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THE CHOLERA EPIDEMIC OF 1873

IN THE

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CHOLERA EPIDEMIC OF 1873

IN THE

UNITED STATES.

THE INTRODUCTION OF EPIDEMIC CHOLERA THROUGH THE AGENCY OF THE MERCANTILE MARINE: SUGGESTIONS OF MEASURES OF PREVENTION.

BY JOHN M. WOODWORTH, M. D.,
SUPERVISING SURGEON U. S. [MERCHANT] MARINE-HOSPITAL SERVICE.

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TREASURY DEPARTMENT,
December 31, 1874.

SIR: Herewith is transmitted the report of the Supervising Surgeon of the Marine-Hospital Service upon the cholera epidemic of 1873, made in accordance with a joint resolution of Congress approved March 25, 1874.

I am, sir, very respectfully,

B. H. BRISTOW,
Secretary of the Treasury.

To the PRESIDENT.

UNITED STATES MARINE-HOSPITAL SERVICE,
SUPERVISING SURGEON'S OFFICE,
Washington City, December 30, 1874.

SIR: The Supervising Surgeon of the United States Marine-Hospital Service, in connection with a medical officer of the Army, was instructed by joint resolution of the Forty-third Congress, approved March 25, 1874, "to confer with the health authorities and resident physicians of such towns, [as were visited by the cholera epidemic of 1873,] and to collect, as far as possible, all facts of importance with regard to such epidemic," for the purpose of making a report of the same to the President of the United States, to be submitted to Congress.

In pursuance of these instructions I have the honor to transmit the accompanying report.

Very respectfully,

JOHN M. WOODWORTH,
Supervising Surgeon.

To the Hon. SECRETARY OF THE TREASURY.

THE INTRODUCTION OF EPIDEMIC CHOLERA INTO THE UNITED STATES THROUGH THE AGENCY OF THE MERCANTILE MARINE: SUGGESTIONS OF MEASURES OF PREVENTION.

THE INTRODUCTION OF EPIDEMIC CHOLERA INTO THE UNITED STATES THROUGH THE AGENCY OF THE MERCANTILE MARINE: SUGGESTIONS OF MEASURES OF PREVENTION.

In the preamble to a joint resolution of the Forty-third Congress of the United States, adopted during its first session, and approved by the President March 25, 1874, it was set forth that Epidemic Cholera had "prevailed during the year eighteen hundred and seventy-three in various parts of the United States, especially in the valley of the Mississippi, causing a deplorable mortality;" and that it is highly important, whenever such epidemics occur, that "the facts concerning the spread of the disease and its mode of propagation should be ascertained as fully as possible, with a view to the prevention or limitation of future outbreaks." It was therefore ordered that a medical officer of the Army, in connection with the Supervising Surgeon of the Marine-Hospital Service, should ascertain such facts, and "make a detailed report of the information collected, on or before the first day of January, eighteen hundred and seventy-five, to the President, to be submitted to Congress."

With the strictly narrative portion of the investigation made in pursuance of the foregoing it is not here proposed to deal. That is done most thoroughly and exhaustively by Dr. McClellan, to whom were furnished whatever facts of importance the Supervising Surgeon had been able to gather concerning the epidemic, and much of which that gentleman has incorporated in his report.*

It will rather be attempted in these pages to briefly set forth the facts which establish the connection of the mercantile marine with the importation of cholera into the United States, and to suggest what, in the present state of knowledge concerning the disease, may be done by addressing our efforts to this alleged *fons et origo* of malignant cholera in the western hemisphere, "with a view to the prevention or limitation of future outbreaks." For if it be true that "cholera has always been brought to America by ships," the task of preventing future outbreaks within our borders is a problem in preventive medicine the solution of which would seem comparatively easy. Such solution depends, however, in common with the answer to any question, upon the extent and accuracy of our knowledge of the factors of the problem. Hence it will be necessary to state compendiously what is known and accepted concerning the cause of malignant cholera—its origin, character, mode of propagation, transportation, etc.; a summary which will be of additional use in assisting to a correct estimate of the value of any suggested means of prevention or limitation. No attempt is made in this summary to decide questions which are yet *sub judice*, to discuss mere theories, or to trace the various phases through which "the distractingly confusing history of the disease" has passed. On the contrary, what is here offered is simply a series of propositions condensed from the vast mass of cumulative evidence which has been laboriously col-

* See Appendix A.

lected by a multitude of cholera-students in both hemispheres; and these propositions are intended to bear solely upon the question of the exclusion of the disease from this country:

I. *Malignant cholera is caused by the access of a specific organic poison to the alimentary canal; which poison is developed spontaneously only in certain parts of India, (Hindostan.)**

II. *This poison is contained primarily, so far as the world outside of Hindostan is concerned, in the ejections—vomit, stools, and urine—of a person already infected with the disease.*

III. *To set up anew the action of the poison, a certain period of incubation with the presence of alkaline moisture is required, which period is completed within one to three days; a temperature favoring decomposition and moisture or fluid of decided alkaline reaction hastening the process, the reverse retarding.*

IV. *Favorable conditions for the growth of the poison are found* (1) *in ordinary potable water, containing nitrogenous organic impurities, alkaline carbonates, etc.;* (2) *in decomposing animal and vegetable matter possessing an alkaline reaction;* (3) *in the alkaline contents of the intestinal portion of the alimentary canal.*

V. *The period of morbific activity of the poison—which lasts, under favorable conditions, about three days for a given crop—is characterized by the presence of bacteria, which appear at the end of the period of incubation, and disappear at the end of the period of morbific activity. That is to say, a cholera-ejection, or material containing such, is harmless both before the appearance and after the disappearance of bacteria, but is actively poisonous during their presence.*

NOTE.—It is not meant by this that the bacteria so found are the cholera-poison, since they differ in no appreciable manner from bacteria found in a variety of other fluids. Indeed, Lebert hints that the bacteria may even be the destroyers of the poison.†

VI. *The morbific properties of the poison may be preserved in posse for an indefinite period in cholera-ejections dried during the period of incubation, or of infection-matter dried during the period of activity.*

VII. *The dried particles of cholera-poison may be carried (in clothing, bedding, etc.) to any distance; and when liberated may find their way direct to the alimentary canal through the medium of the air—by entering the mouth and nose and being swallowed with the saliva—or, less directly, through the medium of water or food in which they have lodged.*

VIII. *The poison is destroyed naturally either by the process of growth or by contact with acids:* (1) *those contained in water or soil;* (2) *acid-gases in the atmosphere;* (3) *the acid secretion of the stomach.*

IX. *It may also be destroyed artificially* (1) *by treating the cholera-ejec-*

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*The student of cholera-literature cannot fail to be struck with the resemblance between the early writing on *syphilis* and much of the current speculation and theory concerning cholera. It now seems incredible that the connection between sexual intercourse and syphilis should have ever been overlooked—not to say vehemently denied—and yet it is not hazarding much to say that future generations will be quite as incredulous of the delay in recognizing the true mode of cholera-propagation. Just as certainly as that contact of pre-existing syphilitic virus is necessary to produce syphilis, so certainly is contact of the pre-existing cholera-virus necessary to produce cholera in any portion of the globe outside of Hindostan.

†"Among the reasons why the disease does not fully develop under apparently favorable conditions, we may notice here again the fact that the germs may reach even an exuberant growth in the water of the soil and then be destroyed by otherwise innocent bacteria of putrefaction and fermentation before they have come into thorough contact with the human organism."—(*Cyclopedia of the Practice of Medicine.* ZIEMSSEN, vol. I, p. 374.)

tions, or material containing them, with acids; (2) *by such acid (gaseous) treatment of contaminated atmosphere;* (3) *by establishing an acid diathesis of the system in one who has received the poison.*

NOTE.—Why, when perennially endemic in India, with which country intercourse is constant, the disease becomes epidemic elsewhere only at long intervals, is beside the present purpose to inquire. What conditions, meteorologic, telluric, and diathetic, are necessary to its epidemic spread, even in India, are not yet determined; and no practical result for the object of this paper could accrue from speculation thereon. Neither are modes of treatment when the disease is established in the system any better settled; and as in these pages it is intended to deal only with generally accepted facts and measures based thereon, these topics are necessarily excluded from present consideration.

The deductions which may be legitimately made from the foregoing premises are of wide applicability. Many of them are admirably discussed in connection with specific measures of prevention on shore by Dr. McClellan, whose remarks on cholera-transportation inland, by rail and river, on local and general sanitation, and upon the duty and responsibility of the State and the Nation with reference to the public health, are replete with information and sound counsel. These deductions, however, should be first applied to the subject of modes of excluding the poison—which is, *ipso facto*, the disease—from our shores, a question logically taking precedence of that of purely terrene measures of prevention, so far as this country is concerned, and one which may be conveniently discussed under the general topic of Marine Sanitation, including in this term the Sanitary Supervision of Ocean Travel and Traffic, the Question of Quarantine, the Mode of Dealing with Cholera on Shipboard, and the Treatment of an Infected or Suspected Ship on Arrival at a United States Port.

Under the first head it may be observed it has not yet been demonstrated that merchandise, in contradistinction to passengers' luggage, is ever the medium of conveying the cholera-poison across the Atlantic. Even upon infected vessels the cargo is so protected from any chance of contact with cholera-ejections that the risk of importation from this source is of little practical moment. Of course, upon a very foul ship carrying steerage passengers suffering from cholera, there is a bare possibility of such contact; but no instance of this kind has ever been known to occur. So that the subjects of this supervision are limited to (*a*) human beings—cabin and steerage passengers, officers and crew; and (*b*) personal effects—comprising hand-luggage, (or such as is allowed in cabin or steerage for use on the voyage,) trunks, chests, bales of bedding, etc., packed before embarking and not opened until after arrival, the wardrobes of officers, and the kits or dunnage of the crew.

Under existing regulations for the emigration-service of most countries, some sort of inspection of steerage passengers is made with the avowed object of detaining such as "appear, by reason of bodily or mental disease, unfit to proceed;" and especial care is taken to prevent the embarkation of cases of infectious or contagious maladies among these. Unfortunately this inspection does not extend to the cabin-passengers nor to the crew. And yet it will hardly be questioned that sailors are among the most active and wide-spread propagators of disease, nor asserted that cabin passengers are exempt from the possibility of becoming poison-carriers. Indeed, during 1873 a fatal case of cholera occurred in the person of a gentleman returning from Europe on a vessel (the Ville du Havre) belonging to a line which ostensibly does not carry steerage passengers; and the circumstances of the case were such as to place it beyond doubt that a competent medical examination of

the individual would have attracted such attention to his condition as either to have prevented his embarkation or to have placed him at once in the surgeon's hands on board the vessel.

But even if cabin passengers and crew were both included in such inspection, it would be entirely inadequate as a measure of precaution in the case of cholera. Bearing in mind that "the morbific properties of the cholera-poison may be preserved *in posse* for an indefinite period in cholera-ejections dried during the period of incubation, or of infection-matter dried during the period of activity," and "that these dried particles of cholera-poison may be carried (in clothing, bedding, etc.) to any distance, and when liberated may find their way direct to the alimentary canal, through the medium of the air—by entering the mouth and nose and being swallowed with the saliva—or, less directly, through infected water or food in which they have lodged," and that thus the disease may be set up anew at points remote, both in time and space, from the immediate source of infection, it is obvious that the inspection of individuals, however thorough, is no positive safeguard; that not alone the passengers and crew may appear to be perfectly healthy, but the port and surrounding country may be free from cholera, and yet the disease be shipped from such port. Instance the cases of the Swanton and the New York, the sources of the cholera-epidemic of 1849. When these vessels left Havre in the autumn of 1848—October 31 and November 9 respectively—not alone was there no cholera at that port, but there had then been none in all France. It did, however, exist in Middle Europe, whence came the migrants who embarked on board these vessels. Cholera broke out on the New York on the 25th of November, when sixteen days out of port, and on the Swanton on the following day, November 26, when twenty-seven days out, and was carried by these vessels to the ports of New York and New Orleans respectively.

Similar cases occurred in 1854 and in 1866. In the former year, according to Prof. Henry Hartshorne, cholera broke out on the packet-ships Tonawanda and Tuscarora, bound for Philadelphia; the first case appearing on the Tonawanda two weeks after leaving Liverpool, at which port there was no cholera when she sailed. In 1866 the disease broke out on the steamer England, when five days out, and on the steamer Virginia, eight days out from a healthy port.

In 1873, three distinct outbreaks of the disease occurred at widely remote points in the United States, from poison packed and transported in the effects of emigrants from Holland, Sweden, and Russia. These people and the vessels in which they were carried had been perfectly healthy, and the people remained so until their goods were unpacked at Carthage, Ohio, at Crow River, Minn., and at Yankton, Dak., respectively. Within twenty-four hours after the poison-particles were liberated the first cases of the disease appeared, and the unfortunates were almost literally swept from the face of the earth.*

These instances, which might be multiplied, sufficiently demonstrate that no amount or character of inspection of persons alone will suffice to prevent the importation of cholera to this country while the disease exists on the European continent, as it has for the past ten years, and as it is likely to continue to do, owing to the increasing facility of intercourse with India. They also remove any difficulty in the way of accounting for the introduction of the disease into the United States during the winter of 1872–'73—a subject which has provoked so much discussion that the chief points may be outlined in this connection, bearing as they do so directly upon the topic under consideration.

* See McClellan for details of these cases.

As early as August, 1871, cholera began to be exported from Hamburg, and in September infected vessels arrived at Amsterdam in Holland, at Hull, Sunderland, and Hartlepool in England, and at Cardiff in Wales.

On the 6th of November of that year the steamship Franklyn put into Halifax, Nova Scotia, in distress. She had cleared from Stettin, October 10, touching at Copenhagen on the 12th and at Christiansand on the 15th. On the 23d, eight days after leaving the last-named port, the first death from cholera occurred, and before her arrival at Halifax there were twenty-eight deaths on board, two other fatal cases occurring while the ship was in harbor. The disease was carried on shore by two men who were employed in coaling and watering the vessel. Both were taken sick on the 13th of November, and one died after twelve hours' illness, while the other carried the disease to his family at Chezzetcook, a fishing-village on the southeast coast of Nova Scotia, about twenty-two miles from Halifax. Four members of this family contracted the disease, and two of them died; but the disease did not spread either in Halifax or vicinity.

After coaling, the steamer proceeded on her voyage to New York, where she arrived November 12th, having lost eleven more of her passengers, making forty-one deaths in all during the voyage. Seventy-two cases were removed from her to quarantine-hospital, among which number there occurred twelve more deaths, making a total of fifty-three deaths out of her 611 steerage-passengers. All the passengers were detained in quarantine about three weeks, or until the early part of December, and no diffusion of the disease is known to have followed.

According to that indefatigable investigator, Dr. Peters, the disease continued to be carried from Hamburg, and during the year 1872 it was sent thence "to London, Havre, Liverpool, New York, and various other places, probably also to New Orleans."*

Arrivals of vessels at both New York and New Orleans from a number of notoriously infected ports, including eleven arrivals at the former port from Taganrog and Cronstadt, were constant and numerous during the entire year; and one case of "cholera asphyxia" was officially reported as sent from the New York emigrant depot at Castle Garden to the State Emigrant and Refuge Hospital on Ward's Island, besides four cases of "cholera sporadica" treated in the Temporary Hospital at Castle Garden. Cholera is also reported to have prevailed during that year on the island of Cuba, and the neighboring island of Jamaica is known to have quarantined against Cuban vessels on that account. An examination of the consular correspondence of 1872–'73 from West Indian and South American ports, which examination was made for the purposes of this paper by the State Department at the request of the honorable the Secretary of the Treasury, shows also that cholera reached Jamaica in the autumn of 1872. Under date of September 23, the consul at Kingston reports the arrival of a cooly-ship at Bluff's Bay, upon which vessel sixty deaths had occurred on the passage, and one other fatal case, admitted to be cholera, occurred after her arrival.

This, it will be seen, brings the disease within striking distance of New Orleans, and direct communication between the two points is shown by the arrival of vessels from Jamaica at that city during the month of January, 1873. More conclusive, however, than this is the fact that while cholera thus existed at almost every European port of embarka-

* On the Origin and Spread of the Asiatic Cholera which raged in the United States in 1873. By John C. Peters, M. D., of New York City, chap. IV of Dr McClellan's report.

tion for emigrants—107 cases occurring in one week at Hamburg—there arrived at New Orleans, via Liverpool, Hamburg, and Bremen, during the months of December, 1872, and January, 1873, a total of nearly two thousand emigrants from cholera-infected districts of Europe.*

While, in the absence of direct evidence to the contrary, it may be admitted that no person actually laboring under cholera was landed in New Orleans during the winter of 1872–'73,† the unavoidable alternative is that the poison which caused the epidemic in the Mississippi Valley in the latter year was imported in the same manner as that which caused the later outbreaks at Carthage, Crow River, and Yankton, namely, in the personal effects of immigrants, sailing from healthy ports, in healthy vessels, and subjected to the usual sanitary requirements of the period.

And this suggests the very obvious query, "Of what avail, then, is quarantine as a measure of protection for this country against cholera, if the cholera-poison may thus elude—as it admittedly did in each of these latter cases—the surveillance of a quarantine establishment 'the best administered and most efficient in the world?'"‡

It is fortunately true that, from various causes, no extended epidemic outbreak of the disease followed the liberation of the poison-particles on the banks of the Ohio, or in Minnesota, or in the Territory of Dakota. But even the tyro in cholera will fail to be re-assured by this, remembering, as he must, that at times "a single case suffices to swiftly produce an epidemic or even a raging pestilence."§

The want of favoring conditions cannot always be depended upon. Sooner or later these will exist, and if the spark is then applied, a repetition of the horrors of 1832, of 1849, and of 1854 is inevitable.

The very success which Dr. Vander Poel has achieved in the administration of the quarantine of the port of New York proves that the spark is not always excluded by the present system of quarantine. It therefore remains to inquire, "What is yet wanting in this direction?" And the answer is not far to seek with reference to cholera: *Prompt and authoritative information to threatened ports of the shipment of passengers or goods from a cholera-infected district.*

If the health-officer at the port of New York, for instance, had been aware of the facts which were subsequently ascertained concerning the emigrants from Sweden, Holland, and Russia, there is no reason to doubt but that such measures would have been resorted to, on the arrival of these people, as would have effectually prevented the transportation of the cholera-poison in their effects half way across the continent. But how shall he obtain such knowledge? The law requires the master of a migrant-carrying vessel, on his arrival at a United States port, to furnish to the customs officer "a list of all the passengers taken on board the vessel at any foreign port or place; in which list he shall designate * * * the country to which they [the passengers] severally

* See tables compiled by Dr. McClellan from statistics of immigration into New Orleans during 1872–'73.

† During the following summer it was alleged with much circumstantiality of detail that three Hungarian emigrants, *en route* for Texas, were landed and died of cholera in New Orleans about the middle of February, and that in consequence thereof the alcalde of Havana, acting upon dispatches from the Spanish consul at New Orleans, caused vessels from the latter port to be quarantined. Inquiry at the Spanish legation in Washington and of the consul at New Orleans failed to substantiate the report, although such action with reference to quarantine was in fact taken by the authorities in Havana soon after the appearance of the disease in New Orleans.

‡ *Vide* Annual Report Supervising Surgeon United States Marine-Hospital Service 1873, p. 16.

§ Lebert, *loc. cit.*, p. 395.

belong;"* and to this list the health-officer, it is true, has access. But the information it gives is inadequate for the purpose under consideration, first, from lack of accuracy and fullness, and, secondly, because it is not available in season.

What is needed is that the National Government, through its consular officers, at least at each port of departure, shall acquire the necessary information, and then promptly and intelligently furnish it to the ports and localities exposed. This is entirely aside from a national quarantine-board, a national bureau of health, or other specific organization, concerning the present wisdom and expediency of which, opinion is at least not unanimous. It is a simple utilization of already-existing machinery on the part of the General Government, for the acquisition of knowledge indispensable to the general welfare. Such knowledge cannot through its own agents be acquired by a State or by a municipality; and yet upon such knowledge are the city and the State alone qualified or competent to take action; and upon such knowledge and action does the future immunity from cholera of the country at large depend.

A circular-letter from His Excellency the President, through the Department of State, instructing consular officers to place themselves in communication with the health-authorities of their respective localities; to advise promptly, by cable if necessary, of the outbreak of cholera (or other epidemic disease) at their ports or in any section in communication therewith; to inspect all vessels clearing for United States ports with reference to the original and intermediate as well as to the final points of departure of emigrants thereon; and to report, always by cable, the sailing and destination of any such vessel carrying infected or suspected passengers or goods—this should be the first step.†

And the next would be equally simple: A medical officer, selected for his good judgment and attainments in sanitary science, should collate and digest the information thus obtained, and transmit direct to the threatened ports, as well as through the public press, the note of warning. Thus advised, the threatened community would have ample time for preparation; and the publicity given to the warning would be the most efficient means of insuring proper precautionary measures.

International sanitary action is too remote, and the steps toward it have been too vacillating in the past to admit of much hope from it for the near future. But the acquisition and diffusion of general sanitary knowledge is a matter in which each nation for itself may engage, and when such knowledge becomes sufficiently wide-spread all else may be safely left to local and individual effort. Let the General Government do its share in collecting and publishing the information—a work which it alone can do—and the various and varying details of inspection, disinfection, isolation, etc., etc., will be most efficiently, economically, and satisfactorily performed by those most directly and vitally interested—the people themselves.

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*Revised Statutes of the United States, sec. 4266.

† SEC. 1752. The President is authorized to prescribe such regulations and make and issue such orders and instructions, not inconsistent with the Constitution or any law of the United States, in relation to the duties of all diplomatic and consular officers, the transaction of their business, the rendering of accounts and returns, the payment of compensation, the safe-keeping of the archives and public property in the hands of all such officers, the *communication of information*, and the procurement and transmission of the products of the arts, sciences, manufactures, agriculture, and commerce, from time to time, as he may think *conducive to the public interests*. It shall be the duty of all such officers to conform to such regulations, orders, and instructions.—*The Revised Statutes of the United States*, p. 312.

For the rest, as to the treatment of an infected or suspected vessel on arrival, little need be said. The barbarous quarantine of detention, "a forty days' precaution 'gainst disease,"* is a thing of the past, at least where modern sanitary science holds sway. When the disease has actually appeared upon a vessel during the voyage, it may be necessary to detain the passengers for a time, varying with the conditions in each instance; in short, governing the administration of quarantine in accordance with common sense based upon exact knowledge of the evil to be dealt with. As Dr. VanderPoel observes, "No arbitrary rules can be laid down which shall be applicable to all vessels. Every arrival of a vessel with cholera must * * * be judged by the particular features which belong to that case. While, as a rule, every vessel, its passengers and crew having had cholera upon its passage, or at the time of its entry, should be subjected at least to a quarantine of observation, still this rule is not without exceptions. For instance, two steamers entered this harbor [New York] last fall, [1873,] having had deaths from cholera, and another with one well marked, and several of choleraic diarrhœa on board, neither one of which was detained more than twenty-four hours; and yet I felt quite secure in allowing them to proceed to the city. Why was this? In the first, the case was a cabin-passenger. The nature of the disease was almost immediately detected by the surgeon. At once absolute isolation was enforced, passengers from neighboring state-rooms were removed, dejections disinfected, and care taken with reference to soiled linen. Seven days had elapsed since the death; when the vessel entered, the state-room had been scrupulously cleaned and disinfected daily. Here, then, every intelligent preventive measure had been employed; the time of incubation, when any passenger having contracted the disease before entering the vessel, was past, and, in view of the measures employed, I had only to consider the possibility of contamination from the particular case. It had been limited to one; the average time of incubation was more than past since his death, without another case, and I therefore decided to let the vessel go up. Now, had a cast-iron rigidity been followed, without reference to the measures which the surgeon employed, all of the passengers should have been taken from the ship, subjected for eight or ten days to a quarantine of observation, the vessel itself thoroughly cleaned, and every part aired and daily fumigated. While such a course would have been warranted by law, and sanctioned, too, by sanitarians, I felt that the precautionary measures adopted were sufficient, and would encourage medical officers and the shipping interest to attack the disease at its *source*, rather than passively allow it to gain full headway, under the conviction that no efforts they might apply would be recognized by the sanitary authorities of the port. The other death was in the steerage, so sudden that the surgeon was not informed until actual collapse. On inquiry no dejection had taken place except at the water-closet into the sea; none occurred after the collapse; the clothing was at the time examined to see if there was any stain upon it; the body was at once thrown overboard, all the effects disinfected, and ten days had elapsed since the death, on their arrival. Wherein would a quarantine of ob-

* "Her husband sailed upon the Adriatic,
And made some voyages, too, in other seas;
And when he lay in quarantine for pratique,
(A forty days' precaution 'gainst disease,)
His wife would mount at times her highest attic,
For thence she could discern the ship with ease;
He was a merchant trading to Aleppo,
His name Giuseppe, call'd more briefly Beppo."—*Byron.*

servation have helped me in this matter? In the case of cholera which entered the port, every precautionary measure had been adopted; the most rigid examination and inquiry could not detect other cases of choleraic diarrhœa than those referred to. The period of incubation, from acquiring it before entering the ship, had passed, and, with no evidence of contamination to others, the vessel was allowed *pratique*. In acting in this manner in the above three instances, I but followed on a limited scale what is universally recognized by all the European governments, and to which all their later efforts have principally tended, viz, to suppress the disease as far as possible at its source. They feel that the great field for precautionary measures is in the home of the disease, and the local governments are, as far as possible, discouraging the great pilgrimages, with the large agglomerations of people, and their subsequent religious rites, with already an appreciable diminution in the routes of transmission.

"A vessel arriving, however, with several cases on board, would be compelled to undergo the full ordeal of precautionary measures. The passengers would be removed from the vessel, subjected to a quarantine of observation, and any sick appearing be removed to the hospital located on another island, a mile distant from the island where the quarantine of observation was enforced. In the mean time all clothing would be thoroughly washed, aired, and disinfected, and, when eight days had elapsed without the appearance of a new case, they would be allowed to leave. In the mean time the vessel, after being subjected to thorough cleansing and disinfection, would be allowed *pratique*."

In addition to the foregoing views and *dicta* of one of the foremost practical sanitarists of this country, it is urged that in thorough exposure to *acids* in some form, lies the only assured safety against the cholera-poison. All suspected goods should be treated with acidulated water or acid-gases before being landed; and twenty-four hours should suffice, with proper appointments, to render innocuous the cargo of the largest vessel.

With the admitted uncertainty of therapeutic measures in this disease, its outbreak at sea—which it now remains to consider—should be the signal for the most scrutinizing search for its origin, with the view of thence "stamping it out."

Cholera may break out upon a vessel at any time, from a few hours up to many days, after leaving port;* so that the mere passage of time cannot be relied on as security against an outbreak during cholera-years. But within certain limits the period of the appearance of the first case will furnish some clew as to its origin. If within the first few days—rarely, if ever, exceeding five—it may be set down as reasonably certain that the germs of the disease were brought on board by some passenger suffering from an apparently harmless diarrhœa, or in the hand-luggage or personal effects in immediate use. If a longer period has elapsed, it will probably be found, on careful investigation, that luggage has been recently and for the first time opened and used during the voyage. Notably this latter was the case with the outbreaks on the New York and Swanton—suddenly cold weather on the New York, leading to the unpacking and use of heavier and thicker clothing, and running

*Cholera appeared on the steam-ship City of New York on the 18th day of July 1866, the first day out from Liverpool, and was observed by the writer, who was a passenger on the vessel. On the troop-ship Renown cholera broke out on the 5th of September, 1865, thirteen days after leaving Gibraltar. On the New York, in 1848 the disease appeared sixteen days, and on the Swanton, in the same year, twenty, three days after leaving port.

into a warmer belt by the Swanton, causing an overhauling of lighter wear—in each case the disease quickly appearing after this disturbance of baggage packed in the cholera-regions of Germany.

In the first instance it should be borne in mind that *no diarrhœa is harmless during a cholera-season*. The surgeon of the vessel should make special inquiry for all cases of looseness of the bowels among the passengers; and, aside from any specific modes of treatment of the individual disorder, should exercise the most careful supervision of such cases, isolating them from the other passengers, if necessary, but in any event taking such precautions as will prevent the possibility of their excreta—oral, anal, or renal—from coming in contact with others.

If the disease cannot be traced to this source—*i. e.*, a passenger suffering from flux, cholerine, choleraic diarrhœa, etc.—it will be safe to assume that it is due to some infected article; and then thorough acid disinfection, gaseous or liquid, as may be necessary, should be at once resorted to.

For the details of sanitary measures which should be enforced on shipboard in case of an outbreak of cholera no better directions can be given than those laid down by Macnamara, whose fifteen years of consecutive labor in the endemic area of cholera entitle him to speak with authority:

"If one or more persons are seized with cholera on board a vessel, they should at once be brought on deck, and laid on a thick piece of sail-cloth, so that they may be surrounded by a free current of air, with which the organic matter emanating from their persons may be diluted as far as possible. The stools should be voided into a vessel containing sulphate of iron, and they must then and there be thrown into the sea. McDougall's and Calvert's disinfecting-powders should be freely sprinkled about the spot where the patient lies, and layers of sulphate of iron should be placed between the folds of the sail-cloth upon which he is laid. Subsequently, whatever the issue of the case may be, the patient's clothes, and anything about or near him to which the matter of the dejecta might have attached itself, should be burnt; if this cannot be done, they must be thrown overboard; and the deck on which the patient lay should be well washed with some acid agent. In cases of this description I would limit the number of attendants on the sick; let one or two men be employed for the purpose, and keep them separated from the remainder of the crew. This precaution probably somewhat exceeds the requirements of the case, but still it is better to be on the safe side, and extra care in these matters renders quarantine the less necessary—an object we should keep steadily in view, placing as few impediments on commerce as possible, and leaving it at first very much in the hands of those in charge of cholera-stricken ships to take the necessary measures for preventing the communication of the disease to others, which if they refuse or neglect to do, they must then expect to suffer the inconvenience of quarantine.

"The measures I have indicated would stop the extension of cholera on board a vessel from an individual case; but very possibly others may be attacked within three days of the first case, supposing them to have imbibed the poison at the same time; or it may be that the water in the ship's tanks is contaminated, in which case the outburst of cholera may be prolonged until the oxidation of the organic matter in the water has been accomplished, and this may take some days in the cool, dark hold of a vessel at sea. It is well, therefore, if a case of cholera occur on board a ship at sea, particularly if more than one man is struck down with the disease, to have all the water served out to the crew or passengers properly filtered and boiled before it is used for drinking purposes. If there are condensers on board, by all means let th

water from them be drunk in place of that in the tanks, at any rate for eight or ten days, or until the water shall have purified itself by oxidation."

Meanwhile both passengers and crew should be put upon a mineral-acid regimen, with the view of establishing an *acid diathesis of the system*, or as nearly so as may be. *Sulphuric-acid lemonade* should be served out regularly, under the supervision of an officer clothed with authority to see that no one shirks its use.

As a test bearing directly on the value of such a measure in arresting an outbreak of cholera, the following statement of Dr. Curtin is given *in extenso:*

* * * * * * * *

During this last visitation [of cholera, 1866,] I was resident physician in the insane department of the Philadelphia Hospital. The disease had almost entirely disappeared from the city and from all parts of the Philadelphia Almshouse and Hospital, except from the women's wards in the insane department, where it still continued in a very virulent form. Strange to say, it was almost entirely confined to three of the seven wards on the female side of the hospital. It was so persistent that the board of health paid the hospital an official visit, but were unable to account for the presence of the disease in particular wards. It is true that the women's apartments were very much crowded, there being three hundred and fifty inmates, but the wards in which it was so prevalent had proportionately fewer inmates than others which almost entirely escaped. During the whole epidemic only two cases occurred in the male wards, while among the females one in every nine was attacked. Sex would not account for this difference, for statistics at large show that male and female lunatics are equally liable to the disease.

I was induced to try sulphuric acid by my friend Dr. James F. Wilson, with gratifying results, if I may be allowed to judge. Dr. Wilson had read an article in a British newspaper, in which the writer stated that the workmen and their families connected with a large factory had been treated with sulphuric acid as a prophylactic during an epidemic of cholera. The correspondent stated in the letter that "the result was that not one man or any of their families were attacked with diarrhœa, whilst around them death took its own course." I caught as a drowning man at this straw, for everything else had been tried, and yet the disease continued its ravages. After having concluded to use the sulphuric acid, the next thing was to administer it to all the patients, many of whom were so suspicious that they refused at all times to take medicine for fear of being poisoned. Knowing that it would be impossible to conceal it in their food or usual drinks, I concluded to administer it disguised as lemonade, and announced, through the nurses, to the patients that I intended to "treat" the whole institution to lemonade every day, which announcement was well received in general, and by some of them with enthusiasm. The drink was made in this way: About twenty drops of the dilute sulphuric acid were mixed with four ounces of water and sweetened with white sugar. Some oil of lemon and a few cut lemons greatly assisted in the disguise. What followed the administration of the sulphuric acid can best be shown by the notes taken at the time. The diary was begun on August 20, 1866, before which time seventeen cases had occurred in the insane department.

August 20.—Four new cases.
August 21.—Four new cases.
August 22.—Four new cases.
August 23.—Two new cases. Board of health visited the hospital.
August 24.—Five new cases.
August 25.—One new case. Acid given for the first time in the afternoon.
August 26.—Four new cases *during the night*, within twelve hours after the first administration of the acid.
August 27.—No new cases.
August 28.—One new case—a woman who refused to take the acid.
August 29.—No new cases.
August 30.—No new cases.
August 31.—No new cases. The acid was discontinued.
September 1.—No new cases.
September 2.—Two new cases, two days after the suspension of the acid.
September 3.—No new cases. Acid resumed. The acid was continued for some time, and no more cases occurred.

It will be seen by the above diary that up to the time of administering sulphuric acid the disease was pursuing a steady course in the female department. It is true, and should be here stated, that every means had been tried to banish the disease, such as ventilating and cleansing the wards, spreading disinfectants, scattering the patients by using the large sewing-room for a sleeping-ward, attention to diet, etc., but with-

out apparent effect. The acid was first given on the 25th of August, and continued until the 31st. Four cases occurred *within twelve hours* of the time when the acid was first given. After this only one case occurred while the acid was being used, viz, on the 28th. This was a poor ignorant (?) lunatic, who, upon tasting it, spit it out, and surprised me very much by saying, with great vehemence, "Docther, you call this limonade, but ye can't desave me; it's nothing but ile of vitriol!" On the 31st of August it will be seen that the "lemonade" was stopped, on account of the exhaustion of the supply of white sugar in the drug-store, as without this sugar it would have been impossible to prepare the acid in such a manner as to insure the patients' taking it. On the 2d of September, *two days after the suspension of the use of the acid, two new cases occurred*, both of which proved fatal. The prophylactic was then resumed, and *no new cases* occurred in the insane department; but cases continued to arrive from the city until the 1st of November. The use of the acid was continued uninterruptedly for several weeks. My friend Dr. J. F. Wilson gave it to the patients in the surgical wards during the epidemic, and he informs me that the *cholera visited every department of the almshouse and hospital except the surgical wards.*

The question naturally arises, was it the sulphuric acid that arrested the march of the disease? I think it was, for the following reasons:

1. *The prompt disappearance of the disease within twelve hours of the time when the acid was first administered*, the only case arising during its use being that of a patient who refused to receive it. The acid was stopped on the 31st of August, and two days after this two cases occurred. The acid was then immediately resumed, and not a single case occurred afterwards.

2. *The fatality attending the disease.* When an epidemic declines from natural causes, it generally becomes less fatal. Of the four patients attacked on the 26th of August, three died, of whom one was a young robust epileptic, who lived but five hours after the first symptom; another was a strong lunatic, who succumbed in nine hours. The two cases which occurred on the 2d of September, after the suspension of the use of acid, both died; thus showing that the type was none the less fatal.

How did the sulphuric acid act? According to Dr. G. B. Wood, it has the following effects upon the system, viz, *tonic, astringent, refrigerant*, and *diuretic*. It has been largely used in the treatment of the first and second stages of cholera. Dr. Macnamara, in his work on Asiatic cholera, recommends the use of dilute sulphuric acid, in doses of fifteen minims, in the second stage. The celebrated "Austrian specific" was composed of sulphuric and nitric acid. Nitric acid had been used in India in the treatment of cholera with considerable success. It was tried in England and found to be of no avail, when further investigation proved that the nitric acid of India contained a considerable amount of sulphuric acid. The latter was an accidental product of the manufacture of the nitric acid of India. Hence the use of the combination of these two acids in the treatment of cholera. Elixir Halleri, or liquor acidi Halleri, has been much used in India, and is ordered as part of the medical stores of the British army there. It consists of sulphuric acid and alcohol. Drs. Buxton, Sansom, and Fuller, of England, used sulphuric acid with success in the first stages of cholera, especially in the choleraic diarrhœa.

From the above statements it would appear that sulphuric acid itself has some effect upon the disease; and now we will proceed to discuss its influence as a prophylactic.

It had been noticed that workers in copper were remarkably exempt from cholera, and upon investigation it was found that the air surrounding them was considerably charged with sulphurous acid, which gave rise to the supposition that this was the active preventive agent. This led to the use of sulphurous acid in cholera districts and hospitals, but with what results I have not been able to learn.

Dr. Burg, in reviewing the statistics of deaths from cholera, found that "out of thirty-two thousand artisans in copper, brass, and bronze, employed in Paris and other cities, during the last outbreak of cholera, only sixteen deaths resulted from that disease. Another interesting fact bearing on this question is that the city of Rio Tinto, surrounded as it is by copper-mines, has never been visited by this epidemic."

The sulphurous acid found near these mines proceeds from the smelting-works, in which the sulphurets of copper are generally used; other sulphurets often being associated with the copper-ore, also yield their sulphur to the atmosphere. Still further, it has been noticed that persons living near gas-works are less liable to be attacked than those living remote. Here also we find the atmosphere more or less impregnated with sulphurous gases. Almost all gas-coal contains sulphur, and the process of purification in part consists in the removal of the sulphureted hydrogen. Hence we discover a source of sulphurous gases, which gases may be the protecting agents. It may be, judging from these circumstances, that the cholera-germ is destroyed; for in the case of Rio Tinto, which is surrounded by sulphurous acid, it would seem to form an impenetrable barrier to the cholera. It is a well-known fact that sulphurous acid in the form of a sulphite will arrest fermentation; and it has been suggested that it acts in the same manner upon the zymotic cause of cholera.

But again, we find that sulphuric acid seems to have an influence over the disease,

which would lead us to ask whether the *sulphur may not be the destroying agent of the cholera-germ*, acting as a specific in the same manner that it does in the case of the itch-insect. If this be true, the disease may be easily eradicated from a ship or a house or any infected locality by fumigating with sulphurous acid, simply by burning sulphur; also disinfecting privy-wells and other objectionable places by means of sulphate of iron, and at the same time giving liquid sulphurous acid, sulphuric acid, and the sulphites, by the mouth, to those exposed.

It has already been stated that sulphuric acid may act beneficially independent of any specific action upon the cholera-germ.

I have said that it is a tonic, astringent, refrigerant, and diuretic. The vital energies are often very much reduced, digestion is poor, and the intestines and the system at large are in a relaxed condition, the result of the high temperature of summer. Here we find the condition favorable to an attack of cholera. The tonic, astringent, and refrigerant effects of the sulphuric acid would all be eminently indicated by these conditions, and its administration might tide the patient over the period of danger. It may also act beneficially in another way. We all know the depressing effect of fear, which undoubtedly predisposes to cholera. A prophylactic given in such cases would allay the fear and thus ward off the disease. But this latter condition was not a characteristic of the poor lunatics in the Philadelphia Hospital; for many of them knew no fear except that produced by their hallucinations. It is pleasant to have a preventive at hand; but in none of the text-books have I been able to find anything recommended as such in cholera. Having one, we might be able to quiet the fears of the nervous and keep them from the often injurious nostrums of those who prey upon this class.

One thing should be remembered. It is this: that sulphuric acid, when administered for a long time continuously or in too large doses, may give rise to symtoms of intestinal irritation. However, although the acid was given to the lunatics uninterruptedly for several weeks, no ill effects were observed. It should be given only to those who are greatly exposed during an epidemic of cholera; otherwise the above unpleasant effects may be produced.

It may be alleged that in the foregoing pages too great stress has been laid upon the *acid prophylaxis of cholera*, to the exclusion of all others. But the cumulative evidence of the experience of the last sixty years warrants the ground here taken. Beginning with the year 1814, the cholera-literature down to the present time abounds in proofs, clinical, physiological, pathological, and meteorological, of the efficacy of sulphuric acid, and there can be little doubt, despite the *dicta* of the last International Sanitary Conference,* that *we possess in the mineral acids a certain means of prophylaxis against cholera.*

NOTE.—The lessons of the epidemic of 1873 point strongly to the value of sulphuric acid even as a therapeutic agent against the disease. According to Dr. McClellan, the mortality among cholera-patients treated with acids was only 8 per cent., while the lowest mortality rate where other remedies were used was 23 per cent., and the highest 59 per cent.

It is safe to say that malignant cholera can be excluded from our shores with reasonable certainty through an intelligent sanitary supervision of the mercantile marine; in which supervision, while the General Government on the one hand, in exercising its delegated powers for the protection and promotion of the general welfare, shall simply acquire and furnish the necessary information; on the other, the ports themselves, thus forewarned and advised, shall be left to enforce the necessary precautionary and preventive measures in accordance with their own local conditions and requirements. For nothing is more clearly proved by the history of cholera than that epidemics of this dreaded disease can be controlled by *vigorous hygienic measures. The true remedy against cholera is preventive medicine.*

* Upon the question, are any means or processes of disinfection known by which the generative contagious principle of cholera can certainly be destroyed or deprived of its intensity, the vote stood—No, 12; abstaining, 7.—*Proceedings International Sanitary Conference*, 1874.

APPENDIX.

Vide supra, page 7.

With the view of making the collection of facts concerning the epidemic as full as possible, the Supervising Surgeon, in addition to personally visiting many of the points at which the epidemic prevailed, addressed the following circular-letter of inquiry to some two hundred and sixty physicians in the infected districts:

SUPERVISING SURGEON'S OFFICE,
UNITED STATES MARINE-HOSPITAL SERVICE,
Treasury Department, August, 1874.

DOCTOR: The Supervising Surgeon of the United States Marine-Hospital Service having been designated by joint resolution of the Forty-third Congress, approved March 25, 1874, in connection with a medical officer of the Army, "to confer with the health authorities and resident physicians of such towns, [as were visited by the cholera epidemic of 1873,] and to collect, so far as possible, all facts of importance with regard to such epidemic," for the purpose of making a report of the same to the President of the United States, to be submitted to Congress, I have the honor respectfully to solicit a detail of the facts which came under your observation concerning the propagation and spread of the disease during that year.

The following memorandum embraces substantially the points upon which information is desired:

1. Name, sex, and age of patient.
2. Residence of patient—town, street, and number.
3. Day and hour of attack.
4. Premonitory symptoms, their nature and duration.
5. Progress of the disease:
   - *a*. Day and hour of beginning of rice-water discharges.
   - *b*. Day and hour of beginning of cramps.
   - *c*. Day and hour of beginning of collapse.
   - *d*. Period and extent of suspension of renal function.
   - *e*. Nature of treatment and result.
   - *f*. Day and hour when convalescence began.
   - *g*. Day and hour when death occurred.
   - *h*. Post-mortem appearances in detail.
6. Story of house occupied, and height of floor from ground.
7. Sanitary condition of house and inclosure:
   - *i*. As to cleanliness of rooms—clean, neglected, filthy.
   - *k*. As to ventilation and light—good, defective, bad.
   - *l*. As to drainage of house—good, obstructed, absent.
   - *m*. As to drainage of ground—good, obstructed, absent.
   - *n*. As to location and condition of privies or water-closets, connection with street-sewer, mode of flushing, of ventilation of soil-pipe, disinfection, etc.
   - *o*. As to surface-water, garbage, or filth about the premises.
8. Source and quality of water-supply. If from a well or cistern, proximity of privy, sewer, or drain thereto, and chance of pollution.
9. General topography of localities in a given town where cholera prevailed.
10. Character of soil.
11. Character of drainage.
12. Occupation and habits of patient, and whether a resident of house where attacked for two weeks or over.
13. The facts in any case where the patient was attacked within two weeks after removing from an infected district into one previously free from the disease, specifying the respective districts and character of exposure.
14. The sequence of cases where more than one was attended, with their relations to each other, and to the cases of other physicians, with names of such physicians.
15. The means and agents used by the physician, by the family, and by the municipal authorities to prevent the spread of the disease, and the result of such preventive measures.

16. Public measures taken to prevent the introduction of the disease into your community, with the result.

17. Temperature, rain-fall, and prevailing winds for as long a period as practicable prior to appearance of cholera, and also during its continuance.

18. Dates of first and last cases of cholera in the locality in 1873—total number of cases and mortality.

19. Connection, if any, between first cases in 1873 and the localities of the disease in the immediately preceding epidemic.

20. Names of cities, towns, and villages known to you where cholera occurred during 1873, with any facts relating to the introduction of the disease to such, and the address of some respectable practitioner residing in each of the places named.

Contributions to this investigation, by answers to the foregoing, or to so much thereof as is practicable, will be fully acknowledged in the official report, the value of which, it is hardly necessary to say, will largely depend upon the co-operation of the profession thus sought.

Copies of any reports or papers which you may have already prepared on the subject, or of those prepared by others and annotated or emended by yourself, will also be of service, and may be forwarded, to be returned if desired.

I am, doctor, very respectfully,

JNO. M. WOODWORTH,
Supervising Surgeon.

In response to the foregoing and to subsequent letters of special inquiry, replies were received from the following gentlemen:

Dr. O. L. Crampton, Mobile, Ala.
Dr. J. J. Dement, Huntsville, Ala.
Dr. C. H. Franklin, Union Springs, Ala.
Dr. John C. Furniss, Selma, Ala.
Dr. James C. Harris, Wetumpka, Ala.
Dr. M. H. Jordan, Birmingham, Ala.
Dr. T. C. Osborn, Greensborough, Ala.
Dr. J. T. Searcy, Tuscaloosa, Ala.
Dr. R. D. Webb, Livingston, Ala.
Dr. William H. Barry, Monticello, Ark.
Dr. J. A. Dibrell, jr., Little Rock, Ark.
Dr. Wilson C. Carver, Bluffs, Ill.
Dr. E. B. Cannon, Tuscola, Ill.
Dr. William G. Cochran, Farmer City, Ill.
Dr. J. N. Danforth, Chicago, Ill.
Dr. Walter Hay, Chicago, Ill.
Dr. A. W. Heise, Joliet, Ill.
Dr. Herbert Judd, Galesburgh, Ill.
Dr. Thomas Lawrence, Goose Island, Ill.
Dr. W. R. Milam, Clear Creek, Ill.
Dr. Lloyd T. Miller, Caseyville, Ill.
Dr. Benjamin C. Miller, Chicago, Ill.
Dr. J. W. Mott, Villa Ridge, Ill.
Dr. John N. Niglas, Peoria, Ill.
Dr. David Prince, Jacksonville, Ill.
Dr. G. T. Ragan, Peoria, Ill.
Dr. James Roberts, Carbondale, Ill.
Dr. Horace Wardner, Cairo, Ill.
Dr. William Walker, Little York, Ill.
Dr. John Wright, Clinton, Ill.
Dr. J. C. Beaver, Vincennes, Ind.
Dr. M. S. Blunt, Mount Vernon, Ind.
Dr. A. F. Cummins, Bloomington, Ind.
Dr. R. O. Crandall, La Porte, Ind.
Dr. T. Henry Davis, Richmond, Ind.
Dr. W. Scott Wolfe, Elizabeth, Ind.

Dr. A. S. Maxwell, Davenport, Iowa.
Dr. S. N. Pierce, Cedar Falls, Iowa.
Dr. William Berry, Lancaster, Ky.
Dr. J. R. Best, Millersburgh, Ky.
Dr. S. B. Caldwell, Paducah, Ky.
Dr. E. S. Gaillard, Louisville, Ky.
Dr. Hugh McNary, Princeton, Ky.
Dr. D. A. Maxwell, Paducah, Ky.
Dr. S. L. Manly, Louisville, Ky.
Dr. Thomas Rivers, McCracken County, Ky.
Dr. C. G. Royster, Woodville, Ky.
Dr. R. Saunders, Paducah, Ky.
Dr. J. W. Singleton, McCracken County, Ky.
Dr. J. W. Thompson, Paducah, Ky.
Dr. F. C. Wilson, Louisville Ky.
Dr. S. M. Bemis, New Orleans, La.
Dr. C. B. White, New Orleans, La.
Dr. F. W. Dancy, Holly Springs, Miss.
Dr. John R. Hicks, Vicksburgh, Miss.
Dr. J. B. Alexander, Lexington, Mo.
Dr. W. L. Barret, Saint Louis, Mo.
Dr. W. S. Edgar, Saint Louis, Mo.
Dr. Jas. G. Hickman, Hannibal, Mo.
Dr. J. E. Tefft, Springfield, Mo.
Dr. A. Bowen, Nebraska City, Nebr.
Dr. J. P. Bing, Portsmouth, Ohio.
Dr. William Clendenin, Cincinnati, Ohio.
Dr. George A. Crew, Cadiz Junction, Ohio.
Dr. Thomas L. Neal, Dayton, Ohio.
Dr. E. S. Nichols, Xenia, Ohio.
Dr. William H. Herd, Philadelphia, Pa.
Dr. W. Snivley, Pittsburgh, Pa.
Dr. Strickland Albright, Ducktown, Tenn.
Dr. J. S. Barnes, Chattanooga, Tenn.
Dr. F. K. Bailey, Knoxville, Tenn.
Dr. John Blackinship, Maryville, Tenn.
Dr. Paul F. Eve, Nashville, Tenn.
Dr. B. F. Gardner, Chattanooga, Tenn.
Dr. H. A. Schell, Gallatin, Tenn.
Dr. E. M. Wight, Chattanooga, Tenn.
Dr. Alexander W. Acheson, Denison, Tex.
Dr. James Johnston, Denison, Tex.
Dr. J. S. Cabell, Richmond, Va.
Dr. R. P. Davis, Parkersburgh, W. Va.
Dr. E. L. Jepson, Wheeling, W. Va.
Dr. Robert D. Murray, Surgeon U. S. Marine-hospital Service.
Dr. George Purviance, Surgeon U. S. Marine-hospital Service.
Dr. Orsamus Smith, Surgeon U. S. Marine-hospital Service.

These replies embraced facts concerning the epidemic in one hundred and thirty localities, as follows:

ALABAMA.

Tuscaloosa.
Union Springs.

ARKANSAS.

Plantation near Little Rock.

INDIANA.

Aurora.
Evansville.
Indianapolis.
Indian Creek, (near Princeton,)

Mount Vernon.
North Vernon.
Terre Haute.
Vincennes.
Wabash.

ILLINOIS.

Bluffs.
Carmi.
Cairo.
Caseyville.
Chicago.
Clear Creek.
Galesburgh.
Goose Island.
Jacksonville.
Little York.
Monmouth.
Okaw.
Villa Ridge.

IOWA.

Davenport.

KENTUCKY.

Ashland.
Bowling Green.
Beaver Creek Ridge, (near.)
Between Woodburn and Franklin.
Ballard County, (near Cairo, Ill.)
Burkesville.
Cromwell.
Columbia.
Cadiz.
Caldwell County.
Claysville.
Elizabethtown.
Grayson.
Henderson.
Henry County, (near Hardin's Bottom.)
Hopkinsville.
Hartford.
Louisville.
Lancaster.
La Grange.
La Rue County.
Logan County, (near Shocho.)
Maysville.
Mason County.
Madison Mills.
Millersburgh.
North Fork Ridge.
Newport.
Oddville, (near.)
Owensborough.
Paducah.
Paris.
Princeton.
Simpson County.
Shelby County.
Stanford.
Taylor County.
Woodbnrn.
Woodville.
Worthville.
West Point.

LOUISIANA.

New Orleans.

MISSOURI.

Fayette.
Hannibal.
Louisiana.
Poplar Bluffs.
Perryville.
Saint Louis.

OHIO.

Carthage.
Cincinnati.
Cleveland.
Columbus.
Dayton.
Portsmouth.

PENNSYLVANIA.

Philadelphia.
Pittsburgh.
Temperanceville.

TENNESSEE.

Blue Springs, (near Midway.)
Belleview.
Chattanooga.
Craggy Hope.
Carter's Station.
Campbell County.
Clarksville.
Ducktown.
Decatur.
Eaton's and Dry Creeks.
Erin.
Edgefield.
Farmington.
Fountain Head.
Gallatin.
Goodletsville.
Greeneville.
Hartsville.
Jonesborough.
Knoxville.
Lavergne.
Limestone Station.

Lebanon.
Loudon, (near.)
Memphis.
Morristown.
Murfreesborough and County.
Maryville.
Mungle's Creek.
New Haven.
Nashville.
Nolensville.
Ooltewah.
Pegram Station.
Reynold's Station.
Russellville.
Rogersville.
Shelbyville.
Sulphur Spring.
Swan Spring.
Union City.
Unionville.
White Bluffs.
Whitesburgh.
Yates Spring.

TEXAS.

Denison.

VIRGINIA.

Richmond.

Finding that Dr. McClellan, the medical officer of the Army detailed by the Secretary of War, had also covered, with few exceptions, the points above named, and concurring with him in the opinion that one narrative embracing all the points would be more valuable than two independent and fragmentary ones, the mass of material thus obtained was placed at his disposal.

The Supervising Surgeon desires to express his individual obligation to Dr. Ely McClellan, Dr. Elisha Harris, Dr. F. W. Reilly, Dr. J. S. Jewell, and Dr. P. H. Bailhache, as well as to those gentlemen whose details of their own personal observation and experience during the epidemic, form such an important contribution to the literature of cholera in the United States.

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WAR DEPARTMENT, SURGEON-GENERAL'S OFFICE.

CHOLERA EPIDEMIC OF 1873

IN THE

UNITED STATES.

REPORTS PREPARED

UNDER

THE DIRECTION OF THE SURGEON-GENERAL OF THE ARMY.

A.—HISTORY OF THE CHOLERA EPIDEMIC OF 1873 IN THE UNITED STATES.
By ELY McCLELLAN, M. D., Assistant Surgeon U. S. A.

B.—HISTORY OF THE TRAVELS OF ASIATIC CHOLERA.
By JOHN C. PETERS, M. D., of New York City, and
ELY McCLELLAN, M. D., Assistant Surgeon U. S. A.

C.—BIBLIOGRAPHY OF CHOLERA.
By JOHN S. BILLINGS, M. D., Assistant Surgeon U. S. A.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1875.

H. Ex. 95——III

ERRATA.

On page 36, for miscroscopic read microscopic.
On page 59, for Libert read Lebert.
On page 328, for present read prevent.
On page 409, for borborygm read borborygmi.

Illinois contributors, add names of—

Dr. R. F. Cuningham, Lebanon, Ill.
Dr. F. W. Lytle, Lebanon, Ill.
Dr. L. T. Miller, Caseyville, Ill.
Dr. A. B. Tadlock, Knoxville, Tenn.

WAR DEPARTMENT,
Washington City, January 11, 1875.

To the PRESIDENT:

SIR: As required by the joint resolution of Congress, approved March 25, 1874, I have the honor to inclose letter of the Surgeon-General of the Army, and report, therewith transmitted, of Assistant Surgeon Ely McClellan, upon the causes of epidemic cholera.

Very respectfully,
Your obedient servant,

WM. W. BELKNAP,
Secretary of War.

WAR DEPARTMENT,
SURGEON-GENERAL'S OFFICE,
Washington, D. C., January 2, 1875.

To the Hon. SECRETARY OF WAR:

SIR: I have the honor to transmit herewith a detailed report of facts collected by Assistant Surgeon Ely McClellan, United States Army, the medical officer detailed to inquire into and report upon the causes of epidemic cholera, under a joint resolution of Congress, approved March 25, 1874, together with his letter forwarding the report.

This comprises all the information obtained on the subject, and is hereby respectfully reported for publication, in accordance with the final clause of said resolution.

Very respectfully,
Your obedient servant,

J. K. BARNES,
Surgeon-General.

WAR DEPARTMENT,
SURGEON-GENERAL'S OFFICE,
Washington, D. C., January 1, 1875.

To the SURGEON-GENERAL OF THE ARMY:

SIR: I have the honor to present the report made in accordance with the joint resolution of Congress, approved March 25, 1874, authorizing the Secretary of War to detail a medical officer of the Army to inquire into and report upon the causes of epidemic cholera. A copy of the joint resolution, with copies of the orders under which I have acted, and a detailed account of the work performed, is herewith respectfully submitted.

I.
General Orders. }
No. 29. }

WAR DEPARTMENT,
ADJUTANT-GENERAL'S OFFICE,
Washington, April 8, 1874.

The following joint resolution of Congress is published for the information and government of all concerned:

JOINT RESOLUTION authorizing the Secretary of War to detail a medical officer of the Army to inquire into and report upon the causes of epidemic cholera.

Whereas epidemic cholera prevailed during the year eighteen hundred and seventy-three in various parts of the United States, especially in the valley of the Mississippi, causing a deplorable mortality; and whereas it is highly important that, whenever such epidemics occur, the facts concerning the spread of the disease and its mode of propagation should be ascertained as fully as possible, with a view to the prevention or limitation of future outbreaks; therefore,

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the Secretary of War be, and he is hereby, authorized and directed to detail one medical officer of the Army, who shall, during the present year, under the direction of the Surgeon-General of the Army, in connection with the supervising surgeon of marine hospitals, acting under the direction of the Secretary of the Treasury, visit the towns at which cholera prevailed during eighteen hundred and seventy-three, or such of them as, in the opinion of the Surgeon-General and Secretary of the Treasury, may be necessary, confer with the health authorities and resident physicians of such towns, and collect, so far as possible, all facts of importance with regard to such epidemic, and shall make a detailed report of the information collected, on or before the first day of January, eighteen hundred and seventy-five, to the President, to be submitted to Congress. And the Surgeon-General is hereby authorized and directed to report to the Secretary of War, for publication, such information on the subject as he may have or shall obtain.

Approved March 25, 1874.

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General.

II.
Special Orders. }
No. 85. }

WAR DEPARTMENT,
ADJUTANT-GENERAL'S OFFICE,
Washington, April 18, 1874.

Extract.

18. To carry out the provisions of the joint resolution of Congress, approved March 25, 1874, Assistant Surgeon Ely McClellan is, on the recommendation of the Surgeon-General, hereby detailed to inquire into and report upon the causes of epidemic cholera. He is relieved from duty in the Department of the South, and will report in person to the Surgeon-General for instructions.

By order of the Secretary of War.

E. D. TOWNSEND,
Adjutant-General.

Official:
L. H. PELOUZE, *Assistant Adjutant-General.*

III.

WAR DEPARTMENT,
SURGEON-GENERAL'S OFFICE,
Washington, D. C., May 7, 1874.

Assistant Surgeon Ely McClellan having been ordered by Special Orders No. 85, Adjutant-General's Office, April 18, 1874, to report in person to the Surgeon-General for instructions to carry out the provisions of the joint resolution of Congress, approved March 25, 1874, and having duly reported in person to the Surgeon-General, in accordance with said order, is hereby directed to proceed to Louisville, Kentucky, from whence he will visit those towns in the States of Louisiana, Mississippi, Alabama, Arkansas, Tennessee, Kentucky, Missouri, Illinois, Indiana, Ohio, West Virginia, Pennsylvania, Iowa, and Minnesota, and in the Territories of Dakota and Utah, at which cholera prevailed during the year 1873, for the purpose of ascertaining as fully as possible the facts concerning the introduction and spread of the disease. He will confer with the health authorities and resident physicians of said towns, collect so far as possible all facts of importance with regard to the epidemic, and submit to this Office, as soon as practicable, a detailed report of the information collected.

J. K. BARNES
Surgeon-General U. S. A.

Official:
C. H. CRANE,
Assistant Surgeon-General U. S. A.

On assuming charge of this work, in obedience to the foregoing orders, it was found that the area of infection extended over the following States and Territories:

States.	Number of infected localities.	States and Territories.	Number of infected localities.
Louisiana	12	Pennsylvania	2
Texas	3	Ohio	20
Mississippi	11	Indiana	15
Alabama	7	Illinois	46
Georgia	4	Missouri	31
Arkansas	6	Iowa	4
Tennessee	43	Minnesota	2
Kentucky	52	Dakota	3
West Virginia	2	Utah	1

Making a grand total of two hundred and sixty-four infected localities from which information should be obtained. The total number of days allotted to the work was two hundred and thirty-eight. It was therefore a matter of physical impossibility to accomplish the task by personal inspection alone.

At many points, as the cities of New Orleans, Memphis, Nashville, Cincinnati, Chicago, and Saint Louis, the work demanded patient investigation and careful study, which could not be accomplished in a hurried visit; it therefore became necessary to issue the following circulars, and by dint of unceasing correspondence, through their use, much valuable information has been collected:

[Circular No. I.]

LEBANON, MARION COUNTY, KY.,
———— ——, 1874.

Doctor ——, ——:

DEAR SIR: Having been detailed to carry out the provisions of a joint resolution of Congress, directing the Secretary of War to detail a medical officer to investigate and report upon the epidemic of cholera of 1873, under the direction of the Surgeon-General of the Army, I am most anxious to obtain a complete record of all cases of the disease which occurred in —— during the last year.

The task assigned me is a laborious one, and I can only hope for success in placing before the profession a history of any scientific value by securing the active co-operation of my professional brethren.

With this you will please find a set of blank forms, upon which I would respectfully ask that you will record all cholera cases which came under your care during the last year, those who recovered as well as those who died; and further, that you will embody in a note any valuable information you may have obtained of the epidemic, such as the history of the early cases, the history of groups of cases occurring in one house or in public institutions, and any facts which you may possess of the mode by which the disease in question was introduced into your locality.

Allow me to urge, in view of the scientific importance of this investigation, that you will extend to me your prompt and hearty co-operation, and that you will address to me your answers at Lebanon, Marion County, Kentucky.

Very respectfully,
Your obedient servant,

ELY McCLELLAN,
Assistant Surgeon, U. S. Army.

[Circular No. II.]

LEBANON, MARION COUNTY, KY.,
November 1, 1874.

Doctor ——, ——:

DEAR SIR: I have the honor to ask your attention to my letter of ————, and to urge upon you the importance of favoring me with an answer without further delay. If you are unable to send me full lists of cases, I would earnestly ask that you will

send me a letter descriptive of the epidemic as you witnessed it, giving me, if possible, an account of the introduction of the disease into your community, how, where, and from whom the early cases were infected, and the manifestations of the disease as regards its spread, its intensity, and its decline. Any local influences which may have favored the spread of the disease, the source and character of the water-supply, should be noted.

To do this will cost you but little time and labor, and will enable me to complete the chain of evidence, while your neglect will cause a gap which cannot be filled. I am in possession of a large amount of evidence. The profession of the South and West have, in the great majority of instances, responded promptly to my call. I would earnestly beg that you will aid me in presenting to the next Congress a report from the medical men of the Mississippi Valley, complete in its scientific information. Any contribution with which you may favor me will be fully acknowledged in my report.

I am, dear sir, very respectfully,

Your obedient servant,

ELY McCLELLAN,
Assistant Surgeon, United States Army.

[Circular No. III.]

LEBANON, KY., ——, 187 .

Doctor ——, ——:

I have the honor to ask your attention to my previous letter, asking information as to the cholera epidemic of 1873. The facts as to the demonstration of the disease at —— are as yet incomplete, and, unless furnished at once, will of necessity be omitted from the narrative of the epidemic. I would earnestly ask that you will send me, with as little delay as possible, a note of all facts in your possession, addressed to me, in care of the Surgeon-General United States Army, Washington, D. C.

Very respectfully,

Your obedient servant,

ELY McCLELLAN,
Assistant Surgeon, United States Army.

From Dr. John M. Woodworth, Supervising Surgeon of the Marine-Hospital Service, who was associated with this work, I have received valuable contributions, which will be found duly accredited in the narrative of the epidemic.

At my request, Assistant Surgeon John S. Billings, United States Army, has prepared a most exhaustive bibliography of cholera, which will be found to be one of the most valuable contributions to the literature of the century.

To Assistant Surgeon J. J. Woodward, United States Army, Dr. John C. Peters and Dr. Elisha Harris, of New York City, I am especially indebted for aid and counsel.

From the officers of the Army, stationed at or near points of infection, I have received valuable assistance.

From Hospital Stewards Charles E. Lord, Richard Keogh, and F. M. Guyon I have received clerical aid, which was rendered in addition to their official duties.

At all points of the area of infection, I was most courteously received, and every facility was afforded the investigation. To the medical gentlemen or the South and West my thanks are due.

During the prevalence of the epidemic of 1873, Dr. A. B. Judson, of New York City, assumed the task of daily compiling the cholera announcements made by the press throughout the United States. The vast manuscript thus formed was placed at my service, and to the points thus obtained the success of the work is in a great measure due.

I am, sir, very respectfully,

Your obedient servant,

ELY McCLELLAN,
Assistant Surgeon, United States Army.

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ACKNOWLEDGMENTS.

In carrying this work through the press, our thanks are due for much courteous consideration to the Hon. A. M. Clapp, Congressional Printer; to Capt. H. T. Brian, Foreman of Printing; and to the compositors and proof-readers of the establishment.

From Acting Assistant Surgeon T. W. Wise, United States Army, of the Library of the Surgeon-General's Office, we have received valuable aid.

To Messrs. W. S. McPherson, T. L. Miller, L. M. Penfield, and F. J. Foster, clerks in the Office of the Surgeon-General of the Army, we are indebted for clerical aid.

CHAPTER I.

CLINICAL HISTORY OF THE EPIDEMIC OF 1873.

During the year 1873, cholera prevailed throughout the entire valley of the Mississippi. The early cases of the disease occurred at the city of New Orleans. From that city, the disease was carried northward, when it became epidemic at all points attacked, although it assumed a pandemic form at none. The occurrence of this epidemic gave rise to a most extended discussion in medical circles, during which there was a greater diversity of opinion expressed than had been occasioned by any disease which had appeared upon the American continent during the past century.

The vast majority of the medical men of the United States who were engaged in combating the disease during the progress of the epidemic, both in hospitals and in private practice, are unanimous in pronouncing it to have been Asiatic cholera of foreign origin; making use, in their reports of cases, of the synonym which was individually most acceptable, namely, cholera, cholera epidemica, cholera spasmodica, cholera asphyxia, serous cholera, malignant cholera, &c.

A second class, composed of a most respectable number of gentlemen, both numerically and intellectually, recognized the disease to have been cholera in a fatal form, but announced it as American cholera, not epidemic but endemic, having its origin in certain local and malarial influences.

A third class reject entirely the cholera hypothesis, and pronounce the disease to have been "pernicious bilious fever of an algid type," "congestive malarial fever," etc.; and, when pressed by facts, take refuge behind such terms as sporadic or septic cholera.

The key-note to this discussion will be found in the obscurity which surrounds the infection of the initial cases, the consideration of which is referred to the narrative of the epidemic.

From the study of this demonstration of the disease, in which the writer has been engaged almost constantly since August, 1873, during which time the records of some seven thousand cases have been obtained from physicians at all portions of the field of infection, he does not hesitate in announcing the disease to have been *malignant epidemic cholera*. During the entire season, the epidemic was governed by the same well-defined laws that have been presented by all other demonstrations of the same disease. That the intensity of the epidemic was modified and its advance checked at most points was due to the general diffusion of sanitary knowledge throughout the country during the past few years, and not to any change of type in the disease itself; but, at the same time, it is shown that whenever the infection of cholera found a fitting and unmolested nidus, then and there the disease exhibited its fatal malignancy. The truths upon which this assertion is based were most vividly impressed upon the mind of the writer by the direct contact in which, from the necessities of his work, he was placed with a very large number of the medical gentlemen residing in the

great valley of the Mississippi; and the fact that the disease did not assume its accustomed epidemic form in the larger cities, but that its malignant demonstrations were confined to the smaller towns and villages, is robbed of the significance assigned to it by many observers. The narrative demonstrates that cholera was present in the large cities of the Mississippi Valley, but at the greater number of such points the virulence of the epidemic was controlled by the prompt and energetic action of the health-boards, assisted by the active co-operation of the medical profession and municipal authorities.

At the present day, almost every village and hamlet throughout the United States contains medical men who are versed in sanitary science, who demand from local authorities that all efforts be made to preserve the public health, and who are engaged in the diffusion of sanitary knowledge among the members of their respective communities. Each year, the suggestions of local medical societies are received as edicts for the public good. It is claimed for the medical men of the Mississippi Valley that, as practical sanitarians, they are the peers of sanitarians in any other section of the country.

How great the change effected in the last decade, and how mighty will be the revolution when the state confers upon health-boards autocratic powers upon all points which may influence or affect the public health! Eternal vigilance is the price paid for the safety of the republic; and eternal sanitary vigilance should be exercised by national, State, and municipal authorities.

As, in the narrative of the epidemic, space cannot be taken to note in detail individual instances of the disease, it has been thought best, at this time, to present a history of the symptoms and general course of the epidemic, as it occurred in the Mississippi Valley from February to October, 1873.

The clinical history demonstrates that no age, sex, color, or condition in life was exempt from its influences. Fatal cases are recorded as having occurred at all ages, from that of one month to that of one hundred and eighteen years; and it is demonstrated that pregnancy affords no immunity to the disease. The greatest mortalities are recorded between the twentieth and fortieth years of age. Males suffered from the disease more severely than females, and, in proportion to their numbers, blacks than whites. A larger number of cases occurred among those who were married than among the single. The disease was most malignant among the lower orders of each community, but the better classes were by no means exempt. Many who lived in healthy localities, who obeyed all obvious sanitary regulations, suffered in their persons and families.

During the epidemic of 1873, the disease presented the four distinct stages, and the characteristic symptoms of each stage, which are now so well recognized as pathognomonic of cholera.

THE FIRST STAGE: THAT OF THE PRODROMATA.—In the vast majority of cases which have been reported, the disease was ushered in by a distinct stage, which was characterized by general malaise, borborygmi, and diarrhœa; the latter passive, painless, but attended with increasing languor and fatigue. This stage, in the greater number of cases, was from one to five days in duration. Exceptions to this are, however, reported, in which the patient, who was apparently in perfect health, after but one dejection passed into the stage of well-defined cholera. This was especially noticeable in the cases of children, many of whom are reported as retiring to bed at night in their usual good health, to be awakened at an early hour of the morning by a strong

desire to go to stool. One copious dejection, and the symptoms of the second stage were immediately developed. In these cases, no definition of stages could be determined; the patient after a single profuse dejection becoming exhausted, and collapsed before medical attention could be procured.

SECOND STAGE.—In the majority of the reported cases, the attacks of cholera were announced at an early hour of the morning; the largest number having occurred at or about 3 o'clock a. m., the patient awaking with an active desire to go to stool, which was accompanied with more or less nausea. One profuse dejection was generally followed by active vomiting, and together the two symptoms increased in severity.

The dejections were universally described as "rice-water" in character. At first passed with a sensation of relief, from the overdistention of the rectum, they increased rapidly, both as to frequency and quantity, and became at the last involuntary; the exhaustion as becoming more and more profound after each dejection. Fatal cases are recorded in which the diarrhœa had scarcely been present during the attack; but the first handling of the body after death was followed by copious discharges per anum of the "rice-water" fluid.

The vomit is described as consisting at first of the contents of the stomach at the moment of attack; but, as the disease progressed, the fluid, diluted by the water which had been drank, or mixed with the substances which had been swallowed, presented the rice-water characteristics. Some instances are reported in which the vomiting could scarcely be designated as a symptom of the disease, the act consisting in the simple squirting-out of a mouthful of fluid at a time. The thirst in all instances was intense, and the call for cold water incessant.

The cramps were confined, in the majority of instances, to the extremities, commencing invariably in the fingers and toes. But few instances are reported of the abdominal or pectoral muscles becoming involved. One terrible instance of cramping of the pectoral muscles was witnessed by the writer. The voice was described as changed, low, husky, lost, or unnatural. Profuse perspiration was present in all cases. A sensation of intense heat, generally referred to the abdomen, while the surface of the body was so benumbed that sacks containing ashes that had been raked from beneath brisk fires and dampened were borne without the least complaint. Intense restlessness was observed. In many instances, it was with difficulty that the patient could be confined to bed. Lividity and shrinking of the skin were present. Change of facial expression was so great that, in many instances, patients who were before the attack in the full vigor of health presented the appearance of being aged and decrepit. Suppression of urine was marked in all cases, and in many instances this symptom was present far into the stage of reaction.

Temperature.—Variations of temperature in the second stage are noted, ranging from 98°, the highest, to 95°, the lowest recorded. One interesting case is recorded by Acting Assistant Surgeon S. L. S. Smith, United States Army, in which, during the second stage of a cholera attack, the temperature in the axilla was 97°, under the tongue 96°. 6, and in the rectum 102°. The fact that the temperature of the body is lowered by severe cramping is especially noted in some reports.

The duration of the second stage is noted at from two to six hours, but many notable instances are recorded of the patient having rapidly passed through the second stage, and one instance exists of the patient being fully collapsed within twenty minutes from the time of the first vomit and dejection. In this case, the blending of the stages was so

complete that it was impossible to determine where one stage ended and another began.

THIRD STAGE: COLLAPSE.—In the majority of the instances reported, as the patient became collapsed, there was a perceptible diminution in the frequence of the act of vomiting. The dejections were still passed involuntarily, and in some instances of profound collapse ceased altogether; the pulse becoming more and more feeble, until at last it was imperceptible in the extremities, and could only be determined close to the heart. The respiration was hurried and accompanied with sighing. An interesting observation, made in a case reported by Dr. J. Paschal, of Louisville, Ky., shows that five minutes before the death of a patient from cholera at the Louisville city hospital, the act of respiration was performed as follows:

On the first of the five minutes, there were twenty respirations.
On the second of the five minutes, there were fifteen respirations.
On the third of the five minutes, there were twelve respirations.
On the fourth of the five minutes, there were six respirations.
During the fifth minute, there was one long and deep respiration, and the patient died.

During this stage, complete aphonia existed; dyspnœa was developed; and the physiognomonic changes were most striking. The intense thirst and sense of abdominal heat continued. The shrinking and lividity of the skin became more marked. The cramping of the muscles of the extremities continued. In some instances, an intense cramp was complained of along the course of the great arteries, attended with violent action of the heart. During this stage, blunting of the special senses was apparent; in no way was this more marked than in the utter apathy of the patient as to his condition.

Temperature.—A gradual rise of the temperature as collapse deepened has been noted. One case characteristic of many is recorded. A female, in cholera collapse:

At 10 o'clock a. m., recorded 97°.
At 10.45 o'clock a. m., recorded 98¼°.
At 11.15 o'clock a. m., recorded 100°.
At 12 o'clock m., recorded 101°.
At 1 o'clock p. m., recorded 103½°.
At 2 o'clock p. m., patient dead.

The duration of the third stage was from four to thirty-six hours.

THE FOURTH STAGE: THAT OF REACTION.—In a large number of the reported cases, the stage of reaction was ushered in by a condition which closely resembles the "tepid stage" of the Indian observers. A gradual subsidence in the intensity of the collapse occurred. The vomiting, purging, and cramps ceased. The patient lay upon the bed in a listless and in some cases almost a comatose condition. The respiration was less hurried, more natural, but was still labored, and a tendency to nausea was noted.

In favorable cases, the skin became dry, the pulse at the extremities perceptible, and the patient complains of no discomfort beyond that of intense thirst. The variations of the thermometer between the axilla rectum, or vagina, were less marked. During sleep, the physiognomy became more natural. The urine was again secreted, and in the few observations recorded was found to contain albumen.

In less favorable cases, the period of reaction ushered in a condition which has been termed typhoid; the lividity of the skin gave place to "dusky-red color;" the eyes were injected; the pulse became rapid and flickering; the temperature of the body raised; the tongue brown and

dry. Intense cerebral excitement was observed in some cases, while in others life passed away in a low muttering delirium.

In some few cases reported, the convalescence was rapid and without drawback; but in the vast majority of cases the process was tedious, slow, and requiring the exercise of constant watchfulness and care.

The evidence collected is confirmative of the expression of Jaccoud that the duration of convalescence is in direct proportion to the difficulty of "repair; in the most favorable cases, the patient's digestive organs remain irritable and susceptible of cardialgia and chronic catarrh. In other cases, there is anæmia, which culminates in marasmus, and finally terminates fatally after a variable duration. Relapses are common enough, especially when a judicious regimen is not carefully observed."

The sequelæ of cholera which have been reported are:

I. URÆMIA.—Many fatal cases are reported of individuals, who reacted from the collapse of cholera, to die ultimately of uræmia, or in the typhoid condition, of which suppression of the urinary secretion, either partial or absolute, is an invariable symptom. It was observed that these cases were most frequently recorded of individuals to whom opium or alcohol had been exhibited in large doses. Cases are reported of individuals who lived many days in this condition, and who ultimately recovered. The large majority of such cases, however, terminated fatally. In one, severe demonstration of the disease, the initial case, lived in this typhoid state for twelve days, during which eighteen persons, who had been infected through him, died.

II. HÆMORRHAGE FROM THE BOWELS.—A large number of instances are reported of severe dysenteric attacks following the reaction from choleraic collapse. At some localities, an epidemic of dysentery succeeded that of cholera, the mortality of the second epidemic being as great if not greater than that of the first.

III. UTERINE COMPLICATIONS.—In the great majority of instances in which pregnant women were attacked with cholera, labor occurred generally when the patient was in the collapsed stage. The fœti were invariably still-born; their bodies were shriveled and blue, as if their blood had been drained of its serum; but they presented no other of the characteristic symptoms of cholera poisoning. Two pregnant females are reported as having died undelivered. Several are noted who recovered from the cholera, although the attack had been complicated by labor. No cases of uterine hæmorrhage were noted. The occurrence of cholera in the persons of puerperal females, so far as has been reported, invariably led to fatal results. It is probable that other sequelæ of the disease occurred, but the facts are not stated in the record.

We append a series of typical cases, with notes upon the treatment of the disease, from gentlemen whose experience has not been noted in the body of the narrative.

CASE 1.—*Reported by Dr. John D. Jackson, of Danville, Ky.—Cholera—Second stage—Recovery.*

J. R., æt. 17 years, white, male, a student of Center College, left his home in Lebanon, September 1, cholera being at the time epidemic in that town, a fatal case having occurred August 30, in the immediate vicinity of his father's residence. On the 4th, early in the day, was obliged to leave his class-room from sickness. During the evening had one or two actions of his bowels. After dark, was taken with purging and vomiting, which continued through the night. No physician was

called; the family with whom he resided attempted treatment by compresses and enemata of cold water after each dejection. A small quantity of quinine in brandy was also administered.

Early on the 5th, his condition becoming critical, Dr. Jackson was called in haste. "Found him in the blue stage of cholera; his skin covered with a clammy moisture; his pulse was yet moderately full; his extremities not actually cold, but he presented the bluish, leaden-hued skin of epileptics after the long-continued use of nitrate of silver. The matter vomited at this time was perfectly transparent and odorless, with a mucoid-looking material in it, and the alvine dejections were like distilled water, with flocculi, resembling the boilings of rice-gruel, floating in them. They were without the slightest odor."

Mustard was substituted for the wet compresses; morphia sulphatis, gr. $\frac{1}{8}$, hypodermically, and Hydrg. submur., gr. iij, were at once administered; the last being vomited was at once repeated. A teaspoonful of the following mixture, in two ounces of water, was directed every hour while the vomiting and purging continued: R. Acid. sulph. dil., f$\frac{3}{3}$i; morph. sulph., gr. ij. M.

The vomiting and purging continued until after the administration of the third dose; two more doses were given, and by 2 p. m. reaction was fully established. The last dejection occurred at 1 p. m., and was still of the rice-water character. About dark of that evening, a relapse was imminent, but by a steady perseverance in treatment it was averted. The acid and morphia mixture was continued in diminished doses and at longer intervals for twenty-four hours. No dejection until the morning of the 6th, when he had a large, perfectly thin, watery evacuation, tinged, of a faint greenish brown, and offensive in odor. Convalescence regular; nausea existing for two or three days. Urine secreted in from thirty-six to forty hours from time of seizure. Bile re-appeared in dejections in from forty to forty-four hours. Urine free from albumen; sp. gr. 1020; presented a few broken tube-casts and quantities of renal epithelium.

The vomit and dejections were disinfected immediately upon their discharge, and thrown into a small pit, together with the water used in rinsing the vessels, then covered with six inches of fresh earth. Dilute sulphuric acid was administered to all the occupants of the house, in doses of fifteen drops three times daily. No other cases occurred on the premises.

CASE 2.—*Reported by S. P. Craig, M. D., of Stanford, Ky.—Cholera—Fully developed—Recovery.*

"Lynn Hansford, æt. 14 years, negro, male, was attacked by diarrhœa on Monday morning, September 1. His mother had died of cholera on the previous day. Was a resident of the infected portion of the town of Stanford. Hyd. submur., gr. iij, with opii pulv., gr. $\frac{3}{4}$, were ordered every two hours. After the third dose, his diarrhœa was checked, and remained checked until evening, when it re-occurred, attended with vomiting, to relieve which sinapisms were applied to the epigastrium. About 4 o'clock in the evening, he had several large rice-water discharges. Commenced giving calomel in gr. ij doses every hour. At 6 o'clock p. m., his pulse became very feeble, and his extremities began to get cool. Gave him one-sixtieth of a grain of atropia hypodermically. At 7 p. m., he was still colder; put him in hot bath, and applied fresh sinapisms. At 8 p. m., gave another dose of atropia, (one-sixtieth of a grain.) At 9.30 p. m., he was pulseless at the wrist, and cold to the knees and elbows; gave atropia,

one-thirtieth of a grain, and left with instructions to keep up the hot applications *until he died.* At daylight on the morning of the 2d found him alive. There was a little more warmth, but still no pulse at the wrist. Gave atropia, one-fortieth of a grain. At 9 a. m., repeated the same amount of atropia; pulse perceptible. At 12 m., pulse improving; repeated atropia in same dose. At 3 p. m., reaction was completely established. Secretion of urine was established in seventy-eight hours from inception of disease. Patient made a rapid recovery. After reaction was established, diuretics were freely used."

CASE 3.—*Reported by L. S. McMurtry, M. D., of New Orleans, La., (visiting in Garrard County, Kentucky)—Cholera—Fully developed—Death.*

L. R., æt. 48 years, negress, a stout, healthy woman, and the mother of a large family of children, was taken with diarrhœa at 5 a. m., September 2, 1873, which continued, accompanied with vomiting and cramps. until 2 o'clock p. m., when Dr. McMurtry was asked to see the case.

"On arrival, found her in complete collapse. No pulse in the radial artery, and barely perceptible in the brachial. Aphonia. Pinched expression of face. Suppression of urine. Involuntary, odorless, and colorless passages. Severe and painful cramps in muscles of leg and hand. Temperature, 97°. Treatment consisted of the hypodermic use of morphia, sinapisms to the epigastrium, and friction of the entire surface of the body. Death at 8 o'clock p. m.

"It is of interest and value to note that this woman had been in no choleraic district, remaining at home during the entire summer, and had committed no imprudence of diet. The drinking-water was, however, not very pure, and the ventilation of the house was very defective.

"A searching inquiry into the causes affecting this case, furnished Dr. McMurtry with the fact that a black boy, ten years of age, was living with this woman, and had been in the family for several days prior to her attack, who had come from the infected district of the town of Lancaster.

"Several members of the same family suffered with diarrhœa, before and after the death of L. R., from which two small children died, with no symptoms of cholera other than a severe diarrhœa. The boy from Lancaster, however, remained in perfect health."

CASE 4.—*Reported by W. B. Harlan, M. D., of Danville, Ky.—Cholera—Second stage—Recovery.*

A. P. B., æt. 33 years, white male, a farmer in comfortable circumstances, temperate in his habits, living six miles from Danville, was attacked at 8 o'clock on the night of August 30, 1873, with profuse vomiting and purging. Had a slight diarrhœa for some hours previous to attack. Dr. Harlan saw this patient at 11 o'clock p. m. "Rice-water discharges fully established. Body bathed in profuse perspiration. Cramps of abdominal muscles and those of lower extremities. Skin cold and markedly blue. Pulse 100. Thirst intense.

"Sinapisms were applied to surface. Morphia was exhibited hypodermically. Hydrg. submur., gr. ij were ordered every hour for four hours. Acid. sulph. dil., gtt. xx, with quiniæ sulph., gr. iij, were ordered every hour until four doses were taken.

"Disease arrested and reaction established by the twelfth hour. Patient recovered."

CASE 5.—*Reported by I. S. Warren, M. D., late of Lancaster, Ky. Cholera—Fully developed—Death in eleven hours.*

"Mrs. R., æt. 22, white, was attacked at 3 a. m., August 24, 1873, with cramps, vomiting, and diarrhœa. Pure 'rice-water discharges' were soon established, and, by 5 o'clock a. m., she was fully collapsed.

"When first seen, the vomiting, purging, and cramping were violent and constant. Pulse imperceptible. Sinapisms and dry heat were applied, and morphia, gr. $\frac{1}{3}$, atropia, gr. $\frac{1}{60}$, were at once exhibited hypodermically. In fifteen minutes, the vomiting had ceased. Cramps considerably relieved. Temperature, 96°.

"At 6 o'clock a. m., temperature the same. Had occasional cramps; vomited once on taking ice-water. Restricted to cracked ice.

"At 7 o'clock a. m., gave capsicum and quinine, which were at once ejected. Pupils not dilated, and atropia, gr. $\frac{1}{40}$, exhibited.

"At 8 o'clock a. m., temperature 97°, pupils still not affected

"At 9.30 o'clock a. m., seems worse. Temperature 95°. Extremities icy-cold, lips livid, vomiting recommenced. Gave morphia, gr. $\frac{1}{3}$, atropia, gr. $\frac{1}{40}$, hypodermically. Bladder empty.

"At 10.45 o'clock a. m., temperature 98°.4. Extremities much warmer; no cramps, vomit, nor dejections; pupils partially dilated. Comatose.

"At the expiration of an hour, temperature 100°, pulse just perceptible, feet not quite so cold. At 12 o'clock m., temperature 101°. Still comatose. In an hour, temperature 103°.5. Comatose. 2 o'clock p. m., died.

"The husband of this patient died early of same day from cholera."

CASE 6.—*Reported by I. S. Warren, M. D., late of Lancaster, Ky.—Cholera—Fully developed—Death in twelve hours.*

"E. H., a private of E Company, Sixteenth United States Infantry, was taken with diarrhœa at 4.30 o'clock a. m., of August 29, 1873. Up to 6 o'clock a. m., when the doctor was called to the case, had frequent discharges; and was found much prostrated by them. Temperature 97½°. Sinapisms were applied to abdomen, and atropia, gr. $\frac{1}{60}$, was given hypodermically; and a powder containing full doses of opium, camphor, calomel, and bismuth, given every third hour. The first powder was vomited, the second retained.

"At 8 o'clock a. m., temperature 96°. Had one rice-water discharge. Atropia, gr. $\frac{1}{60}$, repeated, and hyd. submur., gr. v, to be given every hour and a half. Dry heat to extremities.

"At 9.30 o'clock a. m., temperature 97°.8. About one drachm of urine was drawn from the bladder, and the following ℞. alb. ovi, No. i; sodæ chlor., gr. x; spts. frumenti, ℥ss M.; to be repeated as might be required.

"At 10 o'clock a. m., temperature 98°.2, restless, great dyspnœa. Morphia, gr. ¼, atropia, gr. $\frac{1}{60}$, were exhibited hypodermically; this relieved him, and was followed by sleep.

"At 11 o'clock a. m., patient sleeping soundly, temperature normal.

"At 12 o'clock m., temperature 98°.4; profuse perspiration; and tinct. digitalis, gtt x; spts. ether. nit., ℥j, was ordered to be taken every third hour.

"At 2 o'clock p. m., temperature was 102½°; pulmonary congestion was developed; and the patient died at 4 o'clock p. m. No urinary secretion."

CASE 7.—*Reported by I. S. Warren, M. D., late of Lancaster, Ky.—Cholera—First stage—Recovery.*

"W. G., a private of E Company, Sixteenth United States Infantry, was taken at 10 o'clock a. m., Septemper 4, 1873, with diarrhœa. One

drachm of Squibb's mixture was given every three hours. Had during the day four evacuations of watery character; an occasional vomit.

"At 10 o'clock a. m., September 5, temperature 98°.5. Had a pure rice-water evacuation. Introduced a catheter, but found bladder empty. Exhibited hypodermically morphia sulph., gr. ¼; atropia, gr. $\frac{1}{60}$.

"At 10.30 a. m. had another rice-water discharge, and vomited. Hydrg. submur., gr. x, ordered to be taken every hour until five doses have been taken.

"At 4 o'clock p. m., another evacuation; consistency and color improving.

"At 7 o'clock p. m., another dejection; urinated freely.

"At 8 o'clock p. m., another action of the bowels; color improving. Temperature 98°.

"Convalesced rapidly."

CASE 8.—*Reported by S. P. Craig, M. D., of Stanford, Ky.—Cholera—Fully developed—Death in twenty-three hours.*

Mrs. Jos. L., æt. 31 years, a resident of the infected portion of the town of Stanford, but who had left the town as soon as cholera became epidemic, and did not return until ten days or two weeks had elapsed from the occurrence of the last case, was taken Sunday, September 28, about 12 o'clock m., with looseness of the bowels. Dr. Craig, having been called, prescribed some powders of opium and tannin, which temporarily checked the tendency to diarrhœa. At 6 o'clock p. m., the looseness continuing, a powder was administered containing opium, gr. j; plumbi acet., gr. iij, and she was requested to inform the doctor at once if this failed to check the discharges.

"At 5 o'clock a. m., September 29, was informed that Mrs. L. had a very profuse diarrhœa during the night. On reaching her residence was informed that she had passed two ordinary-sized chamber-vessels full of thin watery fluid since midnight, and that there was another one still full in the house. Examination of this chamber determined it to be full of rice-water dejections. The patient was much prostrated, but quite cheerful. Her thirst was intense, and she complained of great internal heat. Crampings and vomiting soon came on; the skin of fingers and toes became shriveled, and the countenance became anxious; eyes sunken, voice changed, and became low and husky; pulse smaller and smaller. Collapse quickly followed.

"Succeeded in getting her quite warm several times after the collapse, by means of hot water, atropia, &c., and she died with a warm surface. The contractions of the muscles after death were astonishing; an hour after death, they were observed.

"The residence of this lady was about fifty yards from where there had been three cases of cholera during the second week of the epidemic; but, from the fact of the absence of the family the house was closed, and Mrs. L. was not attacked until a full week after their return. The water used was brought from a well in town at some distance from their residence, and the same well had been used by a number of families without developing any disease."

"On the same day, Mr. L., æt. 33 years, was taken with looseness of bowels, and frequent disposition to go to stool, for which he was treated, but without effect. On the morning of the 29th, this looseness threatening to become violent, he was placed in bed, dry heat applied to surface of his body, and morphia sulph., gr. ¼, exhibited hypodermically, and a powder, containing calomel, gr. ij, camphor, gr. ij, was given

every hour until he had taken eight doses. During the next twenty-four hours the morphia-injection was repeated two or three times, and several weak brandy-toddies were given. Reaction was fully established, and at 11 o'clock a. m. he had two dejections containing a little fecal matter. Convalesced slowly."

CASE 9.—*Reported by W. W. Cleaver, M. D., of Lebanon, Ky.—Cholera—Fully developed—Death on the tenth day.*

Miss B. S., æt. 16 years, residing upon the Rolling Fork, while on a visit to the house of an aunt on the 29th of August, was, during the night, taken with vomiting and purging. Had eaten her supper, and retired to bed in her usual health, but, about 11 p. m., was awakened by violent nausea, followed by profuse vomiting. In a few moments a dejection occurred. The vomiting and purging continued for the space of an hour, when cramps in the lower extremities were established.

An express rider was dispatched to Lebanon, a distance of seven miles, for Dr. Cleaver, as soon as the cramps occurred, and, by using all haste, the patient was first seen by Dr. C. at a little before 3 o'clock a. m. of the 30th.

"The vomiting and purging at the time of this visit consisted of pure rice-water; violent cramps of both extremities occurred. The surface of the body was covered with a profuse perspiration. Extremities icy-cold; skin of fingers and toes shriveled; tongue cold. Slight pulse could be distinguished in the radial, and was counted to 130 beats to the minute. Features contracted, anxious, and pinched; eyes sunken; voice changed and scarcely audible. Complained of the most intense thrist. Dejections involuntary; complete suppression of the urine. A sinapism was applied to the abdomen, and covered with a large, hot poultice; dry heat to the spine and extremities. Hydrg. submur., gr. ij, with opii pulv., gr. ss, was exhibited every hour until three doses had been taken, when the same powder, with the addition of bismuth sub-nit., gr. iv, camphor, gr. j, was given until three doses had been taken, when the interval was increased to three hours. This was continued during the day, with the addition of occasional doses of quiniæ sulph., gr. ij, and a drachm of spts. æther. nit., the last to be given at three-hour intervals.

"After the first three powders had been taken, the vomiting and purging were notably lessened, and the interval between the paroxysms much increased.

"August 30, at 7 p. m., found the pulse increased in volume. Surface of body moist with perspiration; extremities warm. Face less anxious. Voice stronger. Thirst still excessive, but vomiting and purging had ceased. No urine had been voided. The treatment was continued.

"August 31, 10 o'clock a. m., general condition was found much improved. Reaction established. Had slept some during the night, and on awaking had vomited slightly. No urine yet secreted. Discontinued the calomel-powder. Substituted bismuth, gr. iv, every four hours, and the following mixture, a teaspoonful of which to be taken every three hours:

"℞. Tinct. opii camph.,
Ext. ginger fluid, āā ʒij.
Tinct. camphor,
M. Tinct. capsici, āā ʒij.

"The quinine and nitre to be continued.

"September 1, at 10 o'clock a. m., found the patient decidedly improved. During the past twenty-four hours had but three dejections, still watery, but colored. No more vomiting. No urine yet passed. Expressed a desire for food. Treatment of previous day was continued. Milk and a light soup allowed.

"September 2, early in the day the patient was removed to her father's house, a distance of three-quarters of a mile; but by the time she reached the house vomiting and purging were re-established. At 5 p. m. of the same day the pulse was found to be thread-like. Skin warm, except at the extremities. Countenance anxious and distressed. Complaining of intense abdominal pain. Having thin watery discharges. Had passed several ounces of urine.

"Placed her upon powders of calomel, opium, and bismuth, one every hour, and in the interval the camphorated mixture was continued. Discontinued quinine and spirits of nitre.

"September 3, 11 a. m., diarrhœa arrested. Skin dry and warm. Pulse small, hard, and rapid. Tongue brown and dry. Urinary secretion nearly natural. Had slept none during the previous night. Continued treatment and nourishment, with the addition of milk-punch.

"September 4, 11 a. m., no change in her condition; still complaining of the intense abdominal pain. This pain was constant. No improvement occurred in the next three days, when the patient died."

CASE 10.—*Reported by B. E. Avritt, M. D., of Lebanon, Ky.—Cholera—Fully developed—Recovery.*

M. A., æt. 12 years, female, white, living on the Rolling Fork, from the 1st to the 5th of September complained of diarrhœa, for which no treatment was asked, although the county was suffering severely from the epidemic.

At 12 o'clock m. of the 5th was taken with violent purging, which was soon followed by vomiting and cramps of the feet and hands.

At 1 p. m. she was first seen by Dr. Avritt. The vomit and dejections were of "pure rice-water." Her face was livid. Eyes shrunken and surrounded by a discolored ring. Extremities cold; skin of fingers and toes shriveled. Tongue cold as ice. Extremely restless, tossing from side to side, and complaining of burning heat. Voice nearly lost. Thirst most intense, calling constantly for water, which her friends had refused. A powder, consisting of opium, gr. ss, plumbi acetatis, gr. ij, bismuth, gr. v, was given, but it was immediately ejected. Morphia acetatis, gr. ¼, was given hypodermically. She became quiet; vomiting was arrested. Chloroform, ℥ss, brandy, ℥j, in water, was given, and repeated every fifteen minutes. The powder, of lead, opium, and bismuth, was given and retained, and was ordered to be repeated every two hours. Dry heat was applied to the body, sinapisms to abdomen and extremities. Ice-water and cracked ice allowed freely. The diarrhœa became less frequent and the quantity of water lost at each discharge was diminished. Extremities became warmer. Gradually, reaction was established. Urine was not secreted freely for seventy-two hours. Convalescence slow and tedious.

CASE 11.—*Gooden family—Reported by Drs. Cleaver and Avritt—Cholera—Death and recovery.*

On the morning of August 31, Robert Gooden, æt. 20 years, single, white, was taken with vomiting and purging, attended with prostration,

while on a visit to the town of New Market. Dr. Porter prescribed for him; he was placed in bed; and the severity of the symptoms was relieved. On the 3d of September he returned, on horseback, to his father's house, a distance of a mile and a half, reaching home about 5 o'clock p. m. Said he felt well but tired, and soon went to bed. At midnight he was taken extremely ill, vomiting and purging, with cramps of his hands and feet, soon extending to the entire limbs. His mother described the rice-water discharges exactly. In a very few moments he became perfectly collapsed, and he died at 10 a. m. of the 4th. His father describes him as "the coldest and wettest human" he ever saw. No physician could be found until just before his death. This young man had attended the Marion County fair.

On the 6th, James, æt. 22, single, the eldest son of the family, was attacked with a looseness of the bowels, which continued all day. At 3 o'clock a. m. of the 7th was vomiting, and had profuse watery evacuations, which rapidly assumed the rice-water characteristics. Cramps commenced in his feet and rapidly involved the entire body. Became icy-cold, but had but a slight perspiration. Complained of intense internal heat, and the most excessive thirst. Skin of fingers and toes became shriveled. Urine suppressed. Sinapisms were applied to his body, with dry heat, and he was supplied with all the ice-water he wished. (This had been denied to his brother.) No doctor could be procured until the 8th, when Dr. Palmer saw him. The collapse was fully developed. Bags of salt were heated as hot as possible and packed around him. Heat to abdomen. Chloral hydrate administered freely. Calomel and morphia were exhibited. Reaction was gradually established, and in twelve hours from Dr. Palmer's visit the case was considered out of danger.

The father, Lewis Gooden, æt. 50 years, was attacked on the 9th with excessive purging of a watery character, which soon became "rice-water." They were attended with excessive prostration and intense thirst, but which yielded to absolute rest and the calomel and opium treatment, and, as the patient insists, the free use of ice-water.

Three other members of the same family were on the 10th attacked with symptoms identical with those presented by the father; but in each the disease was arrested in the first stage.

The family resided in an isolated position among the "Knobs," north of the Rolling Fork. No local influences could be discovered, and all the family were in their usual health until the return of the son, Robert, from the Marion County fair.

No efforts at disinfection or the use of prophylactics were attempted.

CASE 12.—*Reported by B. E. Avritt, M. D., of Lebanon, Ky.—Cholera—Second stage—Recovery.*

Charles, a negro, æt. 35 years, single, after a few hours of diarrhœa, was attacked with vomiting and purging, attended with excessive prostration. Cramps of hands and feet were rapidly developed. The discharges assumed the rice-water character. Skin of fingers and toes was shriveled. He was first seen by Doctor Cleaver at 6 o'clock p. m. of September 10. The patient was in an old shanty, without any of the comforts of a sick-room. Some one had made up a bed for him, but at the time of the visit he was alone. He was placed upon full doses of opium, calomel, and bismuth, and Doctor Avritt was asked to take charge of the case.

At 7 o'clock p. m., Doctor Avritt exhibited a full dose of chloroform;

continued the powders. At 8 o'clock p. m. the chloroform was repeated, and quinine, gr. ij, was added to the powder already noted. Finding it impossible to obtain any nurse for this man, Dr. Avritt made him as comfortable as the circumstances would admit; placed by the side of his bed a bucket of ice-water and a glass, and visited him as often as possible during the night. The vomiting and purging continued during the night, but at lengthening intervals, and as water from the tumbler did not satisfy him, he drank from the bucket as long as he could tilt it to his mouth. During the night he drank all the water that was provided. At 6 o'clock a. m., September 11, surface of his body was not so intensely cold, a slight pulse, no vomiting or purging; by noon was fully reacted; and on the 13th was able to sit up.

CASE 13.—*Reported by W. W. Cleaver, M. D., of Lebanon, Ky.—Cholera —Fully developed—Recovery.*

W. E. R., æt. 35 years, male, white, residing in the Pleasant Run district of Marion County, was attacked September 10, 1873, at midnight. His father-in-law had died of cholera a few days before. His wife was at that moment *in articulo mortis* of the same disease.

At 11.30 p. m. of September 9, this gentleman left the room of his wife, went into an adjoining chamber, and threw himself for a few moments upon a lounge, fell asleep, and, as he had been in constant attendance upon his wife for three days and nights, his friends permitted no one to disturb him. A few minutes before midnight he was awakened by sudden and uncontrollable nausea; springing to his feet, he shook Dr. Cleaver, who was sleeping in the same room, and before a vessel could be secured vomited upon the floor. Expressed a strong desire to evacuate his bowels; the borborygmus being distinct to all in the room. He was at once placed in bed, and at the earnest solicitation of Dr. Cleaver made effort to restrain the inclination to evacuate the contents of his rectum. Hydrg. submur., grs. iij, opii pulvis, gr. j, was administered, and in less than an hour the same amount of calomel with half a grain of opium was given. Sinapisms and dry heat were at once applied. In twenty minutes' time, his extremities were very cold; his face was pinched and contracted; his voice was husky; and he had slight cramps of the hands and feet, and, shortly, of the abdominal muscles. Intense thirst was at once established. Ice was allowed freely. From 1 o'clock a. m. he slept for about half an hour, (probably from the exhaustion of his previous watching.) On awaking, he still complained of his desire to go to stool. Vomiting recurred. Becoming extremely nervous, potass. bromid., gr. xxx, was exhibited, and, in a few moments, a third powder of calomel and opium. He again slept for nearly half an hour. On awaking, he insisted on going to stool, but yielded to the desire of his attendants, and made no further attempt. He rested quietly, with occasional naps, unti 5 o'clock a. m. of the 11th instant, when a fourth powder of calomel and opium was given. No more vomiting had occurred, but his extremities were much colder, his body was bathed in perspiration, and his pulse was small, weak, and rapid.

At 7 o'clock a. m. had vomited once more, a tinged fluid. A fifth powder of calomel and opium was given. He was growing decidedly worse. Ordered calomel, gr. ij; opium, gr. ss; plumbi acet., gr. ij; to be given every two hours.

Up to this time, Dr. Cleaver had remained in constant attendance, and by his personal control over the patient had restrained him from

going to stool. In a few moments after Dr. C. left the house, the patient yielded to his desires, and had two large watery actions, but voided no urine. The diarrhœa thus established soon assumed the rice-water character; vomiting was re-established, of the same grade; the cramps increased in severity; and all three continued until late in the evening. The directions of the morning, with the addition of small doses of quinine, had been persisted in.

At 7 o'clock p. m., Dr. Cleaver returned and resumed control of the case. The vomiting, purging, and cramping had been arrested. Reaction had commenced. Body still bathed in profuse perspiration. He was placed upon a camphorated mixture containing opium, capsicum, and ginger.

At 8 o'clock p. m., he had two large rice-water discharges, with vomiting of the same character. Calomel, gr. iij, opium, gr. ss, was exhibited. A severe and violent paroxysm of cramping followed the second action. Sinapisms and dry heat.

At midnight had another small rice-water dejection. Thirst became intolerable. Ice-water was allowed at pleasure. No urine had been passed for twelve hours. Bladder empty. Spts. ætheris nit., in drachm-doses, repeated every two hours, was ordered.

At 1 o'clock a. m. sleeping quietly. No more vomiting or purging.

September 11, at 6 o'clock a. m., skin dry; extremities comfortably warm; no nausea or disposition to go to stool; thirst continued excessive.

At 7 o'clock a. m. had one small, dark, but watery dejection. Still no urine. Directed the nitre to be continued every three hours, and, if the dejections should become frequent, a powder to be taken every two or three hours of lead and opium. Milk and brandy. During the day had but one action. No nausea. Urine secreted freely, and convalescence was established. The excessive thirst continued for several days. Recovery very slow and tedious.

CASE 14.—*Reported by W. E. Mattingly, M. D., of Lebanon, Ky.—Family of W. T. Spaulding, esq.—Cholera—Death—Recovery.*

Residence upon the Rolling Fork, some six miles from Lebanon. The majority of the family and the servants had attended the Marion County fair.

At 4 o'clock a. m., on Sunday, August 31, Steve Smith, æt. 21 years, white, a farm-hand, was taken with diarrhœa; was given a "cholera-mixture," which arrested the discharges, and at 9 o'clock a. m. he went to church. While at church had several actions of his bowels, and reached home about 12 o'clock m. Diarrhœa became more violent, vomiting was established, and, by 7 o'clock p. m., when Dr. Mattingly reached the patient, he was vomiting and purging incessantly, and suffering with cramps of both extremities. The surface of body and tongue was very cold; countenance pinched and anxious; voice low and husky; skin on fingers and toes shriveled; intensely thirsty; urine suppressed; collapse rapidly developing; pulse thread-like. Sinapisms to abdomen and extremities. Dry heat. Calomel, gr. iv, bismuth, gr. x, morphia, gr. j, as a powder, and directed to be given every hour. Enema of starch-water, containing tinct. opii, every hour. Whisky and water. Water allowed freely.

The case ultimately recovered.

September 1, a son of Mr. S., who occupied a room with Smith,

was taken with the same disease ; the attack, although severe, yielded to treatment.

Miss L. S., æt. 17 years, was taken on the 2d of September with the premonitory symptoms, which increased in severity ; had several rice-water discharges ; but the case yielded to treatment as in former case, before the second stage of the disease was fully developed.

Mrs. S., æt. 45 years, at 12 o'clock midday on the 4th day of September, had the premonitory diarrhœa for some hours before the disease was developed. Vomiting and purging of rice-water, with violent cramps. Surface of body cold and shriveled ; profuse perspiration. Suppression of urine.

When the violent symptoms occurred, her husband gave, on his own responsibility, calomel, gr. x, and applied sinapisms and dry heat. Dr. Mattingly saw the patient at 3 o'clock p. m. The symptoms were becoming more severe. Hydrg. submur., gr. ij, opium, gr. ss, bismuth, gr. xv, to be taken every three hours. Ordered, after each dejection, cold starch-water enemata ; cold drinks.

At 10 o'clock a. m., of the 5th September, vomiting had been arrested ; one dejection during the night, of a dark, watery character. A disposition to diarrhœa was developing. Starch-water enemata, containing quinine, gr. iv, ordered after each action. No urinary secretion ; hot turpentine stupes to spine.

September 6, at 10 o'clock a. m., reaction established ; during the night voided a small quantity of urine.

Convalescence very slow.

N. R., æt. 30 years, male, white, son-in-law, September 6, at 4 o'clock a. m., was taken with profuse diarrhœa, attended with great exhaustion and thirst.

Arrested in five hours by rest in a recumbent posture, and the use of calomel, opium, and bismuth.

W. T. S., æt. 50 years, married, male, white, September 7, was taken with profuse watery diarrhœa, which yielded to rest and treatment as in former case.

F. S., æt. 16 years, single, male, negro, September 7, was taken, about 4 o'clock a. m., with vomiting and purging. He was placed in a spring-wagon and taken one mile to his home.

Cholera was fully developed in this case ; by 5 o'clock p. m. was collapsed, and died at 2 o'clock a. m. of September 8th.

J. R., æt. 1 year, white, female, grandchild, on the 9th of September was taken at 5 o'clock a. m. with vomiting and purging ; went rapidly into collapse, and died at 8 o'clock p. m. of same day.

I. S., æt. 14 years, white, male, September 13 attacked about 4 o'clock a. m. with premonitory symptoms, which threatened to become severe, but yielded to calomel, opium, and bismuth, and rest.

S. S., æt. 16 years, white, female, September 14 attacked about 3 o'clock a. m. with premonitory symptoms, which yielded to the treatment as in former case.

The district in which this family live has always been considered healthy. The water-supply was good. No local causes could be discovered. The family were in easy circumstances.

CASE 15.—*Reported by N. G. Leake, M. D., of New Haven, Ky.—History of the Wheeler family—Cholera—Three deaths.*

T. W., æt. 20, male, white, at 8 o'clock a. m., August 20, had a large rice-water discharge from the bowels ; vomiting of the same character

and cramps in different parts of the body followed immediately. In an hour, the pulse had disappeared at the wrist; the extremities became cold, and the entire body was bathed in a cold sweat; intense thirst; tongue and breath cold; urine suppressed. At 1 o'clock p. m. was fully collapsed; pulsation at the carotids was scarcely perceptible; the features were pinched and changed; the skin of extremities wrinkled. Sinapisms were applied to the surface of body and extremities; dry heat. Stimulants and full doses of quinine, camphor, capsicum, and strychnia were exhibited.

At 5 o'clock p. m. died.

Two other cases in the same family, one a female and the other a male, were attacked the same day. The onset of the disease was violent in each case. In one, death occurred in fifteen hours; in the other, in ten hours. This family lived some eight miles from a physician. Several hours elapsed before they could be visited professionally, and in each case the patient was *in articulo mortis* when first visited.

CASE 16.—*Reported by N. G. Leake, M. D., of New Haven, Ky.—Cholera—Second stage—Recovery, with abortion.*

Mrs. M. C., æt. 25 years, two months pregnant, was attacked late in the evening of September 8 with copious watery discharges. In two hours from their occurrence, violent vomiting and cramping took place, and the symptoms of the second stage were quickly and perfectly developed. It being impossible for the case to be seen at that time, Dr. L. prescribed—R. Quiniæ sulph., capsicum, camphor, and calomel, āā gr. xij; morphia sulph., gr. j, divided into four powders, one of which to be given every hour until the violence of the symptoms should subside. Chloroform, gtt. v; tinct. capsici, gtt. xv; tr. opii, gtt. v; creasote, gtt. j; oil cloves, gtt. iij, suspended in mucilage, to be given every fifteen to thirty minutes until no longer indicated. Sinapisms, dry heat, and crushed ice.

September 9, at 4 o'clock a. m., the patient much depressed; very frequent and feeble pulse; extremities cold; body bathed in cold sweat; skin of extremities corrugated; thirst intense. Vomiting had ceased, but the dejections were constant and involuntary. All these discharges were of pure rice-water. The amount of calomel and quinine was reduced to gr. ij each, and with this exception the powder of the previous night was exhibited every hour until reaction was established. The symptoms gradually subsided, and by 6 o'clock p. m. the reaction was complete. Powders given at intervals of two hours.

September 10, improving very slowly; some indication of the disease still present. Urinary secretions re-established early in the day. Powders continued at intervals of four hours.

September 11, fully reacted. Prescribed quinine, gr. xij; camphor, gr. xviij, divided into six powders; one to be given every four hours.

September 12, the patient aborted. Placenta removed with difficulty. Recovery slow, but perfect.

CASE 17.—*Reported by S. T. Chandler, M. D., of Campbellsville, Ky.—Cholera—Second stage—Recovery.*

H. H. C., æt. 16 years, male, white, visited the town of Lebanon on the 31st of August, and indulged to some excess in water-melons was on the following day attacked with a slight diarrhœa, which continued in spite of treatment until the 2d day of September, at 7 o'clock p

m., when the diarrhœa became violent, attended with severe vomiting and cramps. All the symptoms of the second stage of cholera were rapidly developed. Sinapisms and dry heat were applied, and calomel and morphia were exhibited, but little relief was obtained.

September 3, at 3 o'clock a. m., was placed upon the use of dil. sulphuric acid, with an immediate subsidence of the violence of his symptoms. Quinine was substituted for the calomel; sinapisms and heat continued. The dil. sulphuric acid was freely used with the effect of relieving the nausea and intense thirst. Reaction was established by a perseverance in this treatment, but convalescence was extended over seven or eight days.

Three young ladies of the same family were attacked on the 3d of September with the premonitory diarrhœa, but, by the free use of dil. sulphuric acid, the disease was arrested. Each of these three cases would, in Dr. Chandler's opinion, have terminated in an acute attack of cholera but for the early treatment which their cases received.

CASE 18.—*Reported by D. O. Polin, M. D., of Springfield, Ky.—Cholera—Fully developed—Three deaths.*

1. L. T., negro, æt. 50 years, attended Marion County fair. Was taken during the night of August 30 with diarrhœa, which passed rapidly into second stage of cholera. At 9 o'clock a. m. of the 31st was fully collapsed, and died at 4 o'clock p. m. of the same day.

2. Dr. M. L., æt. 50 years, was attacked with choleraic diarrhœa September 3. Had eaten freely of fruit, and drank a quantity of new cider. The diarrhœa continued during the day and succeeding night, and at 9 o'clock a. m., September 4, the symptoms of the second stage were fully developed. At 2 o'clock p. m. was fully collapsed. Up to that hour had resisted all treatment. Symptoms powerfully marked. Atropia was actively used, with a strong ammoniacal solution, both hypodermically, but without favorable results. September 5, at 10 o'clock a. m., died.

3. Mrs. N. R., æt. 23 years, a daughter of above, was attacked September 7, at 9 o'clock a. m., with vomiting and purging. Was placed upon calomel, gr. iij, opium, gr. ss, which was repeated every two hours until three doses had been taken. After first dose had one large "pure rice-water" dejection, which was not repeated for thirty-six hours. She was never fully collapsed. Her pulse was always perceptible; but from the time of the dejection on the 7th, there was complete suppression of urine, which lasted a period of sixty-six hours. Every effort was made to re-establish the urinary secretion; she gradually became comatose, and died in seventy-two hours after the onset of the disease.

It is interesting to note that all the white members of this family and several of the negroes employed were taken with fully-developed cholera. One or more of these cases are reported in detail elsewhere, having been under the care of different physicians. The results were five deaths and two recoveries. All the persons attacked had attended the Marion County fair.

CASE 19.—*Reported by William Berry, M. D., of Louisville, Ky.—Cholera—History of the Singleton family—Death—Recovery.*

On Tuesday, August 19, Captain Singleton, a resident of Lancaster, together with his wife and four children, all grown, moved to the country, about five miles, and lived with his son-in-law, Clayton Finley, leaving his son, Hunley Singleton, to care for his property in town.

Said son was complaining at that time of slight diarrhœa. A few days thereafter he followed his father to the country, and on Monday, August 25, was attacked with vomiting and purging large quantities of rice-water discharges. Husky, whispering voice; cold skin, and cramping in the extremities and abdominal muscles, together with almost entire suppression of urine. At this time, he was seen by Dr. O. P. Hill.

"On Tuesday I saw him, with Dr. Pettus, at which time no urine had passed for nearly twelve hours. He had reacted, and at that time his pulse was small and 90 to the minute, with hot, dry skin, and great thirst, but vomited everything. All purging had ceased. Dr. Pettus saw him on Wednesday. A catheter was passed, but only a few drops of urine found. He was then given infusion of digitalis and spirits of nitre, and had cloths wet with hot water placed on the hypogastrium, and in a few hours passed about a pint of urine; after which he began to improve, and was able to be up on Saturday."

"About the same time, John R. Singleton, a grandson of Captain Singleton, and who had been in town on a visit of several days, returned to the country, and was attacked with vomiting and purging rice-water, with some evidence of cramp. Was treated by Dr. Pettus, and recovered in three days. His voice was husky and urine scanty."

"On Sunday, August 24, Mattie Singleton, who had moved with her father to the country, was attacked with purging; light-colored watery stools and vomit; scanty urine and weak voice. Some cramping in the legs. Was treated by Dr. Pettus, and recovered in about a week."

"About the same time, George Singleton was attacked with vomiting and purging; yellow-looking watery discharges; scanty urine, and husky voice. Great nausea. Pain in legs, but no decided cramps. Was treated by Dr. Pettus, and recovered in a week."

"On Tuesday night, August 26, Mrs. F., a daughter of Captain Singleton, but who had removed from the house in which the cases previously noted had occurred, (having used the same infected privy as the rest of the family for a week previous to her removal,) was attacked about 11 o'clock, and died in eighteen hours, with fully-developed symptoms of cholera. She had been unwell on Saturday and Sunday, but was well enough to do some washing on the day she was attacked. This was the only case that had cholera in the county that had not been to town, of which I could hear during the two weeks I remained in Lancaster."

"On Thursday, John Singleton, who had nursed Hunley Singleton, his brother, had diarrhœa, which lasted one day. He also passed but a small quantity of urine on that day."

"On the same day, Clayton Finley returned from the grave of his wife with cold skin, sweating on face and hands, and complaining of feeling very cold. Had cramps in all his limbs and in some of the abdominal muscles. Had no vomiting or purging, but had considerable nausea. He was treated with sulph. atropia, gr. $\frac{1}{40}$, hypodermically. Had no other medicine. Was convalescent in twenty-four hours."

CASE 20.—*Reported by F. Paschal, M. D., of Louisville, Ky.—Cholera—Fully developed—Death.*

P. F. K., male, white, æt. 28 years, single, nativity and occupation unknown, was admitted into the Louisville City hospital on July 23 at 7.15 p. m. He had arrived two days previously from Elizabethtown Ky., where the cholera was prevailing at the time he left. He stated

that two days before his admission he had been drinking quite hard; had a slight diarrhœa for two days; had not eaten anything for twelve hours; and had slept the night previous in the open air. On the morning of July 23, was taken with vomiting and purging. When admitted to hospital, his eyes were sunken, surfaces were cold and clammy, pulseless; thirst intense; severe cramps down the thighs and legs; subsultus tendinum marked; voice shrill and weak; urine totally suppressed; nausea and vomiting. He had no operation after admission.

At 7.20 o'clock p. m., temperature at axilla 96°; in rectum 99°. Sulph. morphia, gr. ¼, given hypodermically.

At 7.40 o'clock p. m., gave him, in same manner, $\frac{1}{16}$ gr. sulph. morphia and $\frac{1}{30}$ gr. atropia.

At 8 o'clock p. m., cataplasms of mustard applied to abdomen and lower extremities.

At 9 o'clock p. m., pulse could be felt for the first time, beating 120 to the minute.

At 9.30, temperature in axilla 99½°; in rectum 101°; and at 10 o'clock he commenced sinking rapidly. Five minutes before death, which occurred at 11 o'clock p. m., his respirations were, 1st minute, 20; 2d, 15; 3d, 12; 4th, 6; 5th, 1 deep inspiration. After death, muscular contractions were very marked.

CASE (21) *of Asiatic cholera brought from Evansville, Ind., to Louisville, on the 8th of June*, 1873—*Reported by Dr. J. A. Metcalf, of Louisville, Ky.*

"John Rankin, æt. 29 years, a native of Indiana, arrived in Louisville June 8, 1873, at 5 a. m., after a trip from Terre Haute, Ind., via Evansville. Was taken sick with vomiting and purging at 5.30 a. m., half an hour after arrival from Evansville, where there were cases of cholera. The above symptoms continued increasing in severity until 5.45 a. m., when he was so much prostrated as to be forced to lie down on the sidewalk. He was brought to the city-hospital a short time afterward by the police. When I first saw him, he had very much the appearance of a cyanotic child; his extremities were cold; and there was profuse sweating, principally of the hands and feet. He had a peculiar, anxious stare, which, however, soon passed away. He was put to bed after a warm bath, (being filthy when taken to the ward,) and tr. opii, gtt. xl, administered, which checked the purging immediately. The vomiting continuing, I gave him small bits of ice instead of water, which he begged for constantly. Every two minutes, there were well-marked spasmodic contractions of the muscles of the entire body; gave him hypodermically morphia sulph. gr. ¼, with sulph. atropia, gr. $\frac{1}{60}$, gradually increasing both. Had one action from the bowels half an hour after admission. He was ordered the following mixture:

"℞. Chloroformi, f℥iij.
Tr. capsici, tr. opii, āā f℥ij.
Aquæ camphor., f℥iij.
Acaciæ pulv., ℥ij.
Mix. ft. sol.
A dessertspoonful every two hours until easy; then as needed.

"After taking of this mixture two doses, the bowels were perfectly quiet. There was excruciating pains during one of the crampings, and the nurse gave him tr. opii, ℥ss. After this, at 9.30 a. m., the cramps seemed almost confined to the inner side of the thighs and the whole of the arms. His face was wet, and as cold as if it had been bathed in

ice-water. Cataplasms of mustard were applied to the abdomen and inner side of the thighs.

"June 8, 11.30 o'clock a. m., the cramps are very much less severe from the subcutaneous use of morphia sulph., gr. $\frac{1}{2}$, and atropia sulph., gr. $\frac{1}{30}$. He constantly spoke of his condition in the most indifferent manner, saying if he 'recovered from this attack, which he did not think he would, he wanted his feet cured;' there being ulceration of the stumps, after Hayes's operation through the tarso-metatarsal articulations. At 3 o'clock p. m., patient's respiration assumed a gasping character, and he gradually became worse and died at 4.37 p. m.

"There was complete suppression of urine from the first. The fingers were of the peculiar shriveled appearance characteristic of this condition. This case was treated by Dr. Frank C. Wilson and myself. It was seen by a number of medical gentlemen, all of whom were of the opinion that there was no doubt of its being genuine cholera of the Asiatic type."

CASE 22.—*Reported by Turner Anderson, M. D., of Louisville, Ky.—Cholera—Fully developed—Death.*

W. R., æt. 56 years, male, white, single, subject to paralysis agitans for seven years, was attacked June 16 with diarrhœa, at 5 o'clock a. m. No medical aid was called until 11 o'clock a. m., when he was found fully collapsed; livid; cold tongue; profuse perspiration; complete suppression of urine; shriveled hands; great restlessness; intense thirst. Vomiting and purging were arrested. Saw him about 12 o'clock m. Treated by albuminous drinks; injections of tepid water. Died at 4 o'clock p. m., without having made any effort at reaction.

CASE 23.—*Reported by Turner Anderson, M. D., of Louisville, Ky.—History of Bauer family.*

Residence on south side of Green street, between Fourteenth and Fifteenth. Frame cottage, low and damp; kitchen floor several inches below the surrounding ground. No provision for drainage. Privy, wash-house, and coal-shed under one roof, and all in dirty condition.

Family consisted of mother, two single daughters, two married daughters with their husbands, and two grandchildren. On the 30th of July, at 11 o'clock p. m., was called to see a married daughter, Mrs. G. Found her with vomiting, purging, and cramps. The attack was sudden and without any known cause. Morphia was exhibited, hypodermically, and quinine, gr. v, ordered for every second hour. This treatment was followed by the relief of all symptoms, and in forty-eight hours she was out of bed. On the 22d of August, this lady went to Bowling Green to visit her husband, who was detained by business in that city. On the 25th, while in Bowling Green, she was taken with cholera, and died after twelve hours' illness. Her body was brought to Louisville to her mother's house on the 28th prior to burial. The coffin was opened, and the remains viewed by her friends.

On the 2d of September, the child of Mrs. G., two years of age, was taken with vomiting and diarrhœa, which were attended with great prostration. Treatment: albuminous drinks, soda, morphia, and mint-water. Recovered. Quinine was used for several days.

September 4, was called to see one of the single daughters (æt. 14 years) at 7 o'clock a. m. Found that she had been taken ill at 5 o'clock

a. m. When first visited she was fully collapsed, and died at 1.30 o'clock p. m.

The same day, a child of Mrs. G., four weeks old, was taken with cholera, and died in forty-eight hours.

September 6, the second married daughter, Mrs. A., was taken with cholera at 10 o'clock p. m., after a slight premonitory diarrhœa, and died within twenty-four hours.

All the remaining members of Mrs. Bauer's family (after the death of Mrs. G.) took quinine in decided doses, except Mrs. A., who was afraid to do so from the fact that she was seven months pregnant. All the other members of the family had more or less diarrhœa, and suffered severely from fright, but all escaped the disease.

CASE 24.—*Reported by Dr. S. A. Foss, of Jefferson County, Ky.—Cholera —Death.*

Mathias Hahn, native of Würtemberg, Germany, æt. 68 years, farmer, married, in comfortable circumstances; residence eleven miles south of Louisville, Jefferson County, on right bank of Bearcamp Creek, bed of which had been dry for three weeks, and south of Pond Creek five hundred yards. Elevation of dwelling 45 to 50 feet above bed of nearest stream. Stable 150 feet south of house. Drinking-water from well 15 feet deep, situated 50 feet north of house, and protected from surface-drainage. Water soft. No privy on premises.

After slight supper, retired. Slept well till 12.30 a. m., August 17, when he awoke with desire to purge. Had seven stools of thin fecal matter in two hours and a half; stools then became watery, apparently containing bile; passages every 45 or 50 minutes for two hours, when they assumed a rice-water character. Had six rice-water dejections up to 12 o'clock m., when I saw him. Pulse 92, very feeble. Surface blue, cold; features pinched, hands and feet shriveled; bathed in cold perspiration. Tongue nearly clean, cool, lessened. Respiration 30. Voice husky. Since 9 a. m., cramps in muscles of abdomen and extremities almost constant. Thirst not great. Did not complain of feeling hot. Complained of mustard on extremities, but jugs of hot water pleasant. Insisted that he had voided urine frequently up to 9 a. m.; passed none after I saw him. Had only one stool of about 8 ounces "rice-water" after I saw him. He declined steadily; pulse barely perceptible at 6 p. m., extinct at 9 p. m. Died at 12.30 a. m. August 18. Mind clear throughout illness. Cramps ceased 30 minutes before death.

Hahn had not been near or in contact with any person suffering with disease for weeks; had habitually slept in second story of house, which was occupied by self and wife only. Six persons, aged from 15 to 70, assisted in nursing him; none were attacked with the disease.

CASE 25.—*Reported by Dr. S. A. Foss, of Jefferson County, Ky.—Cholera —Death.*

"M. Russell, negro, æt. 55 years, farm-laborer, married, loaded his farm-wagon on the evening of August 17; took supper; was unusually cheerful; slightly intoxicated; slept well till 1 a. m. August 18, when he was awakened to go to market. Said he did not feel very well, turned over, and began to vomit. Purging immediately followed. Both continued at short intervals, accompanied by cramps in voluntary muscles. Thirst urgent; complained of great heat, and died in three hours from commencement of attack.

"This man resided eight miles south of Louisville, on east side of Salt River turnpike. House one and one-half story log; sanitary condition better than usual for that class of people. No stagnant water within half a mile. Drinking-water brought one-third of a mile, from a well fifty feet deep to coarse sand and gravel. One hundred people using same well with no bad effect. No stable or privy on premises. Ground thoroughly dry under and around the house. Russell had been in the habit of visiting the Louisville market weekly. He slept on first floor of house.

"Two people in contact with him during illness, six after death; none were attacked with disease. The locality where these cases occurred is decidedly malarial, but there have been fewer cases of malarial disease this autumn than since 1854."

History of a case of cholera, by Assistant Surgeon Charles Styer, U. S. A.

Edgar M. Cummings, private Company E, Second United States Infantry, æt. 21, admitted to post-hospital, Chattanooga, Tenn., June 23, 1873.

Was admitted to hospital at 8 p. m., at which time he was first seen. He stated that he had slight diarrhœa for several days, but not severe enough to induce him to apply for treatment. During the afternoon, he had been working, assisting in repairing a gun-carriage, and felt pretty well up to sunset. Shortly before I saw him, the diarrhœa had become worse, and he had cramps.

When I saw him in the barracks at the above hour, he was lying in his bunk with his limbs drawn up, and complaining of severe cramps in legs and arms. Pulse at the wrist barely perceptible, and sweating profusely. I ordered his immediate removal to the hospital, where he had to be carried.

I then found his legs up to the knees and his arms to the elbows were of dark-purple appearance, and no pulse perceptible in radial or tibial. The skin felt doughy and clammy, and the capillary circulation seemed to have entirely ceased. The cramps were of terrible severity, the countenance anxious, and the eyes sunken. His thirst was extreme, but there was no vomiting, nor was there any up to his death, although there was considerable retching. The symptoms indicated cholera; and, as this disease was reported in the town of Chattanooga, I so diagnosed the case.

I ordered pulv. opii, gr. j; calomel, gr. iij, mixed, which dose was repeated at 9 p. m., and again at 12.

June 24, but little change took place until 2 a. m., when he became more easy and fell alseep. During this time, the cramps had been incessant. Turpentine and chloroform were used freely externally, and also hot blankets dry.

I saw him again at 6 a. m. The attendant reported that from 2 to 6 he had slept at intervals, the cramps had not been troublesome, his stools had been infrequent; there was, however, no change in his general condition. His answers to questions were coherent and his mind rational, but the circulation in the limbs showed no sign of returning.

The discharges during the night were characteristic of cholera in color, consistence, odor. Mustard had been used freely all night externally over the whole surface of the abdomen. At 8.30 a. m., he rallied, seemed better than he had been during the night, and asked for a cup of tea. In about ten minutes, when the tea was made, he was utterly speechless, unable to swallow, and comatose, evidently dying.

Death occurred about 9 a. m., (24th.) There was no true collapse until just before death. At 6 a. m., I thought his recovery probable; at 8.30, I considered him out of danger; and at 9 he was a corpse.

I learned subsequently that, on the 23d, this man had eaten largely of unripe blackberries and had drank enormous quantities of water. He never indulged in alcoholic drinks, and was one of the most robust men in the garrison. He had not been to the town of Chattanooga for several days.

Case reported by Dr. Edgar, of Saint Louis, Mo.

Mr. P., æt. 62 years, merchant, remained late at his store on Fifth street, between Olive and Locust, actively employed until 11 o'clock, when he complained of feeling too tired to go to his dwelling on Pine street, between Eleventh and Twelfth. Having a bed in one of the upper stories over the store, he retired on that a little before 12 o'clock at night. At about 2 a. m. he was called up to the water-closet, which was in the building, hence the character of the stool was not known further than that it was "thin as water;" from this time until 6 o'clock in the morning he had six more stools, all of the same character, during which time nothing had been taken, except a spoonful of brandy occasionally with the water he drank. He now, at 6 o'clock, vomited freely a liquid thin as water, after which he was so exhausted as to alarm his clerks, who were with him, and who procured a carriage and removed him to his residence on Pine street, as above. A few moments after his arrival, about 6½ o'clock a. m., I saw him, and the stool which had just passed him, which was copious and rice-water in character; also the vomited matter was similar; skin cold, and covered with perspiration; no discharge of urine since the attack; cramps were slight, voice husky and feeble. The patient was placed on a mattress, head low, extremities at once enveloped in flannels wrung out of hot mustard-water; also the same were placed over the bowels and chest. Pounded ice, with a few drops of whisky, was fed to him almost constantly; and twenty drops of the following recipe, commonly known as Hartshorn's mixture, was given every fifteen minutes, viz:

℞. Chloroform,
Tr. opii.,
Tr. camphor,
Arom. spts. ammonia, aa ℥iss.
Creosote, gtt. iij.
Oil cinnamon, gtt. vℨj.
M. Spts. vini gallici, ℥ii.

S. Dose, 20 drops every 10 or 15 minutes until relieved.

The mustard-fomentations were kept up faithfully, and all the ice allowed that was desired.

The vomiting continued more or less for an hour, the intervals of relief being prolonged until it ceased; also, but one discharge took place from the bowels after the first portion of medicine was taken. As a slight acid odor seemed to come from the vomited matter, *chalk* was added, five grains to each dose, until thirty grains had been taken. As the circulation improved (the pulse having been 60 and small) and the surface became warm, he was wiped dry, and lightly covered with a blanket; no food allowed for twenty-four hours after the vomiting ceased, only ice and brandy in small quantity, and not the slightest muscular effort permitted. Convalescence commenced about twelve

hours after the attack, and about six hours after treatment was commenced. Although I have had patients to die under the above method of treatment, I am confident my success has been better with it than by the mercurial or any other method I have tried. I keep the medicine ready prepared, as it takes time to put it up, and particularly to get a clerk up at night to prepare it. The case I have reported was a well-to-do merchant, living in a clean, healthy part of the city. The vessels receiving the dejections from his body were provided with disinfectants liberally. No other case occurred in the house, or store where some ten or twelve clerks were employed; and I don't remember to have had a case during the season where a second case followed in the same family or house, except in one case where they used *water from a well* near the house, in a densely-populated part of the city. On my first visit to this house, several of the family had premonitory symptoms. I warned them not to use the well-water. They all recovered; but the father, who thought it a mistake about the water, and drank from the well, relapsed a third time, when he narrowly escaped death, but satisfied himself finally that it was the well-water.

Cholera case at the Cook County hospital, Chicago, Ill.

Name and age, Amelia Bazseler, fourteen years; nativity, Germany; diagnosis, cholera; admitted July 5, 1873; died July 6, 1873.

Ten days ago, the patient and family arrived from Germany. Soon after arriving, settled in a portion of the city in which they were obliged to drink surface-water. Father, mother, and one sister soon died of cholera morbus, or, perhaps, the cholera.

July 5, patient admitted about 4 p. m.; was taken with diarrhœa and vomiting during the morning. Had five dark-brown stools during the afternoon, and six during the night; the stools all the time becoming lighter.

July 6, rested none last night; had incessant calls for water. Had a stool about 6 o'clock this morning, and another about 8 o'clock. These stools were watery in consistence, resembling rice-water. Vomited frequently during the night. The vomited matter was green in color, and a great portion of it was what she drank. Patient manifested considerable uneasiness during the night, throwing herself from one side to the other, and troubled with cramps in the extremities. This morning (9 a. m.) patient looks dark and hollow about the eyes; extremities purple and cold; tongue covered with a yellow fur, through which the *papillæ* appears; drinks much, but soon rejects it.

Ordered the following: Tr. capsici, oz. ij; tr. camphoræ, oz. ij; tr. opii, oz. j; syr. simp., add oz. ij; M.; S.; drachm j, every three hours; also, fifteen grs. of bismuth and five of piperine, every hour; morphia hypodermically; hot bottles to the extremities. Pulse 148; temperature 96½; respiration 26. A murmur is heard in the base of the heart, accompanying the first sound. During the middle of the day vomited but little. Soon after taking the above medicine, the patient's extremities, which were cold, became warmer, and she began to perspire, but was still troubled with cramps in the lower portion of right leg. Called frequently for water. Afternoon, the extremities again became cold; pulse almost imperceptible, beats about 120 per minute; eyes sunken, dark color around the lids; lips very purple. She now (2 p. m.) became quiet, and was sinking; had one stool in the afternoon; sank and died about 4 p. m.

Notes of treatment.

NOTE I.—Dr. F. R. Alpuente, of New Orleans, reports a case in which chloral hydrate was exhibited with most satisfactory results. The vomiting and purging was arrested, a sleep ensued, during which convalescence was established.

NOTE II.—Dr. George T. Trezevant, of Tullulah, La., reports that the treatment adopted by him consisted of mercury, opium, and astringents, bromide and chlorate of potash, ammonia, chloroform, carbolic acid, stimulating embrocations, dry heat. During convalescence, alterative doses of mercury with ipecac and digitalis.

NOTE III.—Dr. S. Allen, of Centreville, La., reports the treatment employed was dry heat to extremities, ice-bag to spine, small but frequent doses of calomel, iced water *ad libitum*. When the preparations of opium were used, they were exhibited hypodermically. Dr. Allen reports the recovery of a female, five months pregnant, under this treatment, without miscarriage.

NOTE IV.—Dr. C. P. Whitehead, of Transylvania, La., reports his treatment to have been morphia, calomel, and iced water.

NOTE V.—Dr. James Johnston, of Denison, Texas, reports the recovery of a male from profound cholera collapse, after "enormous" doses of strychnia had been administered hypodermically.

NOTE VI.—Dr. Edward S. Frost, of Willmar, Minn., reports that the only cases among the Norwegians who recovered (two in number) were treated with tincture of catechu and opium at the commencement of the attack.

NOTE VII.—Dr. Le Grand G. Capers, of Vicksburgh, Miss., reports a case of pronounced cholera, in which, by the use of frictions, ice to the spine, morphia, capsicum, and calomel internally, atropia and quinine hypodermically, the patient reacted slowly. The note reads: "Commenced to react at 2 o'clock p. m. Left patient a 7 o'clock p. m.; reaction then apparently complete; pulse 105; respirations 23; face flushed; surface warm and apparently about 101°; no action on bowels since 2 o'clock p. m.; stomach perfectly quiet; urinated freely; regarded the case as safe; discontinued all medication; ordered absolute quiet, and a light broth to be taken if desired. On calling the next morning, found patient had slept comfortably until 10.30 o'clock p. m., when he had been suddenly aroused by a return of active symptoms, and died about 11 o'clock p. m., half an hour later."

NOTE VIII.—Dr. P. T. Baley, of Jackson, Miss., reports that the disease was easily checked in its early stage, when opiates, astringents, and mercurials were used. Absolute rest in the recumbent position was the most important aid to any treatment. In some cases, dilute sulphuric acid, with tincture of opium, was of advantage.

NOTE IX.—Dr. J. A. Tillman, of Deer Creek, Miss., writes: "The use of chloroform and camphor, as was recommended by Dixon, was unsatisfactory; and we relied almost exclusively upon mercurials, opiates, astringents, and stimulants, as the symptoms presented themselves."

NOTE X.—Drs. Felts and Palmer, of Osceola, Ark., report the successful employment of calomel, opium, and camphor in combination, and that chloroform or chloral hydrate, exhibited as stimulants, were more efficacious than alcohol in any of its forms. These gentlemen note the extreme difficulty of procuring efficient disinfection in country practice, from the isolation of families as well as from the apathy or penuriousness of individuals. Dr. Palmer obtained satisfactory results from a combination of morphia and chloral hydrate when used hypodermically, and notes the occurrence of several deaths from the injudicious use of opium.

NOTE XI.—Dr. H. P. Crute, of Chicot, Ark., notes the necessity of treating the disease when in the stage of the prodromata. Used chloral hydrate with most decided relief of four patients when fully collapsed. He was induced to exhibit the remedy on account of the extreme restlessness of his patients, and the results were so satisfactory that the doctor regretted his not having used the remedy more freely during the epidemic.

NOTE XII.—Dr. J. R. Dale, of Little Rock, Ark., reports that quiniæ sulph., tinctura ferri chloridi, tinctura opii, and brandy gave more satisfaction than any other combination of remedies.

NOTE XIII.—Dr. R. W. Mitchell, of Memphis, Tenn., writes: "When satisfied that I had cholera to contend with, as indicated by rice-water discharges, vomiting, cramps, and shrinkage of extremities. I ceased medication by the stomach, and used the formula given hypodermically:

"℞. Acidum sulphuricum, ℥ss.
Morphia sulphas, gr. ½
Spt. vini gallici, ℥iss.
Aquæ dist., ℥iij. M.

"The above was injected under the skin of the arms, legs, and over the stomach every hour until the symptoms of the disease were relieved."

NOTE XIV.—Dr. T. D. Johnson, of Clarksville, Tenn., reports the general treatment adopted was, internally, calomel, opium, and capsicum, with stimulants; externally, sinapisms, frictions, and heat.

NOTE XV.—Dr. G. B. Thurston, of Memphis, Tenn., writes: "The general treatment that I adopted was about as follows: Calomel and opium in alterative doses, say in two of the former to one of the latter, repeated every hour for several hours. In conjunction with this, used the following:

"℞. Ext. canabis indica, gr. xvj.
Gum camphor, ℥ss.
Chloroform, ℥ss.
Ol. terebinthium, ℥ij.
Mucilage accacia, syrup simplex, āā. ℥ss.
M. Aquæ cinnamomi, ℥i.

"S. Dose, a spoonful every one or two hours."

NOTE XVI.—Dr. J. T. Jones, of Nashville, Tenn., reports that, in the cold stage of cholera, he has used creasote with greater success than any other article of the materia medica, and suggests the following formula:

℞. Creasote, gtt. j.
Aquæ camphoræ,
Infus. gentian. comp., āā. ℥vj.

M. At a dose, and repeated every two hours.

Dr. Jones relies upon calomel, opium, camphor, creasote, and ice in the treatment of cholera, and deprecates the practice of loading the patient with bed-clothing in the vain hope of restoring surface-heat.

NOTE XVII.—Dr. W. F. Glenn, of Tennessee, reports that, when called at the inception of a case of cholera, he gave 30 or 40 drops of laudanum, and calomel, gr. ij, with camphor, gr. j, as frequently as required. Dr. Glenn states that whenever the dejections became rice-water in character, he never knew the exhibitions of opium to be of any benefit. In the stage of collapse, ice, iced water, and stimulants, in as large quantities and as often repeated as the patient could bear; but states that but two patients recovered who had become collapsed.

NOTE XVIII.—J. M. Meyer, M. D., of Boyle County, Kentucky, reports: "In regard to the treatment of the cholera-cases that occurred under my care, in the first three cases, I was called to see them at the earliest indications of disease; they all had copious stools, which were assuming the 'rice-water' aspect; strength giving way; thirst intense; some tendency to cramp. Ordered perfect rest in horizontal posture; warm clothing; *no frictions;* frequent potions of a strong solution of soda, hydrg. submur., and opii pulv., āā gr. j, to be repeated as often as necessary until the stomach became tolerant; then added quinine, gr. ij, and to be then repeated every two or four hours, as required. As soon as any discoloration made its appearance in the stools, the calomel to be omitted. *Water absolutely forbidden*, but cracked ice to be freely used.

"The fourth case had progressed further when first seen. The cramps were more positive, and the evacuations were clear and perfectly free from smell. The same general plan of treatment was more vigorously applied. Not having the means to give a full warm bath, I ordered light blankets soaked in hot water doubled, so as to cover the entire chest and bowels, wrung as dry as possible, and applied closely to the body, with warm covering; dry heat to the extremities; ice freely given. This case, although yielding to treatment, lapsed into secondary fever, which continued about ten days.

"The fifth case had progressed still further when first seen. Diarrhœa, which had existed during the previous day, became violent about midnight. He purged and cramped fearfully. Symptoms became all fully developed. The means already indicated were vigorously used. Morphia, gr. ¼, was given hypodermically, and this was repeated in an hour. In two hours' time, the violence of symptoms seemed to subside, and he was inclined to sleep. The symptoms, however, were again vigorously developed, and the case died in a few hours.

"Some time after death, the muscular irritability was distinctly visible."

NOTE XIX.—S. P. Craig, M. D., of Stanford, Ky., in conclusion of report of epidemic in Lincoln County:

"The following plan of treatment of the initiatory stage of cholera has, I think, presented better results than any other I have tried.

"Rest absolute and prolonged; hypodermic use of morphia repeated as often as may be indicated; calomel and camphor in sufficient doses; dry heat to surface of body and extremities. I have tried the sulphuric-acid treatment in two or three cases, with no good results."

NOTE XX.—L. D. Knott, M. D., of Bradfordsville, remarks upon his report: "Three of the fatal cases reported were fully collapsed, and

so nearly dead when I first saw them that no treatment was adopted. Calomel was freely exhibited; creasote and plumbi acet. were found of value as affecting the vomiting and purging; chloroform was useful for the cramps; and opium, bismuth, tannin, and sulphuric acid were freely used."

NOTE XXI.—D. O. Polin, M. D., of Springfield, Ky., reports that, during the continuance of epidemic cholera in Washington County, he obtained no results which encouraged him to place faith in the prophylactic effects to be obtained from the exhibition of quinine; nor did he obtain beneficial results from the use of atropia. He obtained good results from the use of veratria and dilute phosphoric acid.

In the cases which had not advanced beyond the stage of acute diarrhœa, when seen early enough, always found the exhibition of calomel and opium to be efficacious.

NOTE XXII.—I. B. Evans, M. D., of Riley's Station, Ky., reports that during the months of July, August, and September, nearly all the families in his practice suffered from malarial causes. Most of the cases of cholera seen by him had attended the Marion County fair, and nearly all had eaten freely of fruits, &c. In the treatment of cholera, Dr. Evans relied upon calomel, in doses of from grs. iij to grs. v, and the hypodermic use of morphia; dry heat, acid drinks; ice-water *ad libitum*. Discarded stimulating embrocations, but sponged the body freely with ice-water.

NOTE XXIII.—N. G. Leake, M. D., of New Haven, Ky.: In the majority of cases which came under the observation of Dr. Leake in the town and vicinity of New Haven, Ky., there was premonitory diarrhœa of a day or two before the violent symptoms occurred.

In all the cases that terminated fatally, uremic coma was fully developed in from fifteen to twenty hours. All the cases reported were the subjects of suppression of urine.

NOTE XXIV.—W. T. Chandler, M. D., of Taylor County, Ky.: cholera; four cases; two recoveries; two deaths.

In reporting four cases of cholera which occurred near to the Muldraugh Hill tunnel of the Ohio and Cumberland Railroad, Doctor Chandler remarks that these cases were preceded by many cases of cholera-morbus and dysentery. The cases were isolated and at no time had come in contact with each other. They had all been residents of the "Hill" for some months, and neither of the four cases had been under any treatment for the premonitory diarrhœa. He reports many cases of acute diarrhœa which occurred among the employés of the railroad-company. All who applied for treatment at the commencement of the attack recovered. Great reliance was placed on the free use of dilute sulphuric acid.

NOTE XXV.—Dr. James A. Carr, of Kentucky, reports that the remedy most relied on in the treatment of cholera was opium in combination with camphor and calomel; and that, if used in sufficient doses during the stage of premonitory diarrhœa, the disease was most effectually checked. The exhibition was made in the form of pills, each containing opium, gr. j; calomel, gr. ij; camphor, gr. iij. Dr. Carr states that although he frequently gave as many as four of these pills after each dejection, in no instance was narcotism induced.

Dr. Carr joins in the opinion that when cholera is prevailing as an epidemic, *every diarrhœa is cholera*, and that in this stage the disease is as readily controlled by opium and calomel as intermittent fever is checked by the use of quinine. Dr. Carr is convinced by his observations that by the use of calomel, the consecutive symptoms of the disease will be far less troublesome. In from eight to ten hours after a choleraic diarrhœa has been checked by the use of opium and calomel, Dr. Carr has recourse to castor-oil.

NOTE XXVI.—Dr. B. J. Moore, of Saint Mary's, Ky., reports 19 cases of cholera; 11 recoveries, 8 deaths.

Dr. Moore reports that eleven of the cases had been in attendance on the Marion County fair. Six of these eleven cases terminated fatally. He relied principally upon calomel, opium, and camphor, using chloroform, stimulants, hot baths, and heat as the cases demanded. Nitric acid and opium were also found useful, but opium was used with caution, and not as had been the practice in former epidemics.

NOTE XXVII.—S. T. Chandler, M. D., of Campbellsville, Ky., who treated, during the epidemic of cholera in 1854, some sixty to seventy cases of the disease in its various stages, records his experience as having been largely in favor of the use of dilute sulphuric acid in full doses and repeated every 15 to 30 minutes, until the vomiting and purging are arrested. In the epidemic of the present year, the same plan of treatment was adopted, and with like results. "The acid relieves the nausea, arrests the vomiting like a charm, and gradually the dejections are stopped."

The experience of Dr. Chandler as related in this note and in case 17, taken in connection with the note of his son, W. T. Chandler, and the case (1) of Dr. Jackson, goes far to corroborate the views expressed by Dr. Curtin in the July 12th number of the Medical Times.

NOTE XXVIII.—Dr. John W. Culley, of Lizton, Ind., writes: "Considerable reliance was, by Dr. H., placed on the following:

"℞. Ætheris sulphurici, f℥j.
Tinct. olei cinnamomi,
Tinct. capsici et myrrh., āā, f℥j.
Tinct. opii, f℥ss.
M. Tinct. camphor, f℥j.

"S. Dose, from one-half to one and a half teaspoonfuls every hour, or after each discharge from stomach or bowels.

"This, Dr. H. used in the first stage, and until the discharges were checked. It would not control the discharges in my hands. But one case that reached the third stage recovered. In all cases the urine was albuminous."

NOTE XXIX.—Dr. L. T. Miller, of Caseyville, Ill., reports that during the epidemic of cholera he relied upon opium, calomel, camphor, and capsicum, and that every case to whom this mixture was administered in the early stage of the disease recovered.

Dr. Miller writes: "From my limited experience with cholera, I am satisfied that many cases prove fatal which might terminate favorably if prompt attention was given them. Cholera seems above all others the disease in which 'an ounce of prevention is worth a pound of cure.' Many of my cases might have been cured had the 'looseness of the bowels' been attended to promptly; but, in the majority of the fatal cases, nothing was taken until after the occurrence of the cramps."

NOTE XXX.—Dr. J. J. Fyke, of Odin, Ill., writes: "The cases that died received no treatment until the disease was far advanced. There was scarcely any person in the infected portions of the town who did not have the premonitory symptoms, but the disease yielded readily to treatment when taken in the early stages. Treatment consisted in external warmth, hot cloths, sinapisms; internally, the preparations of mercury, carbolic acid, camphor, quinine, and ammonia. Those which proved most successful were opium, calomel, and camphor."

NOTE XXXI.—Dr. A. K. Van Horne, of Jerseyville, Ill., reports the case of a gentleman who was attacked with cholera after assiduously nursing a son who had died of the disease. As soon as he was taken sick, he commenced taking powders of calomel, opium, camphor, and capsicum. He did not vomit at all, *but the medicine passed through him in a few moments after taking each dose.*

During the epidemic at the town of Lebanon, Ky., a gentleman who was suffering from profuse and watery diarrhœa was given at night by his physician six powders, with directions to take one after each dejection. Having occasion to empty his bowels many times during the night, he went into his wood-shed, and had the dejections upon the light, dry soil. The powders were all taken during the night, each enveloped in a light wafer. At daylight, he found all six powders, still enveloped, lying upon the ground, where they had been passed during the night. In this case, the diarrhœa was with extreme difficulty arrested.

NOTE XXXII.—Dr. F. J. Foster, of Carmi, Ill., reports satisfactory results obtained from the exhibition of creasote and acetic acid.

NOTE XXXIII.—Dr. E. L. Stewart, of Carmi, Ill., found the use of dilute sulphuric acid and tincture of opium to relieve the intensity of the symptoms.

NOTE XXXIV.—Dr. R. E. Young, of Jefferson City, Mo., physician to the State penitentiary, reports that the treatment adopted at that institution consisted of the application of dry heat, dry frictions, morphia exhibited hypodermically, and calomel internally. Under this line of treatment, out of thirty-three cases treated at the penitentiary but three died. Four other cases, who were treated by digitalis hypodermically, all died.

NOTE XXXV.—Dr. John Baker, of Jefferson City, Mo., reports that his treatment of four cases of cholera consisted of calomel and morphia, with sinapisms and turpentine stupes, ice, and iced water *ad libitum.* Of these cases, two died. One of the cases who recovered was salivated.

NOTE XXXVI.—Dr. George B. Winston, of Jefferson City, Mo., notes that in the epidemic "there were some cases without any premonition whatever other than perhaps a psychical influence, strengthened by night and darkness, since it would seem that there was a decided nocturnal preference, or periodicity, in the occurrence of a very large majority of the cases."

Dr. Winston's line of treatment was morph. sulph., gr ¼, dissolved in a teaspoonsful of cold water, with calomel, gr. ij, floating upon the water, repeated after each vomiting, and as soon as the stomach would bear it; quinine, in 2 or 3 grain doses, repeated every two hours for ten or twelve hours.

NOTE XXXVII.—Dr. U. S. Wright, of Fayette, Mo., reports that, becoming discouraged by the unfavorable results which had attended the stimulating methods of treatment, placed a negro man, who had become fully collapsed without receiving treatment, upon full doses of calomel, without combination with any other drug, and adds, "to my intense surprise, he recovered."

NOTE XXXVIII.—Dr. James A. Ward, of Troy, Mo., reports that, in the treatment of the cholera-cases under his care, he gave calomel and opium; used blisters, sinapisms; allowed no ice and but little water, but frequently sponged off the body with iced water, after which friction was made with a coarse towel. Found the following combination of use:

℞. Chloroform,
Spt. ammonia dil., āā, ℥j.
M. Cinnamon-water, ℥iv.

S. Half to be given at a dose, which was repeated every two hours.

The 7,356 cases of which full records have been collected, are presented as representing but a small portion of the actual number of cases which occurred during the course of the epidemic. Several months had passed after the subsidence of the disease before the extended work of collecting material for this report was commenced; and it was found that many obstacles existed to the individualization of a larger number of cases than those herewith presented. The deaths of several medical gentlemen, of much prominence in their respective communities; the devastating floods to which the lower valley of the Mississippi was subjected during the spring of 1874; and the unsettled social condition of a considerable portion of the area of infection, combined to form the principal obstacles to the more complete performance of the duty.

It is impossible to present a detailed report upon the treatment which was adopted during the epidemic of 1873. The data upon this point which were obtained are imperfect and not absolutely reliable; having, in the majority of instances, been supplied from memory, no records of treatment having been made during the progress of the disease.

The greater number of cases reported were treated with calomel, either singly or in combination with opium, acetate of lead, and stimulants. It would seem that the vast majority of the physicians who were actively engaged in the treatment of the epidemic adopted, and relied chiefly upon, this line of treatment.

Calomel was exhibited in heroic doses by some gentlemen, who claim for the remedy thus employed the most beneficial results. By others, it was given in small but frequently-repeated doses. Opium was largely used in combination by many; but others discard its exhibition by the stomach, and employ its alkaloids hypodermically. By many, favorable results are claimed for the combination of calomel, opium, and acetate of lead; others, yielding to a natural impulse, sought to induce reaction in the cold stage by the use of alcohol.

The cases which have been collected show that, in the treatment by calomel, in large and small doses, there was a mortality of 23 per cent.; calomel and opium, there was a mortality of 31 per cent.; calomel, opium, and acetate of lead, the mortality was 40 per cent.; calomel, opium, and stimulants, the mortality was 50 per cent. In cases where stimulants alone were employed, the mortality was increased to 59 per cent. Where the preparations of iron were used, the mortality was 33 per cent.; while from the acid treatment but 8 per cent. is recorded; of

the latter, the cases reported are scarcely numerous enough to afford reliable data, (64 cases with 5 deaths.)

In the 7,356 cases which have been collected, the mortality was 52 per cent.

The necessity of instituting treatment at the earliest moment after the occurrence of a diarrhœa was most generally recognized throughout the area of infection. Wherever physicians, during the progress of the epidemic, ceased the attempt to diagnose between cholera, cholera-morbus, and diarrhœa, and treated all cases that occurred as cases of cholera, the lists of mortality were reduced; while, on the other hand, increasing mortality was shown wherever too great reliance was placed upon diagnostic powers.

The evidence is conclusive that the exhibition of opium, followed by alterative doses of calomel, and absolute rest in the recumbent posture, almost invariably arrested the disease when in the premonitory stage. In the advanced stages, the entire range of the pharmacopœia seems to have been brought into use, with no better results than have been obtained in previous epidemics.

The experience of the writer is strongly corroborative of the beneficial results which may be obtained from the use of sulphate of iron and dilute sulphuric acid as prophylactics during an epidemic of cholera; and, further, that the most successful treatment of the disease is to be found only in all that is implied in the word sanation.

It will not be out of place at this time to note a most interesting series of experiments made by Nedswetzky during the epidemic of 1872, which were undertaken with the view of ascertaining the effect of the various medicines which have been employed in the treatment of cholera upon the bacteria found in cholera-dejections.

EXPERIMENT I—*Quinine.*—To two separate portions of rice-water discharges, each two drachms in quantity, was added, to one ten grains of the sulphate, to the other ten grains of the muriate of quinine, both in concentrated solution. On the second and third days, no changes could be observed. The bacteria lived and moved as before. On the fifth day, a film had formed on the surface of the fluid, which consisted of a granular mass. The forming bacteria made their appearance.

EXPERIMENT II—*Camphor.*—To two drachms of rice-water discharges, half a drachm of camphor was added. On the second day, no change could be seen in the bacteria. Small particles of the camphor floated upon the fluid, and between them swam the bacteria. On the fifth day, a granular mass had collected upon the surface of the fluid, and a new crop of bacteria.

EXPERIMENT III—*Carbolic acid.*—To two drachms of cholera-discharge, five drops of strong carbolic acid was added. On the second day, bacteria were found to be alive and moving. On the fifth day, the same was observed. Five drops more of the carbolic acid were added, (on the fifth day,) and the bacteria still lived and did not alter.

EXPERIMENT IV—*Tar.*—To two drachms of rice-water discharge, there was added one drachm, and in another experiment two drachms of tar, which floated upon the surface, and the bacteria remained alive. Although the fluid was several times violently shaken, they continued to live below the tar, and showed their usual movements.

EXPERIMENT V—*Calomel.*—To two drachms of rice-water discharge, ten grains of calomel were added. On the next day, the whole fluid had assumed a blackish color, and a sediment had formed at the bottom of the vessel. Between the particles of calomel, the bacteria lived and

moved as in their normal condition. On the fifth and sixth days, a new granular mass had formed.

EXPERIMENT VI—*Opium.*—To two drachms of rice-water discharge, one drachm of tincture of opium was added. On the second and third days, the bacteria remained alive. On the sixth day, a portion only of them had lost their ability to move.

EXPERIMENT VII—*Nux vomica.*—To two drachms of rice-water discharges, one drachm of tincture of nux vomica was added. The action upon the bacteria was similar to that of opium. On the tenth day, the bacteria were living, and only a portion of them remained motionless.

EXPERIMENT VIII—*Tannic acid.*—To two drachms of rice-water discharges, ten grains of tannin were added. In two hours, the fluid had divided into two nearly equal layers. The upper layer was transparent as distilled water. The lower layer, on the contrary, was thick, opaque, and had a grayish-white color. In the upper layer was a very small quantity of motionless bacteria. In the deposit there were altered epithelial cells, lumps of mucus, and an innumerable quantity of cholera-bacteria without life or motion. On the fifth and also on the tenth day, all the bacteria remained without motion; and when they were afterward transferred to distilled water they showed no sign of life.

EXPERIMENT IX—*Chloroform.*—To two drachms of rice-water discharges, one drachm of chloroform was added. The bacteria ceased at once to move, and remained in this seemingly dead condition for several days; but when transferred to distilled water, a few came to life.

EXPERIMENT X—*Sulphate of iron*, in concentrated solution, acted fatally upon bacteria in the rice-water fluid. They ceased at once to move, and assumed the position and shape of dead bacteria, and when transferred to distilled water they did not come to life.

EXPERIMENT XI—*Chlorine-water*, (chlorine, ℥ss; aquæ, ℥vj.)—To two drachms of the rice-water discharges, two drachms of dilute chlorine-water were added. In this the bacteria died at once.

EXPERIMENT XII—*Sulphuric acid*, (acid, gtt. xx; aquæ, ℥j.)—To two drachms of rice-water discharges, two drachms of dilute sulphuric acid were added. In this the bacteria died at once.

EXPERIMENT XIII—*Muriatic acid*, (acid, gtt. iij, to aquæ, ℥vj.)—To two drachms of rice-water discharges, two drachms of dilute muriatic acid were added. In this the majority of the bacteria died, and only a small number remained alive, but in a greatly-altered condition.

EXPERIMENT XIV—*Nitric acid*, (acid, gtt. xx; aquæ, ℥j.)—To two drachms of rice-water discharges, two drachms of dilute nitric acid were added. In this the bacteria died.

EXPERIMENT XV—*Chloral hydrate.*—To two drachms of the rice-water discharges one drachm of chloral hydrate was added. The bacteria remained alive.

STATISTICS OF AGES.

STATES.	Under one month.	One month.	Two months.	Three months.	Four months.	One year.	Two years.	Three years.	Four years.	Five years.	Five to ten years.	Ten to twenty years.	Twenty to thirty years.	Thirty to forty years.	Forty to fifty years.	Fifty to sixty years.	Sixty to seventy years.	Seventy to eighty years.	Eighty to ninety years.	One hundred and thirteen years.	Unknown.	Total.
Arkansas	.....	.....	.....	.....	1	.....	3	3	.....	1	2	25	33	38	19	4	2	.....	1	.....	5	137
	.....	.....	.....	.....	.....	4	12	13	9	2	18	28	45	74	37	22	6	5	1	.....	7	283
Alabama	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	2	.....	3	.....	1	1	2	.....	.....	43	55
Dakota	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1	.....	.....	.....	.....	.....	.....	.....	2
Georgia	.....	.....	.....	.....	.....	4	6	3	6	6	26	40	57	70	30	21	14	6	1	.....	151	441
	.....	.....	.....	.....	2	4	3	4	5	4	21	39	71	68	44	24	16	6	1	.....	11	323
Indiana	.....	.....	.....	.....	.....	.....	1	.....	.....	.....	1	2	7	8	8	1	.....	.....	.....	.....	4	32
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	373	355	265	165	101	37	.....	.....	24	1,712
Illinois	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	103	68	54	42	14	1	.....	.....	23	405
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	16	22	10	6	1	.....	.....	.....	.....	73
Iowa	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	2	1	.....	.....	.....	.....	.....	.....	.....	7
	2	1	1	2	.....	21	29	20	17	13	48	231	147	154	100	63	34	9	1	.....	63	746
Kentucky	.....	.....	2	1	.....	16	16	9	8	9	11	23	143	164	105	62	38	6	3	.....	40	740
	.....	.....	.....	.....	.....	.....	.....	1	.....	1	4	12	16	3	2	.....	.....	.....	.....	.....	.....	6
Louisiana	.....	.....	.....	.....	.....	.....	.....	1	.....	.....	1	2	1	480	264	112	66	10	4	.....	315	2,321
	.....	.....	.....	.....	.....	5	11	14	11	11	41	81	541	7	7	3	1	.....	.....	.....	.....	34
Mississippi	.....	.....	.....	.....	.....	18	23	21	7	10	42	56	15	.....	2	.....	.....	.....	.....	.....	.....	4
	.....	1	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Minnesota	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	1	.....	3	68	44	39	34	94	212	5	6	9	6	5	2	.....	.....	.....	35
Missouri	.....	.....	.....	.....	.....	33	.....	.....	.....	.....	.....	1	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	1	.....	1	.....	.....	2	.....	.....	.....	.....	2	2	6	6	5	2	84	18	1	686	7,356
Ohio	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	105	174	133	102	93	310	756	1,565	1,522	956	532	299	.....	.....	.....	.....	.....
Pennsylvania	.....	1	.....	.....	7	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	5	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tennessee	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	3	3	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Texas	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Utah	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
West Virginia	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
	2	3	3	5	7	105	174	133	102	93	310	756	1,565	1,522	956	532	299	84	18	1	686	7,356
Grand total																						

STATISTICS OF SOCIAL CONDITION AND RESULTS.

STATES.	Male.	Female.	White.	Black.	Married.	Single.	Widowed.	Condition in life unknown.	Recoveries.				Deaths.				Record incomplete.				Total recoveries.	Total deaths.	Total results unknown.	Grand total.
									White.		Black.		White.		Black.		Cases.	Results.						
									Male.	Female.	Male.	Female.	Male.	Female.	Male.	Female.		Recoveries.	Deaths.	Unknown.				
Arkansas	88	49	69	68	55	80	2	.....	22	12	19	10	25	10	22	17	.....	...	...	...	63	74	.....	137
Alabama	168	115	151	132	129	153	1	.....	54	28	15	5	38	31	61	51	.....	...	...	...	102	181	.....	283
Dakota	10	2	12	.....	5	5	2	.....	7	1	....	....	3	1	....	....	43	1	42	....	9	46	.....	55
Georgia	1	1	2	.....	2	.....	.....	.....	.....	.....	....	....	1	1	....	....	.....	...	...	...	.....	2	.....	2
Indiana	203	171	353	21	212	148	14	.....	112	91	2	5	81	69	8	6	67	56	....	11	266	164	11	441
Illinois	179	144	312	11	183	108	27	5	39	27	....	1	132	114	8	2	.....	...	...	...	67	256	.....	323
Iowa	23	9	32	.....	15	17	.....	.....	8	5	....	....	15	4	....	....	.....	...	...	...	13	19	.....	32
Kentucky	954	750	1, 051	653	979	672	53	.....	342	246	137	124	264	199	211	181	8	...	...	8	849	855	8	1, 712
Louisiana	252	153	217	188	203	174	6	22	33	37	19	9	93	54	107	53	.....	...	...	...	98	307	.....	405
Mississippi	39	34	32	41	30	27	5	11	14	5	7	14	8	5	10	10	.....	...	...	...	40	33	.....	73
Minnesota	3	4	7	.....	2	5	.....	.....	.....	2	....	....	3	2	....	....	.....	...	...	...	2	5	.....	7
Missouri	420	267	624	63	314	311	40	22	99	24	13	5	279	222	29	16	59	4	55	....	145	601	.....	746
Ohio	373	356	687	42	354	293	39	43	171	187	12	5	180	149	10	15	11	...	....	11	375	354	11	740
Pennsylvania	4	2	6	.....	5	1	.....	.....	1	.....	....	....	3	2	....	....	.....	...	...	...	1	5	.....	6
Tennessee	1, 179	875	1, 229	825	930	930	66	128	488	332	221	173	237	172	233	198	267	255	12	...	1, 469	852	.....	2, 321
Texas	27	7	33	1	9	22	3	.....	10	4	....	....	16	3	1	....	.....	...	...	...	14	20	.....	34
Utah	4	.....	4	.....	1	3	.....	.....	.....	.....	....	....	4	.....	....	....	.....	...	...	...	.....	4	.....	4
West Virginia	23	12	33	2	28	6	1	.....	11	2	....	....	11	9	1	1	.....	...	...	...	13	22	.....	35
Total	3, 950	2, 951	4, 854	2, 047	3, 456	2, 955	259	231	1, 411	1, 003	445	351	1, 393	1, 047	701	550	455	316	109	30	3, 526	3, 800	30	7, 356

CHAPTER II.

THE ETIOLOGY OF THE CHOLERA EPIDEMIC OF 1873.

The joint resolution of Congress under which we have had the honor to act, calls for a report upon the causes of epidemic cholera, which is herewith presented, embraced under a series of propositions.

PROPOSITION I.

That Asiatic cholera is an infectious disease resulting from an organic poison, which, gaining entrance into the alimentary canal, acts primarily upon and destroys the intestinal epithelium.

While no miscroscopic changes have been found in the dejections that are peculiar to cholera, or which differ in any way from those observed in ordinary intestinal catarrh, certain abnormal conditions are always found in the bodies of those who die from the disease.

Macnamara, who has closely studied the disease, discusses this subject at length. From his work we abstract the following summary of the morbid anatomy of cholera:

I. The epithelium of the nasal passages and of the mouth is found almost completely destroyed after death during the collapse of cholera.

II. The epithelium of the pharynx and of the æsophagus is shed in large patches, and near to the orifice of the stomach is often found entirely destroyed. Similar changes in the cell-lining of the stomach are observed, the basement membrane between the orifices of the gastric follicles being covered by a whitish, mucilaginous-looking substance, beneath which the injected walls of the stomach may be seen. The trunks of the peptic glands are full of a similar material, which consists of epithelial particles, many of the cells having been destroyed and massed into patches of molecular matter imbedded in the mucous stratum lining the walls of these tubes.

III. In the small intestines the villi are found extensively to have shed their epithelium, and if the exudation with which they are found to be covered is removed by a stream of water, much of the basement membrane will be found denuded of its epithelium. The same condition is found in the tract of the large intestine.

IV. The epithelium in other portions of the body is found involved after death from cholera. The urinary tracts, and the cells lining the tubules of the pyramidal portions of the kidney, present the changes indicative of detached and altered epithelial cells. Similar changes are found in the cells lining the alveolar portion of the lungs. The epithelium of the pleuræ, the abdominal cavity, and choroidal plexuses is also found involved. *Thudichum* asserts that the nerve-tubes and ganglionic cells of the gray matter become affected in the algide stage; "*that the cylinder axis separates and the nerve-marrow curdles.*" It is, however, probable that the changes noted in this paragraph are for the most part post mortem.

V. On opening the walls of the abdomen after death, in the collapse stage of cholera, the viscus lie back in a compact form deep in the abdominal cavity. No constant anatomical changes are to be found in the stomach, beyond the changes already described in the epithelium. Occasionally patches of ecchymosis are observed, but in many cases the organ is not even congested.

The mucous surface of the intestines in the majority of instances presents a uniform arborescent injection, with ecchymosed spots; this, however, is not constant, for the mucous surface of the intestine is often found to be pale and exsanguine. The veins are filled with a plug of thick, viscid blood.

The solitary glands and Peyer's patches are indurated. The mesenteric glands are in a state of hyperæmia. The spleen, from loss of blood, is lighter in weight and colo than normal. The liver weighs less, its cellular structure is contracted, and its cap sule wrinkled. The portal veins are filled with viscid blood. The gall-bladder is ful of dark, viscid bile. The kidneys present only the epithelial changes. The lungs ar collapsed and of but one-half their natural weight, congested; the posterior portion soft and easily broken.

In the majority of instances, the right side of the heart, the jugular veins, the cav and the coronary veins are full of blood, but the left side of the heart is empty an contracted, the pericardium containing but little if any fluid.

The sinuses of the dura mater are loaded with dark blood. The veins of the pia mater are in the same condition. Serous effusions have been observed in the arachnoid cavity, the meshes of the pia mater, and the sheath of the spinal cord.

During the epidemic of 1873, at Paris, Hayem conducted a series of post-mortem examinations, upon which he makes the following observations:

The only organs constantly involved are the intestines. The capillaries, the different layers of the epithelium, the sets of glands, and the villi had all undergone certain changes, but differed in no way from the changes observed in ordinary intestinal catarrh. In the blood there was found an increase of the white corpuscles and small fragmented globules. These are explained by the stasis of the blood in the algide period and the decrease in the proportion of water. No microscopic characters peculiar to cholera were found.

Through the kindness of Dr. Ben. C. Miller, the sanitary superintendent of Chicago, we are able to present the results of a series of microscopic examinations, which were made at his request by Dr. I. N. Danforth, of Chicago, the autopsies from which the specimens examined were obtained having been made by Dr. Marshall W. Wood, now of the United States Army. These reports are possessed of an additional interest from the fact that they are as yet the only published American investigations conducted in the epidemic of 1873.

CASE I.

The clinical history of this case is provokingly meager and deficient, especially when the fact is taken into consideration that the patient died in a public hospital, subject to the disciplinary regulations thereof. The brief notes before me were furnished by Dr. Hyde. From them I am able to record the following: The patient (I am not informed whether male or female) was admitted to the cholera hospital August 26, 1873; was married three weeks previously; had cicatrices of buboes and syphilides on the cutaneous surface, and an ulcer over the internal aspect of the left thigh which was probably syphilitic. The prominent symptoms of epidemic cholera were pronounced, namely, "vomiting, purging, cramps, cold breath, and rice-water discharges." I infer that collapse came on soon after the patient's admission, as I learn from Dr. Hyde's notes that milk was injected into the veins on the night of the 26th, or shortly after admission. Death occurred on the following day (August 27), and the necropsy was made by Dr. Wood on the evening of the 27th, between the hours of eight and eleven. Concerning the post-mortem appearances, I have exactly no information at all; the notes in my possession do not so much as indicate the sex of the patient. Dr. Hyde, however, was kind enough to send me the following specimens:

(1.) Termination of ileum and commencement of colon.
(2.) The lower six inches of the ileum, empty.
(3.) Section of the ileum, about six inches long from its central portion, with its contents imprisoned in the intestine by ligatures applied previous to removal.
(4.) Portion of mesentery, eighteen inches from ileo-cæcal valve.

As no pathological appearances are recorded in connection with the remaining organs of the body, it is fair to presume that they were all in healthy condition. Of course my own observations must be confined to the specimens enumerated above.

(1.) *Termination of ileum; that is, that portion of the canal immediately above the commencement of the colon.* The mucous membrane looked swollen, soft, of a peculiar ashy hue in some spots, unusually pale or blanched in other spots, and unnaturally red in still other places. Hence the surface of the membrane presents a singularly mottled or "speckled" appearance. An enormous number of elevated papules, each the size of a pin's head, may be both felt and seen. If the specimen be gently put upon the stretch and held between the eye and a strong light, groups of arborescent or stellate vessels may be seen which are not apparent in health. Under a hand-glass of moderate power, numerous minute vessels, turgid with blood, some of them tortuous and elongated, are brought into view; but it may also be observed that the inter-vascular spaces are unusually pale and translucent. The elevations or papules alluded to above are also brought more prominently into view, and are seen to be quite symmetrically arranged, thus indicating their origin in swollen Peyer's or solitary glands. If the finger be passed gently over the mucous surface, the minute elevations, consequent upon the swelling of these glands, can be readily felt, as well as a peculiarly soft, delicate, velvety feeling, which I do not remember to have seen described.

Microscopy.—Before detailing the morbid microscopic appearances, it will be expedient to recall the structure of the intestinal canal in health, that we may have some reliable

standard for comparison. A transverse (vertical) section of healthy small intestine, well-prepared and mounted, presents the following appearances: two well-defined compact layers, namely, a mucous layer and muscular layer; between these, a loose net-work of areolar tissue (the so-called submucous connective tissue) which binds the two layers together, and also serves as a support to the vessels in their passage toward the mucous membrane; in connection with, sometimes imbedded within, sometimes projecting slightly below the mucous layer, we find Peyer's glands (the so-called agminate glands) huddled together in "schools" or patches, and the solitary glands, which are slightly larger than the former, but precisely similar in structure. In addition to this, we find those peculiar projections of mucous membrane, called "villi," which float their free extremities in the lumen of the intestine for the purpose of absorbing, by virtue of their epithelial structure, the nutrient material within their reach. The villi as well as the floor of the intestine are coated with a compound layer of conoidal epithelium, which can readily be seen with a quarter-inch objective.

We are now prepared to appreciate the changes found in our choleraic specimens. I have examined several sections cut from the specimens above described. Under a power of about eighty diameters, the following appearances are noted: the mucous and muscular layers seem to have been much disturbed in their relations, and separated widely apart; between them a very beautiful, loosely-woven web of areolar or connective tissue is seen, sending its delicate filaments across the intervening space, with here and there a little vessel, making its way toward the mucous layer; the latter is unusually thin and unusually smooth on its free surface; not a single perfect villus can be seen, but a few "stumps" of villi are easily made out, as though the missing portion had been rudely torn away. Under a power of 260, the surface of the mucous layer is seen to be almost, in fact *quite*, denuded of epithelium, since not a single normal club-shaped cell can be seen. The mucous membrane seems to have passed through some scene of violence, during which its villi have been wrenched from their attachments, and its clothing of epithelium stripped from its surface and carried away. It seems almost beyond belief that a few short hours could have so totally changed the intestinal surface, but every section which I have examined from the specimen of intestine now under consideration presents precisely the same appearances. Peyer's glands do not seem to be much altered, quite to my surprise. Possibly they are slightly swollen, but not otherwise perceptibly altered. But, after all, this is not so surprising; the storm is too brief to affect tissues beneath the surface to any great extent. It is rather like a terrible tornado, desolating everything within its reach, but limited in its ravages to objects presenting salient points of attack. The submucous connective tissue and the muscular layer are both beautifully displayed, but neither present any evidence of disease, unless the unusual separation of the mucous and muscular layers be regarded as such.

(2.) *Commencement of the colon; that is, that portion immediately below the ileo-cæcal valve.*—With the exception of an unusual turgidity of the smaller vessels, no abnormal appearances were detected by the unaided eye. Nor does the microscope disclose anything in respect to the mucous membrane of the colon which could be classed as peculiar or distinctively abnormal, save the loss of its epithelium, as in the case of the specimen last described. The same singular tendency to separation from the muscular layer, upon the slightest pressure, is also to be noticed in the specimen now under consideration, and of course the same elegant display of intervening connective tissue.

(3.) *Portion of the ileum, about six inches above its termination in the colon.*—To the unaided eye the mucous membrane seems a little swollen; it is quite pale, and presents the same papulated appearance alluded to in connection with specimen No. 1; numerous stellate groups of turgid vessels are easily seen, and it is also observed that they sometimes appear irregularly distended and tortuous, with knob-like enlargements or protrusions here and there, as though they had been suddenly and forcibly injected with blood, and had, as a consequence thereof, suffered forcible rupture of their inner tunics in certain localities. To the touch the mucous surface seems soft, velvety, and water-soaked or *sodden*, as though it had long been macerated in tepid water.

Microscopy.—Under the microscope this specimen looks much more natural, and appears to have suffered much less violence than the one first examined. A power of 80 diameters shows the mucous and muscular strata sustaining their normal relations to each other; both layers, with the interconnective tissue, are handsomely shown, as well as the lumina of the over-distended vessels. Confining our attention to the mucous layer, we find that its free surface gives evidence of having passed through some violent convulsion, and of having sustained serious injury thereby. Most of the villi are gone; their ragged proximal ends or points of attachment are still seen, broken and torn like the stumps that mark the course of a recent cyclone; some of them are half gone leaving behind the proximal half more or less damaged; a few remain apparently intact, but *only* apparently, as we shall shortly see. Peyer's glands and the solitary glands are enlarged, swollen, and filled with a confused mass of cells, probably the half grown epithelium violently hurried from its legitimate home. It now becomes evi

dent that the little elevations or papules already referred to are the swollen and distended solitary glands.

Under a power of 260 diameters, the ragged remains of numerous villi are seen with great distinctness, and those which are apparently perfect are now seen to be shriveled and contracted, and also to be totally stripped of their characteristic epithelial covering. The shriveling of the villi is so great as to quite change their appearance, and suggest atrophy in marked degree. Of course some allowance must be made for the altered size of the villi, on account of the absence of the conoidal epithelium; but after making all possible allowance for that, the shriveling is yet undeniably great. The free surface of the mucous membrane is entirely deprived of its usual epithelial coating, in place of which we see an irregular layer of small, round cells, which are doubtless the progenitors of the future perfect ephithelial cells; in other words, the upper, exposed, and full-grown layer is gone, having been hurried away in the general uprooting of the epithelial structure; the lower layer still remains, and had the patient recovered, would soon have developed into a perfect conoidal epithelial coating, in accordance with its own law of type. Under the higher power, the huddled mass of cells, which in some instances completely fill the solitary glands, shows with greater distinctness, but the cells themselves present nothing requiring extended remarks.

(4.) *Specimen of the ileum, with its contents retained by ligatures, from the middle third of the canal.*—The intestine. The intestinal wall is excessively thin, and the inter-vascular spaces quite diaphanous; the vessels are intensely congested; the solitary glands are swollen and elevated above the surface; no ulceration.

Microscopy.—A low power (80 diameters) shows that the mucous layer is surprisingly thin, and that the slight pressure of the glass cover is sufficient to produce a wide separation between the mucous and muscular layers, thus displaying the areolar tissue and vessels intervening; the villi are mostly present, but much shriveled and contracted, and in some instances torn. Increasing the power to 260 diameters we are able to see that, although the villi are pinched and shriveled, they are not, like those already examined, entirely deprived of epithelium, but that they are generally clothed with a single dense layer of small, round, or polygonal cells, and that a true conoidal cell may occasionally be seen. But this layer of polygonal cells must not be mistaken for the true epithelium, which consists always of conoidal or club-shaped cells, and these, as I have just stated, are only occasionally seen. The upper layer of true conoidal cells is missing; the lower layer of cells, which would be conoidal if let alone, is still in place, and, in the event of the patient's recovery, would have been developed into typical conoidal epithelial cells. The floor of the intestine is also covered with a layer of similar cells; the exceeding thinness of the mucous membrane is still apparent, but nothing like ulceration, or localized loss of substance or solution of continuity, is apparent

(5.) *Microscopy of the intestinal contents.*—It will be remembered that the specimen now under consideration was sent to me with its contents retained by ligatures. The ligatures were removed immediately upon receiving the specimen, and the contained liquid allowed to flow into a conical glass. It was thin, watery, dirty clay or ash color, and in a short time separated into two parts—a dense grayish deposit and a clear watery fluid. A drop of the deposit magnified 260 times is seen to consist mainly of cells, but partly of granular matter in rather coarse granules. Concerning the cells I find: (1.) Single full-grown and quite perfect conoidal cells scattered here and there in disorderly groups; and these, it seems to me, are the few remaining cells of those which clothed the villi and coated the floor of the intestine at the commencement of the attack. These worn-out and cast-off conoidal cells are generally present in great number in the intestinal canal; in this present instance the majority of them had been carried away by the earlier discharges, but a few still remained, probably by lodging in the corrugations of the intestinal mucous membrane. (2.) Large patches of cells, nearly or quite full grown, which formed the first layer of cohering cells composing the epithelium of the villi. By "cohering cells," I mean cells so joined together by their peripheries as to adhere with sufficient tenacity to admit of being torn away from the villi, and probably carried out of the intestinal canal without very much disturbing their relations to each other. (3.) Smaller and more symmetrical, as well as more intimately united patches of cells, which are obviously the deeper layer of epithelial cells from the villi. These are half-grown cells, hurried off while yet in their childhood, and therefore prior to their having entered upon their functional life. While it is well known that the intestinal epithelium, like that of all other parts of the body, is being constantly thrown off in the form of individual worn-out cells, it is also equally well known that patches of cohering cells are *never* found free in the intestinal canal, except in conditions of grave and generally acute and, indeed, violent disease. In chronic intestinal diseases, a few cohering cells from the upper layer, usually in a granular or fat-bearing condition, may occasionally be found; but when large patches of still adherent cells, from the lower as well as the upper layer, are thickly scattered over the field of the microscope, we may confidently predict that the patient is in a condition desperate indeed, if not necessarily fatal; for it indicates the flooding of the intestinal canal by the most violent exosmotic action; a condition of things

which, when not produced by local irritants, or the most drastic cathartics, speaks of the invasion of the system by a profound "zymotic" poison. (4.) I also find an occasional isolated nucleated cell which has every appearance of being a white blood corpuscle; such I believe it is. In view of the well-established fact that these cells, under conditions of intense excitement, speedily become migratory in their habits, I think it is altogether probable that many of them acquire the power of ameboid movement, and, being aided somewhat by the out-flowing current of serum, escape from the vessels and make their appearance in the intestinal canal. In the latter stages of cholera this supposition becomes almost a certainty. For, in the first place, the villi have been stripped of their natural clothing of epithelium, which brings the capillaries almost to the surface—in some places, probably, they are quite exposed. In the next place, collapse is by this time fully established, and, if the exosmotic action is now less violent, the profound relaxation of tissue, especially of contractile tissue, produces the precise condition most favorable for migration of the corpuscles; lastly, the corpuscles themselves are by this time in the "ameboid" state, and are therefore ready to take advantage of the conditions which favor their escape. The presence of the white corpuscles in the intestinal canal, therefore, is not a matter to be wondered at; it is merely the inevitable result of the operation of established laws of pathology. As the specimen of mesentery, before alluded to, presented nothing abnormal, no remarks concerning it will be necessary.

CASE II.

The patient, Joseph Schere, was admitted to Saint Luke's Hospital on the 7th of September, 1873, with well-pronounced symptoms of cholera. Shortly after, he was sent to the Cholera Hospital, and from the time of his admission there, came under the notice of Dr. J. N. Hyde, who furnished me the clinical history, so far as he could obtain it, and notes of a post-mortem examination, made by himself. I cannot do better than insert Dr. Hyde's account of the case at length, which is as follows:

"The patient, an Alsatian, had been admitted from Saint Luke's Hospital to the Cholera Hospital, Chicago, on the 7th of September, 1873. When examined, almost immediately after admission, he was discovered to be in a condition of collapse, but was still vomiting and purging freely. The emesis was checked by the administration of a solution of carbolic acid, (gr. i ad oz i;) the purging, however, continued in spite of the medication pursued, which consisted chiefly of stimulants and the administration of beef-tea. Soon after the exhibition of the latter the stools lost their "rice-water" characteristics, and consisted largely of the undigested and unabsorbed nourishment given. The patient exhibited the "facies choleraica," had a coolness of the expired air which was very noticeable, and suffered from cramps. Specimens of twelve of his dejections were preserved for examination, in separate bottles, and numbered in the order of their occurrence. The entire surface of the body had been cool and damp, the lips, tongue, and cutaneous superficies were livid; there had been also extreme restlessness, thirst, feeble, rapid pulse, dyspnœa, complete suppression of urine, sunken countenance, mental apathy, half-opened eyelids, and a partial recognition of his condition. Consciousness continued up to within a half hour of his death, which occurred twenty-three hours after his admission. The patient died in great agony, and was so violent that the attendants were obliged to hold him forcibly in bed. This was all of the previous history of the patient I could gather from the officials of the hospital. The patient was said to have been exposed to the disease in the State of Indiana.

"*Necroscopy* at 10 a. m. of September 9. Rigor-mortis was fully established. The body appeared to be that of a man not far from thirty-five years of age, somewhat emaciated. The skin of the face and neck was exceedingly dark; that of the abdomen and lower limbs of a natural color. The eyes were sunken, the abdomen not depressed, and resonant on percussion. The dura mater and pia mater of the brain were deeply congested, and the sinuses of the brain were filled with fluid, dark-red blood. The hemispheres, on section, presented an enormous number of "puncta cruenta," and the floors of the lateral ventricles, the velum interpositum, the pes hippocampi, and the valve of Vieussens, were all equally injected; a similar condition was found over the entire surface of the base of the brain, the surface of the cerebellum, the pons varolii, and the medulla oblongata. The arachnoid membrane everywhere was translucent and normal. No evidences of pathological products were anywhere visible. The lungs were of a dark slate color, and in their posterior portions were deeply congested. They were everywhere crepitant on pressure, and were neither solidified nor bound down by pleuritic adhesions.

"The heart was large, firm, and filled with fluid, dark, almost black blood. Firm, white heart-clots were found in each ventricle, well attached to the tendonous columns of the valves; the latter were of normal appearance. The right side of the heart was more fully expanded by dark blood than the left, but it was not evident that the left was entirely empty. The liver was of a normal size, of a dark-purple hue, and a section appeared to be gorged with venous blood. The gall-bladder was moderately distended, and its mucous lining smeared with a dark tenacious and tarry bile. The

spleen was enlarged to at least twice its normal size and was deeply congested, almost black on section. The kidneys were of natural size and color externally, but were also, on section, found to be congested and of a darker color than was normal. The apices of the pyramids were particularly engorged. The bladder was contracted fully and completely. It did not contain, as far as could be ascertained, a single drop of urine. Its mucous lining was entirely normal in external appearance, and presented no traces of the congestion so marked in the other viscera. The stomach was distended with fluid contents, consisting largely of beef-tea, and was not manifestly altered. The entire intestinal tract was moderately distended with fluid contents, of offensive, but not excessively offensive, odor, of the consistency and color of reddish pea-soup. The external surface of the intestines presented a color very peculiar, suggestive of a light chocolate, a tan and yellow combination; and this was true of every portion of the tract, but especially of the small intestines. The rectum was merely smeared with a reddish-yellow secretion, not sufficient to constitute "contents." The pancreas was unaltered; the mesenteric vessels injected; the omentum diaphanous and normal; the peritoneal membrane, abdominal glands, prostate, glands of Cowper, cerebro-spinal nerves, ureters, larger arteries and supra-renal capsules all appeared in a normal condition. No pericardial fluid was discovered.

"The following specimens were preserved for microscopic examination:

"Section of right hemisphere of brain; floor of lateral ventricle; pons varolii and medulla oblongata; left and right heart-clots; sections of liver, spleen, and both kidneys; ilio-cæcal section; portion of central tract of ileum, (the latter with contents undisturbed;) bladder entire, with attached prostate and a portion of the walls of the gall-bladder. The muscular tissue was normally red and firm. Description of the mucous lining of the intestinal tract to be found in the report on the specimens preserved."

Upon microscopic examination of the specimens of the various parts and organs sent to me, I found nothing, except evidences of recent congestion, save in the specimens of intestine; to those, and to the microscopic appearances of the alvine discharges, therefore, our attention may be limited. The intestinal specimens consist of the middle third of the ileum, the lower extremity of the same, and the upper extremity of the colon.

(*a.*) *The central portion of the ileum under a low power.*—It is evident that the mucous lining of the intestinal canal has undergone great and violent alterations. The appearances do not vary greatly, except in degree, from those observed in connection with Case I. The villi are nearly all torn away, and the remaining stumps present a rather ragged appearance. The solitary glands cannot be recognized; the disposition to separate from the muscular layer is much less than in the former specimens; the connective and muscular tissues seem quite normal. Under a higher power (260 diameters) patches of shriveled Peyer's glands are seen; the damaged condition of the villi is more apparent, and the mucous membrane appears to have been nearly stripped of epithelium.

(*b.*) *Ileum, near ileo-cæcal valve.*—In this location the villi seem to be almost destroyed; Peyer's glands are scarcely recognizable; the mucous membrane shows hardly a trace of epithelium, and in fact the intestine in its entire structure is so changed, that an expert might be pardoned for failing to recognize it.

(*c.*) *Colon near ileo-cæcal valve.*—This specimen does not show any very material change. In fact, with the exception of a somewhat shriveled and pinched appearance, and the loss of the upper stratum of its epithelial coating, there is nothing about it worthy of mention.

Microscopy of the choleraic discharges.—I received from Dr. Hyde eleven bottles containing specimens of the dejections, numbered from one to eleven, in the order of their occurrence. I am not informed at what stage of the disease the first discharge occurred, or how long before death the last one took place. As, subsequent to the passage of the first two or three specimens, the patient was assiduously plied with beef-tea, the greater portion of which was unabsorbed, the microscopic appearances are largely modified and masked, and their value correspondingly lessened thereby. A great amount of granular matter was present, in the form of very large oblong masses of a light gray or ash color. On being gently compressed by the covering glass these masses separate into smaller masses, and if the pressure be still increased, these secondary masses are separable into very minute granules, which are probably composed of albuminous matter derived from the blood. I also observed occasional oblong patches of small round or polygonal cells, probably epithelial cells thrown off from the villi and floor of the intestinal canal; and, scattered here and there, an occasional full-grown epithelial cell, not yet carried out of the intestine, but looking cloudy and nebulous, as though it had been for some time macerated in the intestinal contents. About the same appearances, with the addition of a few free oil globules. The sediment consists largely of oil globules and floating masses of granular matter; an occasional patch of aborted epithelial cells may be seen, but they are less abundant than in preceding specimens. The appearances are chiefly marked by the presence of extraneous matter derived from the beef-tea, of which the patient partook frequently

during the last hours of his life. I find shreds of striated muscular fiber: bits of connective tissue; crystals of sodium chloride and potassium chloride; fat globules; a few epithelial cells; masses of granular matter; bits of vegetable structure, which I apprehend are fragments of tea-leaves; and some other bodies which I cannot recognize, but which I believe to be altered blood-corpuscles. It is obvious that these latter specimens, however interesting they may be from the stand-point of microscopy, throw very little light on the pathology of cholera. Examined with a high power (about 1,000 diameters) I could discover no special or peculiar structure which could be called a specific cholera germ, in any of the specimens of intestinal discharges, but myriads of granules, far more minute than those already alluded to, were brought into view, and I have no doubt that a yet higher power would have revealed other granules smaller still.

PROPOSITION II.

That the active agents in the distribution of the cholera poison are the dejections of persons suffering from the disease in any of its stages. That in these dejections there exists an organic matter which, at a certain stage of decomposition, is capable of reproducing the disease in the human organism to which it has gained access.

That the rice-water discharges are not simply the watery portions of the blood, as is popularly believed, is demonstrated by chemical examination. Thudicum, for the purpose of ascertaining "what successive chemical changes are undergone by the body in the progress of cholera, and what relation subsists between those changes and the symptoms presented by the patient during life," conducted in 1866 a vast number of experiments, which are recorded in Appendix 10 to the report of the medical officer of the privy council for that year, vol. ix, pp. 458–512. In this report, after most careful examination, Thudicum states that the rice-water dejections of a cholera patient contains "vibriones, cells from the surface of the intestines, granular *débris* of cells, mucin, modified hemochrome, albumen, an albuminous body, giving, when treated with nitric acid, a rose-pink reaction, butyric acid, acetic acid, ammonia, leucine, and some inorganic salts. The dejections in a state of active decomposition evolve nitrogen, then hydrogen, and ultimately nothing but carbonic acid." The most careful and patient investigations have failed as yet to determine the presence of any fungoid growths in cholera dejecta that differ from those grown in the dejections of patients who may die from other intestinal diseases.

Macnamara observes that the rice-water discharges are always alkaline; that soon after they are passed they separate in the vessel into two portions, the flocculent matter sinking; that the rapidity with which this takes place is an evidence of the severity of the attack; for, if this separation takes place very speedily, it indicates the complete death and disintegration of the organic matter, and an unfavorable termination of the case may be predicted. He writes:

> The flocculent matter of the stools is composed of epithelial cells and the lining of the intestinal canal in various stages of decomposition. The epithelial cells, disintegrated and changed so as scarcely to be recognized under the microscope, are full of molecular matter, precisely as in other instances of decomposing organic matter, but no new chemical elements can be discovered.

In the examination of this molecular matter, Macnamara continues:

> Supposing, therefore, we examine some of the columnar epithelial cells covering the villi of the small intestines, or those lining Lieberkühn's follicles, taking care that the specimen is a fresh one, and that the cells are kept moist on the slide of the microscope by means of some of the fluid from the rice-water dejecta or other alkaline medium. If, now, we employ a quarter of an inch object-glass we shall notice that the cells contain a vast number of minute dark specks precisely similar to those seen in a pus-corpuscle. The extent to which the epithelium of the intestinal canal is occupied by this molecu-

lar matter varies very considerably in different specimens taken from various parts of the intestinal canal of the same subject; even in the most quickly fatal cases which I have examined, patches of almost healthy epithelium were to be found on the walls of the intestines and in the fluid it contained; nevertheless, as a general rule, the majority of the epithelial cells are invaded by this molecular matter, and in rapidly fatal cases the rice-water dejecta invariably contain abundance of these disintegrated particles.

If a comparatively healthy patch of cells be examined as above described, we shall notice that in the course of a few hours the quantity of molecular matter they contain increases, and as it does so, the outline of the cells becomes altered, their margins jagged, and ultimately their shape is completely destroyed, the molecular matter increasing at their expense. If these changes be carefully and continuously watched in a small collection of these cells, the result of the process, at the end of a few hours, is an irregular mass of molecular matter, granular, diphtheritic, or amorphous deposit, as it has been variously called by authors. It is an aggregation of these molecular masses which constitutes the bulk of the flocculent substance noticed in the rice-water stools of cholera patients. I say the bulk of these intestinal contents are thus constituted, because I am well aware that the mucous lining of the canal, and a vast number of the cells contained in the villi and intestinal glands, also contribute to form the flocculent matter in the watery dejection of cholera.

If, instead of examing the epithelial cells by means of a quarter of an inch power, we place them under a twenty-fifth of an inch object-glass, the same conditions being observed, and the temperature of the apartment maintained at from 80° to 90° Fahrenheit, we shall discover that specks which appeared as one under a low power, are composed of smaller particles, and that these have often an independent but limited motion among themselves.

I have examined these molecules for hours together, with, probably, the highest magnifying power yet constructed, (the $\frac{1}{70}$ of an inch,) in order to bring all the resources of the microscope to bear on this point. I confess I have learned but little through the aid afforded me by this marvelous piece of optical work. The molecular matter, when examined by it, is still nothing more, apparently, than molecular matter—small specks in the epithelial cells. I conceive, however, that the higher the power used, and the more careful the search instituted, the more certain it becomes that this molecular matter is formed in and at the expense of the epithelial cells, blood-globules, gland-cells, or, in fact, any organic matter brought within it influence.

It seems to me that this molecular matter, if introduced into the intestinal canal of men, is capable of setting up during life, in the cells lining the intestines, an action similar to that by which it was itself produced; but whether this conversion is due to chemical affinity, or is brought about by the introduction and growth of a cholera-germ, I am at present unable to say. But I believe that this rapid molecular formation in the epithelial cells of the intestinal canal is peculiar to the disease we call Asiatic cholera, and in no other malady is anything similar witnessed, if we take into account the rapid course which cholera runs, the epithelium being invaded by this matter in the space of a few hours, and that without any evidence of pre-existing illness or the introduction of unwholesome food, purgatives, or, in fact, any known cause of the disease or death but the one we have indicated.

It is from this molecular matter in the vibrionic stage of decomposition, and not from the vibriones themselves, that the dejecta of cholera patients are capable of setting up a morbid action in the intestinal canal of those who may receive it. "The vibriones are but a manifestation of the changes going on in the organic matter, which, when it has passed through the form of vibriones, appears to lose its terrible property of inducing cholera." "The perfectly fresh dejecta in the active stages of the disease contain no vibriones, but toward the end of collapse, when the evacuations are passed less frequently, probably remaining in the intestines for some hours, vibriones may be seen in the fluid immediately after it has been passed."

The question of the period of the disease at which the intestinal epithelium is shed is still undecided.

Macnamara is of the opinion, as has already been shown, that it is a primary result of the disease, and in this he is sustained by other observers. On the other hand, Parkes, Aitken, Bruberger, and others have been unable to discover any evidence of epithelial cells in fresh cholera stools. Bruberger writes, after the examination of the dejecta of 540 cholera patients:

After prolonged search I succeeded in finding cylindrical epithelium in three cholera stools. One, that of a patient in the typhoid stage, the other two in the rice-water stools. In one I found the half of a tuft with cylindrical epithelial cells; in other trials of the same stool, nothing could be found. The other cases were rice-water stools, in which I isolated at the first dip of the tube two or three isolated but distinctly perceptible cells. In subsequent trials nothing was found.

The suggestion of Aiken is, however, pertinent:

It may be, however, that a distinctive change in the epithelium described by Macnamara may be so complete as to prevent its recognition as such.

To test the accuracy of the statements which have been made, it is but necessary to perform the most uncomplicated experiments.

If a sufficient amount of the fresh dejecta of a cholera patient to produce a slightly opaline tinge be added to water, and the fluid be exposed to the full rays of a hot sun, at the end of twenty-four hours "the vibrio stage of decomposition or change in the organic matter is in full force, the surface of the fluid being covered with large vibriones. During the next twenty-four hours no additional changes will be observed, but on the next, ciliated infusoria will have appeared in the fluid and replaced the vibriones that are no longer to be found in motion, but collected together at the bottom of the vessel. In a few days longer bubbles of gas will rise to the surface, and the sides of the vessel will be lined with conferviod growths."

Thiersch fed white mice upon the dejecta of cholera patients. Strips of paper were saturated in the dejecta at various stages of decomposition, with the result that all the animals who ate of the discharges which had been exposed to the air for from two to six days were seized with diarrhœa, suppression of urine, and, after death, the presence of large quantities of an odorless, colorless liquid was detected in their intestines.

In 1866, Burdon-Sanderson confirmed these experiments and added much interesting matter. He demonstrated that the liability to attack was greatest when the papers from the third and fourth days of decomposition were eaten, much less and nearly equal as regards the second and fifth days, and least of all as regards the first day. The fluid contents of the intestines of mice that had died from eating human cholera dejections was collected and subjected to the same tests, when it was found that they communicated "*a malady indistinguishable in character from that developed by the human dejections in other animals of the same kind.*"

These experiments have been fully corroborated by those of Thudicum, Marshall, Beale, Meyer, Gull, Popoff, and others; but in the hands of Macnamara they seemed to have failed, while good fortune gave him the results of an accident, unfortunate to the individuals involved, but of incalculable value to science.

In 1861 a small quantity of the dejecta of a cholera patient was known to have been accidentally washed into a vessel containing water. The mixture, after being exposed to the heat of the sun for one day, was swallowed by nineteen men. They all remained perfectly well during the day; ate, drank, went to bed as usual, and slept as usual. One of them on waking the next morning was seized with cholera. The remainder of the party passed through the second day perfectly well, but two more of them were attacked with cholera the next morning. All the others continued in good health till sunrise of the third day, when two more cases of cholera occurred. The other fourteen men escaped the disease. That the water of which they drank had been contaminated with organic matter was first discovered from the appearance of vibriones on its surface, and this ultimately led to the detection of all the circumstances. Cholera was not prevalent at the time, nor had it visited the locality at which this occurred for several years.

This occurrence led to a number of experiments which at this time can be but briefly noticed, and from which it was determined that if the alkaline cholera dejecta, even in a stage of decomposition, be rendered

acid, the molecular action is instantly destroyed; that if the dejecta of a cholera patient are mixed with the healthy gastric juice of carnivorous animals, the molecular changes are arrested and the organic matter appears to be digested. Reasoning from these experiments, it is safe to assert:

I. That the dejections of a cholera patient swallowed before the stage of vibrionic decomposition has taken place by a healthy person, will be so acted upon by the acids of the stomach that molecular decomposition will be impossible.

II. That in a healthy subject, the functions of whose stomach are regularly and properly performed, the action of the gastric juice will destroy the molecular process of decomposition, and no infection will result.

III. That if a large quantity of water infected with cholera stuff is swallowed, a portion will inevitably pass at once from the stomach to the intestines, and as their contents are alkaline the process of infection will quickly take place; or if this contaminated water be drunk while the individual is fasting and the secretions of the stomach are alkaline, the gastric juice will not be sufficiently powerful to arrest the decomposition, and infection will result.

A most interesting series of experiments with the discharges from cholera patients was made during the latter part of July, 1873, by Högyes, of the University of Pesth. They were originally published in the Centralblatt für die Med. Wissensc., No. 50, and translated for the Medical Record of January 15, 1874. These experiments are so strongly corroborative of the statements which we have quoted that we reproduce them in detail.

The points which Högyes sought to determine were, in brief, the following:

I. *Do fresh cholera-discharges operate injuriously upon the organism of lower animals, and under what manifestations?*

II. *Does an artificially-excited catarrh of the stomach and bowels increase the susceptibility to the action of the cholera-discharges?*

III. *Can a current of air bear away particles from the discharges which are capable of affecting the organism injuriously, and what difference is there in this respect between non-disinfected and disinfected cholera-discharges, simple diarrheal discharges, and putrefying fluids?*

IV. *Are cholera-discharges freed from their form- (living) elements still able to act upon animals?*

V. *What portions of the disinfected or non-disinfected discharges does the air-current bear away, and what is the further destiny of these form-elements when they fall upon a neutral medium or one adapted to their development? In what manner do these elements modify the action of this medium?*

To decide the first and second questions, fresh cholera-discharges were given to healthy dogs, and to others in which an artificial catarrh of the stomach and intestines had been excited by the administration of croton-oil, sulphate of copper, &c. *Both dogs were made sick, with frequent vomiting and diarrhea; but while the previously healthy animals recovered in three or four days, those in which a catarrh had been excited died the day following.*

To determine the third question, rabbits were placed under a bell-glass and exposed to air which had become impregnated as desired from either cholera-discharges, disinfected or not disinfected, diarrheal discharges, or putrefying fluids. Two rabbits, in one of which a bronchial catarrh had been produced by inhalations of ammonia, were exposed for twenty-four hours to air from cholera-discharges not disinfected. *On the third day following violent purging set in, and both animals became soon cold and collapsed. The one in which a bronchial catarrh had been excited died first, and the other five hours later. A rabbit exposed for twenty-four hours to air from disinfected cholera-discharges remained well; another exposed for an equal length of time to atmosphere impregnated from simple diarrhea-stools escaped uninjured; while another which remained for twenty-four hours in atmosphere contaminated from putrid fluids, though at first made insensible, afterward recovered without harm.*

As to the fourth point, cholera-discharges were injected into the jugular veins of dogs and guinea-pigs; the discharges in one case having first been freed from their form-

elements by thorough filtration and the other not. *The effect in both instances was the same.*

To determine the final points, a current of air was made to pass through fresh cholera-discharges, both disinfected with carbolic acid and not disinfected, and then conducted through two separate vessels which contained respectively an indifferent fluid-medium, and one adapted to the support and development of any living forms which the current should bring to it. The two fluids used were distilled water and the fluid of Cohn. In a short time, in the fluids communicating with the undisinfected discharges, a considerable number of form-elements had accumulated, which proved to be almost exclusively the bacteria which are usually found in putrid animal-fluids. In twelve hours Cohn's fluid had become clouded and milky; in twenty-four hours it was covered with a thick bluish-green fungous slime, and emitted a foul odor. The distilled water remained clear.

Both of these fluids when injected into the veins of dogs and rabbits caused the same symptoms as after the injection of the cholera-discharges themselves. This was also true of the fluid of Cohn, after its fungous element had been quite removed by filtration, showing that these elements are at least not the only source of infection. Similar experiments with discharges which had been disinfected with carbolic acid showed that the organisms which the air-current brought to Cohn's fluid were incapable of propagation. Upon injection of the distilled water and fluid of Cohn, after previous disinfection of the discharges by carbolic acid, only symptoms of carbolic-acid poisoning were manifested.

Drs. Lewis and Cunningham, in a report of microscopical and physiological researches into the nature of the agent or agents producing cholera, (Calcutta, 1874,) after a series of experiments which consisted in injecting into the veins of large dogs alvine solutions obtained from both healthy and choleraic subjects, arrive at the following conclusions:

It appears from these results that the dejections of persons suffering from cholera, and also those of persons in good health, when injected into the veins, act in some cases as a poison; have the power of producing a definite effect on the intestinal mucous membrane, resulting in a disorganization of its substance.

The symptoms and pathological changes induced by both varieties of material, the choleraic and non-choleraic, present no differences; but, so far as our experience goes, the proportion of cases in which this result is attained when choleraic fluids are employed is considerably larger than when non-choleraic material is used.

It is advanced that the conclusions obtained from the series of experiments noted are a sufficient reply to and explanation of the circumstances which in 1833 led to the assertion that cholera was not an infectious disease. So conclusive seemed the facts that individuals who had tasted and drunk of cholera dejections, had fed the same to animals, or had inoculated themselves with the discharges, and yet all escaped the disease, that the dogma of non-infection is adhered to by many.

It has been urged against the theory of the infectiousness of cholera the supposed immunity to the disease enjoyed by the attendants upon cholera-sick. It has been asserted that in hospitals medical attendants, nurses, and laundresses are but seldom attacked with the disease, and this supposed fact is advanced as one proof of non-infection. Is not this a question worthy of careful study? Experience has profoundly impressed us with the belief that, proper precautions having been taken, cholera attendants may enjoy the most perfect security from the disease; but the question is, are those attending upon a case of cholera safe when the disease and its products are left to nature alone?

The narrative of the last epidemic furnishes sufficient evidence in answer to the assertion and the consequent inquiries. While in the majority of instances the attendants of cholera-sick escaped the disease, yet a sufficient number of instances are recorded to demonstrate the danger that exists. During an epidemic of cholera all the members of a community are not attacked. No pandemic has yet occurred upon the American continent. An epidemic of cholera does not occur at every locality which may be infected by cholera arrival. Of the nine-

teen men who drank of the infected water, as described by Macnamara, but five were attacked with cholera; fourteen remained uninjured.

During an epidemic of cholera, it is particularly those whose systems are vitiated by other diseases; those who are suffering from depression of the nervous forces from any cause, but especially that which attends excessive fatigue, fear, or debauches; those who live in open violation of all hygienic laws; those impoverished by want, who are especially liable to the disease. Anxiety, mental depression, alarm, overindulgence in unripe or unwholesome fruit or vegetables, the physical exhaustion produced by debauches of all kinds, the use of impure water, all may result in derangement of the digestive organs and diarrhœa, but they cannot of themselves produce cholera; in each and every instance it is essential that the specific poison be introduced. We have endeavored to demonstrate how the system of a healthy person may resist the invasion of the disease, but these individuals have nothing to resist with, and therefore succumb.

The assertion of the Registrar-General of Great Britain, "that the person who contracts cholera in England is *ipso facto* demonstrated, with almost absolute certainty, to have been exposed to excremental pollution, excremental sodden earth, excrement-reeking air, or excrement-tainted water," is peculiarly applicable to the American epidemic of 1873, as will be demonstrated by the narrative.

PROPOSITION III.

That cholera-dejecta coming in contact with and drying upon any objects, such as articles of clothing, bedding, and furniture, will retain indefinitely their power of infection. That in this manner a sure transmissibility of the cholera infection is effected, and that a distinct outbreak of the disease may occur by such means at great distances from the seat of original infection.

At the recent international sanitary conference it was unanimously affirmed that "Cholera can be transmitted by personal effects coming from an infected place, especially such as have served for the sick from cholera; and certain facts show that the disease can be carried to a distance by these effects if shut up so as to prevent free contact with the air."

To demonstrate the value of the facts upon which this proposition is based, it is but necessary to recall the experiments of Macnamara. This observer mixed a quantity of fresh cholera-dejecta with some fine sand, and allowed it to dry in the heat of the sun. The material was then inclosed in a packet and stored securely. After the lapse of seven years, a small quantity of this earthy-looking stuff was placed in pure water and again exposed to the rays of the sun. A careful examination of the water thus infected failed to determine any differences between it and water which had been treated in the same manner with a fresh cholera-stool.

If the organic matter of a cholera-dejection retained its characteristics in a mass of dry sand for an indefinite period, and only resumed the process of decomposition on coming in contact with water, the same phenomena may reasonably be expected from fabrics that have been subjected to the same influences. The only essentials demanded for the revival of activity in the infection is moisture and heat.

Numerous instances illustrative of this proposition are recorded in the narrative. Conspicuous among them is the instance of an aged lady who slept one night in the same room and upon the same bed that was

occupied by the initial case of cholera in the epidemic at Lancaster, Ky. The next morning this lady was taken with cholera and died. Thirty days had elapsed since the death of the former cholera-occupant of the bed, and sixteen days since the occurrence of the last of the preceding cases of the epidemic.

To refute the theory of infection, as illustrated under this proposition, the fact is brought forward of clothing which was infected with cholera-discharges having been washed with impunity on the part of those performing the work. It has further been asserted that this supposed immunity is the rule and not the exception. Instances will, however, be found in the narrative disproving such assertions, and it is advanced that when such work is performed with impunity, the security which the workers have is to be found in the limitation which exists to the infecting power. Clothing soiled with cholera-discharges is generally washed out immediately after use, and the water repeatedly changed. In hospitals where all soiled articles of bed-furniture are acted upon by steam, in closed caldrons, a very practical disinfection is secured; but instances are too numerous of cholera-attacks following work over the wash-tubs in which were cholera-infected articles, to allow the assertion to stand.

During the virulent epidemic of cholera in 1873, at the Winfrey House, at Columbia, Ky., the bed-linen and other articles which were soiled with the cholera-discharges were placed in tubs of water, which were left in the yard in rear of the hotel. At the close of the second day of the epidemic the building was abandoned, nothing but the dead was removed, and no one attempted to visit the house until some weeks had passed. At the re-occupancy of the building the clothing and other articles were found unmolested in the tubs. These articles were now washed by several negro women, and with entire immunity. Surely the limitation of the stage of infectious decomposition is sufficient explanation.

But more positive and conclusive is the evidence collected in the narrative of the distinct importation from Europe of the cholera-infection, which developed an epidemic of the disease immediately upon the arrival of emigrants at their point of destination, and only then after they had unpacked and proceeded to take into use articles of clothing that had been packed in cholera-infected Europe. These instances will bear enumeration.

I. The family of Tent Havre, from Holland, all of whom died of cholera at Carthage, Ohio, and from whom one cholera-death occurred in the town, and the disease was carried into Longview Insane Asylum.

II. The family of Antonson, from Sweden, who died, with but two exceptions, after their arrival at Crow River, Minn., and who communicated the disease to their friends, who had been for some years in this country.

III. The party of Russians, who, coming from the Odessa district of Russia, died of cholera after their arrival at Yankton, Dak., and who communicated the disease to the inhabitants of that city.

The portability of cholera having been established, a most interesting field of study is open, in which the agency of common carriers in the rapid diffusion of the disease is most prominent for consideration.

That the merchant-marine and war-vessels upon the high seas are active agents in the diffusion of contagious diseases has been demonstrated and accepted for ages. In the days of her prosperity, Venice recognized this agency, and as early as 1448 her authorities not only established the quarantine, but detecting one method by which disease

was diffused, decreed the destruction of the effects of those who died of the plague, the epidemic of that day.

Epidemic cholera having escaped the cordon of quarantines, the agency of common carriers (those who transport persons or goods by either land or water for hire) in effecting a wide diffusion of the disease is presented for earnest consideration. Conspicuously at the head of all carriers are railway and steamboat companies, the great porters of cholera-infection.

The age demands rapid transit. A traveller, anxious to arrive at his distant home, avails himself of the one of the many competing lines of railway that offers the greatest annihilation of space. So urgent is this demand that the journey which in the olden time consumed months, at the present is but a matter of days or even hours. A map of the United States is almost gridironed, and the community is primitive, indeed, that is not served by actual contact with or by close proximity to a railway in active operation.

A passenger-train upon any of these roads consists of a baggage-car, one or more coaches for the general traveling public, and generally a sleeping or parlor car for the more exclusive, in addition to the engine furnishing the motive-power. A railroad-train thus constituted becomes an active agent for the transportation of any contagious disease. The plush or rep-cloth coverings of the seats offer an asylum in their meshes to contagion, while the misnamed salons at the end of each car afford unequaled facilities for the distribution and transportation of disease.

Especial attention is asked to the interior of the salons. They will be found fitted with a urinal, which, connecting with a pipe, allows the urine therein deposited to fall upon the ground below the car; a commode, with a hinged cover, containing a funnel-shaped vessel, which empties below the car all dejections therein deposited; a large reservoir, with movable cover, which contains the drinking-water furnished for the occupants of the car. This in the majority of coaches completes the furniture of the salon; but upon some roads a small wire-gauze-covered box containing chloride of lime is added.

Upon well-appointed roads the urinal and the vessel of the commode, as well as their conducting-pipes, are made of a glazed earthenware, which admits of thorough washing; but many coaches are daily occupied by the public in which the material used is zinc, tin, or iron, and the least possible attention is paid to their cleanliness.

The reservoir of drinking-water is securely fastened to the partition-wall between the salon and the coach. A silver-mounted spigot in the general interior of the car compensates the traveler for the polluted source from which the water flows, and unless he has been thoughtful enough to provide his own drinking-glass, he must use the mug of tin or pewter, which, polluted by the contact of many lips, is unmolested in its filth.

What rational man would place the water-cooler which contains the drinking-water of his family in the water-closet or privy of his establishment? And yet upon all the lines of travel this violation of hygienic law is found.

Upon a railway-train, thus equipped, the task of proving an active agency in the diffusion as well as the transportation of disease is far from difficult.

At the Vienna conference it was unanimously affirmed "that man is the propagator of cholera when he comes from a place where the germ of the disease already exists." It is almost universally acknowledged that the excreta of individuals infected with cholera are the active

agents by which the disease is disseminated. That this diffusion may occur from actual contact with the excreta, or from the inhalation of an atmosphere impregnated with their products, or from the imbibition or deglutition of fluids or other substances infected with the same.

An individual at an infected point enters a coach which is a portion of a railway-train. The man may be at the moment suffering from the premonitory diarrhœa, or he may be seized with the same after the departure of the train. The commode of the salon is called into active use, and whenever the desire is present, with the egotism of the American traveler the contents of the rectum are discharged. It matters little to the individual whether the car may be at the moment passing an unoccupied portion of the country, drawn up at a railroad-station, or passing through a populous town or city; the instinct is satisfied, and the poisonous dejection falls below the car.

It is true that upon roads ballasted with sand a partial disinfection occurs, but who is prepared to assert that in the cloud of dust caused by the passage of the succeeding trains the active agent of cholera is not present? It is true that many of these dejections take place in isolated positions, where no one can be injured, but it is also true that the lines of railroads frequently pass in close proximity to dwellings and other habitations, and that the bed of the railroad is very frequently at a considerable elevation above the buildings.

At the city of Columbus, Ohio, the Pittsburgh, Cincinnati and Saint Louis Railroad, in the southwestern portion of the city, passes along an embankment and trestle-work from Randolph street until the Scioto River is crossed. On Spring street west the railroad is in front of the Ohio State penitentiary. On Spring street east and immediately under the bank of the railroad, is the small house at which the initial case in the epidemic of 1873 occurred. Crossing Spring street is the culvert to which reference is made in the narrative as having been tapped for the use of the penitentiary, and immediately below the trestle-work on which the railroad crosses the street is a large man-hole or vent which communicates with the sewer. Cholera was epidemic at Cincinnati and Saint Louis, as well as at other smaller points along the line of this road, and it is quite as rational to account for the occurrence of the epidemic at Columbus as due to the transportation of the cholera-poison from points previously infected with that disease, as to urge that a special endemic agency was established for that city.

The fetid atmosphere of the *salons* of many coaches is a matter of daily comment among those who are obliged to travel much during the heated term; and if any one doubts the effect of the noxious gases of these rooms upon the drinking-water stored up in them, a small quantity of the permanganate of potash will demonstrate the condition of the water after remaining a night in the reservoir.

Americans demand that transit should be not only rapid but luxurious. This demand is fully met by the Pullman Car Company, whose coaches are attached to nearly all railway-trains. These coaches are divided during the night into "sections," which are separated from each other by wooden partitions, and from the remainder of the coach by thick woollen curtains. Equipped for a night's travel, each section forms two beds; the lower composed of the covered seats, a mattress covered with some woollen fabric, two sheets, two pillows, (generally in woollen cases, which for use are covered with linen,) and one or more heavy blankets. The upper bunk is the counterpart of the lower, save that the frame-work of the bed is not covered with the same class of material,

and during the day is not exposed to contact with the persons of those who may be diseased.

Double glass sash protect each window, and heavy woollen curtains are further provided to protect the traveller from air, sun, and dust. The ventilation of these coaches is a matter of much care upon the part of those having them in charge, but the total air-space of an unequipped car is but 10,080 cubic feet; and allowing but two persons to each section, exclusive of the conductor and his porter, there would be *per capita* a vital air-space of 504 cubic feet. The vital capacity of the coach is, however, materially reduced by the *salons* and by the heavy furniture, which certainly occupy fully one-tenth of the air-space. In many of these coaches an apartment is partitioned off for the use of the more luxurious or exclusive travellers, differing in no way but its isolation from the remainder of the car.

To the credit of the company owning these coaches it must be said that great care is taken to keep all appliances in the most perfect order as regards cleanliness. The coach is ventilated as often as circumstances will admit. The furniture is cleaned frequently during each trip, and the entire coach is stripped and cleaned after each journey. The bed-linen is supposed to be used but once. The mattresses and pillows are aired and beaten. Indeed, so many and so great are the precautions adopted to secure cleanliness that at the first glance it would seem unjust and unnecessary to suggest further precautions, but the evils which have been enumerated exist, and until some remedy has been found, will continue to affect the health of communities through which they may pass.

During an epidemic of cholera, the construction and repair trains upon lines of railroad are as active agents in the dissemination of the infection as are fully-equipped passenger-trains. A construction-train gives employment to a large number of workmen, generally Irish and negroes. These hands sleep and eat upon the train, and the cabin-cars which they inhabit are often filthy in the extreme. Such a train moving over a road, passing the night at the switch or side track nearest the point at which the work is being performed, constantly visiting all stations along the line of the road, when once infected with cholera, will infect in turn each station that it may visit, unless extraordinary precautions are adopted.

Freight-trains are less active but still absolute porters of cholera-infection. Various articles of merchandise and baggage that may have become infected with the disease are by such trains conveyed great distances. The propagators of the disease are represented in the employés necessary for the management of the train. Numerous instances exist in the history of the epidemic of 1873 of the initial cases of the disease in local demonstrations being in the persons of employés of freight-trains.

All that has been said of passenger-trains applies with equal force to emigrant-trains, and during the years that cholera may be upon its westward journey, when such trains will in all probability convey large numbers of individuals from cholera-infected districts of Europe, there is occasion for unceasing watchfulness on the part of all communities through which they may be transported.

Upon the roads controlled by the Pennsylvania Company there is now in process of construction an especial car for emigrants, in which, while comfort is secured, there will be no fixtures which will prevent the coach being washed out at any and all times by a full stream of water, and in

this way not only filth will be removed, but the car will be kept from much which results from the presence of disease.

The class of common carriers who, next to railway companies, are most actively employed in the transportation and diffusion of infectious diseases are the vessels of all descriptions which are engaged in the navigation of rivers and other inland lines of navigation.

During the American epidemic of 1873 many striking and well-defined instances of their agency in the distribution of the cholera occurred. During the month of May, in that year, the disease was first brought northward along the line of the Mississippi River by infected boats; and during the ensuing months their agency was felt upon the Arkansas and Ohio Rivers, as well as streams of lesser magnitude. Nor was it in conveying the disease from the seat of original infection that their agency was evinced, for we find that the line of infection was turned, and that they conveyed the disease upon return trips to re-enforce the epidemic at the original point of departure. An inspection of one of the large steamboats that navigate the western waters will be all-sufficient to convince the most skeptical.

These vessels, compelled from the necessity of the waters navigated to be of light draught, are built with broad, deep decks. The lower deck, which is the largest, is for the accommodation of the machinery, freight, crew, and deck-passengers; the second deck, the sides of the greater portion of which are lined with state-rooms, is for the use of cabin-passengers; and an upper deck, or "the texas," upon which is a row of state-rooms for the use of the boat's officers; the whole is surmounted by the pilot-house.

All the available space upon the lower deck is occupied during a trip by freight, which consists of merchandise of all classes. The provision-chests and ice-boxes of the boat are generally found upon this deck, and to it are confined the class known as deck-passengers and the crew. A deck-passenger is one who cannot pay full fare, and in America at once indicates the individual as belonging to those classes of the community among whom infectious diseases find their most numerous victims. These persons are furnished with nothing but transportation. They sit during the day and sleep during the night in such positions as they may best secure; and this is generally found to be upon those piles of freight which will be for the longest time unmolested. In this they are but little better off than the crew, who when not at work occupy any place they may select.

It is among the deck-passengers of a river-steamer that infectious diseases, cholera especially, is conveyed from point to point. As the disease almost always occurs in a community unprepared for its advent, so it is upon these vessels. The disease may have been announced in cities or towns upon the route of the vessel, but it is not until the disease is absolutely fastened upon the boat that the officers are inclined to adopt any precautions. Thus it was in 1873. Boat after boat passed up the Mississippi and Ohio Rivers from infected points, upon which cases of cholera occurred; but the existence of the disease was denied, and the sickness was attributed to green fruit and vegetables, or to cholera morbus, that useful scape-goat!

A deck-passenger taken with choleraic diarrhœa uses the close and wet closet provided for his accommodation, and returns with soiled clothing to the pile of freight. The second stage of the disease occurs, and he vomits indiscriminately. The vomit and the involuntary dejections soak into the packages. The patient may advance to the stage of collapse, or the case may terminate fatally before attention is called to

AN INSURRECTIONARY MOB AT THE FRENCH BARRICADES.

it. It is impossible to define to what extent articles of merchandise may become infected. Science has not yet defined the stage of the disease in which the excreta are most actively infectious, although it seems to be indicated that the excreta of cases in the stage of acute painless diarrhœa and the dejections of those convalescent, or who have passed into the stage of typhoid, are absolutely more virulent in their infecting properties than those which are drenched with watery constituents; and the recent series of experiments at St. Petersburg show that the urine of individuals infected with cholera is capable of reproducing the disease.

The class of persons who are known as cabin-passengers are those whose systems are most generally in the condition to resist the invasion of the disease. The accommodations afforded them are ample for comfort. Every effort is made to secure cleanliness. The food furnished is good and well cooked. But among this class of individuals, those who may have contracted the disease before starting on the journey, or who are infected with the disease at any stage of its progress, will inevitably carry the infection with them; and the articles of bed-furniture which have become soiled will, when washed, the destination of the vessel being reached, affect the health not only of those who perform the work, but also that of the communities in which the workers reside.

It is suggested, as a remedy to the evils herein enumerated, that during any season in which cholera may have been declared epidemic in any portion of the United States, precautions be adopted upon all river-steamers to prevent deck-passengers and the crew of such vessels coming in contact with freight in said boats other than in the necessary handling; that a constant surveillance be kept upon the crew and deck-passengers, and every case of diarrhœa promptly treated; that during any season in which cholera is epidemic each steamer carrying passengers be compelled to add a medical man to the officers of the boat; that he be absolute in all matters of sanitary importance; and that he be provided with all stores that may be required for the use of the sick.

The General Government exercises supervising influence over common carriers of this class. The hull and machinery are subjected to rigid inspections. The captains and pilots are licensed. Costly hospital arrangements have been provided for the sick among the crew, and yet no provision has been made to prevent these carriers from transporting contagious diseases to and fro, as their owners may see fit. It is claimed for the Medical Department of the United States Army the original denunciation of these existing sanitary abuses.

The remarks herein made apply to vessels of all classes. The flat-boat, conveying a house in which live a family, who are generally the keepers of a store or drinking-saloon and the owners of a cow or other domestic animals; the barge, laden with heavy merchandise; the canal-boat or raft, all exercise a decided activity in the diffusion of contagious diseases.

PROPOSITION IV.

That the specific poison which produces the disease known as cholera originates alone in India, and that by virtue of its transmissibility through the persons of infected individuals or in the meshes of infected fabrics, the disease is carried into all quarters of the world. That cholera has never yet appeared in the western hemisphere until after its route of pestilential march has been commenced in the eastern world, and that its epidemic ap-

pearance upon the North American continent has invariably been preceded by the arrival of vessels infected with cholera-sick or laden with emigrants and their property from infected districts.

At the meeting of the International Sanitary Conference of 1874, it was unanimously affirmed "that the Asiatic cholera, susceptible of epidemic extension, is not developed spontaneously, except in India, and when it appears in other countries it is invariably by introduction from without."

During the year 1873, Pelikan startled the medical world by announcing the fact that cholera had become endemic in Russia, that the last outbreaks of the disease in Eastern Europe were not from new importations from Asia, but were from the seeds of the disease having remained latent from former epidemics.

The evidence upon which this opinion was based seemed, at the time it was advanced, to be unanswerable; but at the meeting of the British Medical Association of the same year, Netten Radcliffe, representing the medical department of the privy council, demonstrated the erroneousness of the conclusions to which Pelikan had arrived. It was conclusively shown that, although the disease lingered at Kiev, the Holy City of Russia, during the years of 1865, 1866, 1867, and 1869, it had been constantly re-enforced by successive cholera arrivals by way of the Red Sea, Persian Gulf, and North Persian route. One year later, and a conference of European scientists confirm the opinion contended for by Radcliffe, and India must continue to be recognized as the birth-place of cholera.

That cholera is a portable disease, is at the present day denied but by few observers; even among those who reject the contagiousness of the disease this fact is recognized.

The histories of all epidemics demonstrate that the disease appears wherever there are routes of human intercourse; that the infection is inevitably confined to such routes, and that the rapidity of its advance is regulated by the rate of human travel. Macnamara has shown—

"That as the communication between India and Europe has become more constant and rapid, so has epidemic cholera become more frequent in its visits to that continent, invariably pursuing the route followed by man in his passage to and from India, halting for a time in intermediate countries, where the seeds of the disease have been sown to bear fruit in due season, whence fresh germs have been again transmitted to other men, who have carried it a step farther toward the west. Thus has the malady been propagated from one human being to another until its influence has spread from the east as far as the western shores of America, *But cholera has never appeared in America unless Europe has been first affected; it has never broken out in the west of Europe unless the eastern part of the continent has been previously under its influence; and it has never been generated in the east of Europe unless correlated with an outburst of the disease in Turkey in Asia, Arabia, or Persia, nor have these countries been affected until the disease had previously burst out with violence over Bengal and traveled by slow and steady steps to the west of India.*"

Those nations nearest the *nidus of infection* suffer most frequently from cholera; those farthest removed suffer no less surely, but being at so great a distance from the focus from whence is the radiation of the disease, it is of necessity but an occasional visitant. So much is reasoned from the histories of past epidemics. What may be the future is beyond the range of human vision; but as the great laws of nature remain unchanged, and as heretofore no disposition has been observed on the part of natural forces to adapt their workings to the theoretical wishes of individuals, it is safe to conclude that the same great order of events will repeat themselves, influenced as to frequency by the rate of human ingenuity in the annihilation of space.

The only countries upon the inhabitable globe to which cholera has not as yet been carried, are the islands of the South Pacific, Australasia, the Cape of Good Hope and the western coast of Africa, the islands of St. Helena, Ascension, and Bermuda, the islands of the North Atlantic, and the western coast of South America. These localities are all separated from India by a wide extent of ocean, and during the past have had little or no commercial intercourse with that country. Lebert, in his retrospect over the course of this disease up to the present time, states that those portions of the globe not yet visited by cholera owe the immunity "partly to their comparative isolation and partly to accident." That cholera has not yet become acclimated in any portion of the globe outside the confines of India may be safely affirmed, while at the same time the well-established fact should be noted that in all the provinces of Hindostan the endemicity of the disease is not shown. From its birth-place in the Delta of the Ganges, the disease has effected a permanent lodgment in the provinces of Bengal, Madras, and Bombay, while in those that lie to the west and northwest, such as the Sinde, Rajpootana, the Punjab, it occurs but as an epidemic, developing itself only at the great religious and commercial gatherings, when the inhabitants of Bengal, Madras, and Bombay, with those of all other Indian provinces, as well as those of the adjacent nationalities, are congregated.

Hurdwar, in the Punjab, at the foot of the Himalaya Mountains, is spoken of as "a great nursery of cholera." At this city cholera has never originated *de novo*, but has always been developed during the great Hindoo festivals and fairs. Of these festivals Hurdwar is cursed with two; a yearly, which, occurring in the month of April, draws together a vast concourse of people, and one every twelfth year, which is attended by an almost fabulous number of human beings. Inspector-General Murry reports that at the Hurdwar festival of 1867 nearly three millions of people were gathered together, because of a report among the Hindoos that this would be the last of the great fairs, Hurdwar having lost its sacred character from the waters of the Ganges having been profanely diverted into the Ganges Canal. This immense number of human beings were collected together upon a bare, level, sandy plain, on the banks of the Ganges. The encampment occupied a space of about twenty-five square miles, and was regularly subdivided into streets and lanes. Shops were established from which an ample supply of good food was furnished, and pure water was provided from the Ganges. The people were placed in tents or in grass huts, where cleanliness was provided for and carried out strictly and effectually, the encampment being under the supervision of sanitary officers.

The people began to assemble during the end of March, but the fair was not regularly opened until April 3; at noon on the 12th of April the grand ceremony of bathing in the sacred Ganges was performed by the host, and during the evening of the same day cholera broke out. Up to this time, but five cases of the disease had occurred in this vast crowd; these cases had been at once isolated and treated. The cause of this outbreak is to be found in the fact that, during February of the same year, cholera had occurred along the range of the Himalaya Mountains; during March the disease was epidemic at Benares, far down the Ganges, and on the 25th of the same month it broke out at the sacred city of Allahabad. From all of these points pilgrims had gone to Hurdwar. By April 15 the vast crowd had dispersed, carrying cholera with them, and it is making no idle assertion to state that the cholera infection which was thus exported from the Hurdwar fair of 1867 died in the valley of the Mississippi in 1873.

It has been asserted by some American physicians that the epidemic of 1873 in the United States originated at or near the city of New Orleans; "that an importation of the disease was unnecessary, as the germs are always and everywhere present, only awaiting favorable circumstances to multiply and produce the effects customarily experienced from the general and abundant presence of cholera-poison."

By others it is asserted that the local peculiarities of the delta of the Ganges are reproduced in that of the Mississippi, and that as it has positively been demonstrated that the disease originates in the swamp-country through which flow the many streams that empty the waters of the Ganges into the Bay of Bengal, it may also originate in the swamps around the mouths of the Mississippi.

In support of such arguments, the interesting and seemingly plausible narrative of Estrazulas, which attempts the demonstration of an original development of cholera in the heart of South America during the year 1866 and the Paraguayan war, to originate which there were apparently all the factors of cholera present as they have been studied in the Sunderbunds, has of late been frequently advanced. But his narrative is robbed of its interest by the statement of Rego, the president of the Imperial Academy of Medicine at Rio de Janeiro, by which it is shown that before the disease occurred in Paraguay the cities of Pernambuco, Guanzy, and Rio de Janeiro had been infected by European importation; that prior to the outbreak of the disease in Paraguay, a troop-ship left Rio for the seat of war; that when two days out from port the troops on this vessel were attacked with cholera; that after entering the Parana River, but before coming within the lines of the army, she was turned back and placed in quarantine at the island of Santa Catharina. It is shown that this cholera-infected troop-ship was on the Plata and Parana Rivers a sufficient length of time to communicate with other vessels that did proceed to the seat of war.

It is recorded by historians that cholera has been endemic at the delta of the Ganges for centuries, and that as early as 1543 the disease was *exported*. It was a disease almost exclusively confined to the natives, and it was supposed that in them it was induced by their exposed persons, filthy habits, and poor food. After the English occupation of India the troops were frequently attacked, and as early as 1774 Paisley noted the efficacy of withdrawing troops from infected camping-grounds. At that time the disease was designated *true cholera morbus*, but at a later date Barnes supposed that cholera stood in the place of *periodical remittent fever*.

The sum of all observations that have been made by cholera-students goes to show that to produce an epidemic of the disease there must be a combination of certain powerful factors, each of which may of itself produce disease, some of the symptoms of which may resemble cholera, but that epidemic cholera is the result alone of their combination.

Peters points out as the principal factors of an epidemic of cholera:

1. An atmosphere impregnated with the products of fermenting human excrement.
2. An elevated temperature, with a still, stagnant, and peculiarly oppressive condition of the atmosphere.
3. Such meteorological conditions as have a marked tendency to favor the chemical decomposition of organic substances.
4. Lowness of site, swampy ground, moist soil, decomposition of vegetable matter, and all those causes which tend to produce bilious and remittent fevers.
5. Foul camping-grounds, filthy streets and yards.
6. Impure water.
7. Bad, spoiled, or defective food.

The summary of cholera-causes by Dr. Montgomery may be added to the list of Peters. It is as follows:

1. Undue exposure to the vicissitudes of climate, especially during cold nights following hot days.
2. Physical fatigue and nervous depression.
3. Undue abstinence or deprivation of food.
4. Excesses in eating, drinking, and licentiousness.
5. Vitiated atmosphere from all causes.
6. Direct exposure to the contagion of disease.

It has time and again been demonstrated that only in India do all these factors exist; that India alone, from her two hundred million inhabitants, the vast majority of whom are utterly reckless as regards sanitary laws, and are "naturally devoid of habits of cleanliness and decency," can furnish the dense masses of humanity among whom, when gathered together for their religious ceremonies and public fairs, cholera in an epidemic form originates.

It is difficult to appreciate the line of reasoning that could convince a healthy mind that any similarity exists between the delta of the Ganges and that of the Mississippi. The physical conformation may be similar, but certainly the condition of even the lowest, poorest negro living upon one of the Mississippi bayous is far removed from that of the Hindoo. It is readily to be conceived that did a congregation of from one hundred thousand to half a million American negroes annually come together in the swamps of the Mississippi delta, that among them cholera might possibly be developed. But America has never had occasion to witness such an event. The narrative of Estrazulas, before referred to, was the nearest attempt of the western world to manufacture cholera, but Dr. Rego has robbed the event of its charms of novelty and truth.

The spring-rains of 1874, in the valley of the Mississippi, were most extraordinary. The great western rivers refused to be confined to their banks. The Mississippi River in front of Memphis, "the City of the Bluffs," was more than forty-five miles wide. The levees were broken, and Arkansas, Mississippi, and Louisiana were inundated. Nor was this inundation confined to the Mississippi alone; all the streams and watercourses of the South overflowed their banks, causing immense loss of property and much human suffering.

Into Mississippi and Louisiana was swept the floating organic matter of the mighty river, and as the flood subsided the surface of the inundated country was covered with decomposing animal and vegetable organic matter and which were exposed to the fierce rays of the southern sun. What was the result? During the summer we received frequent accounts of congestive remittent fevers, terminating in a collapse resembling that of cholera, but the season passed away, and cholera, to the chagrin of the "indigenous theorists," failed to devastate the Mississippi Valley.

PROPOSITION V.

That the respiratory and digestive organs are the avenues through which individual infection is accomplished; that through the atmosphere of infected localities, cholera is frequently communicated to individuals; that water may become contaminated with the specific poison of cholera, from the atmosphere, from surface-washings, from neglected sewers, cess-pools, or privies, and that the use of water so infected will induce an outbreak of the disease.

The majority of observers unite in the opinion that by the medium of infected air, water, and food the cholera-poison gains access to the sys-

tem. Dr. Ball, of the Hôtel Dieu, thinks that although the digestive tube is the habitat, as it were, of the choleraic poison, yet the lungs are the principal viæ of infection. Dr. Murray, in his admirable paper on the "Channels through which Cholera is Communicable," records his opinion that in some instances the cholera-poison enters the system through the skin; and further states that the profuse cold perspiration of a cholera-patient, from its peculiar and characteristic odor, is an evidence of the elimination of the disease by the same means.

That the atmosphere of infected localities is an active agent in the diffusion of the disease is held by many observers.

Upon this point the investigations of Niemeyer induced the following record of his views:

> The cholera-poison is rarely taken into the system by drinking water containing it. As a rule, it undoubtedly enters the nose and mouth with the air, and is swallowed with the saliva. Using infected privies is so dangerous, because they are the favorite lurking-places for cholera-germs, and the gases arising always contain dust-like particles.

The results of Pettenkofer's theory are that the emanations from infected soil impregnate the atmosphere with the cholera-poison. It is indisputable that when cholera dejections are deposited in impure privies, cess-pools, or drains, the poison is propagated and diffused. Adair County, Kentucky, furnishes a marked instance.

In the rear of a livery-stable situated in the town of Columbia was a privy, the vault of which was filled to overflowing with putrid excrementitious matter, and the ground in its vicinity was saturated with the drainage from it. During the months of July and August some attempts were made to cause this privy to be disinfected and cleaned. These attempts at sanitary reform were resisted by the proprietor of the stable. Late in the month of August a negro boy, who had become infected with cholera in another county, came to this stable, suffering from diarrhœa, and made use of this privy. The diarrhœa became cholera, and he died; and from that infected privy an epidemic of cholera spread, which cost that community twenty-six valuable lives.

Water undoubtedly performs a most important part in the diffusion of cholera. Macnamara insists that an epidemic outburst of cholera can only occur through the drinking-water of the place becoming contaminated with cholera-matter.

The investigations of Dr. Snow in London, during the epidemics of 1849, 1853, and 1854, prove that cholera may be actively distributed through the medium of drinking-water.

The persistence of a cholera epidemic in Russia during the winter season was only partially accounted for by the habits of the Russian peasants, the construction of their houses so as to exclude all air, the faulty heating-apparatus, &c., until Dr. Routh pointed out that in the Russian settlements everything is thrown out around the dwellings; and that, owing to the intense cold and the great expense of transporting drinking-water, the inhabitants are in the habit of drinking the water from melted snow; that the snow used for this purpose has been frequently that upon which the cholera-stools have been thrown; and that by this impure drinking-water the epidemic is prolonged there can scarcely be any doubt.

The epidemic in Central Kentucky furnishes a striking illustration of the power of drinking-water in disseminating the disease.

Several isolated cases of cholera had occurred in the town of Lebanon, near to a small creek which forms one of the drains of the town. A few days after their occurrence the Marion County Fair was held upon

the grounds near Lebanon. As the water-supply was less than the demand, the deficiency was supplied from the town. Unfortunately a well was selected on low ground and quite near to the banks of this creek. On the second day of the fair a violent rain-storm deluged the country. The creek was filled to overflowing, and it was impossible that the surface-washings should not have infected this well. On the third and fourth days of the fair the water of this well was served as usual; and on the night of the last day (August 31) cholera, malignant in its type, was developed in all localities inhabited by those who had visited the grounds and drunk the water.

Great stress is laid upon the fact that subsequently the water from the same well was used by individuals with impunity, for which certainly the theory of vibrionic decomposition, which has been so fully noted, offers a sufficient solution.

PROPOSITION VI.

That the virulence of a cholera demonstration, the contagion having been introduced into a community, is influenced by the hygienic condition of the population, and not by any geological formation upon which they may reside.

It is shown by Macnamara that the large majority of the inhabitants of the world live upon alluvial soils; that they are crowded together in cities, towns, and villages; and that the lower classes, when thus congregated, especially suffer from diseases consequent on faulty hygienic conditions. The oxidation of their tissues being imperfect, and their food often unwholesome and scanty, the secretions of their stomachs must frequently be far less healthy than they would be under better sanitary conditions; and hence, such people coming in contact with cholera infection, would be more subject to its deadly influence than their healthier brethren.

Pringle, after an experience of twenty years in the service of the Bengal Presidency, notes the fact that comparatively few cases occur among the healthy, well-fed Europeans, when contrasted with the awful mortality among the weak and ill-fed pilgrims to the shrine of Juggernaut.

Libert writes:

> Nothing can be more capricious than the variation in the intensity of cholera in different places and at different times, even at different times in the same places. An imported case may end in a local attack confined to a single room or house; even a simultaneous importation of a number of cases at different points may exhaust itself in a number of local epidemics, while at other times a single case suffices to swiftly produce an epidemic or even a raging pestilence.

The narrative of the epidemic of 1873 affords many new and striking instances of the truth of this proposition and the assertions of the eminent observers who have been quoted. The writer has already presented his views as to the causes which modified the intensity of the epidemic and which stamped out the disease in many of its lines of ramification; but sufficient number of instances are recorded to show that wherever the disease found a suitable nidus prepared that there it was rapidly propagated, and that a virulent epidemic was instituted; but, on the other hand, when the cases of cholera were brought into communities in which hygienic regulations were in force, the disease was in many instances at once stamped out of existence.

It is submitted that in no way is the grand law of the transmissibility of cholera more strongly shown than in the instances which have been

so often quoted as proving that human intercourse has no agency in the diffusion of the disease.

The cordon de santé established by Austria and Prussia, in which a corps d'armée of each nation was employed, was ineffectual in shutting out the disease. Why? Because the line was repeatedly passed by Polish Jews engaged in smuggling, through whose agency the disease was introduced within the Austrian dominions. During the late war, the Government of the United States were never able to absolutely prevent intercourse at blockaded ports, and blockade-runners have passed into history.

Cholera exists wherever the disease has been carried, and finds a fitting and unmolested nidus. The disease does not of itself make sudden and mysterious transfers. Much has been said during the past forty years of the mysterious bound of cholera to New York City, in 1832, from Quebec; the last-named having always been held as the original point of infection in North America for that year; but the truth will no longer be concealed, and it has at last been demonstrated that New York City was infected with cholera by importation from the British Islands before the first cases occurred upon the Saint Lawrence River.

In no way is the transmissibility of the disease more clearly shown than in the eccentricity of its course in the development of the early cases of an epidemic. Cholera may appear in the heart of a populous city, concentrate its poison in certain localities of that city, and the small towns and villages in its immediate vicinity may escape entirely; or the outbreak may occur at a point of less note, and from there be only carried to larger towns after the epidemic has been fully developed. If in such instances an earnest investigation be had into all the circumstances of the origin and spread of an outbreak, it will invariably be found that the individuals engaged in establishing foci of infection have derived their power from a common cause. To illustrate, cholera has never yet appeared upon the North American Continent until after its advance has been announced in foreign territory, and hitherto the earliest cases of epidemics have occurred at the ports of entrance to the country. From the port of entrance the disease is distributed. A traveller infected with the disease at the point of original outbreak reaches his home at an inland city. Here he passes through the various stages of the disease. The excreta are thrown into the privy of his premises, and all individuals who use this privy are liable to the disease from the infected atmosphere. On the other hand, they may be thrown into drains, from which they may pass into sewers, which in small towns are only flushed with water after rain falls. In these sewers the specific poison of cholera comes in contact with organic matter of all description, and the process of molecular decomposition is rapidily advanced. The next outbreak of the disease will probably occur close to the outlet of said sewer, and at a considerable distance from the point of original infection; or, the drains of private houses which communicate with the sewer being unprotected by proper traps, the cholera-infected air of the sewer is discharged into the houses. The excreta of the cholera patient thrown carelessly upon the ground may by surface-washings contaminate the water supply of the family, and all who drink of the water thus infected become liable to the disease, although but a small number of the individuals thus exposed may be the subjects of an explosion.

The occurrence of a case of cholera is almost invariably followed by a scene of terror and confusion. In the excitement of the moment the

discharges are allowed to soil articles of clothing, to fall upon the floor, or vessels containing the excreta are allowed to stand many hours uncared for. There is good reason for supposing that the dejections of the first and last stages of the disease are more absolutely infectious than those which are drenched with the serum. Nedswetzky has shown that the vomit and urine of cholera subjects present the same characteristics of the dejections. It is an acknowledged fact that in the large majority of the early cases in a cholera epidemic disinfectants are not employed.

In a sick-room as thus described, all present may become infected, and the disease developing at the homes of the individuals, new foci are established.

It is earnestly urged that a recognition of the infectiousness of cholera robs the disease of its terrors, and that by cleanliness and disinfection it may be stamped out. That where these precautions are adopted, the occurrence of a case of cholera will influence the health of the other inmates of a house to no greater extent than they would be by a case of intermittent fever.

Small-pox is a contagious disease, and the unprotected individual coming in contact with the disease is always liable to it.

Cholera is an infectious disease, but this fatal power is developed only after the molecular matter contained in the excreta of the patient arrives at a certain stage of decomposition. Prevent this process of decomposition from taking place, and the disease is stamped out.

What vaccination is to small-pox, disinfection is to cholera.

PROPOSITION VII.

That one attack of cholera imparts to the individual no immunity to the disease in the future, but that the contrary seems to be established.

The assertion of Lebert that an attack of cholera usually protects an individual from a second attack, has not been sustained by the evidence collected during the epidemic of 1873. Numerous instances are recorded of individuals who recovered from an attack of cholera to succumb to the disease at a later period of the same epidemic; and indeed does this seem to be in the natural order of events. What more rapidly vitiates the constitution than an attack of cholera? The conditions being present that are recognized as the great auxiliaries of the disease, it is but logical to suppose that the specific poison of cholera reaching the alimentary canal, a fatal explosion of the disease would almost of necessity follow.

CHAPTER III.

ON THE PREVENTION OF CHOLERA, AS ILLUSTRATED BY THE EPIDEMIC OF 1873.

It being demonstrable that cholera is an infectious disease which is spread by the dejections of individuals suffering from choleraic diarrhœa as well as from the fully developed disease; that fabrics upon which these dejections have dried, are but the custodians of the poison which they are ever ready to deliver; and finally that this infection, in whatever shape it may arrive, only reaches the shores of North America after *a positive importation;* it becomes a matter of vital importance to inquire what means may be employed to prevent or arrest the development of the disease whenever it may appear upon the sea-coast.

That the importation of cholera in the persons of individuals may be prevented by proper precautions, or that the disease may be stamped out whenever importation is accomplished, is shown by the evidence collected to be most certain; but to secure the advantages which may be derived from this fact, concerted action is necessary. Of what avail is it that the most elaborate and costly defense is erected at all principal ports of entrance, if but a single opening be left unguarded? It is true that the greater the port the greater the danger, and the more complete should be the precautions; but the neglect of a nation's arming at all points has cost thousands of valuable lives. Of what avail is it that the health-officials at one point recognize the infectious properties of cholera, and concentrate their sanitary forces upon the disease whenever it may arrive at their gates and utterly stamp it out, when those of a sister city fail to attain to the same appreciation of the disease, open wide their gates, close their eyes to the entrance of the disease, and allow a focus of infection to be established from which pestilence and death stalk hand in hand. The results obtained by experienced observers demonstrate that the national means of precaution against a general epidemic of cholera are to be found in the *quarantine of observation.*

It is not proposed to enter into any lengthy consideration of the subject of quarantines. The literature of this subject is so extended, and the demonstrations so perfect, that only by means of quarantines conducted in accordance with the most enlightened hygienic requirements, can the health of a nation be preserved from contagious diseases of exotic origin, that to continue the discussion would be but to reiterate the opinions and expressions of far more experienced observers.

The term quarantine no longer implies that exercise of arbitrary power which has called out such hearty denunciations, and has given rise to so many powerful enemies to the establishment; no longer implies the detention of healthy individuals in the close and infected cabins of a vessel, which in times past cost the sneer "that quarantine instead of preserving actually involves a sacrifice of life;" no longer implies a loss to the mercantile interests of the nation that may amount to millions.

It has been clearly demonstrated that the city of New York was, in the year 1873, secured from four distinct importations of epidemic cholera by the "rigorous quarantine of observation," which, under the

superintendence of Health-Officer Vanderpoel, has more nearly approached perfection than any other similar institution which the United States has known. In the instances alluded to the most rigid and searching investigation was made into the history of all cases that had occurred. The fact that each case had been isolated, that disinfectants had been judiciously employed, and that the full period of incubation had elapsed; the vessels in three instances were allowed pratique, in the fourth instance the detention was less than forty-eight hours. No cases of cholera were developed upon either vessel after leaving the quarantine grounds, and none occurred among the passengers or crews after landing.

The narrative which is presented elsewhere demonstrates how searching was the investigation instituted, and the effect of such a quarantine is most evident. No longer will the officers of vessels when approaching land strive to conceal all evidence of disease which may have occurred during the voyage, but knowing that the hygienic precautions which they may adopt to isolate the sick and to prevent the spread of the disease will meet with a prompt recognition, they are stimulated to still more active exertions. It would be well for the nation were such enlightenment exhibited at all stations, but it is shown in the exhaustive report of Assistant Surgeon H. E. Brown, United States Army, "on quarantine in the southern and gulf coast," that the diversity of laws and the conflicting interests which at present govern all quarantine stations, render the performance of uniform and rigorous quarantine service inoperative if not impracticable.

But while the port of New York was closed to the introduction of the visible disease, yet vessels bearing infected fabrics passed to the city, and from them points of infection were established far in the interior of the United States. The history of the cholera epidemic of 1873 demonstrates that the disease was originally imported into the United States by means of infected fabrics; that during the summer of that year the epidemic received re-enforcements by the same means, and that the medium of infection was the clothing and other property of emigrants from the cholera-infected districts of Europe.

It was found that the individuals who became the mediums in this wide diffusion of the disease, arrived at the port of New York upon uninfected vessels; and that it was not until after their arrival at their points of destination, not until after their effects had been unpacked and exposed to the atmospheric influences, that any demonstration of the disease occurred.

European emigrants arrive at ports of embarkation either singly or in small bands; but large numbers, from all portions of the continent, are not unfrequently gathered together in miserable tenements, awaiting the hour of departure. The crowded quarters which they occupy upon shipboard prevent their access to the bulk of their effects, and the individual is limited to the use of hand luggage. Upon their arrival at the port of entrance, the natural desire to reach that point at which rest and a home is to be secured, demands rapid transit from the seaboard to the interior of the continent. The journey ended, boxes, bales, and bundles are unpacked, their contents exposed to the air, and immediate steps are taken which denote the establishment of a home. We would most earnestly insist, that during the years in which cholera is upon its westward march, that this moment, when the emigrant from Europe has secured his home, is the period freighted with the utmost importance to the inhabitants of North America; and that unless at such times extraordinary sanitary precautions are adopted, precautions

which include the personal property as well as the person of individuals arriving from cholera-infected districts, the United States will always be liable to the invasion of the disease.

It is respectfully submitted that the great sanitary necessity of the present is the establishment of a national sanitary bureau, which, in the hands of the chief medical officers of the Government, could be rapidly and economically organized.

It is submitted that through the influence of the General Government alone can reliable sanitary information be promptly collected from all quarters of the world; and that a daily or weekly health-bulletin from such a bureau would be of incalculable advantage to all local Boards of Health, to whom a national sanitary bureau would stand but as an advisory head.

Such a bureau, in receipt of information from reliable agents, would be able to designate to the health-officer of a port at which an immigrant-vessel was about to arrive the individuals among the lists of passengers whose former residence had been within the lines of infection, thus enabling that health-officer to isolate the effects of said individuals for prompt and efficient disinfection. We are most profoundly impressed with the necessity which exists for such action, and it is asserted that had such a bureau been in operation during the year 1873 thousands of valuable lives would have been saved.

During the months of August and September, 1873, it was the fortune of the writer to witness the epidemic of cholera in the counties of Garrard and Marion, of the State of Kentucky, and at a later period to investigate the manifestations of the disease as it appeared in eighteen States of the Union. In noting the effect produced upon the public when the epidemic of that year was developed, he was impressed with the following facts:

I. *The eagerness with which the public mind fastened upon anything which could give information as to the cholera.*

II. *The terror which was exhibited in most localities on the development of the disease, and the inefficient means adopted to prevent its spread.*

III. *The utter impossibility of instituting proper sanitary regulations in a cholera-district, after the disease had become epidemic.*

IV. *A wide-spread disinclination to admit the infectiousness of cholera, lest the terror of infected communities be increased and the sick be left uncared for.*

Experience teaches that the safety of a community threatened with an outbreak of cholera is to be found in the full recognition of the infectiousness of the disease; and it is submitted that when the laity have become possessed with the truth of this fact, when they learn that cholera should be met by sanitation, as small-pox is with vaccination, that the virulence of cholera epidemics will be lessened, and that its lines of advance will be checked. We are writing of America, and to the inhabitants of the American continent, who alone can be reached by cholera after it has accomplished ocean-transit.

The second great preventive of cholera is cleanliness. Cleanliness in what? Cleanliness in everything. To maintain the perfect sanitary condition of a large city, trained minds are devoted, and thousands of money are lavishly expended; but in the small interior towns, with some few bright exceptions, little or no attention is paid to the subject, each property-holder following the bent of his own mind. In these towns the streets and natural drainage-sources are the receptacles of filth. The ground within and around outhouses is the depository of human excrement. The negro in his cabin is permitted to rival the pollutions

of Jessore or Madras, while the only scavengers to be found are the hogs that roam the streets. The latter, after devouring indescribable filth, are presently served as articles of food.

To secure the best sanitary condition of a town, it should be the duty of the trustees to appoint an inspector, who should have at his command an efficient corps of laborers. By this inspector all that is detrimental to the public health should be removed.

To what should his attention be directed?

I. *To the condition of each house and its surrounding premises.*—Débris of all kinds should be collected in heaps and destroyed by fire. No rank vegetation, which too often conceals pernicious substances, should be allowed to stand, and when cut down should be destroyed by fire. Outhouses of all kinds should be inspected. Privies, stables, chicken-houses, &c., should be cleaned and disinfected. The débris should be buried in such position as not to affect the water-supply. Dirty and damp cellars should be cleansed, ventilated, and disinfected.

The water-supply should be rigidly examined, and property-holders required to place their wells and cisterns in good condition. Débris should not be permitted to accumulate upon the ground around the well. The well should be securely covered and closed. The sides should be banked up, so that the surface-washings may be from, not to it.

Despite all theories to the contrary, the action of the soil as a filter surpasses all others, and from a carefully-kept well pure drinking-water may always be obtained. If a privy-vault should be close to a well, or if a house or other drain should pass in its immediate vicinity, the walls of that well should be rigidly and frequently examined and water taken from the bottom of the well carefully tested, lest contaminating drainage may occur; and all wells so situated that they must inevitably receive impure drainage or surface-washings must be closed in such manner as will absolutely prevent access to their contents. Localities which in a past season had been infected, and where systematic disinfection had not been instituted during the prevalence of the disease, should be most carefully cleansed. Every portion of the premises upon which cases of cholera had occurred should be reached by the disinfecting agents. It should be borne in mind that it is far more prudent to err from over-zealous cautiousness than from negligence.

Individuals arriving in any community from a locality known to be infected should be at least subjected to a close surveillance. If their effects have been so situated that by any possibility they could have become infected, they should be subjected to sufficent disinfection. The individuals should be required to use a carefully disinfected privy until the uttermost limit which can be placed on the period of the incubation of cholera has been passed. For the efficient disinfection of clothing, &c., no plan proposed exhibits more favorable results than that of Dr. Ransom. In the use of the hot-air closet it was found that a temperature 250° F. was effectual in destroying the contagion of small-pox.

A rigid house-to-house system of inspection, once having been established, should never be abandoned. An occasional inspection amounts to nothing. Eternal vigilance is the price of safety.

II. *To the condition of the natural drainage of the town.*—Water-courses and other natural drains should be kept free and unobstructed, and disinfectants should be constantly used throughout their length. The vegetation which almost invariably lines the streets of small towns and chokes the road-side drains should be removed; and then not left to decay in the center of the road, but should be removed beyond the town limits and there destroyed with fire. Ponds and pools of stagnant

water within or near the limits of the town should be filled up; filled up not with the *debris* of the town, but with fresh earth, which is one of the most valuable disinfecting agents.

Cholera having appeared in a town, it is desirable that the authorities select an isolated building, which may be used as a hospital. The house selected should be sufficiently commodious to prevent overcrowding, and to admit of the separation of the convalescents from the sick. This building should be placed in the charge of a competent physician, who should be assisted by a corps of nurses, and the hospital should be furnished with all necessary appliances. To this building all cases of cholera which occur should be removed. This suggestion referring only to that class of individuals who are unable to properly care for their sick, and to adopt such measures as will protect those who reside in their immediate vicinity from the infection.

A distinguished physician of Nashville has pointed out that in an epidemic of cholera want of proper food and the privations to which the lower classes are always subjected during an extensive epidemic adds fuel to the fire, and his suggestions of immediate relief of their wants is worthy the consideration of all town authorities.

The general cleanliness of a town having been secured, there remains to be noted that of individuals. Scrupulous care of the person secures the removal of what may and often does prove the nucleus of disease. Personal cleanliness is best secured by a daily bath. In the sultry and oppressive weather in which cholera most frequently makes its dread appearance, the bath, as hot as can be borne with comfort, affords the most efficient relief that one can secure. A thorough soaping and rubbing of the body with a flannel cloth removes all effete matter from the skin, and the free use of hot water imparts a cooling freshness, a solace from which none may be debarred; and which, taken in the early morning, invigorates to meet the fatigues of the day, and at night encourages refreshing and strengthening sleep.

The under-garments should be frequently changed, and those which have been worn during the day should invariably be removed on retiring to bed. Clothing that has been worn through the day should never be exposed in the sleeping-apartments during the night-hours, and should be well cleansed and aired before being again used.

Trivial and unnecessary as such rules may seem, the observance of them will be found of incalculable value.

III. Disinfection.—What vaccination is to small-pox hygienic regulations are to cholera. The rigid observance of sanitary laws presents to this virulent disease a wall which is almost insurmountable. The foundation of this wall—this line of demarkation between health and disease, between life and death—is undoubtedly laid in disinfectants. If the port of entry is passed by cholera, if the embargo there laid upon the disease has been insufficient to arrest its progress, it behooves each community to raise the wall for their own protection, and it is all the more necessary that the foundations are made sure.

The day has passed in which nauseous-smelling substances are looked upon as disinfectants. "To change the odor is not to disinfect. The odor produced by a putrescent animal mass may be covered, but the effete matter, the product of décomposition, is still present in the air that is breathed, although the nostrils, overpowered, fail to detect its presence." To borrow the words of Dr. Craig, "a true disinfectant must be antiseptic; that is, it must possess the power to destroy or to render inert the products of decomposition of organic matter or of morbid action in the living body through the agency of a reaction in which

the disinfectant itself undergoes chemical destruction." Therefore that agent is the most acceptable and useful which destroys utterly and for all time the effete matter with which it may come in contact.

A study of these agents renders it necessary that some one or other of the classes into which they have been divided should be adopted; but as it is unnecessary in a report of this character to enter fully into the study, and as we will endeavor to point out those which will be most valuable in the emergency of which we are treating, we will pass over the complicated classifications of Jeannel and others and adopt that of Dr. Craig.

1. *Destructive disinfectants*, "which act by oxidizing and consuming whatever organic matter they may come in contact with, attacking the more advanced product of putrefaction first."

2. *Conservative disinfectants*, "which destroy effluvia and organic matter when in small quantities, but are inert upon large masses."

The action of the agents which are classed under these grand divisions, and their application, will be considered when treating of the emergencies which demand their use, and those only will be noted that are attainable by all classes of individuals.

Experience has taught us that water, that indispensable element, is a most efficient agent in the diffusion of cholera-poison.

The question naturally arises, can water which is contaminated with organic matter be detected, and when detected can it be rendered by any process of purification safe for human use? Facts based upon extended observation demand an affirmative answer. To detect impure water, or water which has been contaminated by organic matter, Rawlinson says:

> If the water from a certain well or tank be placed in a tall glass, covered and exposed to the sun, and after twenty-four hours a drop be examined under the microscope, we find its surface covered with molecular matter and vibriones. We may be almost certain that the organic matter from which these vibriones are formed is capable of inducing cholera, supposing it, of course, to have been derived from cholera-ejecta.

This method of examination is certainly beyond the popular reach. Few individuals are skilled in the use of the microscope. Chemistry, however, affords a simpler means, and one which is within the reach of all.

Place a quantity of the suspected water in a glass vessel, and add, drop by drop, a solution of the permanganate of potash (which may be obtained from any chemist) until a pink color is imparted to the liquid. If after standing a short time the color disappears, it indicates the presence of organic matter. Add again the solution of the permanganate until the color is again produced. If the organic matter has all been decomposed, the water will after the lapse of hours retain the pink color; but if organic matter is still in solution, the color will again disappear. The greater the amount of the salt decolorized before the water retains the pink color, the larger the quantity of organic matter present in the water.

Before proceeding to the subject of the purification of water it is well to examine into the sources from which water for domestic purposes is ordinarily obtained.

In communities not provided with a carefully-delivered water-supply the purest water that can be employed for domestic purposes is that obtained from securely-guarded wells and from cisterns which are supplied with rain-water. They alone can be protected from surface-washings. Cistern-water, however, must be as carefully examined and tested as the well-water. Rain-water, it is well known, may contain or-

ganic matter of animal or vegetable origin. Even when it has been collected in a clean glass vessel, before it has come in contact with roof or soil, it has been found to be impure from organic matters, &c., which it has derived from the atmosphere in its passage through it, when taken near inhabited places.

Snow and snow water is much less pure than rain-water, for the crystals of which it is composed imprison the impurities of the atmosphere; and it is said "that snow frequently contains so much organic matter as to show confervoid vegetation under exposure to light."

The water of rivers, marshes, ditches, canals, and ponds is contaminated with organic matter derived from decaying animal and vegetable remains, and from *débris* of all kinds which necessity or surface-washings empties into them. Necessity demands that the water of large rivers shall be employed by the cities and towns upon their banks. In such instances all the aids which science affords are employed in the purification of the fluid before it is distributed for general use. But stagnant water, or the water of nearly dry streams or that of marshes, should never be employed for domestic purposes until it has been deprived of its deleterious constituents.

Spring-water may be contaminated from surface-washings or from organic matter with which the strata of soil through which it passes may be impregnated.

Impure water may be rendered serviceable and fit for use by boiling, which act precipitates most of the mineral constituents and destroys utterly all molecular matter.

Dr. Taylor, a returned missionary from China, reports that during a residence of many years among the Chinese no cases of cholera came under his observation; and this absence of the disease he attributes to the fact that tea is the beverage of the country; consequently nearly all the water which the inhabitants drink has been boiled.

By the process of filtration water may be thoroughly purified. Indeed, so perfectly does the combination of boiling and filtration purify water, that it is asserted that water in which cholera-discharges have been mixed loses entirely its infecting properties on being subjected to these simple expedients.

Dr. Peters suggests an excellent filter for the poor "in one of the largest-sized common red flower-pots, suspended at a convenient height in a shady place, and having the hole in its base plugged with a sponge, so as to permit only an exceedingly fine stream of water to pass through; the sponge to be frequently washed." Filters containing the black oxide of iron are said to be efficient in removing organic matter from water.

Of such vast importance does this subject become that during an epidemic of cholera in any community each family should be provided with drinking-water only after it has been subjected to some such process. Water so prepared, to which ice is added, is not only harmless but palatable. Ice may be used with impunity, for it is one of the purest forms of water when taken from a deep lake or pond. Faraday demonstrated the fact that water in freezing deposits nearly all of its constituents, and that the unfrozen portions contain the impurities.

Not unfrequently individuals are placed in such positions that they are unable to procure water which has been purified by either boiling or filtration. The permanganate of potash, which has already been noted, now becomes invaluable. The action of this salt is explained by Dr. Craig as follows:

When the permanganate is added in suitable quantities to impure water it converts the organic matter into carbonic acid, water, &c., undergoing itself a gradual decom-

position, with the deposition of insoluble deutoxide of manganese. * * * A method which will destroy organic matter in water without adding to it anything unpleasant or injurious is an evident desideratum at all times, and especially during the prevalence of cholera, and there is, perhaps, no method more effectual and convenient than that by treatment by the permanganate.

The practical application of this agent requires the use of from half a grain to one grain of the salt to the gallon of water, and about two hours are required for its action. In smaller quantities the solution should be added, drop by drop, until the pink color is evident. In a tumblerful of water but a few moments are required for its purification. At some of the Indian stations, where the water was offensive from decaying organic matter, a few drops of the permanganate purified the water almost instantly.

The peroxide of hydrogen, an antozone, is said to be still more efficient in the purification of water. It is a powerful oxidizer, and completely destroys organic matter with which it comes in contact.

The late Ashantee war called forth, among other notes of moment, the invaluable memorandum of Crooks on the purification of drinking-water. This observer demonstrates: 1. That the organic matter in impure water may be divided into three classes: (*a*) Matter in a state of putrefaction; (*b*) Matter ready to become putrid; (*c*) Matter which is slow to decompose. 2. That the permanganate of potash acts powerfully upon organic matter of the first class, but that its power over substances of the remaining classes is not only slow but uncertain. 3. That a mixture, consisting of permanganate of lime, one part; sulphate of alumina, ten parts; fine clay, thirty parts, is the most effectual purifier of drinking-water now known.

The use of impure water almost invariably results in the development of diseases of the alimentary mucous membrane, and of specific diseases, such as malarial and typhoid fevers and other affections; but simply impure water will not induce the disease known as cholera. To produce cholera from water, it is essential that the *water must have received a portion of the organic matter from the dejecta of an individual who is infected with the disease.*

An unknown traveler infected with cholera may deposit his dejections in such position that the water-supply of a community will become infected. None knew of his arrival; his departure was not noted; therefore when days have passed and cholera has been developed in persons who have used this contaminated water, the members of the community are at a loss to account for its development; but invariably a prompt and persistent inquiry along the line of infection will result in the detection of the individual who has scattered the disease.

It has been shown that privies, cess-pools, and sewers, the receptacles of human excrement and of other forms of filth, become hot-beds for the dissemination of the cholera infection, when the dejections of an individual suffering from the disease are mixed with their contents. It has been further shown that the effluvia from such localities is impregnated with decomposing organic matter, and that when inhaled this organic matter becomes mixed with the saliva, is swallowed, and the disease is reproduced.

Experience, that mighty expression of power, has demonstrated that certain agents, classed under the general head of destructive disinfectants, will most effectually destroy this poison. Of these agents we will select but those whose efficiency has been well tested, and whose small cost places them within the reach of all classes—namely, *sulphate of iron or copperas, lime, and charcoal.*

Each of these agents belongs to the class of destructive disinfectants;

each acts promptly and powerfully upon organic matter, and a combination of the three procures a most powerful disinfecting agent for the purposes now under consideration. Dr. H. C. Wood thus describes the disinfecting action of copperas:

> It is antiseptic, but it also decomposes sulphureted hydrogen, precipitating sulphide of iron. It is decomposed by ammonia; the oxide of iron, a persistent, powerful oxonizing agent, being precipitated. It slowly but persistently attacks organic matter about it, oxidizing it, and being reduced to a sulphide of iron.

The experiments of Eckstein, made in a privy which was in daily use by a large number of persons, confirmed the value which has been assigned to this agent.

Macnamara found in cholera-dejections which were treated with sulphate of iron the infusoria and molecular action was instantly destroyed and did not recommence. His experiments fully substantiate the statements made by Dr. Budd in 1866, and by Dr. Angus Smith in 1869.

Lime as a disinfectant is of value from its power of destroying organic matter by the process of oxidation, as well as by its powerful affinity for water. The chloride of lime as a disinfectant is claimed by Eckstein to be equal if not superior to sulphate of iron. Macnamara found, however, that although its presence in a cholera-dejection arrested the action going on in the molecular matter for a time, it was very soon resumed. Charcoal acts as a mechanical disinfectant, entangling the organic matter in its meshes.

The most advantageous use which can be made of these agents is as follows: a mass composed of two parts of unslaked lime and one part of charcoal is cast upon the exposed surface of an impure privy or cesspool; upon this is poured after a few hours a solution of sulphate of iron, which has been prepared by adding the salt to boiling water in the proportion of five pounds to the gallon. A sufficient amount of this solution to saturate the mass should be used, and its application should be made daily.

In the consideration of agents which act as disinfectants to human excrement the value of fresh earth must not be overlooked. Its value during the late war in privy-sinks, which were daily used by large numbers of men, was fully demonstrated. The practice which is so universal through the Southwest, of defecating upon the ground and of leaving the excrement uncovered, should be rigidly discountenanced, and the use of sinks which may be disinfected should be insisted upon. The modern earth-closet, which is simple in its construction and so cheap as to be within the reach of all, should be universally provided for the use of females. Goodell has shown how many and how serious are the disorders to which the female is liable, arising from the miserably faulty closet conveniences which, especially in the country, are provided for their use.

During the prevalence of cholera it is most prudent for those persons living in the immediate vicinity of infected localities to adopt some measures by which the disinfection of the atmosphere may be accomplished. It has been shown by various experiments that during the prevalence of cholera there is an absence of ozone in the air. Ozone is a peculiar element, which is supposed to be oxygen acted upon by electricity. It is characterized when in a concentrated form by a peculiar, pungent odor, "and by its intensely oxidizing and bleaching power, so that substances on which common oxygen produces no effect, are rapidly oxidized on contact with air which contains only a small portion of this odorous principle."

To detect the presence or absence of ozone in the atmosphere, Schön-

bein, the discoverer of this element, prepared slips of paper, which, having been soaked in distilled water, were placed in a solution of iodide of potassium and starch, in which they were left for five or six hours. They were then dried in a cool, dark place, in the horizontal position, so that the iodide solution might be equally diffused.

The experiment is performed by hanging these papers in a box from which the bottom has been removed. They should not touch or rub against each other, and on being exposed for observation should be moistened with distilled water. If ozone is present in the atmosphere, the slips are rendered blue; if the ozone is deficient, no change of color is produced.

Various other processes have been described by which these papers may be prepared and the presence of ozone determined. Conspicuous among them are the methods of Moffat, Lowe, and Beard.

Although by some authorities the peculiar properties ascribed to ozone are doubted, still the majority of observers describe it as the vital element of the air; "*that from its presence oxygen is life-supporting, and that in the absence of ozone offensive products in the air are increased, and all diseases which show a putrefactive tendency are influenced injuriously.*"

Several methods for the artificial production of ozone are described: the slow oxidation of phosphorus, the slow combustion of sulphuric ether. The method of Boeltzer, of adding one part of sulphuric acid to two parts of permanganate of potash, is attainable by all. This mixture will continue to give off ozone for several months.

For the purification or disinfection of the air many other expedients are suggested as of practical value: *Charcoal*, from its rapid absorption and subsequent oxidation of organic emanations. *Chloride of lime*, exposed in a shallow vessel and moistened with water, gives off chlorine, which is supposed to destroy organic matter. *Bromine;* this substance, diluted and exposed in saucers, is a popular aërial disinfectant. *Nitrous acid*—the gas may be evolved by placing a small portion of copper in dilute nitric acid—is a most powerful disinfectant. *Sulphurous acid*, most easily evolved by burning sulphur, is also supposed to act powerfully on organic matter.

It is prudent that during a cholera epidemic one or other of these disinfectants should be exposed in all rooms of houses, especially those used as sleeping-apartments; but if bromine, nitrous or sulphurous acid be employed, great care should be used that the gas is disengaged slowly.

The theory that flies may become the carriers of cholera-poison has been advanced; and as the idea carries with it an air of plausibility, effort should be made to counteract any injurious influence which they may exert. The most scrupulous cleanliness, not only of cooking-utensils and table-furniture, but of the rooms in which food is stored or prepared, should be observed. Gauze covers for dishes should be used, and every appliance which may prevent their entrance into houses should be adopted.

The occurrence of a case of cholera in any community should lead to a general and complete disinfection of all points at which the individual may have been during the few days previous to his attack. With the first symptoms of the disease the house in which the patient lies should be put in order. The various vessels and appliances for the sick should be without excitement placed ready at hand. The vessels from which drink and medicine are to be administered should be placed in the room, and not mixed indiscriminately with those in use by the healthy mem-

bers of the family. A deep but narrow pit should be dug in the yard adjoining the house, in such position that no possible drainage can be established with the water-supply, and the bottom of this pit should be covered with crystals of the sulphate of iron. A large supply of a saturated solution of copperas should be prepared, and after each vomit or dejection of the patient a quantity of this solution should be added, and the whole intimately mixed. They should be at once carried from the house, emptied into the pit, and the vessel which contained them should be carefully washed, and the water used for that purpose should also be emptied into *the pit*. Upon each dejection a few inches of earth should be thrown.

It has been suggested that, in place of earth, fresh sawdust be used. It is claimed that the advantages arising from its use are double. First, that the acids of the wood will arrest the decomposition of the molecular matter. Secondly, that the mass may be utterly destroyed with fire. While in crowded communities some advantage may be derived from the use of sawdust, we are decidedly in favor of the absolute and instantaneous disinfection by the sulphate of iron, and of depositing the matter thus treated below the earth.

At some localities necessity demands that the excreta of cholera-patients be emptied into drain-pipes which connect with sewers. In such instances it is of vital importance, not only that each vessel containing excreta be thoroughly disinfected, but that a complete flushing of the drain-pipe be frequently made with a concentrated solution of the sulphate of iron.

A strong solution of the sulphate of zinc, or of chlorinated soda, in a large wash-tub should be in a convenient position, into which all cloths or articles of clothing should be cast as soon as removed from the patient. And in a similar solution, or in water strongly acid with vinegar, the attendants should frequently rinse their hands. When the dejections are passed involuntarily, cloths saturated with the sulphate of zinc solution, or with vinegar, should be placed to receive them. The floors, carpets, or other articles of furniture that may become soiled with the excreta should be carefully washed with strong vinegar, with which also the excreta of the patient should be treated until the disinfectants which have been suggested are obtained. Should the case terminate fatally, all articles of clothing which have been on or around the body should be at once removed and instantly thrown into the tub containing the disinfecting fluid. The body should be washed in one or other of the disinfecting fluids, and all water which has been used on the person or on the clothing should be treated, as regards its ultimate disposition, as has been suggested in regard to the excreta. Should the mattress be found soiled with the discharges, it should be burned at once. Indeed, it would always be more prudent to destroy by fire all fabrics which have been soiled by these fatal dejections than to risk the development of a single new case. The body having been placed in the casket, crystals of sulphate of iron or of permanganate of potash should be placed around it, so as to act upon any product of decomposition which may occur prior to burial, which in no case should be delayed.

It is prudent and well for the healthy occupants of a house in which cholera has become developed to at once subject themselves to some prophylactic treatment. Experience seems to indicate that an acid mixture containing quinine and iron is most efficient. Should a second case occur, at its termination the house should be abandoned, at least until a most careful system of disinfection shall have been instituted.

IV. INDIVIDUAL HABITS.—Niemeyer, writing in 1870, says:

> Certain influences appear to increase the predisposition to the severer forms of the disease, or to diminish the resisting power of the organism to the action of the poison. Chief among these are errors of diet, emetics, and laxatives, catching cold, and other debilitating influences. It is true, foolish people seek to excuse their excesses at the time of cholera epidemics by saying that the mode of living can have no effect in inducing cholera, because persons who lead the most proper lives are attacked by and die of the severest forms of the disease. Whoever is exposed to a poison whose action kills many persons, while others recover from it, is foolish to subject himself to injurious influences which lessen his chances of recovery, even if the avoidance of these injurious influences gives no guarantee of a favorable termination.

We have quoted the remarks of Niemeyer in full, so applicable are they to a class in every community who find in times of public danger only fresh and additional excuses for self-indulgence.

On the development of an epidemic of cholera it is well for all persons in whose power it may be to at once leave the infected locality. Niemeyer's rules were:

(1) *To start soon enough.*

(2) *To go as far as possible.*

(3) *Not to return until the last trace of the disease had disappeared.*

Admirable rules, if adopted and carried out to the letter. But one who starts too late may carry the disease in his person; one who travels too short a distance may be overtaken by the disease; while those who return to their homes with the same haste that attended their departure not infrequently fall victims to the disease.

Flint recommends that the removal of persons in districts where, *owing to the activity of auxiliary causes, the disease is especially rife, should be enforced as a sanitary measure by municipal authority.*

Those individuals who remain in an infected locality during an epidemic of cholera, from necessity or from philanthropic motives, will do well to observe rigidly fixed rules as to their individual habits, which may properly be considered under several heads. Of personal cleanliness sufficient has as already been noted; we therefore pass to other considerations.

1. *Dress.*—The surface of the body should at all times, both of the day and of the night, be fully and warmly protected. Under-garments which have become saturated with perspiration should be removed, the surface of the body briskly rubbed, and dry articles substituted. Whatever may suddenly check perspiration or induce a chilliness is considered dangerous and should be avoided. A broad flannel bandage worn over the abdomen and around the person, even in the oppressive weather of summer, will impart a sense of comfort and a decided relief to the abdominal malaise, so universally experienced during a cholera season.

2. *Diet.*—While it is advisable for all persons to be careful in their diet, and rigidly to avoid all articles of food that are known to be indigestible, it is still as necessary not to produce too sudden and radical a change in the diet. In other words, excesses of all kinds should be avoided; the digestive apparatus should be encouraged to the performance of its duty by the presence of good, well-prepared, wholesome food. Beef, mutton, poultry; rice, hominy, farina; wheat, corn, rye; coffee, tea, chocolate; and the various condiments, as salt, pepper, mustard, and other spices, may be freely used. Nor can we see any reason why such articles as butter, milk, eggs, &c., which a distinguished physician prohibits under the generalization of animal products, should be prohibited. Wine, brandy, and malt liquors may not only be allowed, but when used in moderation are extremely useful in averting those debilitating influences which so often prevent the system from repelling the

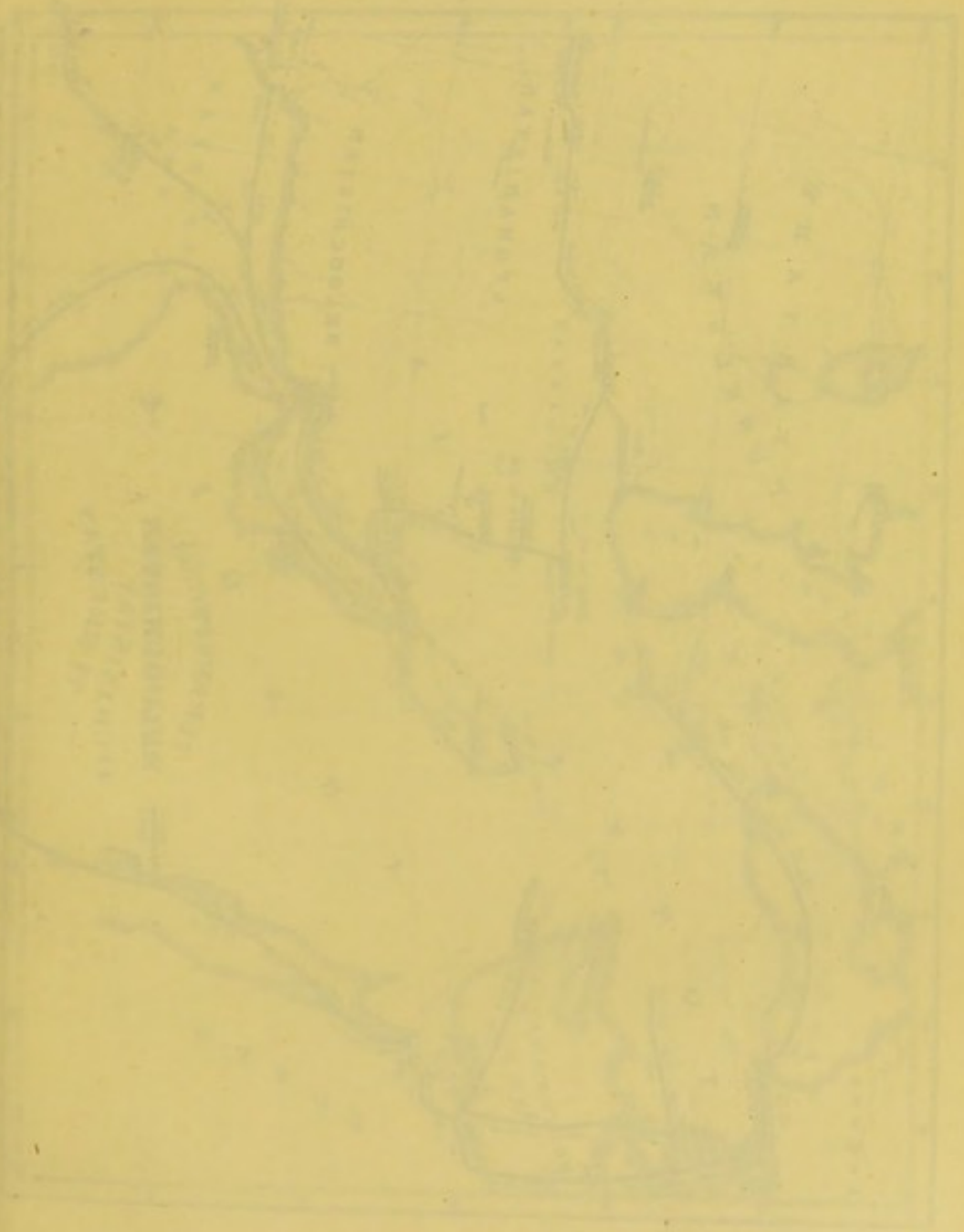
disease; but their use should be interdicted positively whenever undue stimulation results. Experience has shown that a debauch predisposes to cholera when the disease is epidemic.

The free use of salt with food during a cholera epidemic is strongly recommended by several writers, who urge that the debilitated condition of the stomach and bowels, which is known to predispose to cholera, is removed by its tonic influence. In this way it has undoubtedly some prophylactic power. Its value as a disinfectant is recognized.

The condition of the drinking-water should always be an object of solicitude, and it is well to cultivate self-control, and to refrain from drinking water except from the supply which is habitually used; that is, a person whose home is in an infected locality should be careful to supply his family with pure drinking-water, and should impress upon one and all the absolute necessity of drinking none other.

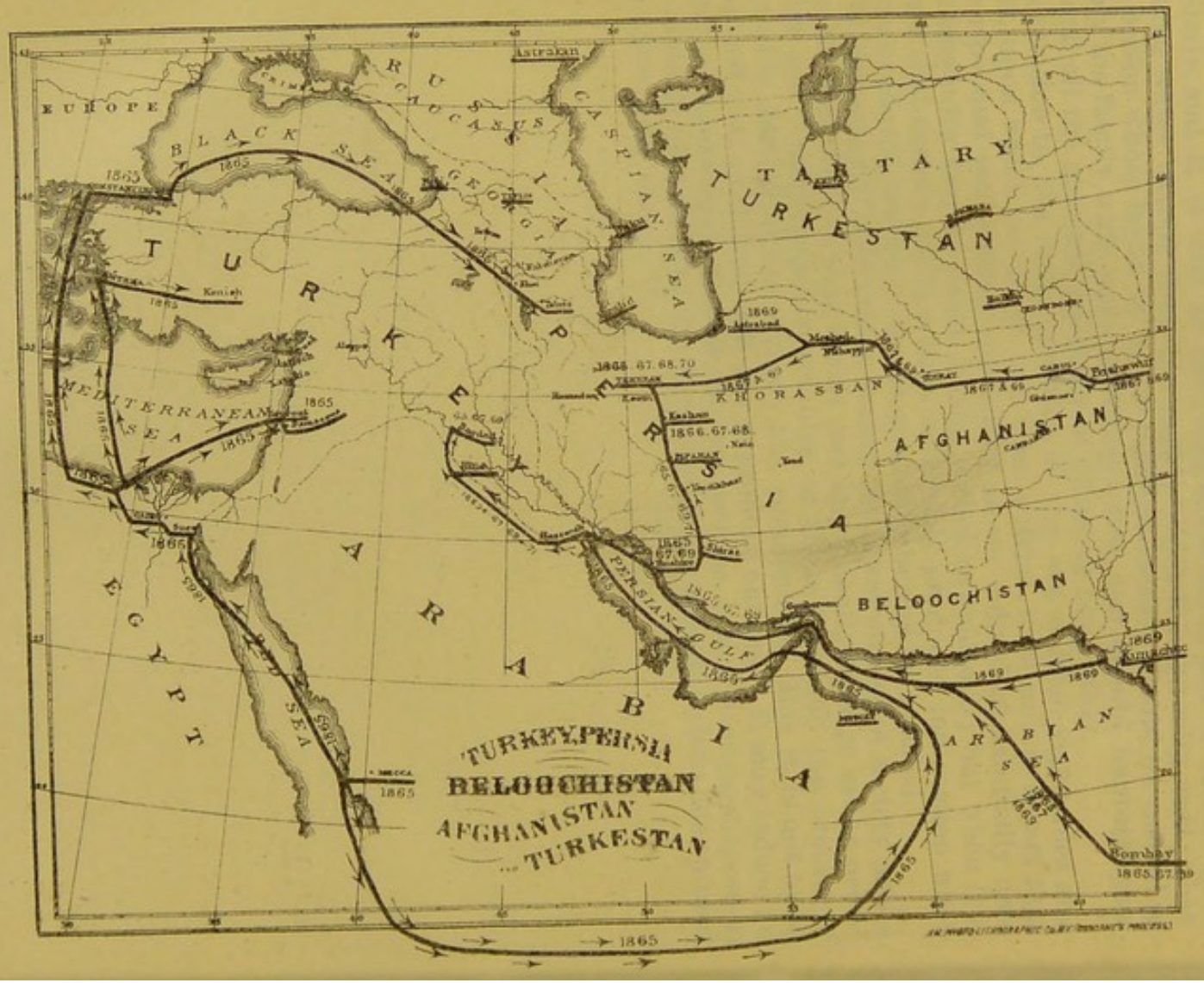
In relation to the vexed question of the use of fresh vegetables and fruits, upon which so much has been written, it is safe to assert that such ripe and well-cooked vegetables as an individual habitually uses with impunity may be eaten during a cholera epidemic; but when it is known that certain articles have invariably produced indigestion when eaten, prudence demands that they should be rigidly avoided.

The necessity of restrictions among the lower classes of society arises from the fact that persons of this sort imprudently indulge in the use of unripe and badly-cooked vegetables, or those in which the process of vegetable decomposition already has commenced. But it is not to be imagined that such fruit will *per se* produce cholera. It may induce an attack of sporadic cholera or cholera morbus, and it does predispose to the rapid development of the disease after the specific poison has entered the alimentary canal.



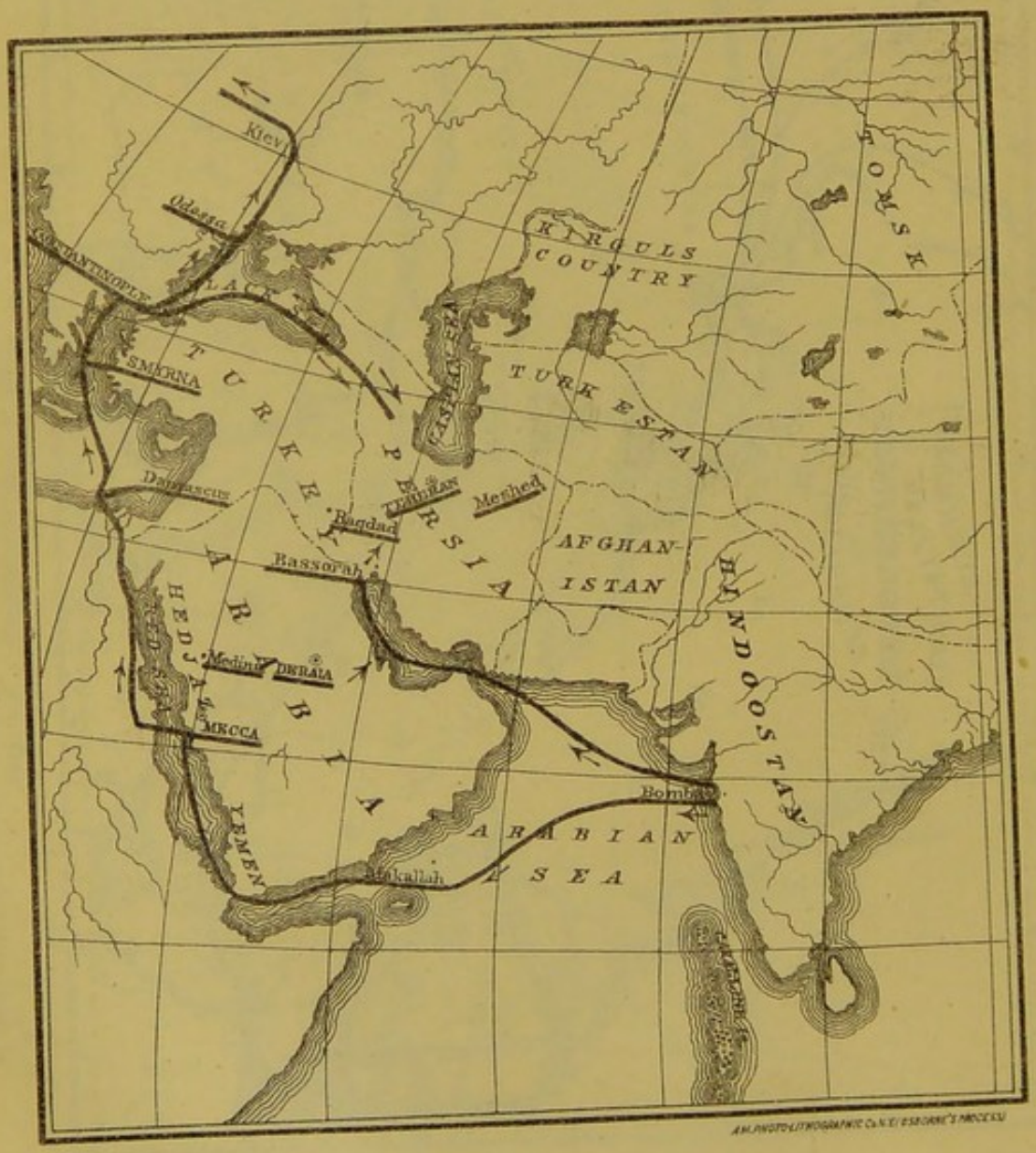
MAP of the Invasion of Persia by Cholera in 1865, 67, 69 and 71, from India by way of Peshawur, Kunachee & Bombay. From Mecca in 1865; from Alexandria, Beyrout, Smyrna & Constantinople in 1865

by Dr J. C. Peters.



(ASIA)

MAP of Persian Gulf & Red Sea Routes
by J. C. PETERS M.D.



CHAPTER IV.

ON THE ORIGIN AND SPREAD OF THE ASIATIC CHOLERA WHICH REACHED THE UNITED STATES IN 1873.

By John C. Peters, M. D., *of New York City.*

The late outbreak of Asiatic cholera in this country, which commenced in New Orleans in February, 1873, was preceded by a great prevalence of the disease in North Germany, Poland, Hungary, and Austria for at least three years, viz: in 1870, 1871, and 1872; and by extended outbreaks in Russia in 1869, 1870, 1871, and 1872; while it had also been present in Persia every year since 1865; and notably so in 1867, 1868, 1869, and 1870.

It is well known to be in operation in India, especially in the province of Bengal, every year; more particularly every third, sixth, ninth, and twelfth years, in connection with the great pilgrimages to Juggernaut, Hurdwar, and their affiliated shrines. The influence of the Juggernaut pilgrimages, or of the worshipers of Shiva, the Destroyer, can be traced from 1781 through the great twelve-year epidemics of 1817, 1829, 1841, 1853, and 1865 in India, stretching north to Calcutta and south to Madras, on the east coast of Hindostan; while the pressure of the adorers of Vishnu, the Preserver, to Hurdwar, in the north of India, and to numberless other sanctuaries, may be seen in the great outbreaks of 1819, 1831, 1843, 1855, and 1869, in India and adjacent places.

The great epidemic of 1865 issued from India, by way of Bombay, to Makallah, and from there up to Mecca by steamships; and was forwarded by Suez, Cairo, and Alexandria to the Mediterranean Sea, and from thence by steamships to Beyroot and back to Damascus in Syria, towards Persia; also to Smyrna, and through Asia Minor again towards Persia. Also, from Alexandria to Constantinople, and from there east through the Black Sea to Trebizond, and down through Armenia, also toward Persia, from the northwest.

It was also forwarded from Bombay, up the Persian Gulf, to Bushire, and from there into Persia, by way of the south. And, finally, returning Persian pilgrims from Mecca carried it back to the Persian Gulf, to Bushire, and Bassorah, from the southwest. (See maps 1, 2, and 3.)

The presence, persistence, and recurring activity of cholera in Persia for so many years, viz, from 1865 to 1872, although paralleled by previous periods of equal continuance, led some observers, especially Dr. Tholozan, principal physician to the Shah, and director of the sanitary administration of Persia since 1843, to conclude that the disease had become naturalized there; and to hint that Persia, rather than India, was the source of the late epidemic in Europe and this country. The entire subsidence of cholera in Persia, however, since 1872, has now finally disproved that supposition; while all the best epidemiologists have again returned to their former conclusions, that the central position of Persia, between India and Europe, exposes it to frequent importation and invasion of cholera, which scarcely allows one outbreak to subside before another is introduced.

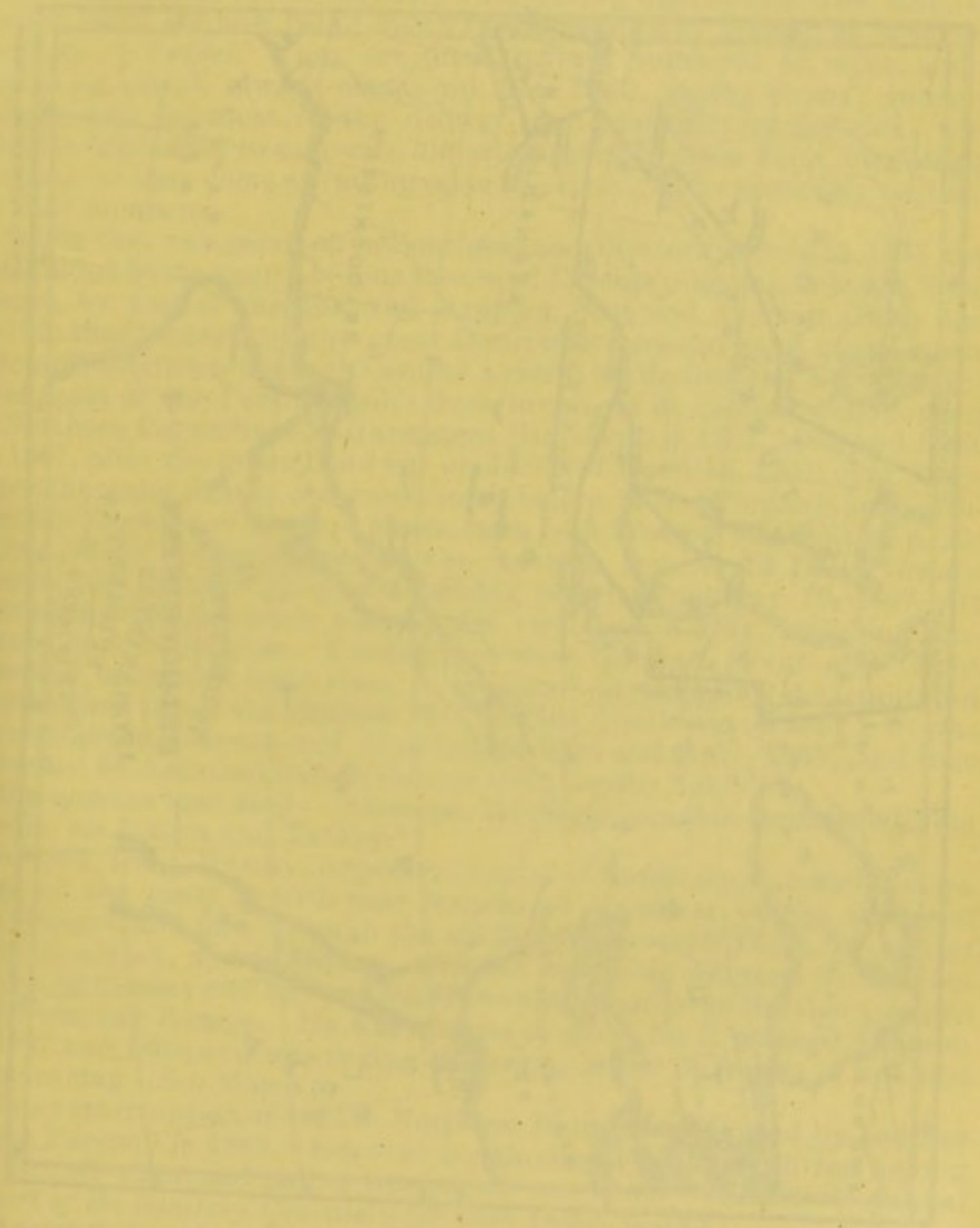
We have already seen that these implantings of the pestilence are much more numerous and occur from many more directions than is generally supposed; but we have not yet exhausted the list: for it is frequently conveyed up the Persian Gulf from Kurrachee, at the mouth of the river Indus, as well as from Bombay. From both places it is forwarded to Bushire, the only great Persian port on the gulf, and from there through Shiraz, Yedz, Ispahan, and Kashan, due north to Teheran, the capital of Persia; which is only seventy miles south of Reshdt, the principal port on the south shore of the Caspian Sea; from which it is easily sent up to Russia in Europe. (See map.)

It is also frequently deported from Bombay to Bassorah, at the head of the Persian Gulf; and from there up the rivers Tigris and Euphrates to Hillah, Bagdad, Damascus, Aleppo, and other great cities in Syria and Asia Minor, and then trends toward the Mediterranean and Black Seas.

From Bassorah, near the united mouths of the Tigris and Euphrates, it is frequently carried by pilgrims to the holy shrines of Kerbela (Meshed Hossein) and Nedjef, (Meschid Ali,) just south of Bagdad. From W. A. Shepherd's book (From Bombay to Bushire and Bassorah, p. 10) we learn that Bassorah, at the head of the Persian Gulf, has many pilgrim-boats, which are always crowded with the living and the dead, going up to Kerbela and Nedjef. The living cargoes, consisting of men, women, and children, are huddled together like pigs; from one hundred to one hundred and fifty being crowded together in a space of forty feet by twenty, with twenty-five or more dead bodies piled about; forming rather close packing in the warm season. As these pilgrim-boats passed or went to windward the scent was anything but pleasant; and it was difficult to say whether the living or the dead were most disagreeably fragrant. Then the Arabs living along the shores of the rivers not only stop the vessels and rob the living, but also take and hold the dead bodies in pawn till the price they set upon them is paid by the sorrowing relatives; who believe that their own souls and those of their defunct relatives will never reach paradise, unless they get their bodies to the tombs of Hossein or Ali, at Kerbela or Nedjef. But these pilgrimages of dead and living bodies to Meshed Hossein and Meschid Ali are more than outrivaled by those which proceed to Great Meschid, which is situated in North Persia, due east of Teheran, toward India; and to all three of them, huge congregations of devotees proceed from all parts of Persia, north, south, east, and west. At Kerbela, (Meshed Hossein,) Nedjef, (Meschid Ali,) and Great Meschid, (Meschid Reza,) the gorgeous mosques are hardly less sacred to the various sects of Mohammedans than is the mosque at Mecca. Kerbela, Nedjef, and Great Meschid are (see Lancet, September 18, 1872) probably the most important fostering-places of cholera in North and South Persia; for they are the burial-places of Hossein, Ali, and the Imam Reza, the three most highly rated saints next to Mohammed; to whose shrines not less than one hundred and twenty thousand pilgrims flock annually from Persia and India, bringing with them many hundred corpses in all stages of decomposition, for interment in the sacred soil of these great holy cities.

Again and again the congregation of pilgrim hordes at these places has been the occasion of grave outbreaks of cholera; the disease having been introduced by the incoming Persian and Indian devotees; and carried back by others to the Ottoman dominions. The pestilence, fostered by overcrowding and the unwholesome conditions which always prevail in the so-called sacred cities, attaches itself to other pilgrims going homeward or passing elsewhere; and thus is disseminated widely by them through the districts they traverse.

J.C.PETERS' PERSIAN GULF ROUTE,
followed in almost every epidemic.



*J. C. PETERS' MAP of the **North Persian & Central Asiatic** routes,*
the former followed in many epidemics – the latter in several.

The pilgrim caravans are difficult to avoid by day; but at night, on the road, one is apt to be awakened from slumber by the shouts of advancing drivers and the tinkling of bells, announcing a passing crowd. By the faint light of the moon or stars one perceives a sea of long black boxes surging by, on scores of mules and camels. Each animal is laden with two of these mysterious objects, one on each side; and many of them are so loosely nailed together that another sense than that of sight soon convinces one that they are coffins. In fact they contain the putrefying bodies of the devout, who, having died in the true Mohammedan faith, are now being taken for burial in holy ground at Meschid, Kerbela, or Nedjef. They are often carried hundreds of miles, and a sickening stench always comes up from their gaping seams; causing nausea and faintness in the drowsy and unsuspecting traveler; who finds it impossible to extricate himself promptly from their disgusting contact, as they come crowding on in the dark, with apparently no limit to their numbers.

While this was going on in Southern and Western Persia in 1865 and 1866, aided by the return of four thousand Persian pilgrims, in boats, from Mecca, by way of the Red and Arabian Seas and Persian Gulf; and double that number by the great Damascus caravan; and a not inconsiderable multitude through Central Arabia, by Medina and Deraia to the west coast of the Persian Gulf; fresh invasions of cholera were coming to Northern Persia from Northwestern Hindostan in 1867, 1868, and 1869. In 1867, after the great Hurdwar epidemic of April 12, 1867, over forty-three thousand deaths occurred from cholera in the Punjaub, or Northwestern province of India. Macnamara (see Treatise on Cholera, p. 25) says: "The epidemic crossed the western frontier of India toward Persia with a large party of Hurdwar pilgrims on May 19, 1867. It prevailed in Afghanistan with fearful virulence in July, 1867, and continued until September. Passing due west through Herat and Great Meschid, with this early start, it appeared at Teheran, the capital of Persia, just below the Caspian Sea, toward the close of 1867. It was reproduced in Teheran and Meschid, in June and July, 1868; and then extended to Astrabad and Reshd, on the Caspian Sea."

Macnamara then said: "Europe, therefore, is again threatened from Persia, *via* Russia and Turkey."

In 1867, Dr. J. Murray, inspector-general of hospitals, watched cholera arise at the great twelfth-year festival at Hurdwar, at the source of the Ganges, and pass through the northwest corner of India, by way of Lahore, Attock, and Peshawur, with the returning pilgrims to Afghanistan and Persia; and foretold that it would spread over Northern Persia to Russia and Europe. He was no false prophet, for it reached Teheran in 1867 and 1868, and was raging in Persia; while in Russia it was just commencing. (See Map 4.)

This vast irruption of 1867 in Northern India was followed by another in the Punjaub in 1869, when over ten thousand deaths occurred among the British white and native troops and residents. (*See Sixth Annual Report of the Sanitary Commissioner with India*, p. 33.)

It prevailed again in Peshawur, the extreme northwestern border town, in August, September, and October, 1869.

Dr. Bryden says, (ibid., p. 220:) "The cholera of 1869 did not stop at the Peshawur frontier. In the first week of September we hear of it above the Kybar Pass, at Jelalabad; and before the middle of September, 1869, its appearance in Cabul, still farther west, was reported."

The Lancet of August 31, 1872, says: "To the pilgrimage at Hurdwar, in 1867, and to Great Meschid, in Northern Persia, in 1867 and

1868, may probably be traced the diffusion of cholera in Russia and Europe during the past three years, viz, from 1869 to 1872."

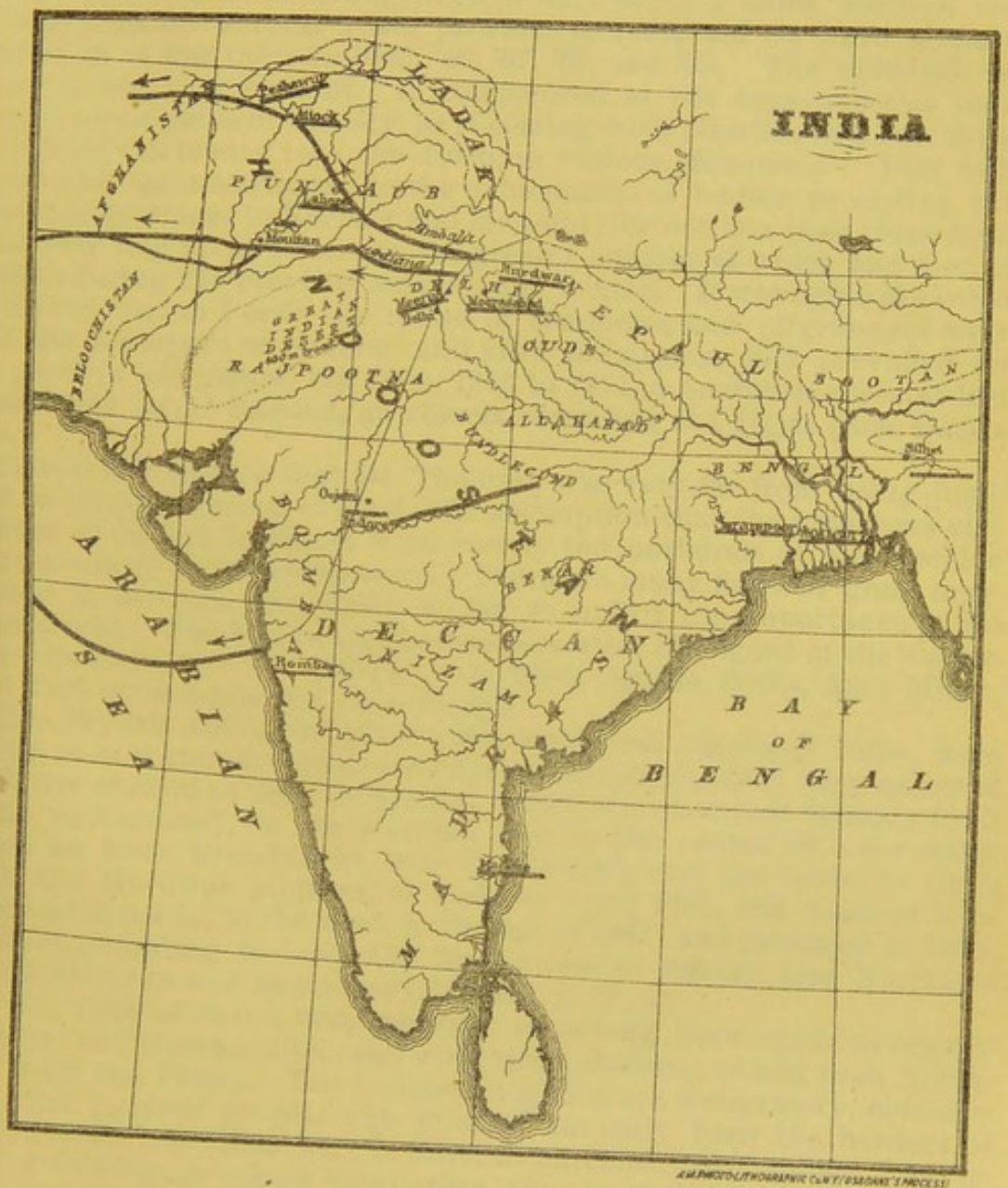
The Times and Gazette of June 29, 1872, says: "India has lately had two great shocks of cholera, viz, in 1867, at Hurdwar; whence it spread northwest into Afghanistan and Persia with the returning pilgrims; and a somewhat similar irruption, in 1869, soon extended as far as the Persian frontier. From Great Meschid, in Northern Persia, where it is known to have prevailed, on both occasions, it was easily distributed over Northwestern Persia to the Caspian Sea; as it is a place of great resort, both by merchants and pilgrims, coming and going from the east and west."

Dr. Renzy, sanitary commissioner of the Punjaub, (see Times and Gazette, April 27, 1872,) says: "Epidemics of cholera are becoming more and more frequent in the upper provinces of India; and from thence are easily carried over into Persia. The winds are the same, but travel has much increased. Calcutta and Lahore, only twenty years ago, were five months' journey apart; now only five days. Tens of thousands of Hindoo villagers now travel where few did before; and the facilities of importation of cholera from Bengal are becoming portentous; so that even the natives now complain that the disease is brought to them, far too frequently by troops, travelers, and pilgrims. At Peshawur, since 1858, there have been four terrible outbreaks; those of 1867 and 1869 being awful; the thirty-sixth regiment alone losing 15 per cent. of its men in thirty days."

Thus we have seen that we have ample proof that there were importations and invasions of cholera in Persia in 1865, '66, '67, '68, and '69; and in the Lancet of August 27, 1870, we read: "During the last four years, viz, in 1866, '67, '68, and '69, cholera has prevailed more or less in various parts of Persia, and particularly in those districts bordering on the Caspian Sea, which are in constant communication with Russia, by means of steamships carrying goods and passengers, which run weekly from the port of Astrabad, in the southeast corner of the Caspian Sea, and from Reshd, on the south coast, to Astrakan, at the mouth of the Volga; stopping at various places, especially at Baku on the middle west coast, in a direct line with Tiflis to Poti, on the east coast of the Black Sea."

Although the Persian minister denied that there was any cholera in Persia, he was flatly contradicted by the English resident, who proved that it could have been carried to Russia in 1867, '68, or '69. We also read in the Lancet of October 1, 1870, that the Shah of Persia was about to undertake a pilgrimage either to Meschid or Kerbela, in the hope that the devastations of cholera in his dominions, which had been very great during the last four years, viz, in 1866, '67, '68, and '69, might thereby be diminished. Unfortunately better counsels prevailed, and the Shah was induced to favor some pretended sanitary reforms, instead of perhaps proving in his own person the folly and danger of such pilgrimages."

Early in 1869, (see Lancet, August 14, 1869,) the French government sent Dr. Prout to explore the west shores of the Caspian Sea, from Astrakan to Baku in the west, and from thence to Reshd in the south, and as far as Teheran, the capital, to ascertain if possible the causes and local conditions which have forced cholera always to follow this route in extending from Persia into Russia and Turkey; and to impress upon the Persian government the necessity of carrying out the rules of the sanitary conference with the European powers as agreed upon in 1867, and which had remained almost a dead letter in Persia. Also, to


INDIA
LADAK
AFGHANISTAN
PUNJAB
BELOOCHISTAN
RAJPOOTNA
OUDE
NEPAUL
BOOTAN
ALLAHABAD
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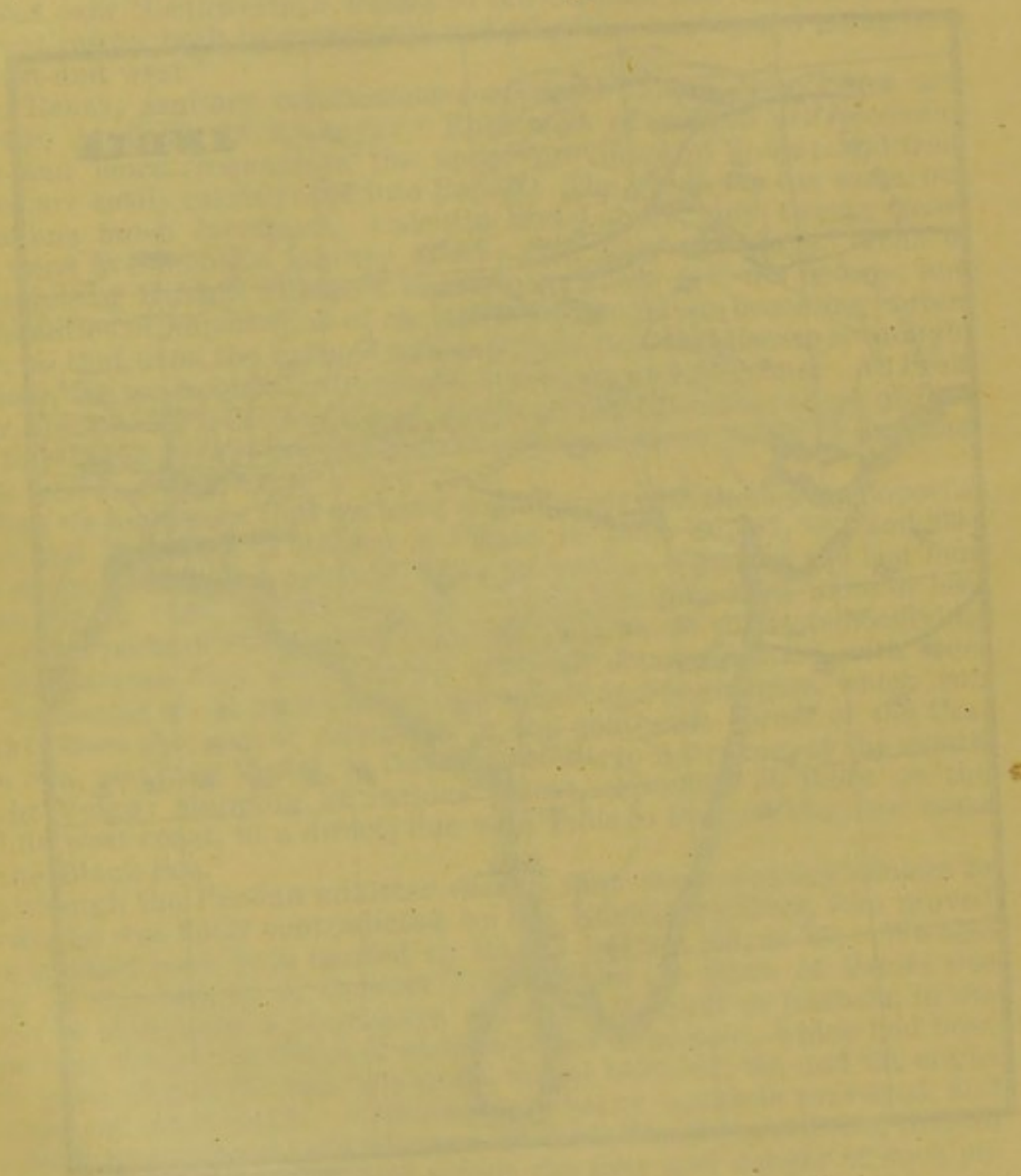
BENNARES
BEHAR
DECCAN
NIZAM
ARABIAN SEA
BAY OF BENGAL
Peshawur
Attock
Mooltan
Lodiana
Nurdwarry
Delhi
Agra
Oojein
Calcutta
Bombay
Madras



stop if possible, during the prevalence of the pestilence, the practice of carrying the bodies of those deceased of this or other diseases, with the caravans of living pilgrims.

It had been remarked, (says the Lancet of April 29, 1871,) for several years previous to 1870, that the recurring outbreaks in Teheran had almost invariably followed the arrival of pilgrims; and the annual exhumation of bodies for transportation to Meschid and Kerbela.

This quotation furnishes another proof, if any were wanted, that cholera had been in Teheran, which is only seventy miles south of the Caspian Sea, for several years previous to 1870, and we have already seen that it was there in 1865, '66, '67, '68, and '69. The epidemic at Teheran was very virulent. It commenced at the caravanserais near the principal gates of the city, as if coming with pilgrims and travelers; and rapidly extended into the town, in various directions. This outbreak was again attributed to the exhumation of bodies, preceding the annual pilgrimages to Kerbela and Meschid; for not less than three hundred were dug up at Teheran; the greater number of which had died of cholera during the previous autumn and winter. It was again regarded as proven that in Persia the routes of commerce and pilgrimages were also the highways of cholera; and after the disease had prevailed for six years in succession, viz, from 1865 to 1871, a quarantine was at last established below Bagdad, on vessels ascending the Tigris from Bassorah.

Thus it will be seen that Dr. Tholozan was very far from being justified in his positive and enthusiastic assumption that the numerous visitations of cholera in Persia were merely the outbursts of the smoldering embers of their predecessors. There are many flaws of great magnitude in his evidence, which go far to nullify the importance of his conclusions. The first is his ignorance or utter disregard of the numerous importations of the disease from India, Arabia, Syria, Asia Minor, and Turkey; also possibly from Russia.

Drs. Bryden and Cunningham, the statistical officers of India, were guilty of still greater carelessness and positiveness, when they assumed that the cholera of 1869, in Persia, was blown over that country from India to Astrabad, on the Caspian Sea, in the course of a few days; when we have already seen that it marched over the border of India with the Hurdwar pilgrims, as early as April 1867, and reached Meschid and Teheran, to the west, in the fall of 1867; and persisted in 1868. Besides, according to Lieut. Col. Sir Alexander Burnes, (see Narrative of a Journey to and Residence in Cabul, p. 77)—

"The most extensive arrangements have long been made to convey pilgrims and merchandise, (and with them cholera,) to and from Northern India and Persia. The Lohanee Afghans are a migratory, commercial, and pastoral people, who proceed annually from the borders of Persia down into Hindostan, in order to purchase merchandise. At the end of October, as winter approaches, they leave Khorassan, in Persia, and descend into India, (where they remain until after the great fair at Hurdwar.) They commence their return toward the end of April; and all reach Cabul and Kandahar by the middle of June; in time to dispatch their investments to Herat and Bokhara; and then pass on into Khorassan, in Persia, where they remain during the summer. They march in three great divisions; the first has twenty-four thousand camels; the second, nineteen thousand; the third, seven thousand." (See map.)

The arrangements for the conveyance of pilgrims, merchandise, travelers, and disease still farther west into Persia are equally complete, according to Sir James Connolly. Due west of Cabul and Herat lies

Meschid, the holy city of Northern Persia. For eight months in the year all the roads, to and from Meschid, are thronged with pilgrims. Nearly sixty thousand come up from India, Cabul, and Afghanistan; and as many more from Turkey in Asia, the Caucasus, and shores of the Black and Caspian Seas.

Cholera has followed this North Persian route very many times, and that of 1869 was at Cabul early in September. Next it was still farther west, at Herat; then, on September 21, 1869, the English political agent at Teheran writes: "It is now some time since the cholera appeared here, and there are from fifty to sixty cases a day."

And still farther west, the agent at Astrabad, in the southeast corner of the Caspian Sea, says: "The cholera made its appearance here on September 8, 1869. It first broke out among the soldiery and irregular cavalry; and these being dispersed, it spread into the town of Astrabad, where it is very virulent."

Here we have a continuous chain of the disease from India, due west, over the old caravan and pilgrim route, through Cabul, Herat, Meschid, and Astrabad, to the shores of the Caspian Sea. But, according to the Lancet of August 27, 1870, it had already been still farther west on the Caspian Sea, viz, at Reshd, the principal port on the south coast, where an outbreak occurred in August, 1869; and a little later it made its appearance at Astrabad, viz, early in September. Again, the Lancet of August 14, 1869, says: "Cholera was reported in the middle of July, 1869, as prevalent at Teheran, only eighty miles south of Reshd, and that there was some danger of it spreading along the shore of the Caspian Sea to Russia and Turkey."

RUSSIA.

Thus cholera had been standing on the borders of Russia for years, when its presence was suddenly announced in one or more places, especially at the holy city of Kiev, on the river Dnieper; more than one hundred miles above Odessa, at its mouth, in July, 1869.

This was regarded as a recrudescence from the great epidemic of 1865 and 1866, without the intervention of any new importation. But in the Times and Gazette of December 2, 1871, we read that Robert Lawson, inspector-general of hospitals, and president of the London Epidemiological Society for 1871, affirms: "There had been a severe outbreak in Persia to the south and east of the Caspian Sea in the autumn of 1868, which continued into 1869; and, in the course of that year it was to be expected in Southern Russia."—*Ib.*, June 25, 1872.

The outbreak in 1869 in Russia corresponded with an exacerbation in Northern Persia, where the disease had been more or less prevalent from 1865 to 1866, as well as in 1867, 1868, and 1869. The Times and Gazette of August 9 says: "The presence of cholera in Persia in 1867 and 1868 converts the probability almost into the certainty that a fresh importation into Russia did occur."

In the British Journal of August 26, 1871, we read: "At Constantinople the opinion is entertained, based upon documents, that the Russian cholera of 1869 and 1870 was due to importation from Persia. The disease is declared to have broken out at Nijni Novgorod, east of Moscow, at the time of the great fair in 1869, and with the arrival of Persian merchants."

According to Dr. Flauvel, one of the most competent French authorities, it was early in 1870 that the alarm was given at Constantinople of an outbreak of cholera at Taganrog, at the head of the sea of Azof, and

Map of the course of the cholera in Europe
from 1869 to 1873 by Dr. J. C. Peters.

at Rostoff, on the river Don; from whence it spread to the principal cities on the Russian coast of the Black Sea, both east and west; so that the disease was quickly announced at Kertch and Theodosia in the Crimea; at Odessa at the mouth of the Dnieper; and even at Poti on the east coast of the Black Sea. It was assumed that it had been carried from Astrabad and Reshd up to Baku on the west coast of the Caspian Sea; from there by the new railroad, which had just been completed through Tiflis to Poti; and from there to Taganrog, as that is the first Russian port which is cleared of ice, in the spring.

As usual, (says Flauvel,) the rapid propagation along the coast of the Black Sea coincided with the arrival by steamships of travelers from infected places. No less than seventy vessels arrived off Constantinople, from infected Russian ports; but a strict quarantine was established and the pestilence did not break out in Constantinople until 1871. (See map 5.)

The Lancet of August 27, 1870, says: "In August, 1869, an outbreak occurred at Reshd, at the foot of the Caspian Sea, and a little later at Astrabad in the southeast corner; whence it could easily have been carried up into Russia, by the weekly steamers to Baku and Astrakan; and from there up the Volga to Nijni Novgorod. In September, 1869, it broke out in Nijni Novgorod, just after the great fair in July and August, to which over two hundred thousand merchants from all parts of Russia, Persia, Central Asia, and other places assemble."

The Lancet (*ibid.*) states: "Later in the year 1869 it appeared at Kiev and Moscow. It also broke out in Taganrog, but did not gain much headway till early in 1870. In 1869, two new lines of railway from Kiev to Odessa, and to Taganrog, came into operation. So that if cholera came out by way of Baku, Tiflis, and Poti, it could be readily and rapidly carried up to Kiev."

From June, 1869, (see Lancet February 19, 1870,) "there had been numerous cases of choleraic diarrhœa in Kiev; but up to October, 1869, there had been only sixty-nine cases of algid cholera; and up to December 11, only one hundred and fifteen cases in all. So that the Nijni Novgorod epidemic seems to have been not only earlier, but more severe and extensive."

This moot point will now probably never be cleared up. The Russian authorities claim that the great epidemic of 1865, 1866, and 1867 left Russia with only eighty-three cases of cholera in 1868; principally in Kiev; to which fifty thousand pilgrims come annually; but also assert that the first case there came from beyond Nijni Novgorod.

In 1869 there were nine hundred and eleven cases reported in Russia; which are said to have spread from Kiev, as a center, northeast through Orel to Moscow, and from there to Nijni Novgorod; also down the river Dnieper to Odessa; and from there to various parts of the Black Sea. In 1870 there were no less than twenty thousand one hundred and forty cases in Russia; and in 1871, three hundred and five thousand two hundred and twenty cases. (See Practitioner, October, 1873, p. 308. See map 6.)

From Kiev it was said to have been carried by way of Orel to Moscow, and from there to St. Petersburg; and thence by rail southwest to Riga, Konigsberg, Wilna, and Warsaw.

It was also forwarded from Kiev, by river and canal, to Warsaw; and along the river Vistula up to Dantzic; and again to Konigsberg on the Baltic. The arrival of cholera in Konigsberg, and Dantzic, from the north and the south, was for a long time a great puzzle to the authorities; but was finally cleared up.

From Kiev it was also said to have been carried down the river

Dnieper to Odessa and by steamship to Constantinople, and also from Odessa by the well-known overland route due west through Jassy, Debretzin, and Pesth to Vienna.

From Pesth it was conveyed down by rail to Italy; especially to Trieste, Treviso, and along North Italy to Genoa; from whence it was sent by two steamships down to Rio Janeiro, and Brazil. (See map 7.)

It reached Hamburg in 1872; and was sent from there to London, Havre, Liverpool, New York, and various other places; probably also to New Orleans.

It was carried from Odessa to England; also from Riga and Dantzic; and from Havre. But the English authorities stamped it out promptly, every time.

From the wretched sanitary condition of these places, outbreaks occurred year after year, especially in Kiev, Moscow, and St. Petersburg; and gradually extended to Archangel in the north; Orenburg in the east; Astrakan, Taganrog, and Odessa in the south; and the border provinces of Moldavia, Galicia, Poland, and Pomerania in the west. Wherever outbreaks occurred they were regarded as recrudescences from the unexpired diffusion of 1865 to 1868; although it was also claimed that the pestilence which began at Kief, in 1869, extended from that city, as from a center, and of course must have been carried from it.

At Toula, just below Moscow, the first four cases died at the railway station, about November 13, 1869; yet the disease was pronounced a recrudescence. It did not attain any great extension in Taganrog until June, 1870; yet it was solemnly declared that the outbreak at Taganrog must be looked upon as a recrudescence of the epidemic diffusion of 1865to 1869; although that city had been in communication with infected places for more than a year. It commenced in Moscow in December, 1869, and did not reach St. Petersburg until August 17, 1870, yet a sanitary commission agreed that it could not have been imported. It is not easy to understand how this body satisfied itself that the disease was not imported, for St. Petersburg had been in direct railway communication with scores of infected places, for many months; and cases had been scattered so freely along the lines of railway leading to and from St. Petersburg, that cholera stations and ambulances were established at the railway junctions, with six beds and one physician to each. The first case in Cronstadt was in the person of an officer from St. Petersburg, which was followed by four others. The disease was scattered down southwest from St. Petersburg, along the line of railroad leading to Warsaw, through Wilna. Officers, soldiers, and conscripts died in various Lithuanian and Baltic towns. It lingered in Wilna, directly east of Konigsberg, on the Baltic, for four weeks; with ten to fifteen deaths daily, before it reached the latter city; and then was brought in by Russian-Polish Jews. Some of the residents of Konigsberg, living in the same hotels and lodging-houses with the Russian merchants, peddlers, vagrants, beggars, and boatmen who introduced the disease, died, while the latter were still only affected with choleraic diarrhœa; but a Russian merchant was among the earliest victims. The Russian physicians, with the simplicity of children, regarded the first death in each place as the initial case of cholera; and made no reference to diarrhœa in relation to cholera. The early cases and groups of cases at Nijni Novgorod, Taganrog, and Kiev were believed to be ordinary cholera nostras, occurring at a time of fairs and pilgrimages; and they were seemingly quite unaware of the chronological relationship of the appearance of cholera in Russia in 1869, with preceding movements of the disease in India and Persia in 1867 and 1868.

Advance of Cholera from Odessa to Genoa in 1870 to 1872 by Dr. J. C. Peters.

For several years, viz, from 1870 to 1873, the great force of the disease seemed to be confined between the forty-first to the sixtieth degree of north latitude, and from the fortieth to the fifteenth degree of east longitude; but especially from the forty-first to the fifty-fifth degree of latitude, and the fifteenth to the thirtieth degree of east longitude. In this square patch, bounded by Odessa, Kiev, and Smolensk, on the east; Odessa, Jassy, Pesth, and Vienna, on the south; Wilna, Konigsberg, Dantzic, Stettin, Lubeck, Altona, and Hamburg, on the north; and Vienna, Prague, Dresden, Berlin, and Stettin, on the west, the pestilence raged in its fullest force. In the west of Russia, rivers that flow north and south, to the Baltic and Black Seas, take their rise under the shadow of the same trees; when in the flood they convert the swamps around their source into one continuous lake; so that a traveler may pass by boat, without interruption, from the Baltic to the Black Sea. One river, the Pripet, a branch of the Dnieper, upon which Kiev is situated, creeps south to the Dnieper through a swamp as long as England. The rivers Niemen, Vistula, and Oder arise in this place and flow north to the Baltic near Tilset, Konigsburg, Dantzic, Elbing, and Stettin; while the Dnieper, the Bog, and Dneister run south to the Black Sea, near Odessa. In Poland, the Niemen and Vistula are connected by canals with the Dneiper; so that there is an uninterrupted water-communication from Odessa and Kiev to Konigsberg and Dantzic. Over forty thousand Polish raftsmen descend the Niemen and Vistula to the Baltic every year, and when the disease was once established in Galicia, which is due west of Kiev, and in Poland, the Baltic provinces were flooded with it every year from 1871 to 1874. And when Hungary was drawn into the vortex, Austria and Italy soon began to suffer.

In Galicia, due west of Kiev, from the first reported case on May 4, 1871, there had been thirty-eight thousand four hundred and forty-eight cases; in three hundred and forty-six different towns and villages.

From October, 1871, to December 13, 1873, there had been four hundred and thirty-three thousand two hundred and ninety-five cases in Hungary, in more than six hundred and two localities.

In Poland, in 1872, there had been thirty-seven thousand five hundred and eighty-six cases.

Various importations and exportations of cholera took place. In September, 1871, the steamer Orion, from Konigsberg, was allowed to go up to the islands at Amsterdam, although the captain had died of cholera. In 1871 an infected vessel from Cronstadt was permitted to come into the Thames. Two infected ships arrived at Hull, England, in 1871. In September, 1871, the schooner Marshall came to Sunderland, England, with her captain dead of cholera. In September, 1871, a fatal case occurred at Hartlepool, England, on board of the Hamburg steamer Uhlenhurst. The United States vessel, Loretto Fish, arrived at Cardiff, Wales, in September, 1871, with four fatal cases, from Hamburg.

The first cases, sixteen in number, in Altona, near Hamburg, occurred August 9, 1871; and the initial attacks happened in Hamburg, August 28, 1871. On September 23, 1871, the ship Alster, from Hamburg, arrived in England, with cases.

In June, 1872, the Austrian steamer Diana carried cholera from Constantinople down to Alexandria. In June, 1872, the steamer Rainbow, of Newcastle, came from Odessa, direct to England, with the disorder. On August 3, 1872, an infected ship from Odessa also arrived at Falmouth, England. In 1872, it forty-seven cases were carried from Warsaw, in Poland, down the Vistula to Dantzic, and spread east and west along the Baltic. In 1872, Cuban vessels were quarantined at Jamaica

against cholera. In Dresden, in 1872, the first case came from Pesth, in Hungary, but was reported as cholera morbus. In August, 1873, it was brought to London, from Hamburg. In June, 1873, several cases were brought to Dresden from Bohemia, (Prague,) on two Elbe steamboats. It was brought to Liverpool by the ships Rosanne and Hortense, from Havre, which had derived the disease from Hamburg. In August, 1872, there were one hundred and seven cases, in one week, in Hamburg. The schooner Inhama, from Calais, France, arrived at London in 1873. Cholera broke out again in Hamburg, in June, 1873. At Thorn, in East Prussia, on the Vistula, it was brought by Polish raftsmen. At Thorn, the Vistula is connected by a canal with the Oder, and the pestilence was carried down to Stettin. The Oder is also united to the Elbe by another canal, and thus the disorder was brought around from the Baltic, to the North Sea. In 1873, there were twelve hundred and twenty-five cases of cholera in Hamburg. In August, 1873, cases occurred on board the Hamburg steamer Rhine. At Dordrecht, Holland, it was introduced by the bark Freia, from the Baltic, with three deaths on the voyage. In 1872 and 1873, it was carried from Russia to Sweden. In August, 1873, three fatal cases occurred in London, in emigrants who came from Sweden to Kiel, in Denmark, and from there went by rail to Hamburg, and from thence by steamer to London. Cholera prevailed in all three places. In September, 1873, a steamer arrived at London from Cronstadt with cholera. Hamburg had over seven hundred cases from July 26 to August 23, 1873.

In the British Medical Journal, August, 1871, we read: "On board three steamers from Cronstadt, bound for Hull, England, there had been fatal cases of cholera, especially upon the Bingos. These vessels were stopped, and the Privy Council of England ordered all bedding and clothing used by cholera patients on board to be destroyed."

The Lancet of October 11, 1873, says: "The steamer Leibnitz, from Liverpool, has been declared affected with cholera, and put into quarantine at Lisbon. It is well known that two steamers from Genoa, Italy, carried the disease down to Rio Janeiro in 1873; but it is not as well known that there are very large colonies of Italians in Brazil who are apt to import the disorder."

The principal points closely connected with the origin and spread of this last epidemic of cholera from India, in 1867, to Europe and the United States up to 1873 and 1874, which have come out with renewed prominence, are: the fearful amount of contamination of the soil and water; and also, of the air of infected houses and hospitals, arising from the habits, not only of the Hindoos and Persians, but of Europeans and Americans.

The Hindoos take the lead merely in point of numbers, for they amount to nearly two hundred millions; and the greater heat of their climate. It is estimated that one hundred and fifty millions of them have no privies, and always defecate upon the open ground. Albeit many thousands of tons of human offal have thus been daily deposited upon the surface of the earth, for some thousands of years, yet some little sense of decency is kept up. The women and children of the better classes always have little screens near their houses, behind which they retire, and their accumulations are removed every week by an outcast sweeper-tribe. The males go to the fields, with the ceremony and regularity of prayers, every morning; and all, both men and women, invariably carry with them a little vessel of water, for ablution, which is performed with the left hand only. Then a small quantity of earth is put on the recrement, as in old Mosaic and modern earth-closet times.

But the result has been an enormous defilement of the surface, with a corresponding degree of saturation of the subsoil, and a consequent extensive pollution of the drinking-water everywhere.

In Persia, the huge inclosed caravanserais, in which hundreds of men and animals are shut up every night, have no privies; and their wells are in the center. The flat roofs of the Persian houses, on which the inhabitants sleep in warm nights, are used as places of conveniency; and the dried deposits are commonly used for fuel. Thus all their cisterns and rain-water supplies are apt to become contaminated.

In Russia, Germany, and Italy the majority of the cess-pits or privy-vaults are in the cellars of the houses; while the seats are often near the kitchen-fire, for warmth and comfort, while paying tribute to Cloacina.

A remarkable outbreak occurred at Delhi, in connection with this subject of coprology, at a funeral feast given November 26, 1871, by a Righur, in commemoration of the death of his brother. All the male Righurs, a peculiar sect, numbering five hundred in all, were present; and none others. The provisions consisted of cooked rice, wheat, and barley, garnished with sugar and melted butter. The sole drink was water; for meats, liquors, and women are excluded from these solemn repasts. The food was good and carefully cooked; but the huge mass had to be spread upon mats on the floor, and among them was a new mat upon which the dead brother had lain. He had been falsely reported as dead of fever; but it was subsequently discovered that he died, after an illness of a few hours, from severe vomiting and purging. The remains of the feast were carried home to the women and children; so that every man, woman, and child partook of more or less of it. No bad effects were observed for nearly two days, when several began to vomit and purge; and by noon of the third day, there had been forty-five attacks and eleven deaths; and up to the eighth day, seventy seizures and forty-four bereavements. Up to the fifth day, all the cases of cholera were limited entirely to the Righurs; fifteen families of whom lived at some distance. After that it spread to others.

New water-works were opened in Calcutta in 1870, up to which time there had always been from three to six thousand deaths from cholera, per year, in that city. In 1870 the number of deaths fell to fifteen hundred and sixty; in 1871 to seven hundred and ninety, and in 1872 to about six hundred. In December, 1871, an outburst, confined to the inmates of three excellent houses in a fine block of buildings in Russell square, Calcutta, occurred. The three residences formed one boarding establishment, with a kitchen in common. There had been no cholera in that neighborhood for four years. On the night of December 5, all the lodgers were in good health, but in forty-eight hours the large majority of them were sick; among them Archdeacon Pratt, who went to Ghazipoor, three hundred miles off, was seized on the 7th, and died the next day. Only one native servant partook of the food prepared for the Europeans, and he fell a victim. The water and milk were brought by carriers who lived in a suburb called Bhowanipoor; and within a stone's throw of the tank from whence the milkman and water-carrier obtained their water, there had been eight cases of the disease from two to five days before; and it had been prevalent in the neighborhood for a week. The disease was carried in the drinking-water and in the milk diluted with it.

Cholera prevailed in St. Petersburg from 1870 to 1874. Dr. Monall states that the sanitary condition of the city is disgraceful to civilization. The soil is so little above the level of the river Neva that it is saturated with sewage, and the place seems almost floating on a mass of

filth; for the excrementitious matters from the houses are conducted into porous cess-pits, whence the liquid portions permeate the surrounding earth, and find their way into the open canals which intersect the city, everywhere. High tides or west winds always force back much of the refuse which has reached the river, so that there is no good drainage, or pure pump, or well-water supply. It has long been notorious that the islands, in the river, especially those farthest opposite St. Petersburg, often escape; but this is because the outscourings of the city are not carried over to them; and their drinking-water is much better.

Konigsberg, Elbing, Dantzic, Stettin, Lubeck, and other Baltic towns were in an equally unwholesome condition. In Lubeck, according to the official report of Dr. Cordes, more than one-half of the privies are inside of the houses; and the greater part of the other half, are in the wash-houses. Wooden pails are generally used as receptacles, which are emptied twice a week, in the day-time, by the market-gardeners, who carry off the feculence in open carts, for agricultural purposes. Every three days, the houses, streets, and whole city are pervaded with abominable foulness. Of those who drank of the dirty waters of the Trené and Wakenitz streams, one in six, to one in nine died; of those who used the not very pure supplies from three rather better sources, from one in thirteen to one in fifteen, and one in thirty-one succumbed; in almost strict proportion to the purity, or impurity of the fluid.

Professor Forster, of Breslau, (1873,) has just given (see "Spread of Cholera by Means of Wells") a list of towns which have never had large epidemics of cholera, although surrounded by it on all sides, and actually invaded by importations. All these have a pure-water-supply, conveyed in pipes, from distant reliable sources; and an equally good system of sewerage and drainage. He also gives a register of parts of towns which invariably escape, although other parts of the same city are almost always attacked. The former have good pipe-water; the latter, foul wells and pumps. The Orphan Asylum in Hallé has always been immune, although the city has often suffered. It is on a hill, and has a separate, unsullied water-supply.

Breslau, with two hundred and eight thousand inhabitants, escaped in 1873, with only fifty-nine cases, in consequence of the recent introduction of chemically pure water, of good taste, and free from all organic and decomposing substances; by cutting a canal to the river Ohlau, by which all the refuse and filth of the heart of the city were carried off; and by early and strict attention to the cleanliness of the city, and the most thorough disinfection.

Dresden, Wurzburg, and Lyons are always spared, from the same reason. But in 1867 and 1873, the Julius Hospital in Wurzburg had rather serious outbreaks, connected with bad water and imperfect privy arrangements.

The great Exposition in Vienna in 1873 happened just before the new water-supply was introduced. The tragic death of the celebrated Dr. Henry Bennet's sister, Mrs. Brewster, is full of warning and instruction. She was in the prime of life, in perfect, vigorous health, and had never had a serious illness. She arrived in Vienna on June 10, 1873, and put pu at the Hotel Donau, a large, new, and luxurious building, just open to the public. She complained of the drinking-water on the first day; and put cologne into it, even to wash with. Herself, niece, and maid were all attacked with diarrhœa, as were many of the servants and visitors, who were led to believe that it was a summer bilious complaint, caused by the heat. But the hotel-water became worse and worse. Mrs. B. complained of it to the proprietors, and in her letters home. She then

resorted to milk and mineral water, until she found that the one was diluted, and the other made out of the water on the premises. On the fifteenth day (June 25) the hot water for tea at breakfast smelt so offensively that the hotel-keeper was sent for, who said that one of the drainage-pipes had broken into his well, but that a dozen workmen were rapidly repairing it. Her niece refused to taste the tea, but Mrs. B. had already swallowed some of it. She remained well all day, but was seized with vomiting and purging at 11 p. m., and in six hours was cyanozed and in full collapse, and died in fifteen hours. It was then found that a gentleman had already died of cholera in the hotel, two days before; four more died on the same day with Mrs. B., and nine more soon after; or fourteen deaths among the guests in six days; while many of the servants and others were sent to the hospital, where they also died. The police then interfered, analyzed the water, found it contaminated with sewage, and finally closed the hotel. Whilst the water was merely polluted with ordinary fecal discharges, a harmless, disagreeable, and troublesome diarrhœa prevailed for eleven or thirteen days; but when the two cases of true cholera came to the hotel, and their evacuations got into the well, the Asiatic pestilence broke out with explosive virulence. Cholera had been creeping about in Vienna since April; but its presence, not only there but in Hungary, and all the Austrian dominions, had been carefully concealed, so as not to interfere with the success of the great exposition. If alarm had not been sounded in the English medical journals, and in the London Times, by Dr. Bennet, thousands of valuable lives would have been lost. This country was completely thrown off its guard. Many careful epidemologists watched the foreign periodicals until the midsummer of 1873, without detecting a trace of any warning of a pestilence which culminated with one hundred and forty thousand deaths in Hungary; forty thousand in Galicia; sixty thousand in Poland; and thirty-seven thousand in Prussia. It was generally believed that there was none in Europe, except perhaps in some very distant and insignificant places.

Hamburg concealed her epidemic so well, that France was misled; and when it broke out in Paris in September, 1873, its course had to be traced back to Havre and Rouen, whence it was imported both by a family from Hamburg, and by a Hamburg vessel which put in at Havre, and had an outbreak soon after its arrival. The celebrated Jules Guerin stoutly denied that genuine cholera had invaded France, for he knew not where it could have come from. Lecadre, Médecin des Épidémies at Havre, admitted the occurrence of numerous sudden deaths from cholera nostras, but denied that they were Asiatic. Finally, two hospital-physicians at Havre proved that Lecadre and Guerin must have very carelessly observed their cases, both in hospital and private practice, or they would sooner have been convinced, that they were genuine Asiatic.

Where concealment is indulged in, proper, rigorous precautions are rarely taken. Hence out of two hundred and ninety-one cases treated in the Paris hospitals from September 16 to November 10, 1873, no less than one hundred and one, or 35 per cent., originated in the hospitals, among the patients suffering with other diseases. One of the Havre cases imported into England is suggestive, but slightly ridiculous. While the steamship Alliance was lying at Havre, among the cholera-ships, one of her men fell overboard, head foremost, into the dock-mud. He vomited a quantity of black, filthy water, which he had swallowed, and on September 6, when the Alliance arrived at Southampton, he was taken to his own house, and from there to the hospital, where he died of fully-developed cholera. His house was cleansed and disinfected; his bed-

ding and clothes destroyed, and the cab in which he had ridden was purified. A similar case occurred in London. The English authorities gave the greatest publicity to the arrival of every cholera-infected ship, and to the occurrence of every decided case from 1870 to 1874. They concealed nothing; the people were always fully informed, and capable of judging of the amount of danger; and of the efficacy of the means taken to obviate it. Their quarantine was the shortest, and at the same time the sharpest and strictest, that had ever been instituted. Commerce was as little interfered with as possible; while the country was thoroughly protected by the rapid but efficient purification of infected vessels, crews, passengers, clothing, and baggage. The health-authorities of every port in England were held to a strict accountability in all their proceedings; and were always helped and supervised in any emergency, by those great sanitarians, Buchannan, Parkes, Netten-Radcliffe, Burdon Sanderson, and their ever-watchful chief, John Simon. To their intelligence and activity England owes her escape, and they were emulated with no great disparity of comparison at New York.

Some fixed points about the mode and degree of infection have been obtained during this epidemic. Of Macnamara's nineteen persons who drank of cholera-water, only four were attacked; or only about one in five were affected, when the cholera-poison had actually been swallowed down into the stomach. In the Righur outbreak of about five hundred persons who ate of polluted food, there were only seventy attacks, and forty-four deaths; *i. e.*, less than one in ten died, and about one in seven were attacked. In Professor Botkin's forty experiments on dogs, viz, sixteen with subcutaneous injections with cholera-urine, sixteen with cholera-stools, eight with cholera-vomits; only twelve, or about 38 per cent., were disordered in any way; and only five died of pure cholera; while four more succumbed from mixed choleraic and putrid poisoning. Hence more than three to one escaped, even from hypodermic injections into the cellular tissue and blood. But it is not a little surprising that seven out of twelve were poisoned by injections of cholera-urine. All going to prove that there are immune persons as well as places.

In four thousand two hundred and three affected houses in the Berlin epidemics of 1866 and 1873, as many as two thousand two hundred and seventy-seven had only one case; proving that cholera has but little inclination to spread, in more than half of all the attacks. There were two cases in eight hundred and ninety-five houses, showing that the tendency to produce two cases is less than twice as small as to induce one case. In four hundred and thirty-five houses there were three cases; four cases, in two hundred and thirty-one houses; five cases, in one hundred and forty-six; six cases, in seventy-two; seven cases, in forty-four; eight cases, in twenty-seven; nine cases, in twenty-eight; ten cases, in seventeen; twelve cases, in six; thirteen, in seven; fourteen, in five, and fifteen cases, each, in five houses; while sixteen, seventeen, eighteen, nineteen, twenty-one, twenty-eight, thirty-two, forty-three, and fifty-four cases, each, occurred in one house. Hence the larger number of houses have a tendency to very small extension of the disease; while a few produce a large number of cases. Hence more than three-fourths of all the affected houses will have only one or two cases. If it were not for this comparative immunity of towns, houses, and persons, the whole world would soon be ravaged by cholera; and it may safely be assumed that any large number of cases occurring in any town or house, points to some great sanitary defect, or carelessness in these places; or to some contamination of food or water, or perhaps milk.

There have been more or less severe outbreaks in the Vienna, Berlin, Wurzburg, Munich, Paris, and Havre hospitals. In strict proportion to the amount of ventilation, cleanliness, purity of the food and water-supply, perfection of the privy and washing arrangements, and to the watchfulness and intelligence of the physicians, nurses, and patients, will be the greater or less extension of the disease. In the Paris Insane Asylum, (Salpetiere,) of five thousand inmates, nearly twelve hundred became victims of the disease. Von Gietl, privy medical counselor and physician to the King of Bavaria, professor and physician-in-chief to the Munich hospital, was sent in 1831 to observe cholera in Berlin, Breslau, Silesia, Bohemia, and Vienna. In the first Berlin cholera hospital, a private dwelling, without hospital conveniences, he saw forty-six out of eighty-one hospital attendants sicken, with the disease, contracted from the patients. In Breslau, four patients, out of eight, in one ward, together with three nurses and one washerwoman. In the first epidemic in Munich, in 1836, of three hundred and twenty-six cases, ninety-four occurred in the wards. In 1854, of seven hundred and thirty-two cases, less than fifty were contracted in the hospital. In 1873 and 1874, of six hundred and seventy-three cases, only forty-eight received the disease in the Munich hospital. Von Gietl is the original suggestor and persistent advocate of the diarrhœal conveyance of cholera; from observations in Bohemia, in 1831, where he noticed a married beggar-man who was sent back from a cholera-infected town to his native village while suffering with premonitory diarrhœa. His wife refused to wash his filthy clothes, which were cleansed by a poor woman in another house, where she hung them up in her room to dry. In two or three days the washerwoman's husband was attacked and died, forming the first fatal case in the village; in two days more, three others died in the same and neighboring houses; and on the third day the washerwoman died, and the husband of the second victim. Then the disease spread. The beggar who introduced it, however, recovered. This succession of cases, corroborated by others, scarcely less clear, led Von Gietl, in the Munich epidemic of 1836, to have a government order issued directing attention to the infection contained in diarrhœa-stools. This Von Gietl theory was enthusiastically adopted by Pettenkofer in 1854, in which year the fecal origin of cholera became very evident in Munich, in connection with the great exhibition there. Pettenkofer almost died from an attack contracted by having his office in the exhibition-building located just above the privies; but soon followed the hypothetical ground-water theory in preference to that which clearly laid under his eyes and nose. Von Gietl has steadily watched for forty-three years the conveyance of the disease by the diarrhœal-sick, their clothes, utensils, privies, and the food and water contaminated by them. He has traced the disease to publicans, cooks, butchers, pork-, sausage-, and dried-fish merchants; to bakers, milk-dealers, washerwomen, foul privies, and polluted water. He places more stress upon indoor privies, than upon subsoil water; more upon emanations from cholera-evacuations than from under-ground waters; more upon surface-filth, than subterranean exhalations; more upon soiled clothes than aerial vapors; more upon vegetables and fruits handled by dirty people, than upon those which are clean, ripe, and well cooked in pure water; more upon mouldy and filthy pork, dried-fish, bacon, sausages and cheese, than upon unstained articles of the same kind. His greatest recent triumph has been in tracing the prolonged epidemic among the Bavarian government horses to pasturage manured with the

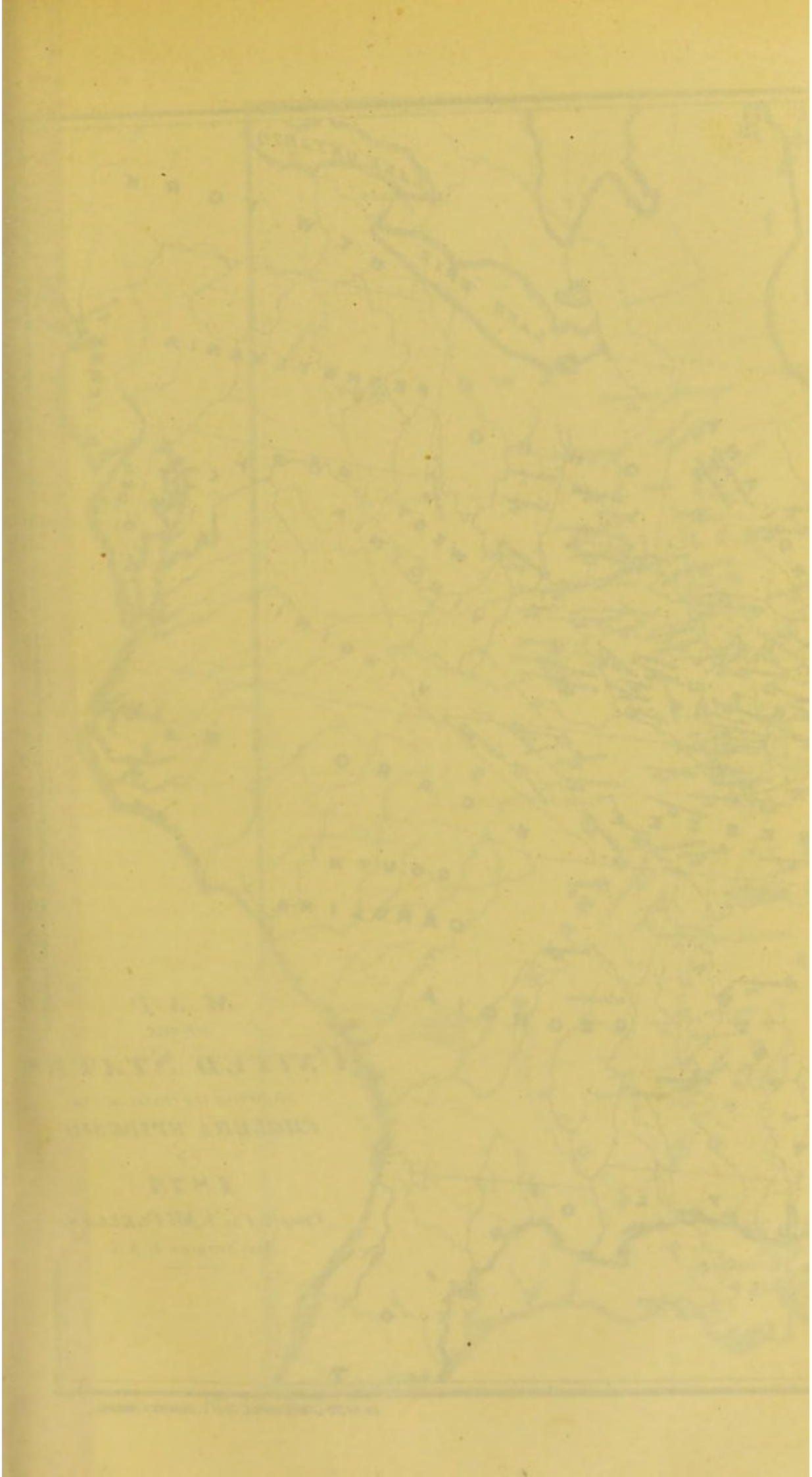
human offal from the large fever-hospitals, while Pettenkofer was seeking for subsoil water.

Bryden's aerial theory received its heaviest blow when he claimed that the cholera of India was blown to Astrakan and Kief in a few days, in 1869, although it was shown that it had been traveling overland through Persia since 1867; and when he asserted that the Zanzibar outbreak was blown from India to the east coast of Africa, in a few days, while it was proven that it had been traveling down the interior of Africa, from the Red Sea, and absolutely came out from Central Southern Africa to Zanzibar, on the coast, with the slave caravans.

Von Gietl is a stanch advocate of the portability and transmission of cholera by means of diarrhœal cases; and insists that in large cities the initial cases are rarely the first fatal ones. This is well exemplified in the Lancaster, Ky., outbreak in 1873, in which Mr. Bewley, who introduced the disease, did not die until eighteen others, who had contracted it from him and his surroundings, had preceded him to the grave. Attached to the Munich hospital was a detached building containing twenty-three female patients, some with chronic diseases, and others convalescent from cholera, but still afflicted with diarrhœa. In the course of eight days six fatal cases of cholera occurred, and six severe choleraic attacks among the twenty-three patients. He says, in towns and cities, the initial cases are frequently or generally diarrhœal, and are then followed by fatal collapse cases; so that the origin of the epidemic is often veiled in obscurity, from all but the closest and most careful observers.

The death of Dr. Obermeir, Virchow's assistant in the Berlin hospital, followed in consequence of his audacious boldness in the endeavor to detect the cause of cholera. He had many specimens of choleraic disease in his room, and finally injected cholera-blood, hypodermically, into his arm, and died in six hours, while endeavoring to examine his own blood microscopically.

Dr. Nedswetzky, of Yaroslav, near Moscow, has apparently discovered the cholera-bacterium, which is developed in enormous quantities in the discharges. He found that quinine, camphor, carbolic acid, tar, calomel, and chloral had no effect upon them; that opium, nux vomica, and chloroform killed them slowly; while tannin, sulphate of iron, chlorine water, (aq. oxymuriat,) and dilute sulphuric, nitric, and muriatic acids killed them rapidly. He suggests the latter six remedies as the most efficient against cholera.



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CHAPTER V.

NARRATIVE OF CHOLERA EPIDEMIC OF 1873 IN THE UNITED STATES.

In submitting the narrative of the epidemic of cholera, as it occurred in the United States during the year 1873, it has been thought best to present as distinct groups the cases of the disease that occurred in each Commonwealth.

The order of the narrative is governed by the dates at which the initial cases at each locality occurred; for which reason the history of the epidemic as it affected each county is presented as a distinct paper.

We have endeavored so far as was in our power to present the views of the gentlemen who witnessed the demonstrations of the disease; and herewith present several most valuable contributions from physicians who resided within the area of infection.

The dates of all initial cases have been subjected to a rigid scrutiny, and it is believed that those presented are absolutely correct.

We submit a table of the dates of the initial cases of cholera in each State which was included in the area of infection. This table demonstrates the erratic course of the epidemic, and it is suggested that in it will be found a strong argument in favor of the portability of the disease.

Louisiana.....February 9.	West Virginia.....June 9.
Mississippi.....April 8.	Georgia.....July 2.
Arkansas.....April 14.	Minnesota.....July 3.
Tennessee.....April 15.	Pennsylvania.....August 1.
Illinois.....May 2.	Texas.....August 1.
Missouri.....May 11.	Iowa.....August 14.
Kentucky.....May 21.	Utah.....August 18.
Ohio.....May 27.	Dakota.....August 25.
Indianaa.....May 29.	New York.....September 10.
Alabama.....June 3.	

It is a matter of regret that full information could not be obtained from all points of the area of infection. The extensive inundation of the States of Louisiana and Mississippi, together with the unsettled social condition of the population of those States, prevented our obtaining any information at many points. In the narrative of each group of cases, the date of the initial case at each infected locality, from which information could be obtained, is given; and, as an appendix, meteorological records, from the report of the Chief Signal-Officer of the Army, are reproduced.

LOUISIANA GROUP.

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Assistant Surgeon R. S. Vickery, U. S. A.

Assistant Surgeon Clarence Ewen, U. S. A.

Acting Assistant Surgeon W. R. Mandeville, U. S. A.

DATES OF INITIAL CASES.

Orleans Parish	February 9.
Jefferson Parish	April 15.
Saint James Parish	April
East Baton Rouge Parish	May 7.
Madison Parish	May 10.
La Fourche Parish	May 10.
Ouachita Parish	May 11.
Saint Mary's Parish	May 30.
Concordia Parish	June 11.
Carroll Parish	June 22.

LOUISIANA.

The earliest cholera-record in the United States, of the epidemic of 1873, is to be found in the city of New Orleans, La., as having occurred upon the 9th day of February, and the following summary, taken from the records of the State board of health, shows that at that city the fatal cases of the disease occurred as follows:

	Deaths.		Deaths.
February	3	August	1
March	16	September	1
April	90	October	0
May	125	November	1
June	18		
July	4	Grand total	259

Through the kindness of Dr. C. B. White, president of the Louisiana board of health, who has placed at our disposal all the notes and other material from which the annual report of the Board of 1873 was prepared, we are able to present the following outline of the early cases of cholera that occurred at the city of New Orleans:

"*Case* No. 1.—Peter Thomson, a sailor, said to be a German, aged fifty-six years, died of cholera February 9, at 39 Ferdinand street.

"Thomson went to Pensacola, Fla., from Galveston, Tex. At Pensacola, finding no work, he left his children and came to New Orleans *two months* before his illness. He found no work until two days before his death, at which time he began to assist in discharging a general cargo from a Liverpool vessel, one and one-half blocks below the head of Ferdinand street. Four squares below lay a Bremen bark. At 2 p. m. of February 8, the second day of his labor, he was taken sick, and died at 9 a. m. the next morning, February 9.

"Eight other men who worked on the levee with him boarded in the same house. None of these suffered from the disease. There had been no sickness on the ship.

"No other case of cholera occurred in this vicinity until May 20, case No. 192 of the record, distant in space one and one-half blocks in direct line, and distant in time one hundred days.

"Thomson was a temperate, steady man. The attending physician reported the case one of sporadic cholera, in his opinion, caused by eating largely of cabbage while suffering from diarrhœa.

"*Case No.* 2.—Justice Coig, native of France, aged twenty-six years, died February 10, of cholera morbus, at the corner of Hancock and Levee streets, a point two squares above the United States barracks, and about *two miles* distant from the locality of case No. 1.

"This man was a butcher, a hard drinker; occupation, slaughtering beeves for his brother at the abbattoir, just below the Jackson United States Barracks.

"He was taken sick during the night of the 9th February, and died on the morning of the 10th. He had resided in the city four years, living with his brother at the locality mentioned; had not been absent from home, save at work, for some time, and had visited no ships. No ships lie near that part of the city.

"Surgeon R. S. Vickery, U. S. A., who was called to attend him, says: 'I found him in bed, in a cold, barn-like loft, in a place used for storing

green hides. He was in a state of collapse, cold extremities, pinched features, speechless or nearly so.'

* * * * * * *

"From a comrade who had been with him a part of the time, I learned that he was seized in the night with an attack of bilious cholera, which soon passed into serious vomiting and purging. This had ceased from exhaustion before I saw him, and the evacuations had all been thrown away." Dr. Vickery attributed the fatal termination of the case partly to the extreme cold of the weather.

He also remarks: "Not having heard of any similar case in that neighborhood, I reported it cholera morbus, but some weeks later should most probably have called it true cholera."

"*Case No.* 3.—Joseph Honoci, (creole,) colored, native of the State, speaking French, aged fifty-two, died February 28, of cholera, on Dumaine street, between Roman and Derbigny streets.

"This death occurred eighteen days after the death of case No. 2, in a locality far removed from either of the first two cases, and having no connection with either of them.

"Honoci was employed as a laborer, unloading the Belle Lee, a river steamboat, at the head of Canal street, on February 27, came home that evening, and died the same night at 12 o'clock.

"The sister and wife of Honoci, his brother-in-law, and three children, occupied the house, which Honoci owned, with the deceased. No other case occurred on the premises, and none in that vicinity, until May 13, case 152 of the record.

"It is to be remembered that the shipping and steamboat landings are at different portions of the levee; that ships are never landed or unloaded at the steamboat levee, or *vice versa*, and that those who unload ships seldom work on steamboats, and steamboat-hands are rarely employed about ships.

"*Case No.* 4.—Hannah Nelson, female, black, aged twenty-one, died March 1, of cholera, at 166 Franklin street.

"While returning from the funeral of her husband on the afternoon of February 28, she became too ill to go to her residence, 55 Burgundy street, and stopping at the house of a friend, remained there until her death, which happened the next day.

"The husband, Edward Nelson, by the neighbors was stated to have died by disease similar to that of the wife. His physician gave a certificate of death by acute gastro-enteritis, and upon after-inquiry being made, insisted on the correctness of the diagnosis already given.

"Nelson came into the city on the Mississippi River boat R. E. Lee, February 24; worked on her during the 25th, and until 3 p. m. of the 26th, at which hour he was carried home, and died the next morning. The premises were in good condition, seven rooms, six occupants. No one here had anything to do with shipping. Nelson visited no other parts of the city between his arrival and death.

"*Case No.* 5.—Margaret Woods, female, black; four and a half years of age, died of cholera-morbus, March 2, at 536 Goodchildren street. In the same house, on March 8, died No. 10 of the record, Isabella Woods, her sister, aged two and a half years.

"On March 1, Perry Scott, uncle of these two children, living at the same place, died, and was buried by the coroner, who gave a certificate of death by diarrhœa. He, however, had the body interred in haste, giving as a reason that Scott had died of a dangerous disorder, and the safety of the community required speedy burial. The case was not re-

ported to the board of health, and the facts stated were elicited in the investigation made of the Woods cases. Scott was a laborer on the steamboat levee.

"The house where these cases occurred was small, crowded, with a very foul privy vault. This was disinfected, and the premises vacated. No other deaths occurred in this immediate vicinity for the next ninety days.

"*Case No.* 6.—Robert Banks, male, black, aged fifty years, died of cholera, March 3, corner of Prytania and Polymnia streets.

"Banks kept an eating-house on the levee, near Canal street, went to his business in the morning, and died at 2 p. m. on the same day. No circumstances connect this case with the shipping. The premises in which he lived and died were in bad sanitary condition, the house old and leaky, stable filthy, privy vault overflowing into yard. The premises were disinfected, vacated, and remain unoccupied. Case No. 22 occurred five blocks distant and twenty-eight days later. Case No. 36, two blocks distant and forty days later. No connection between the two cases traceable.

"*Case No.* 7.—George Williams, male, black, twenty-nine, taken sick March 2, at No. 59 Erato street, removed to Charity Hospital, died March 4, of cholera morbus.

"Williams came to the city from one of the Red River parishes fifteen days before his death, worked on the steamboat levee, unloading barges from Saint Louis, one of which he "pumped out" the night he was taken sick. He did not lodge at 59 Erato street, but somewhere about the New Basin.

"*Case No.* 8.—Daniel Donovan, white, male, native of Illinois, aged eighteen years, 'homeless,' admitted to Charity Hospital March 3, died March 6, of cholera morbus; came from Natchez, Miss.; had been in the city *five* days.

"*Case No.* 9.—Mrs. Nairnes, thirty-four, died March 8, of cholera morbus, at 132 Dryades street.

"Previous to the sickness of Mrs. Nairnes, the husband, by trade a tailor, had an attack said to be similar to that of the wife, but recovered. After the death of Mrs. Nairnes, their child was attacked and recovered.

"The habits of both husband and wife were bad, the latter being reported a hard drinker.

"The family had no connection with either boats or shipping. The premises are unhealthy, being low and damp. Stagnant and filthy water was found in the yard. No. 12 was three blocks distant from this place, but no connection existed between them.

"*Case No.* 10.—Isabella Woods, black, aged two and a half years, died of cholera morbus, at 533 Goodchildren street, a sister of case No. 5. The history has already been given.

"*Case No.* 11.—Frank Baisey, male, black, forty-five, died of cholera morbus, March 7, at 308 Perdido street.

"Baisey was employed on the steamboat levee; had not been at work the day upon which he was taken sick. His physician attributed his attack to an immoderate meal of pigs' feet, eaten just before going to bed at night. He had visited no sick persons. His child, wife, and another woman living in the house did not have the disease. No connection with shipping could be ascertained.

"The premises were in good order, lot well filled, yard paved. The location is back of Galvez Canal, one of the foul draining ditches of the city, and subject to both swamp and sewage poison.

"*Case No.* 12.—James Johnson, male, black, aged sixty years, died March 10, of cholera, at the corner of Lafayette and Basin streets.

"Diarrhœa for a week preceded the marked symptoms of cholera.

"Johnson occupied a room extending over a portion of the privy vault, the odors of which came up through the floor, near which he slept upon a low bed. By the attending physician his illness and death were attributed to the effects of the poisonous air from the vault.

"Johnson was a laborer on the steamboat levee. No connection could be traced with shipping. No other case occurred here.

"*Case No.* 13.—Charles Higgins, black, one year, died March 15, of cholera morbus, at the corner of Dauphine and Marigny streets.

"The child and mother have been living on the premises for *five months.* Neither the mother, the two remaining children, nor the six other persons living there, suffered with the disease. No connection with the shipping ascertainable.

"*Case No.* 14.—Mary Adams, female, mulatto, two years of age, died March 23, of cholera, at 128 Toulouse street.

"The premises, although containing fourteen rooms, occupied by twenty-six persons, were in good sanitary order. An uncle of the child, just from Saint Charles Parish, a few miles above the city on the river, was reported as having eaten of fish a few days previously; as having been taken ill, fallen into a typhoid state, and finally died at this house. This statement was made by the physician who attended him. There was no connection with shipping.

"*Case No.* 15.—Kate Duane, white, aged seven, died of cholera morbus March 28, on Claiborne street, between Cypress and Lafayette streets. Her illness lasted twenty-four hours. The father of the child drove a grocery wagon; had nothing to do with shipping. No connection with suspicious persons or places could be traced Three other persons occupying the premises escaped similar illness.

"*Case No.* 16.—William Brady, white, forty years, 'homeless,' two days in the city from Texas, admitted to the Charity Hospital March 30, and died the same day. Certificate, cholera morbus.

"*Case No.* 17.—William Johnson, white, male, twenty-three years, died of cholera, March 30, on steamboat Sabine, just from Ouachita River, lying at the foot of Customhouse street. Certificate of coroner. No history could be ascertained. His death occurred on the same day on which the boat arrived in the city.

"*Case No.* 18.—Isidore Naines, black, male, twenty-seven years, died of cholera, March 31, at No. 76 Treme street.

"Naines was a steamboatman, had been running in the Ouachita River trade for a month previons to his illness, and upon the steamboat Sabine, as had Johnson, case No. 17.

"He was taken sick the day the boat arrived in port, dying the next day at 3 p. m. No other cases occurred at the locality of his death.

"*Case No.* 19.—Sarah Jackson, three and a half years, white, died of cholera, March 31, at No. 146 Chartres street.

"*Case No.* 20.—Henrietta Jackson, sister of Sarah, white, five years, died at the same house, of the same disease, the next day, April 1.

"These cases had no connection with the levee, or with suspicious persons or places. The premises were filthy, and abutted on the foul and offensive vaults of a row of tenement cottages, at that date not reached by the annual house-to-house inspection.

"The vaults and premises of this and neighboring houses were disinfected. No other cases in the immediate vicinity.

"*Case No.* 21.—Louis Davis, white, thirty-five, died of cholera, April 1, at 17 Jackson street.

"Davis was a sailor, had been living four months at the locality named. Just before his death, the day of the attack, he had been employed shifting ballast in the hold of the ship Research, from Galveston.

"The attending physician considered the disease to have been caused by drinking very largely of cold water while overheated by work in the vessel's hold. The premises where deceased lived were in good sanitary condition. No other cases at this locality.

"*Case No.* 22.—Charles A. Wilson, white, thirty, died April 1, of cholera, on Prytania, near Jackson street, a grocer, a man of means, living in the best portion of the city, having had no connection with shipping, nor with infected places or persons. He had committed serious errors in diet the day preceding his attack, which terminated in death in twelve hours. No other members of the family attacked. No other case occurred within six blocks, save No. 182 of the record, May 16.

"*Case No.* 23.—George Patterson, black, forty-five years, laborer, died March 30, of cholera, at No. 5 Theresa street.

"Patterson had been working at Hoelzel's corn-mill, corner Tchoupitoulas and Calliope streets, four weeks previous to his death; was at church March 30, and died at 12 m. the next day. Three men living in this house worked on the steamboat-landing. The premises were crowded, thirty persons in eight rooms, and were in filthy condition, as was the neighborhood.

"The physician attending, attributed the illness to the damp and bad condition of Patterson's lodging-room, and to the improper and unhealthy quality of his food.

"*Case No.* 24.—J. Baptiste, male, black, twenty-six years, laborer, died of cholera, April 2, at the corner of Marengo and Tchoupitoulas streets.

"The usual occupation of Baptiste was wheeling coal, but he had been at work at the salt warehouse, near Jackson street, two or three days before his last illness; had lived eight months in the neighborhood where his death occurred; premises in good order; no other case in the vicinity.

"*Case No.* 25.—B. Johnson, male, black, aged twenty years, died of cholera morbus at the Hotel Dieu, April 1; was admitted from the Saint Louis steamboat Continental in a dying condition. The Continental arrived at the levee March 31.

"Of these first twenty-five cases, the white numbered eleven; colored, fourteen."

In the consideration of the above twenty-five cases, attention is asked to the fact that the narrative actually includes the history of thirty-one cases, of which two were recoveries.

The report of the President of the Board of Health represents the opinions as to the epidemic of 1873, held by so large a proportion of the physicians of the city of New Orleans, that we present the most important portions of said report in detail:

"The first deaths of cholera, or cholera morbus, occurred February 9 and 10. On the 7th the range of temperature was 24.5° F.; on the 10th 19.51° F. It will be recollected that Surgeon Vickery, in his account of the second case, thought the unusual depression of temperature had much to do with its fatal result.

"The third death of cholera occurred February 28. On the 24th,

25th, and 26th, the ranges of temperature were respectively 18°, 19°, and 17°.

"During the first ten days of March, nine deaths occurred, accompanied by very considerable daily oscillations of temperature, the mercury ranging on one day 18°, on another 20°, and on two days 20.5°.

"The months of March and April throughout, present remarkable daily ranges of temperature.

"It seemed pretty evident that in many cases the exciting cause of the attack was sudden and considerable change of temperature.

* * * * * * *

"April and May are the diarrhœa months of New Orleans. The attacks are seldom severe, and in most cases yield immediately to a very moderate dose of some mercurial, with or without opiates or astringents.

"This, too, is the cholera-infantum period of the year in New Orleans. Our small mortality from that disease occurs almost entirely in the first half of the year.

"The comparative exemption of New Orleans is probably in a considerable degree attributable to the evenness of our summer temperature.

"The summer thermal lines, given in the last report of the board of health of New Orleans, afford an interesting comparison with those of the board of health of New York for the same period.

"In calling attention to rain-fall, it is to be remembered that in 1873, April and May, meteorologically, seemed to have changed places. April is usually a showery month, and May almost unvaryingly pleasant—literally a month of sunshine.

"The chart shows April of 1873 very dry, and May a month of heavy and repeated rain-falls. In New Orleans one-half inch of rain-fall is only an ordinary shower, whose effect immediately disappears, unless it has been preceded by others.

"With the high, cool, and dry winds prevailing, the whole city during the month of April was enveloped in clouds of dust.

"Several days entirely without fall of rain preceded the appearance of the first cases of cholera in February, and again preceded the first cases in March.

"There is a general coincidence between the occurrence of cholera cases and the lack of rain-fall, which is more noticeable by the table of cases than on the chart, as lines of the latter are drawn to show deaths by weeks.

"New Orleans should be free from contagion of drinking-water by cholera-poison, as usually caused, because of its water-supply.

"The larger portion of its inhabitants drink rain-water from cisterns which are invariably above ground. The remainder drink hydrant-water from the Mississippi. Water from wells is never used for cooking or drinking.

"The clouds of dust alluded to might be considered as affording a means of conveyance of poison-germs to the food and water of the people, and would certainly give them abundant access to the lungs, if that be considered a mode of entrance for them.

"By those who think that no evidence exists of the presence in New Orleans of the peculiar poison of Asiatic cholera, this meteorological condition, and its result of continuous foul dust and exhalations, are considered ample cause for the prevalence of the disease under discussion.

"The street-cleaning of New Orleans consists mainly in scraping the

decaying animal and vegetable matter from the gutters, and throwing it up into piles, or scattering it upon the streets. Theoretically, this filth is moved every day; practically, occasionally.

"These matters, left upon the streets, are pulverized by passing vehicles and animals, and in the dry and windy weather are lifted into the air, penetrate all dwellings, and reach the food, drink, and lungs of the people.

"The dust of our ordinary earth-streets contains 15 per cent. of animal and vegetable matter. What the contents of our gutters are, their possible capacity of elimination of noxious gases, when undisturbed and uncleaned by frequent summer rains, the following extract from the late report of Dr. A. W. Perry, chemist to the board of health, will show:

"A gutter the length of one square—say 300 feet, 3 inches deep, and 15 inches wide—contains about 6,000 pounds of semi-fluid mud, of which 23 per cent. is solid matter. This, by the figures of the above analysis, contains 63 pounds of animal matter, and 420 pounds of vegetable matter.

"Four different samples of foul mud (gutters) were examined, with the following results:"

Number.	Dry residue weight, per cent.	Per cent. of animal matter.	Per cent. of vegetable matter.	Amount contained in the two gutters along one block.	
				Animal matter.	Vegetable matter.
				Pounds.	*Pounds.*
1	23	4.50	29.50	126.00	412
2	23	3.80	30.20	106.40	422
3	23	1.81	26.20	59.60	366
4	23	1.38	26.60	36.60	372

"Comment is unnecessary.

"SUBSOIL WATER.

"The universal opinion in New Orleans has been that the varying distance of its subsoil water from the surface was entirely dependent on the height of the river.

"Daily observations, continued throughout the year 1873, corroborate those of former years, showing that the oscillations of the ground-water are independent of the rise or fall of the river, and are coincident with the presence or absence of rain-fall. They are not believed to have causative connection with the rise, prevalence, or decline of cholera, but have an interest as being a coincidence of the rain-fall, which seemed to exercise control over the cause of disorder.

"There seems to be good reason to accept the rain-fall of May as largely efficacious in checking the progress of the disease, and the continuous rains thereafter as having removed its cause, or, at least, as having been coincident with that removal.

"The rain-fall of May 5 was 8 inches. The total rain-fall of the month, 21.87 inches.

"Statements have been made that New Orleans owed its comparative exemption from cholera, first, to its having been put into a thorough state of cleanliness and disinfection previous to its appearance; and,

secondly, to the energetic 'stamping-out' (so called) measures employed by the board of health.

"The board of health is accustomed to begin an inspection of all premises of the city in the early days of January, proposing to have all vaults emptied, all yards cleaned, &c., by May 1 to 15, and thereafter to maintain such repeated re-inspections of those portions of the city in the worst sanitary condition as are practicable.

"This work of inspection and re-inspection is done by members of the metropolitan police force, detailed to duty with the board of health and under its orders. The police force, being a part of the State militia, is liable to be recalled in periods of public emergency. Such emergency occurred at the close of 1872, and continued into 1873, and in consequence of the withdrawal of the force, this house-to-house inspection, and general yearly cleansing, was not commenced till the last of March. It is the opinion of the board of health that, had its sanitary operations not been thus interfered with, cholera might have been much less general and less fatal.

"Therefore the statement that a remarkably favorable sanitary condition of the city existed, antecedent to the date of the appearance of cholera, is incorrect.

"After the disease was recognized as having a striking likeness to epidemic cholera, disinfection was practiced in all cases coming to the cognizance of the board of health. A circular, through the public journals, was issued to the citizens, giving instruction on disinfection; and many physicians took all precautions against the disease, by the usual modes of disinfection of excreta, &c. Others took no precaution whatever; therefore, in these and those other hundreds of cases where no physician was called, and no precautions practiced, there existed sources of infection ample to have poisoned the whole community and created a general epidemic.

"Disinfection in the cases of cholera can scarcely be credited with the escape of New Orleans from universal pestilence.

"NATURE OF THE DISEASE.

"The doubt that existed in the minds of medical men, as to the nature of the disease, is in some degree set forth by the diverse nomenclature employed in the certificates of death given during the first few weeks of the prevalence of the disease.

"As, for example—

"Cholera morbus.
"Cholera spasmodica.
"Cholera sporadica.
"Cholera nervous.
"Cholera asphyxia.
"Cholera.
"Cholera nostra.
"Apparently cholera.

"Cholera Asiatica appearing but infrequently.

"Of the first eighty deaths, forty-six received certificates of death by cholera morbus.

"Even at this time the opinion of the physicians of New Orleans is divided upon the subject.

"Medical men connected with hospitals, seeing few save fatal cases, unhesitatingly pronounce the disease Asiatic cholera.

"A large portion of New Orleans physicians consider it not to have

been Asiatic cholera; all, however, agreeing that in fatal cases no distinction can be drawn between the cholera sporadica of 1873, at New Orleans, and genuine Asiatic cholera.

"The few holding that when no distinction exists, there is no difference, unhesitatingly pronounce the disease Asiatic cholera, and suggest that importation is not necessary; that the germs of that disease are always and everywhere present, only awaiting favorable circumstances to multiply and produce the effects customarily experienced from the general and abundant presence of cholera-poison.

"Most physicians, however, although admitting the difficulty of differential diagnosis in fatal cases, consider that the character of the disease, its course and progress as a whole, warrant the belief that it was not Asiatic cholera. Some of the considerations influencing them to such belief are—

"1st. The non-importation of the disease.

"2d. That no evidence of portability or infection was exhibited in the city, where every facility existed for ascertaining its natural history.

"3d. The appearance of the disease at many localities remote from each other, and from anything that could be considered a common cause, and in all parts of the city, at dates synchronous, or nearly so.

"4th. The small mortality of those attacked with vomiting and purging, during the presence of the disease; attacks similar to which, during the presence of former epidemics, have customarily proved the beginning of that usually fatal disorder.

"The death-rate of persons thus attacked is variously estimated at from 3 to 12 per cent.

"5th. The fact that so general diffusion of the disease existed without resulting in a great epidemic.

"Had the disease possessed the portability and infectiveness attributed to Asiatic cholera, its course and results would have been the reverse of the actual occurrence.

"6th. The fact of the long-continued presence of the disease in New Orleans, without flaming up to epidemic proportions, shows absence of the peculiar characteristics of Asiatic cholera, as generally admitted. The disorder seemed endemic, not epidemic.

"7th. Cholera occurred at the season of the year when intestinal disorders appear in New Orleans, April being the diarrhœa month of the year.

"The city's small mortality of cholera infantum occurs also in the first half of the year.

"The prevalence of cholera at the same period of 1873 may be viewed as the natural tendency of that portion of the year, exaggerated into serious, and deadly, and somewhat general disease, by the presence of local poison, engendered by filth and magnified by unusual meteorological conditions.

"8th. The amenability to treatment of what were in appearance serious cases.

"Under the hypodermic use of morphine and atropia, or morphine alone, immediate relief and ultimate recovery was the rule. Under treatment by calomel and quinine, recovery also seemed speedy. Also, under domestic remedies, many cases were restored to health.

"A large number of persons were taken ill with profuse vomiting and purging, sometimes preceded by faintings and cramps, with great subsequent weakness, who recovered without any aid whatever, save the *vis medicatrix naturæ*.

"9th. The small number of multiple cases is considered an evidence of its non-infective or epidemic character."

It being our earnest desire that the opinions of the profession of New Orleans upon the origin of the epidemic of 1873 should be fully and accurately stated, we have herein reproduced: I. An editorial from the September (1873) number of the New Orleans Medical and Surgical Journal, by Prof. S. M. Bemiss. II. Extracts from a letter of Assistant Surgeon Van Buren Hubbard, United States Army, in which he gives the results he obtained from a series of interviews with the most prominent medical gentlemen of that city.

I. Extract of an editorial of the New Orleans Medical and Surgical Journal for the month of September, 1873, by S. M. Bemiss, M. D.

* * * * * * *

The epidemic of cholera which is at the present time traversing the United States devolves upon the medical profession several questions of difficult solution. The first is with regard to its origin; the second, its mode of diffusion; the third is with regard to its nature, as it respects identity with Asiatic cholera. The greater interest should attach to a discussion of the first inquiry, from this stand-point, because it seems to be an admitted fact that the epidemic first made its appearance in this city.

Whether the disease originated here, or was conveyed hither in vessels or clothing, it is not at this time possible to establish by the testimony of any known and incontrovertible facts. All that has been said or written about its importation in ships from Germany or Russia remains without foundation in any ascertainable events.

It is certainly but little calculated to inspire confidence in the scientific accuracy of the medical profession when its members adopt as truths mere rumors, whose entire want of liability might have been so readily learned by a letter addressed to the board of health of this city. No ship had landed in this city from a Baltic port for nearly, or quite, six months before the outbreak of the cholera epidemic.

We must admit, however, that the negative fact, that it cannot be shown in what manner cholera was brought here, is not sufficient to confirm a belief in its domestic origin. The opinion, long since advanced, that the deltas of the Ganges, Nile, and Mississippi possess so much similitude in climatic and geological condition that it may be assumed that they will give origin to similar diseases, is not supported by the past history of cholera.

Those who believe in the spontaneous origin of cholera, in countries so remote as these from that which has been for centuries known to be its place of perpetual prevalence, may place the late epidemic of New Orleans along with the Saint Kilda outbreak, and successfully challenge all opponents to prove importation by an array of facts. I believe, however, that one important circumstance always attends these mysterious epidemics, which is that they are not known to occur, except when cholera has been previously diffused among a population from whom there is at least a bare possibility of their germs having been imported.

The facts are that three deaths from choleraic symptoms occurred in February; one near the 1st of the month, another on the 10th, and the third on the 28th. The first of these deaths was at 39 Ferdinand street, the second at the Slaughter-House Company's buildings, and the third at the corner of Demaine and Derbigny. The deaths were separated in point of time by intervals unusually long for a disease generally so rapid in its first assaults as Asiatic cholera. The distances which separated the localities where the deaths occurred were from one to two miles. There was but little possibility of intercommunication between the first victims, and no facts have been revealed to show the starting point of the infection.

To show more particularly how the epidemic comported itself in respect to its mode of diffusion, attention is called to the following statement of facts. It was in March that the disease first began to assume an epidemic character, and during this month seventeen deaths occurred. Taking the first seven fatal cases as a fair type of the whole number, they will be found to have occurred under the following circumstances, as it respects dates and localities. In the mention of locality, the distance from the nearest case is also given.

Case 1.—March 1, Franklin street, No. 166, one and a quarter miles from last case.
Case 2.—March 2, Goodchildren street, No. 533, half mile from case No. 1.
Case 3.—March 4, Prytania and Polymnia streets, one mile from case 1.
Case 4.—March 4, Erato street, No. 59, one-half mile from case 3.
Case 5.—March 4, homeless.
Case 6.—March 8, Dryades street, No. 132, eight squares from case 1.
Case 7.—March 8, Goodchildren street, No. 533, in same house with case 2.

The duration, waxing, and waning of the epidemic are shown by the following tabular statement:

	Deaths.
February	3
March	17
April	82
May	108
June	18
July	4
Total	232

The houses in which two fatal cases occurred were five. Three fatal cases occurred in one house only, and more than three in none. None of the houses having multiple deaths were contiguous to each other. The greatest localization of epidemic intensity was observed in a part of the city bounded by Claiborne, Baronne, Common, and Julia streets. This space is about one-half a mile square, and is quite densely inhabited by a population principally colored. Within these limits twenty-eight deaths occurred.

Now, with regard to the influence of any artificial measures designed to prevent the spread of cholera by destroying its germs, in causing the epidemic of this city to have been so mild and short-lived, it is well to mention here the means employed by the board of health for disinfecting the abodes and clothing of the sick. The houses, yards, drains, and sinks were sprinkled with carbolic acid. The clothing was soaked in a solution of carbolic acid, one part to one hundred. I am indebted to the courtesy of the zealous member of the board of health, Dr. A. W. Perry, for these facts, and their accuracy is unquestionable. Although they do not explain either the mode of ingress or of origin of the cholera-poison, they constitute an important matter for reflection and forecast by the medical profession. Shall we hold that cholera-poison is susceptible of *de novo* origin in whatever part of the globe the peculiar climatic and geological conditions which favor its development chance to exist? Under this belief we must either deny to the cholera-poison a specific germ, or we must accord to this germ the quality of panspermatism, and say that it is everywhere diffused, and only awaits favorable telluric states to awaken it to life and activity. Or shall we admit that cholera germs were transported to this city in some manner quite impossible to be ascertained, and having been let loose at a period of the year not so favorable to their development as the warmer months, their activity and virulence were thereby greatly lessened? The latter seems to be the more reasonable conclusion.

In these periods of human history when, by the aid of steam, travel and intercourse are accelerated and vastly multiplied, we must expect to find all those diseases whose spread is in any manner assisted by human intercourse, to have their area of prevalence enlarged, and their outbreaks rendered more frequent and unaccountable through patent facts. That cholera belongs to this category, none familiar with its epidemic history will deny.

In these remarks I leave entirely out of view the theory of cholera-clouds passing over the earth. While every experienced observer is ready to admit that cholera-germs are susceptible of being air-borne over limited areas, I think that a hypothesis which holds that the earth, in its vast transit through universal space, passes through meteoric "cholera-banks," is quite as well supported by history as that theory which teaches that "cholera-clouds" traverse seas, and thus diffuse the disease upon remote continents previously uninvaded. The symptomatology of cholera in this city was, in the genuine cases, strikingly characteristic. I make this statement entirely upon the assertions of my medical confréres. It is probable that fully one-half of the profession here did not meet with a case during its prevalence. I belong to this number. The fatal cases, and some which recovered, had rice-water stools and vomiting, cramps, collapse, and suppression of urine.

It is a somewhat singular fact that coetaneously with this epidemic of undoubted cholera, there should have occurred such a general tendency to diarrhœa as was manifested in a large proportion of the population, and yet that the cholera deaths should have been so few in number. During the epidemic I visited and prescribed for about seventy-five patients suffering with diarrhœa or dysentery. Only one of this number could with any degree of propriety be classed as suffering from the diarrhœa premonitory to cholera. A girl aged fifteen years, living at the corner of White and Terpsichore streets, was attacked suddenly in the night of April 13 with painless watery purging and vomiting. She had cramps, feeble pulse, cold hands and feet, and shrunken features, but no collapse or suppression of urine. A powder of calomel gr. j., sulph. morphia gr. ¼, was placed upon the tongue and washed down with ice-water. The purging was promptly arrested. On the succeeding night the symptoms returned, and the parents, unwilling to disturb me, renewed the prescription and administered two powders. The girl was slightly ptyalized, but made a good recovery.

* * * * * * *

From the commencement I supposed the epidemic to be purely catarrhal in its causation, and was very slow to give in my adhesion to the assertions of my brethren in the profession, who, having viewed the epidemic from a different stand-point, were firm in declaring cholera to be among us.

No efforts were made to perfect a diagnosis by examining the urine for albumen. In truth, my present convictions are that in the zymotic affections the presence of albumen in the urine is more valuable as a point of prognosis than of diagnosis.

II. *Extract from a communication of Assistant Surgeon Van Buren Hubbard, U. S. A., dated New Orleans, La., January* 30, 1874.

* * * * * * *

As a résumé of the results of my inquiries, it may be set down as the unqualified opinion of all the physicians with whom I have consulted in the city of New Orleans, that the cholera of the spring of 1873 in that city and vicinity was native in its origin; that is, it was not brought here from abroad.

That it was Asiatic in character.

That it was mild in type, the percentage of cases to population and mortality to cases being small. Cases that were fatal were in the majority of instances rapidly so, death often supervening in a few hours after the first symptoms.

That the epidemic tendency was not marked—single cases often occurred in isolated localities; that in no single instance, so far as I have been able to learn, did the epidemic depopulate whole neighborhoods, or even families.

I will here state my impression, though not my opinion, (for it would require more extended research to state the latter,) that had the disease died out here and not spread northward through the valley of the Mississippi from this city as its focal point, it might, and perhaps would, have passed into history as "cholera sporadica," the name by which the disease was known weeks after its first appearance. Physicians were for a long time reluctant to characterize the disease by any other name, and it is questionable whether they ever would have done so had it not been for the sterner type the disease assumed as it spread up the valley.

Lastly, that the subjects and victims of the disease were, saving exceptional cases, from the lowest of the population of the city, chiefly negroes.

* * * * * * *

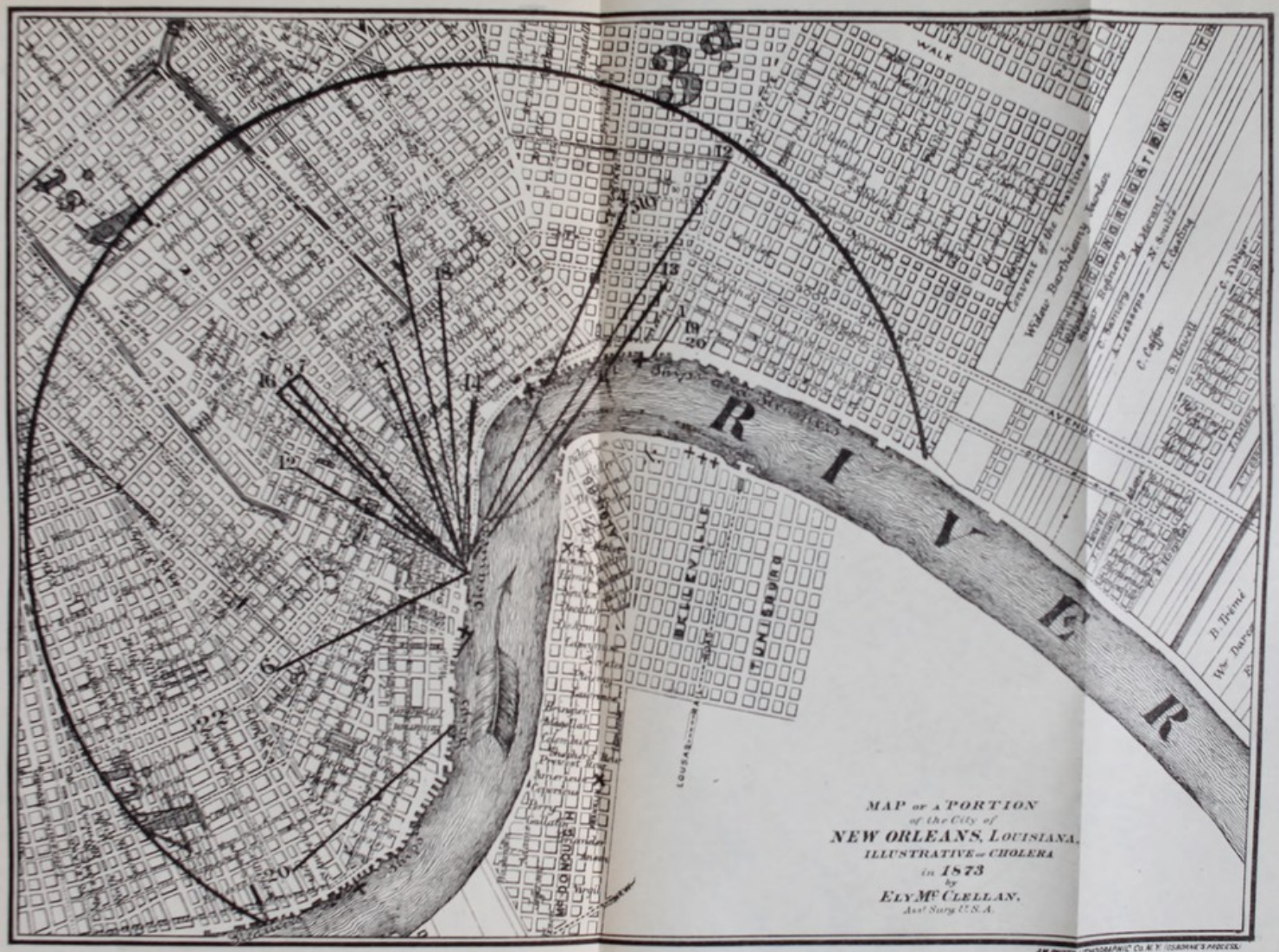
In pressing the investigation which was committed to our charge, the attempt alone was made to develop all facts which might possibly throw light upon the subject of the introduction of the disease into the city of New Orleans.

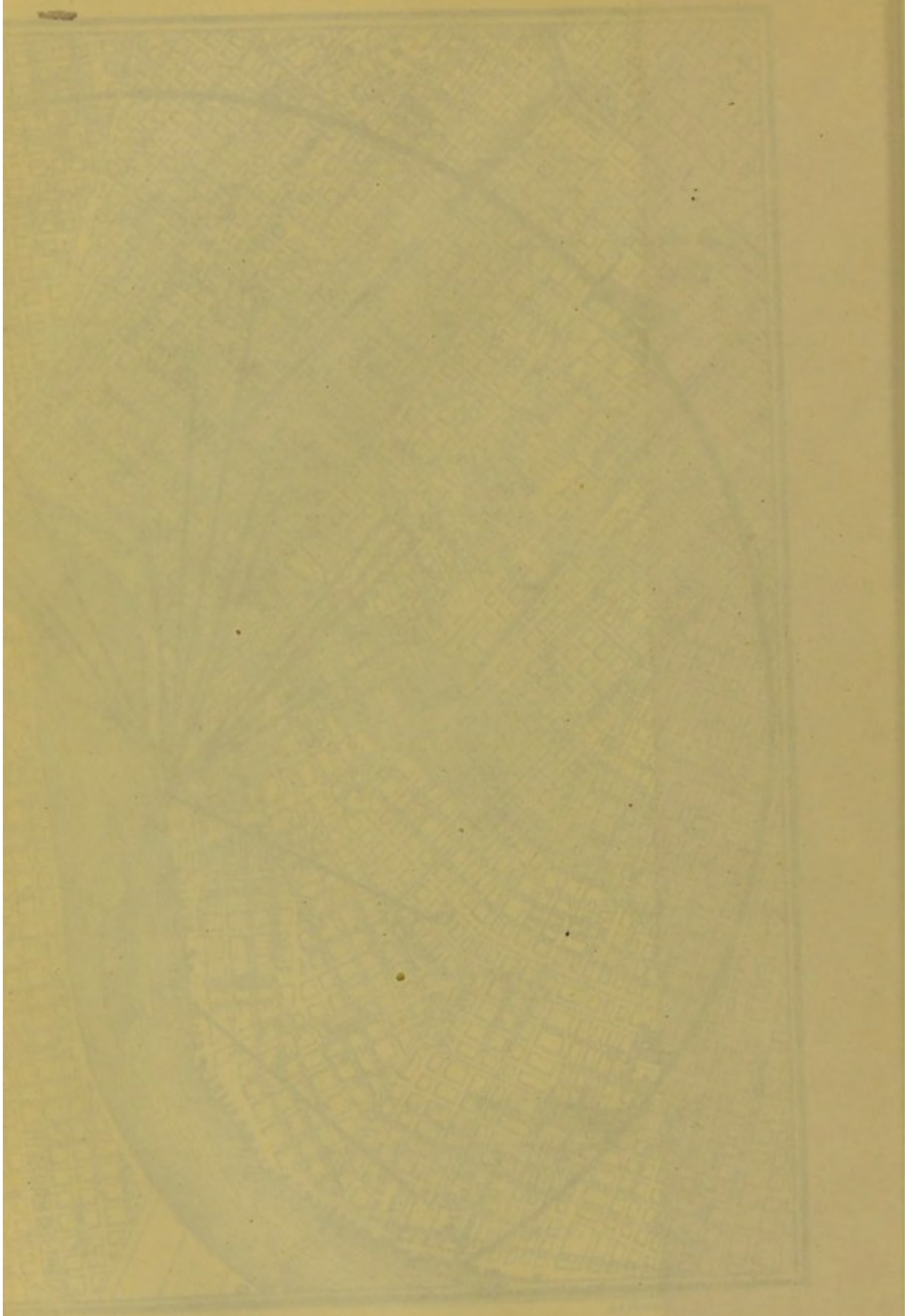
It has been found utterly impossible to establish the arrival of individuals who were personally affected with cholera, but the investigations have developed certain most significant facts.

Upon the accompanying map of New Orleans we have located the point at which each of the first twenty-five cases of cholera died; and also the points at which the cases of the same disease occurred in the town of Algiers, which town is located upon the west bank of the Mississippi river, and opposite to New Orleans.

The report of the board of health, in almost every instance, locates the point at which the cholera-subject worked prior to his sickness. Reference to the report of cases which we have reproduced will show that the majority of these cases originated upon the steamboat and ship levees.

Upon the map it is shown that in ascending the Mississippi river the


RIVER
WALK
AVENUE
MAP or A PORTION
of the City of
NEW ORLEANS, LOUISIANA,
ILLUSTRATIVE or CHOLERA
in 1873
by
ELY Mc CLELLAN,
Asst Surg U.S.A.



levee in front of the city of New Orleans is divided into distinct localities, to each of which is assigned a certain class of vessels: I. Tow-boats; II. Ships and steamers; III. Small craft, (the Picayune levee;) IV. Ships; V. Steamboats; VI. Ships and steamers; VII. Barges of all descriptions.

Now, by drawing a line from the locality of death to the point at which the board of health tells us that the majority of these early cases were employed at the time they were taken with cholera, it will be seen that these lines concentrated upon the steamboat and ship levees.

In the narrative of cases furnished by the board of health, it is stated that "the shipping and steamboat landings are at different portions of this levee; that ships are never landed or unloaded at the steamboat-levee, or *vice versa*, and that those who unload ships seldom work on steamboats, and steamboat-hands are rarely employed about ships." This is strictly true, but incomplete. The steamboat-levee is between the ship and steamer levees, and the communication between the three points is constant. The majority of the blacks who work at all in New Orleans work upon these levees, the great majority upon steamboats. A constant communication is thus established between the levees and the portions of the city occupied by the families of these men.

It is necessary to comment upon some of the facts and conclusions presented in the admirable and exhaustive report of Dr. White. It is, however, reluctantly entered upon, and the comments are advanced with no spirit of controversy with, or criticism of, a gentleman who has placed at our disposal all the means at his command through which information might be acquired; but the theory that the cholera-epidemic of 1873 originated *de novo* at New Orleans certainly cannot be received as immutable, unless the facts upon which it is based are impregnable.

Case No. 1.—If Peter Thompson died of cholera upon the 9th day of February, after unloading a Liverpool ship, it is certainly by no means an unusual event in the history of cholera-epidemics that "the eight other men who worked upon the levee with him, and boarded at the same house," did not take the disease. Of the nineteen men in India, all of whom were known to have drunk infected water, but five took the disease.

Case No. 4.—It is stated in the report, "No one here had anything to do with shipping;" and yet the narrative shows that Edward Nelson, the husband of case 4, died of a disease similar to that of the wife the previous day; and that at the time of his attack he was working on the steamboat-levee.

It is stated that case No. 6, Robert Banks, was not connected with the shipping. He was, however, a negro who kept an eating-house upon the steamboat-levee.

Case No. 9, with her husband and child, lived, as is shown upon the accompanying map, within the circle which is drawn around the original point at which the infection occurred.

Case No. 11.—It is stated that "no connection with shipping could be ascertained," and yet the narrative shows that the subject had worked upon the steamboat-levee.

To case No. 12, the same comment applies.

We have been informed that the father of case No. 15 was constantly called by his business to the steamboat-levee.

Cases 19 and 20 were both children, who lived but one block away from the lower ship-levee. It is not shown what was the occupation of the adult residents of this house.

Case No. 22 was attacked after gross imprudence in his diet. We are informed by Prof. S. M. Bemiss that at midnight, prior to his attack,

he had eaten a large beef-steak with mushrooms, after a prolonged fast. This man was a grocer, and his business called him frequently into the portion of the city in close proximity to the steamboat-levee.

We have purposely omitted until this time the consideration of a few cases. Of case No. 2 of the record, it is stated that the patient "had not been absent from home, save at work, for some time, and had visited no ships." Justice Coig was a hard drinker. Just previous to his illness he had been upon a spree, and with a man of his character, when drinking, it is difficult to undertand how any assertions can be positively made as to where he had or had not been. He was first seen by Dr. Vickery when in *articulo mortis*, lying "in a cold, barn-like loft, in a place used for storing green hides." It is submitted that the doubt which surrounds this case, and the presence of causes which were capable of producing a like result, is sufficient to exclude the case from further consideration.

Case No. 13 was a negro child, one year of age, residing with his mother at a house which was also occupied by eight other individuals. The statement is made, "no connection with the shipping ascertainable," but it is not shown at what work the adult occupants of this house were engaged.

No connection with shipping was required in case No. 14, as a negro man had, a few days before her attack, died in a "typhoid state," after a sudden and violent illness, at the same house.

We would further suggest that it is an inaccuracy to speak of the general diffusion of cholera over the city of New Orleans in 1873. Upon the accompanying map a circle has been described, the center of which rests upon the river-front of Canal street. The diameter of this circle is long enough to include the locality at which case No. 15 died. It will be observed that the circle embraces but the heart of the city of New Orleans, and that a large portion of the city is without its limits. By a comparison of this map with that which accompanies the paper of Dr. White in vol. I, Public Health Reports and Papers for 1873, it will be found that the vast majority of the cholera-deaths in 1873 occurred within the area of this circle.

On the 21st of July, 1873, Dr. George Howe, then resident physician quarantine station, Mississippi river, addressed a letter to the president of the board of health, New Orleans, of which the following is an extract: "Since January 1, 1873, there have passed and been personally examined six hundred and thirty-eight vessels of all kinds, and in no instance has there been cholera in any form, nor has there been, as far as I could ascertain, any cholera during the passage of any vessel to this port. My information has been in every instance obtained from the master of the vessel, as well as from the medical officer, when there was one on board. In some instances, when vessels have arrived from ports where cholera was supposed to exist, I have required a sworn statement from the master, signed by himself, which are kept on file as additional evidence. And in no instance have I had reason to doubt the truth of any statement or sworn affidavit."

The tone of this extract is positive, and the evidence seemingly conclusive.

Desiring, however, additional facts, upon August 5, 1874, we addressed a letter to the quarantine physician of the Mississippi station, from which letter we make the following extracts:

I. Will you inform me if, during the months of December, 1872, and January and February, 1873, the quarantine upon the Mississippi river was rigidly enforced?

II. If during the months named any vessels from supposed infected

ports (in original letter, ports were enumerated) arrived at the quarantine station upon the Mississippi river?

III. If vessels from any of the ports named arrived at the Mississippi quarantine station, I would respectfully ask information as to the character of the inspection to which they were subjected.

In answer to these questions, we received from Dr. A. W. Perry, late quarantine physician of the Mississippi river station, a communication, dated August 21, 1874, of which the following is extracted: "*Quarantine in the months you refer to was confined to asking each captain the questions I here inclose.*" We reproduce the list of questions:

Number of permit?
Date?
Name of tow-boat?
Kind of vessel?
Name?
Name of master?
Name of pilot?
Where from?
Number of crew?
Kind of cargo?
Number of passengers, foreign?
Number of passengers, domestic?
Where are passengers from?
Any sickness while out?
What kind?
Any deaths?
What cause?
Are all well now?
Have you a bill of health?
Number of days out?

The letter of Dr. Perry further contains a list of 175 vessels that arrived at New Orleans during the three months named, bringing into that port from the localities before alluded to 1,844 passengers and 3,500 of crew, a total of 5,344 individuals, the majority of whom were from localities suspected of cholera.

From an examination of the monthly reports of the Mississippi quarantine station, which were furnished through the kindness of the President of the Board of Health, the following tables have been prepared:

I.—*A tabular statement of the number of vessels, with the number of passengers and the number of crew, that arrived at the port of New Orleans, La., during the month of December, 1872, and the first six months of* 1873.

Month.	Number of vessels.	Number of passengers.	Number of crew.
December, 1872	150	2,204	2,684
January, 1873	134	1,169	2,667
February, 1873	100	550	1,884
March, 1873	118	726	2,254
April, 1873	121	804	2,285
May, 1873	86	708	1,592
June, 1873	60	406	1,365
Total	769	5,163	14,731

A grand total of 15,294 individuals.

II.—*A tabular statement of the number of vessels, with the number of passengers and the number of the crew, that arrived at the port of New Orleans, La., during the month of December, 1872, and the first six months of 1873, from European, West Indian, and South American ports.*

Month.	Number of vessels.	Number of passengers.	Number of crew.
December, 1872	68	1,407	1,145
January, 1873	53	820	1,523
February, 1873	41	278	823
March, 1873	65	453	1,187
April, 1873	57	491	1,240
May, 1873	31	481	669
June, 1873	27	329	662
Total	342	4,249	7,249

A grand total of 11,498 individuals.

Following further this line of investigation, from the Annual Report of the Commissioners of Emigration for the State of Louisiana, we quote the following:

STATISTICS OF IMMIGRATION.

The number of foreign immigrants arrived at the port of New Orleans during the year ending December 31, 1873, is as follows:

From Bremen	2,938
From Hamburg	576
From Liverpool	1,834
From Bordeaux	151
From Havre	239
From Marseilles	6
From Palermo	121
From Messina	3
From Genoa	1
From West Indian and South American ports	210
Total	6,079

Five thousand six hundred and eighty-seven arrived in steamships, and three hundred and ninety-two in sailing-vessels.

Classification of immigrants, according to age.

Under ten years	735
From ten to twenty years	1,012
From twenty to thirty years	3,217
From thirty to forty years	720
From forty to fifty years	203
From fifty to sixty years	119
Over sixty years	73
Total	6,079

Of these were born in:

Germany	2,627
Austria	732
France	506
Ireland	683
England, Scotland, and Wales	1,016
Italy	125
Spain	60
Sweden	23
Russia	9
Belgium	14
Holland	11
Switzerland	63
West Indies, Mexico, and South America	210
Total	6,079

Of this number, four thousand one hundred and twenty-two were males; one thousand nine hundred and fifty-seven were females.

Through the kindness of Mr. H. Von Werthen, the agent of the emigration bureau, we obtained much valuable information as to the emigrants who arrive at the port of New Orleans; and from the facts thus obtained we are able to present the following table:

A tabular statement as to the number of emigrants who arrived at the port of New Orleans, La., during the month of December, 1872, and the first six months of 1873, with the port from which they sailed for the United States.

Port of departure.	December.	January.	February.	March.	April.	May.	June.	Total.
Liverpool	467	424	65	190	112	94	244	1,596
Hamburg	491	.....	.....	91	109	.....	.....	681
Bremen	417	169	153	53	224	345	.....	1,361
Barcelona	2	.....	.....	.....	.....	.....	.....	2
Marseilles	3	.....	.....	.....	.....	.....	.....	3
Bordeaux	11	.....	.....	.....	.....	3	.....	14
Havana	8	3	15	18	8	11	9	72
Vera Cruz	.....	.....	3	26	.....	32	.....	61
Palermo	.....	.....	.....	114	6	.....	2	122
Totals	1,399	596	236	482	459	485	255	3,912

Prior to the outbreak of cholera at New Orleans, it was an ascertained fact that cholera was upon its westward march, and that the disease had already, in one instance at least, reached the shores of North America. On the 6th of November, 1871, the steamship Franklyn, from Stettin, arrived at Halifax, having had an outbreak of cholera on the voyage. Two men from the shore who were employed, after her arrival, on this steamer, were taken with cholera. One died of the disease at his home in Halifax; the other man, after he became sick, went to his home at Chezzetcook, a small fishing-village twenty-two miles southeast of Halifax, and there died. At Chezzetcook four other cases occurred in the family of this man, (Lepiere,) two of which were fatal.

The most efficient sanitary precautions were at once adopted at Hali-

fax, and no other cases occurred. After it was known that the disease had been carried to Chezzetcook, the government adopted stringent sanitary measures, and at once checked the spread of the disease.

During the series of inspections instituted at New Orleans, during 1874, it was several times intimated to us, by sanitary observers, that cholera existed in the West Indies during the late months of 1872, but that the fact of its existence had been suppressed. We have most carefully investigated this matter, without, however, obtaining any very definite results. The only clew that could be found was obtained through the Supervising Surgeon of the Marine Hospital Service, who furnishes us with a letter of the honorable the Secretary of State, from which the following extract is made:

"Under date of September 23, 1872, the consul at Kingston, Jamaica, reports the arrival of a coolie ship at Bluff's Bay in that island, and that one case of cholera had occurred since the arrival, resulting in the death of one of the coolies. It was reported also that some sixty of the coolies died on the passage, but the disease was not ascertained by the consul."

The list of the vessels that arrived at the port of New Orleans during January, 1873, shows that direct communication was established between that city and Jamaica and the adjacent islands. January 21, 1873, the schooner Mai arrived from Port Antonio. January 24, 1873, the schooner Challenger arrived from Grand Cayman.

The facts which have thus far been obtained go to prove:

I. That prior to the outbreak of cholera at New Orleans, in 1873, a coolie ship infected with the disease had arrived at Jamaica; and that after her arrival at least one cholera-death had occurred on that island.

II. That at the Mississippi river quarantine, during the last month of 1872 and the early months of 1873, the only inspection to which vessels arriving at that station were subjected, consisted in receiving as final the answers which the officers of vessels saw fit to make to an imperfect list of questions.

III. That during the months named a large number of emigrants arrived at the city of New Orleans from cholera-infected districts.

Upon pushing the investigation further, we are informed that the commissioners of emigration exercise no control over emigrants who arrive at the port of New Orleans, other than of an advisory nature. That the effects of emigrants are inspected upon ship-board by a customs officer, and that upon landing the emigrant follows unmolested his personal inclinations. That the large majority of the emigrants who arrived at the port of New Orleans in the month of December, 1872, went at once to the State of Texas, but that during the succeeding months large numbers passed into the interior of the United States by the Mississippi river route. Emigrants for Texas are usually shipped direct by the Morgan line. The depot of this company joins the ship and the steamboat levee; and individuals availing themselves of this route are seldom detained over night at New Orleans.

Emigrants who desire to pass northward by the Mississippi river remain sometimes for days in the city, *and lodge at emigrant boarding-houses, which face the river upon the steamboat levee. It is an ascertained fact that during the months of January, February, and March many of these houses were filled with individuals of this class.*

We have, therefore, traced individuals from cholera-infected districts of Europe directly to that locality of the city of New Orleans at which the report of the Board of Health states the earlier cases of the disease became infected.

The evidence, although circumstantial, is certainly strong that the unfortunate individuals who contracted cholera upon or near the steamboat levee came in contact with the poison which had been imported in the effects of emigrants from the cholera-infected districts of Europe, from which infected districts it is shown that emigrants did arrive prior to the occurrence of the initial case in the city of New Orleans. This is certainly more reasonable, more in accordance with history, than it is to suppose that a *de novo* development of Asiatic or epidemic cholera occurred at the beautiful Crescent City.

The doctrine of "non-importation" will not stand.

We fully admit that by the board of health, whose officials were earnest in the endeavor to discover the arrival of individuals who might be infected with cholera, every effort was made to develop the facts attending the introduction of the disease. We have with the greatest care gone over the ground which had been previously investigated by the President of the Board of Health, and have been able to determine three additional facts:

I. The arrival of a cholera-infected ship at Jamaica, in September, 1872, and the fact that at least one case of the disease occurred upon that island after the arrival of this ship.

II. The utterly worthless and unreliable quarantine which was maintained at the Mississippi river station during December, 1872, and January and February, 1873. It must be remembered that this station is on the Mississippi river, at a very considerable distance below the city of New Orleans, and therefore far removed from the direct control of the Board of Health.

III. The arrival of emigrants from cholera districts, and the location of such emigrants at the very point in the city of New Orleans at which the early cases of the disease occurred.

It is submitted that these facts destroy utterly the theory of the original development of cholera in 1873 in the United States.

During the epidemic at New Orleans, two hundred and fifty-nine fatal cases of cholera occurred. The number of the non-fatal cases can never be determined; we have made every effort to obtain even an approximation to the number, but without success.

In concluding this paper, we desire to express our obligation to and appreciation of the kind offices which we received at the hands of the officers of the Board of Health.

These gentlemen are most efficient and zealous in the performance of their duty, and it is with regret that we record comments upon the able report which they have made.

From New Orleans cholera was distributed to the interior of the continent by water transportation. It has been found almost impossible to collect information as to the steamboats which became infected, from a mistaken idea on the part of persons employed in the business, that the reputation of the boats would be injured should publicity be given to the fact that they had been infected with cholera. Sufficient evidence, however, has been obtained, as will be developed in the narrative, to demonstrate their agency in the diffusion of the disease.

Since the above narrative was written, we have received the special report of the Board of Health of the State of Louisiana, dated New Orleans, December 31, 1874. From pages 9 and 10 of said special report we make the following significant extracts:

"In April, (1874,) upon the recommendation of this board, Dr. Alfred W. Perry was appointed quarantine physician at the Mississippi station.

* * * * * * *

"Much to the regret of the Board of Health, on the 14th of October, Dr. Perry was superseded by Dr. Howe, who held the position about five weeks, during which period all attempts at economy were disdained, and the expenses brought up to the former rate of about $15,000 per annum.

"At the request of the Board of Health, made in consequence of this official extravagance, and also because of disobedience to positive instructions of the board directing disinfection of vessels from infected ports, Dr. Howe, on November 20, was superseded by Dr. Julius S. Clark."

Upon page 13 we read:

"During the time that Dr. Perry was resident physician of the Mississippi quarantine station, April 11 to October 14, 1874, several vessels which had yellow fever on board, either while in West Indian ports or during the voyage to this port, were disinfected under his supervision. In not one of these did yellow fever make its appearance after the vessel arrived in this city. Two days after the station passed into the charge of Dr. Perry's successor, and contrary to the explicit instructions of the Board of Health, a vessel from Cuba was passed without disinfection. A week after the vessel was laid to wharf and the contents of her hold discharged, yellow fever broke out on the vessel. This may be only a coincidence, but bears strongly the apparent relation of cause and effect."

These extracts are submitted without comment, further than the statement that the gentlemen to whom they refer had control of the Mississippi quarantine station during the winter of 1872 and 1873.

At the town of Algiers a few cases of cholera occurred, which have been recorded by Dr. W. H. Riley.

The first of this series of cases occurred on the 11th day of May, the last upon the 9th of September. With but one exception, these cases were in the persons of individuals who either worked upon or lived in close proximity to the levee. Two of these cases, however, are suggestive.

I. On the 16th of May, a Norwegian sailor, employed upon the Morgan line, was taken with cholera.

II. The mate of the ship Screamer, just arrived from England, was taken with cholera September 9. Both cases recovered.

Jefferson Parish.

Carrollton, Jefferson Parish, is located on the left bank of the Mississippi river, seven miles above the city of New Orleans. This town is connected with the city by a passenger-railway, and many businessmen of New Orleans reside at this point.

For an account of the few cases of cholera which occurred at Carrollton in 1873 we are indebted to Dr. S. L. Henry.

April 15.—A white man, forty-five years of age, by occupation a raftsman on the Mississippi, was taken with cholera and died after an illness of twenty-four hours.

May 19.—A negro child, two years of age, was taken with cholera and died after twenty hours. The parents of this child were very poor; their occupation was unknown.

May 20.—A white man, flat-boatman by employment, was brought ashore at Carrollton sick with cholera, and died the next day.

Eight other cases are reported, but one of whom died. One of the recoveries was in the person of a flat-boatman from the Upper Missis-

sippi. The disease lasted at Carrollton until September 19. Many cases of choleraic diarrhœa are reported, but all cases that were treated during the stage of diarrhœa recovered.

SAINT JAMES PARISH, LOUISIANA.

The untimely death of Dr. Charles Gray, a gentleman of great local reputation, has deprived us of full and complete records of the epidemic as it occurred at this point. Dr. Gray, at the time of the unfortunate circumstance which led to his death, was engaged in the preparation of an elaborate report, but in the confusion which followed his demise the paper has been lost.

Dr. P. M. Lambremont was absent from the parish during the year, and therefore cannot throw light upon the subject; but from Dr. L. De Poorter the following letter has been received:

"CONVENT POST-OFFICE,
"*Saint James Parish, La., 4th 8br*, 1874.

"DEAR SIR: It has been impossible to me to come to a satisfactory statement of the particulars that accompanied the invasion of the epidemic of cholera that prevailed in this parish in the months of April and May, 1873. I will, however, cheerfully, as a testimony of respect to a distinguished member of our profession, state what I know on the subject.

"Asiatic cholera attacked some white laborers working on the plantation of Mr. B. Tureau, situated on the river about seventy-five miles above New Orleans. All those who were attacked died, eight upon the plantation and about as many in different places. The men having fled panic-stricken, their places were supplied by a gang of about forty white men, most of whom were Irish, and who came from points upon the river. These men were at work building a new levee when they were suddenly smitten with the disease, and nineteen died in a few hours. No case that was attacked recovered.

"The symptoms were not violent; a few characteristic evacuations from the intestines and the stomach, muscular spasm, and a gradual sinking, a steady decrease of the phenomena of life. The men lay pulseless, as cold as ice, with their full mental powers, eyes wide open to an ominous and unavoidable danger, when death, a peaceful death, would end their suffering. No treatment had the least efficacy; the calomel and opium plan, however, appeared the best, but they all died; all praying for water, water, iced water, which was given *ad libitum*, but with no better result. For a short time the disease had a tendency to spread. A few negro families living in the neighborhood were affected, and, notwithstanding the most diligent attention, not one escaped; the physician assisting powerless to the most lamentable spectacle the imagination can possibly conceive. * * * * * * * * *

"I am, indeed, very sorry that I did not take notes at the time on the above subject. * * * * * The Convent of the Sacred Heart and the Jefferson College, two magnificent public establishments a mile apart, that I attend professionally, and between which my residence is situated, escaped the disease.

"Most respectfully,

"L. DE POORTER, M. D.

"Dr. ELY MCCLELLAN."

MADISON PARISH.

The epidemic as it affected Madison Parish was confined to the town of Delta, the village of Tollulah, and the adjacent plantations. At Tollulah and its vicinity the disease is reported to have appeared on the 10th of May, 1873; and to Dr. George T. Trezevant we are indebted for the following valuable information:

Tollulah is a station on the North Louisiana and Texas Railroad, six miles west of the town of Delta. This station is a trading center for the great cotton delta that surrounds it. It is located upon the banks of Brushy Bayou, the banks of which stream have been cleared from its origin at Grassy Lake to its mouth, varying in width from one to three miles. This bayou furnishes the negroes living along its banks with water for all domestic purposes; the better class of whites are, however, provided with cisterns. Immediately in rear of these clearings is a low marshy wood about two miles in width. Brushy Bayou empties into Roundaway Bayou about two miles below Tollulah; the water of both streams is polluted by animal and vegetable matters of all kinds. The "infected district" comprised about five miles on Roundaway, and three miles on Brushy Bayou. The disease first made its appearance at the upper limit of the area of infection on Roundaway, and spread toward Tollulah. Dr. Trezevant is of the opinion that the disease was not imported, "as the first and second cases were parties that had not been abroad in months, nor had they in any manner had it communicated by others." From the first case it can be determined that no others originated, but from the second case (three miles distant from the first case, with which no connection can be traced) there is traced a direct chain of communication, shown in the members of the family and the nurses, despite all precautions to prevent its spread. From this case that of Ruea Sheilds, on May 14, nine cases may be traced, seven of which terminated fatally. Four of these nine cases occurred in a family named Fitzhugh, and during their illness a negro man named Williams was employed as their nurse by the parish authorities. While on duty, Williams was taken ill with cholera, and died before medical aid could be furnished. To this date (June 5) the disease had been confined to the Roundaway district. In spite of professional opposition the body of Williams was carried to Tollulah, and there inspected by his many friends, remaining exposed for more than twenty-four hours. Several members of the family of Williams were taken with the disease; the village of Tollulah and the adjacent plantations were infected. The fact is noted that it is utterly impossibe to prevent a contagious disease from spreading after it once invades the negro ranks; they hold it a very great sin and crime for any one of their number to fail to visit the sick and attend the funeral-rites through fear. The communication of Dr. Trezevant closes with an expression of opinion that the disease was beyond doubt very contagious.

A record of twenty-four cases has been obtained from the Tollulah demonstration, fifteen of which were fatal. Fourteen of the cases reported were males, eleven were females. Six of these cases occurred in the persons of whites, eighteen were negroes. Of the fatal cases, fourteen occurred among negroes, but one among the whites.

The line of treatment adopted was calomel and opium, bromide and chloride of potash, ammonia, chloroform, carbolic acid, with stimulating embrocations and dry heat. Brandy and whisky used with moderation. In cases of convalescence, alterative doses of mercury, with ipecac. and diuretics. Rooms and bed-pans were in all cases disinfected. Bedding

and clothing were burned in all cases where it could be enforced. All cases that were prescribed for in the first stage of the disease, with but two exceptions, recovered. Of the excepted cases, one neglected to carry out the instructions received; the other died on the second day of inanition, no symptom of cholera being present.

In the vast majority of the fatal cases that occurred, in one hour from the inception of the disease the patient was collapsed.

Through the kindness of Dr. S. W. Hamilton, of Delta, we are able to present an outline of the epidemic as it affected the eastern portions of the parish.

Delta is situated on a peninsula, which is bounded on the north, east, and southwest by the Mississippi River, and on the west by a wide scope of country. The town has a population of about six hundred inhabitants. From its location upon the river, and from the fact that the town is the eastern terminus of the North Louisiana and Texas Railroad, Delta is a cotton-market of some importance. The water-supply is obtained from the Mississippi river; some few premises are provided with cisterns.

"The first case of cholera that occurred at Delta was in the person of a white man named Sykes, who came from Milliken's Bend, a point upon the river, some twenty miles northwest. This man was vomiting and purging when he arrived, on the 13th day of May; at 10 o'clock a. m. cholera was developed, and at 5 o'clock p. m. the same day he was dead. As the disease was at the time epidemic on Roundaway Bayou, this case occasioned great alarm. The circuit court, which was in session, was adjourned, and every effort was made to arrest the disease. No other cases of cholera occurred in town until June 3, when it was brought in from the infected district on Roundaway, and was confined almost exclusively to the negroes, many of whom died without receiving medical aid. In some families many cases of the disease occurred, and the attendants upon the cholera-sick were by no means exempt. The prevalence of the disease among the negroes is accounted for on the ground that they, regardless of consequences, ate freely of fruits and melons. The negro loses all fear of disease when his stomach makes a demand on him. There were many cases upon the river-steamers; one boat buried a cholera-subject near Milliken's Bend, early in May; other boats buried cases at different points, of which I have not been able to obtain all the facts. I feel assured that the disease reached us through that channel."

Sixteen cases of cholera occurred at the town of Delta, six of whom died. Of the individuals attacked, eleven were whites, five were negroes. Four whites and two blacks died. Fourteen of these cases were males, two were females.

Upon the Ballard plantation, near Delta, seven cases occurred, with five deaths. All of these individuals were blacks; three were males, four were females.

At the California plantation, two cases occurred; both were fatal, and both were in the persons of negro females.

At the Nebraska plantation, fifteen cases occurred. All were negroes, eleven of whom died. Nine of these individuals were males, six were females.

Five employés of the North Louisiana and Texas Railroad died of the disease; all were whites.

A vast number of diarrhœa-cases occurred, that were successfully treated and the disease arrested; and it is most probable that the figures noted only approximate to the number of cases of the disease.

Owing to the death of Dr. Riordan, which occurred early in the year 1874, we have been unable to obtain much valuable information which he possessed as to the epidemic on the Roundaway Bayou. Through Dr. Riordan it is most probable that the facts concerning the introduction of the disease into Madison Parish could have been determined.

La Fourche Parish.

It has been found almost impossible to obtain any information as to the demonstration of cholera in La Fourche Parish. Early in the spring of 1874, from the extensive overflow and inundation from the breaks in the Mississippi river levee, nearly the entire parish was under water. The disease was confined almost exclusively to the negro employés upon plantations, and in many instances the physicians who attended them have removed to other localities where they could not be communicated with.

The primary outbreak of the epidemic occurred among the employés on the Oak Grove plantation, near Thibodeaux, and upon the Bayou La Fourche. The first case occurred after contact with a trading-boat directly from New Orleans. The epidemic was confined to four plantations near Thibodeaux and Raceland, and about one hundred cases occurred, the majority supposed to have been fatal.

Dr. Fulton Rogers, the parish physician, in a letter dated Thibodeaux, July 25, 1874, states that no cholera occurred in the parish, but that many cases of cholera morbus occurred, caused by eating unhealthy fish, and that, during the overflow of 1874, a number of similar cases occurred.

Ouachita Parish.

All possible effort was made to secure an account of the epidemic as it affected Ouachita Parish, but without securing any information of value. The following letter demonstrates the willingness of the profession of the parish to aid in the undertaking, as well as the causes which have prevented our collecting the desired facts:

"Monroe, La., *July* 6, 1874.

"Sir: Your letter of June 1st was received by due course of mail and contents carefully noted. Before replying to it I desired to have a full conference with each one of our physicians, and as one of them was absent, who had seen a good deal of the cholera last summer, I awaited his return and thus delayed my answer. I find that none of our physicians made notes of a single case, and it will, therefore, be impossible for me to provide you with the information you desire. In a general way I may state the disease prevailed almost exclusively among the negroes in the suburbs of our little city, and among the poor class of whites, only one white person having died from the disease who was surrounded with the comforts of a good home, and his death was due to neglect of the premonitory cholerine. About seventy deaths occurred in all, a large majority of whom were negroes. Not one-half of those who died among the negroes received medical attention, from an ill-founded and absurd notion among them that the physicians, glad of an opportunity to slyly kill them, would either give them wrong medicines or poison. One peculiarity I may mention. In nearly every case that died, death was preceded from twenty-four to forty-eight hours by suppression of urine, and in many instances the patient seemed to die more from this complication than from the choleraic symptoms.

"I regret that I cannot give you a more satisfactory answer; but so little interest was felt by the physicians in the cholera as it appeared here, on account, mainly, I presume, of the class of persons affected, that no notes were taken, and of course I can make no other report.

"Very respectfully, your obedient servant,

"R. C. STROTHER, M. D.

"ELY MCCLELLAN, M. D.,

"*Assistant Surgeon, U. S. A.*"

Persistent application has been made to other physicians of Monroe and Ouachita Parishes, but with no other result than an expression of regret that, as no notes or records of the epidemic were kept, accurate information could not be furnished.

BATON ROUGE PARISH.

Baton Rouge, the former capital of the State of Louisiana, is located on the east bank of the Mississippi River, one hundred and twenty-nine miles above New Orleans. The city is built upon the first bluff which is met in ascending the river, giving to the site an altitude of 25 or 30 feet above the highest overflowings. This city has the reputation of being one of the healthiest in the Lower Mississippi Valley. The population in 1870 was 6,498 individuals.

On the 7th of May, a white man named Martin, fifty-four years of age, who was employed at the coal-wharf in coaling river-steamers, was taken with cholera, and died after an illness of seventy-two hours. The day before he was taken sick he had been at work on a barge that had arrived from Port Hudson, at which point cases of cholera had occurred.

May 13.—A daughter of this man was attacked with cholera, but recovered. At the same house, on the 15th, a female child died.

We are informed by Assistant Surgeon C. Ewen, U. S. A., stationed at Baton Rouge, that subsequently two negro men who were employed at this coal-yard died of cholera; and that upon the Highland road, south from the city, several deaths occurred among negroes.

In addition to the family of Martin, four cases are reported, two of which were fatal.

CONCORDIA PARISH.

No returns have been received from this parish, although persistent effort was made by letters, which were addressed to all medical gentlemen whose names could be obtained.

We have, however, unofficial reports that about June 11 a number of cholera cases occurred upon the plantation of Mr. Lambdon, and that ten of these cases died.

About the 19th of June, the same reporter states that at the plantation of Mr. David Miller twenty-six cases of cholera occurred, with six deaths.

Both of these plantations are near the town of Vidalia.

CARROLL PARISH.

One case of cholera is reported as having occurred at Transylvania, Carroll Parish, on the 23d of June, in the person of a negro laborer upon a cotton plantation. The case recovered.

Dr. C. R. Whitehead states that no other case came within his knowledge; and he is of the opinion that cases of cholera occur every year on the Mississippi river.

SAINT MARY'S PARISH.

We are able to present an interesting account of the epidemic as it occurred in Saint Mary's Parish, from the pen of Dr. S. Allen:

"GENTREVILLE, LA., *May* 12, 1874.

* * * * * * *

"SIR: The first as well as the greatest number of cases of cholera happened on the plantation of Mr. Thompson. This beautiful estate is situated directly upon the Bayou Teche, about twelve or thirteen miles west of Brashear, and is one the best-cultivated, best-drained, and generally best-managed plantations in the parish.

"Some time during the latter part of May, 1873, I was called in haste to visit Mrs. N., aged about fifty years. I found the patient on board a trading-boat, lying at Thompson's wharf. She was suffering with every symptom of cholera, with a rapid tendency to collapse. I learned that about six hours before my arrival she had been suddenly attacked with "violent and frequent" vomiting, attended with terrible "pain and cramps;" that these symptoms were followed in the course of an hour by copious and frequent alvine dejections. About one hour before my arrival the nausea and vomiting had in a great measure ceased, but I soon discovered that they had not departed finally, as I found her not only vomiting, but purging almost continuously and involuntarily pure rice-water. The extremities were cold and damp, the forehead covered with large drops of sweat; abdominal and gastrœnemic muscles contrasted into knots, bladder empty, no urine having been discharged during the past four hours. There was inordinate thirst.

"The patient recovered readily under the following treatment: The free and general application of dry heat and sinapisms externally. One grain of calomel was given every twenty minutes, until a change in the color of the dejections was noticed. Iced water was given *ad libitum*.

"The above was the first case that occurred on or near the Thompson place, and probably was the first in the parish.

"On July 5, Esau Tilghman (a laborer on the Thompson place) was attacked, and died on the 9th. On the 10th, Ann Watts was taken sick, and died on the 14th. On the 14th, Mary Jackson, Andrew Jackson, and Rhoda White died after a few hours' sickness. There seems to have been a special malignity about the last three cases, as they were perfectly well at breakfast-time, all ate heartily, yet by 3 o'clock the same afternoon all were dead. On the 18th of July, the boy Harry died, sick about two days. August 11, Alexis Frederic died, after a few hours' illness. During somewhat over a month's time there were forty cases, with eight deaths.

"I have recently been informed by my friend, Dr. H. J. Saunders, (who owns a plantation situated about one and a half miles below that of Mr. Thompson,) that he had about twelve cases of pure cholera, none of which terminated fatally, though one was in a collapsed condition for several hours. His treatment consisted in the active administration of an opiate and astringent mixture, together with the external application of the cold douche and wrapping in sheets wrung out from cold water. Dr. Saunders also informs me that there were a few cases on the Torian and Geneve plantations, all of whom, together with those on his own place, took the disease, he feels assured, after visiting the sick at the Thompson place. At any rate, no case happened on his place among those who had not visited Thompson's, more or less frequently, after cholera was developed there.

"Dr. A. S. Gates, of Franklin, informs me that but one case occurred

at that town during the past summer, and that in the person of a deck-hand on the steamboat Ida, a boat that plied regularly between New Orleans and Saint Martinsville. The patient was moribund when Dr. G. saw him, and had evidently contracted the disease in New Orleans. On comparing dates, I find that cholera already existed on the Thompson place at the time the Ida brought the above case to Franklin.

"The trading-boat upon which the first case occurred had been for months engaged in simply moving up and down the Bayou Teche, trading at the different plantations; had been nowhere, at any rate, where cholera prevailed. The only connection she had with New Orleans consisted in the packages of goods received from there via Morgan's Railroad. I could discover nothing in the water or food generally used on the plantation of an impure or unhealthy character.

"There were two plantations near Thompson's, on which a rigid quarantine was exercised. On one, by my advice, all the houses in which the employés lived were whitewashed and thoroughly cleansed, and carbolic acid was freely applied. No cases of cholera occurred upon either of these plantations, with but one exception, that of a man and his wife who violated the quarantine rules and attended funerals at the Thompson place.

"Very respectfully,

S. ALLEN.

"Dr. C. B. WHITE,
"*President of the Board of Health.*"

Dr. Allen states at a later date that after a most thorough and exhaustive examination he was unable to discover either a local or imported cause sufficient to account for the original outbreak. Probably no plantation in the State is better managed; well drained, having an abundant supply of good cistern-water, food of the best quality, and the houses in which the employés resided were roomy, well ventilated, and raised some three or four feet from the ground. At this plantation (Thompson's) the disease was localized, ("endemic.") All the other cases were directly traceable to infection received while the subjects were visiting or attending funerals on the Thompson place.

The letters of Dr. Allen demonstrate that the cholera-infection, so far as it affected Saint Mary's Parish, had for its initial case the woman at the wharf of the Thompson plantation upon a trading-boat, and that this boat had been for months upon the Bayou Teche, passing up and down stream. But there is nothing to show that the employés of this boat (one of the small craft to which attention has been given elsewhere) had not been from her either to the city of New Orleans, or upon steamboats from that city. Owing to the overflow which devastated the section of the country during the early spring, we have been unable to obtain as full records as were to be desired; but from facts that have incidentally come to our knowledge we are led to the opinion that there was communication between the trading-boat and the steamer Ida prior to the outbreak.

CHAPTER VI.

MISSISSIPPI GROUP.

MISSISSIPPI CONTRIBUTORS.

Dr. P. F. Whitehead, Warren Co.
Dr. W. T. Balfour, jr., Warren Co.
Dr. D. W. Booth, Warren County.
Dr. J. F. O'Leary, Warren County.
Dr. P. A. Quin, Warren County.
Dr. Le Grand G. Capers, Warren County.
Dr. H. Shannon, Warren County.
Dr. J. A. Tillman, Washington Co.
Dr. T. J. Mitchell, Hinds County.
Dr. P. F. Bailey, Hinds County.
Dr. Geo. St. C. Hussey, Adams County.

DATES OF INITIAL CASES.

Vicksburgh, Warren County.....April 8.
Jackson, Hinds County.....June 1.
Deer Creek, Washington County.....June 14.

MISSISSIPPI.

Warren County.

The city of Vicksburgh is built on the east bank of the Mississippi river, equidistant from New Orleans and Memphis. Its altitude is 175 feet above the level of the sea. The town is upon hills, whose steep sides afford fine natural drainage into the river and two bayous; one of which flows westward through the northern portion of the town and empties into the river just above the city landing, the other flows south, parallel with and empties into the river several miles below the city.

There is but one underground sewer in the city, that commencing at the highest point on Washington street, near the Railroad depot, and running north to the river some seven or eight blocks.

The police and sanitary regulations are bad; most of the time no attention is given to this matter, but when there is a threatened or actual invasion of epidemic diseases, a board of health and a health officer are appointed, whose term of service expires with the exigency that called them into being. At the time at which the cholera made its appearance the condition of the city was unusually good. The small-pox epidemic, but just past, had caused a board of health, who had done what they could to clean the city, and had ordered the continued use of disinfectants.

Dr. J. M. Hunt reports that on the 8th day of April he treated a young man named Maiden, who was sick with cholera. This man lived on Levee street, just in front of the wharf-boat, at a boarding-house frequented by river-men. Maiden was taken ill at 1 o'clock a. m., and died at 8 o'clock a. m. the same day. Dr. Hunt reports this as a typical case of cholera. Had cramps, rice-water discharges, and died fully collapsed. Had recovered from an attack of syphilis a short time before. Was a dissipated man, but, as far as can be learned, had not been out of the city.

May 12, A. P. Kuhn, a dissipated white man, who was just over an attack of delirium tremens, and had gone upon another spree, was taken with cholera. Where he had been for two days prior to his attack is unknown; he had been away from his home, but it is thought that he had not been out of the city. This man recovered after an illness of five days.

On the 14th of May the steamer John Kilgore, from New Orleans, arrived at the wharf-boat, having a cholera-case on board. Dr. D. W. Booth, of Vicksburgh, took charge of the case, and to him we are indebted for the following account:

"The patient, Mr. John Schenck, of Ohio, had been troubled for some days before leaving New Orleans with diarrhœa, which continued after he took passage on the Kilgore for Cincinnati. During the early hours of May 14 this diarrhœa became more violent, and was accompanied with vomiting and cramps. He had been very imprudent in his diet, eating freely of fruit both in New Orleans and on the boat. When first seen by Dr. Booth, the condition of the patient bordered on collapse, pulse barely perceptible, washer-woman's fingers, profuse colliquative sweat, tongue cold and pale, extremities cold, and the usual pinched expression of countenance. The discharges had ceased, and did not again occur until after death. Nausea was not excessive, the vomiting only occasional. Mr. Schenck died at a point about fifty miles above Vicks-

burgh. The excreta were thrown overboard without being treated; and there is nothing to show that any unusual care was exercised in regard to the clothing, beds, and bedding."

Dr. Booth left the Kilgore at Lake Providence, some seventy-five miles above Vicksburgh. At that time no other cases had occurred on the boat, but Dr. Booth notes a fact of much significance: "the Kilgore was crowded with passengers, many of whom were on deck." The body of Mr. Schenck was carried to Memphis, where it was removed to an undertakers, placed in a metalic casket, and forwarded by rail to his family in Ohio. The Kilgore proceeded on her passage to Cincinnati, with what results will be noted hereafter.

Dr. Booth reports that after he left the Kilgore at Lake Providence on the 16th of May, he saw a case of cholera at that point which terminated fatally.

May 16, Mrs. Kuhn, the wife of the case of the 12th instant, was taken with cholera, and died the next day. This lady, who was in very feeble health, had been living in the country, about one mile from the town. During her husband's illness she was brought into the city and to his sick room, when she was herself attacked.

From this date the disease is reported as having occurred throughout the community. We have not succeeded in obtaining full lists of all the cases that occurred, but a record of thirty cases have been obtained; this record, as to twenty-three cases, is full and complete, showing that twelve cases occurred in the persons of males and eleven in females. Eleven were blacks and twelve were whites; fifteen died, eight recovered.

By Dr. Le Grand G. Capers, a prominent physician of Vicksburgh, we are informed "that there was a general tendency to bowel affections during and subsequent to the visitation of the disease;" that a very large number of such cases were treated, and that an unusual number of cholera-morbus cases occurred during the same time.

To Doctor P. F. Whitehead we are indebted for much of the information upon which the Vicksburgh narrative is based.

It is known that cholera existed at several points in this State, upon the line of the river, and below the city of Vicksburgh, but we have been unable to collect the information.

Hinds County.

Jackson, the capital of the State of Mississippi, is located upon the right bank of Pearl river, forty-five miles east of Vicksburgh. The Vicksburgh and Meridian and the Mississippi Central Railroads pass through the town; the latter being a great trunk line of railway to and from the city of New Orleans.

We have made every effort to obtain full information of the epidemic as it occurred at this point, but without success.

From a letter written by the late Dr. J. F. Harrington, of Jackson, to Prof. N. S. Davis, of Chicago, we are able to gather the following facts:

The first cases of the disease that occurred at Jackson were on the 1st day of June, 1873, upon which day three cases of the disease occurred. One was in the person of a man from Memphis, Tenn., who had been at Jackson one week prior to his attack; the other two individuals were residents of Jackson. The sanitary condition of the city was bad at the time of the outbreak. That while the first pronounced cases did not present themselves until the 1st of June, the entire community had been suffering from diarrhœa for some two or three weeks

previous. We have made every effort to follow out the clew contained in the letter of Dr. Harrington, but as circumstances conspired to prevent any lengthened personal inspection, we were compelled to intrust the work of collecting data to other hands, and obtained the most discouraging results.

At the State penitentiary, which is located at Jackson, it is reported that eleven cases of cholera occurred with but one death. This fatal case occurred within the penitentiary walls on the 15th of June, and died within twenty-four hours. We are unable to obtain any facts as to the outbreak at this penitentiary.

No cases occurred at the Lunatic or Deaf and Dumb Asylums. Dr. P. F. Bailey states that the larger portion of the citizens of Jackson were affected with diarrhœa, which was, however, readily checked. Every fatal case was traceable to atmospheric influences, irregular habits, and impure water.

Dr. T. J. Mitchell states that the disease was chiefly confined to the negro population, and that over 50 per cent. of the cases were fatal. That among the negroes the course of an attack of the disease was exceedingly rapid; a few hours, in the majority of the instances, terminating the case.

One interesting case illustrative of the portability of the disease is related. A negro girl who was employed as a servant in a family living in the city was taken with cholera and died after an illness of fourteen hours. The family of this girl lived in the country, some miles from town. A few hours after her death her father and mother arrived to see her; and after her death removed her bedding and clothing to their home. One week later the entire family, consisting of the parents and five children, sickened with cholera, and all, with the exception of the father, died.

Washington County.

The only return which we have received from Washington County is from the locality known as Deer Creek, and that through the kindness of Dr. J. A. Tillman.

Greenville, the county town, located upon the east bank of the Mississippi river, was infected with cholera early in the season of 1873, but we have been unable to present any history of this demonstration, from the fact that during the fire of the summer of 1874, that destroyed nearly the entire business portion of the town, the office of Dr. Stewart White, who had been engaged in collecting the information of the local epidemic, was consumed, and with it all his notes and records, which could not be reproduced.

From Dr. Tillman we learn that the cholera appeared on the 14th of June, among a gang of laborers upon a plantation, and that the first three cases, all of whom died, lived at the same house. The previous history of these cases we have been unable to obtain. Dr. Tillman writes: "The most peculiar attendant of the epidemic was its inclination to attack certain localities, leaving a large scope of country, or a number of plantations, intervening, and again descending on others with almost universal fatality, and on others in a more modified form; yet the premonitory symptoms were universal in all. After the communities in which the epidemic prevailed became convinced that diarrhœa was a premonitory symptom of cholera, and after they had taken the precautionary steps to adopt an early treatment, we saw but comparatively few cases, and very soon the disease disappeared from the county,

leaving us as much amazed at its rapid decline as at its sudden appearance."

Dr. Tillman reports twenty-five cases of the disease, with fourteen deaths. Many of these cases occurred in families of which two or more members were attacked with the disease. One instance is of interest. A negro man stole, from a house that had been abandoned on account of cholera, some articles of clothing and carried them to his own house. Within three days this man, his wife, and his three children, were prostrated with cholera, from which the wife alone escaped with her life.

The other physicians of this locality failed to report their experience with the disease.

Dr. W. Y. Allen, of Skipwith Landing, Washington County, reports that no cases of cholera occurred at that point, although he saw "six or seven cases of cholera morbus."

Holly Springs, Marshall County.

It having been reported in a newspaper of Memphis, Tenn., that three deaths from cholera had occurred at Holly Springs, Miss., on July 6, 1873, we carefully investigated the report, and have been informed from the leading physicians of that place "that no cases of cholera occurred at that point in 1873."

Meridian, Lauderdale County.

Dr. John D. Kline, of Meridian, states that no cases of cholera occurred at that town in 1873.

Friar's Point, Coahoma County.

We have been informed by a gentleman residing near Friar's Point that cholera prevailed extensively among the negroes employed upon his plantation; but we have failed in all endeavors to obtain information from the medical gentleman who treated the cases.

Although it has been found impossible to collect the information from those who possess the knowledge, we do not hesitate to state that during the months of March and April the cholera was prevalent upon both sides of the Mississippi River as far north as Memphis; that it was confined chiefly to the negro employés on plantations and the residents of the various landings upon the river.

We confess to the discouraging failure which in this locality attended our efforts to collect the facts of the epidemic; the most persistent and long-continued efforts were unavailing.

In answer to a communication addressed to him, Dr. George St. C. Hussey, health officer of the city of Natchez, writes: "We have never had Asiatic cholera in this city;" and adds information which, although not pertinent to the investigation, is still possessed of so much interest that we offer the extract:

"We have had but one visitation of yellow fever in the past ten years—that of 1871—when the disease was brought from New Orleans on board a steamboat, which had evaded the quarantine and passed that city. At Natchez a sick man was put on shore, and he was carried through the streets for several hours, in an open cart, before a place could be found for him. In a few days the city had cases of yellow fever in every portion, and, strange to say, it commenced in some of our best and most careful families, with whom it proved the most fatal.

The disease found our city in its ordinary sanitary condition, which is generally good, requiring but little effort to keep it so, the drainage of almost the entire city being most excellent. The last visitation of 1873, that had such fatal results at Shreveport, La., and Memphis, Tenn., was effectually prevented by a close observance of our quarantine regulations and rigid sanitary improvement, and we had not a case in the city.

"As to our supply of water, we use none other than pure cistern-water, which, it is said by some of the oldest citizens, was the cause of cholera not prevailing here, when known to be all around us."

CHAPTER VII.

ARKANSAS GROUP.

ARKANSAS CONTRIBUTORS.

Dr. A. L. Breysacher, Pulaski Co.
Dr. P. O. Hooper, Pulaski County.
Dr. W. G. Wright, Pulaski County.
Dr. R. G. Jennings, Pulaski County.
Dr. J. R. Dale, Pulaski County.
Dr. Thompson, Pulaski County.
Dr. D. H. Dungan, Pulaski County.
Dr. J. H. Lenow, Pulaski County.
Dr. W. C. Gillespie, Pulaski Co.
Dr. J. M. Holcomb, Jefferson Co.
Dr. R. A. Burton, Phillips County.
Drs. Felts and Palmer, Mississippi County.
Dr. V. E. Kersh, Lincoln County.
Dr. H. P. Crute, Chicot County.

Acting Assistant Surgeon J. H. Carroll, U. S. A.

DATES OF INITIAL CASES.

Osceola, Mississippi County	April 14 and September 8.
Chicot, Chicot County	May 19.
Pine Bluff, Jefferson County	June 25.
Little Rock, Pulaski County	June 30.
Starr City, Lincoln County	July 17.
Helena, Phillips County	July 20.

ARKANSAS.

Epidemic of 1873 at Osceola, Mississippi County.

REPORTED BY DRS. FELTS AND PALMER.

The town of Osceola is located upon the west bank of the Mississippi river, eighty-seven miles above the city of Memphis. The country is level and interspersed with numerous lakes and bayous. The nearest hill is forty miles distant, a ridge which extends from the Ozark Mountains in Missouri to Helena, Ark. This district, which is known as the "sunk lands," from the effect produced by the earthquakes of 1811 and 1812, is drained by the Saint Francis and Little rivers. The region is highly malarial. Osceola is a town of some two hundred inhabitants, who depend upon river-transportation alone for communication and supplies.

On the 17th day of April, 1873, a white man, forty-eight years of age, was attacked with cholera and died after an illness of a few hours. He lived in a miserable hovel a short distance north of the town. This cabin was filthy in the extreme, and contained but one room, in which two families, consisting of ten individuals, lived. April 18, the wife of this man was taken with the same disease. She was at once removed from this house; was carefully nursed, and recovered after an illness of six or eight days. The same day that this woman was attacked, a man named Lawrence, who also lived at the same cabin, was taken with cholera, and the next day his wife was also attacked. The two last cases also recovered, after having been collapsed from twenty-three to seventy-three hours.

It was subsequently ascertained that Lawrence, who was a vagrant, had, some two or three days before the first case occurred, returned from Memphis, and that he was then suffering from diarrhœa. The other occupants of this cabin had more or less diarrhœa, but in each instance the disease was checked. The cabin and surrounding grounds were cleansed and disinfected. The excreta of all the cases were disinfected and buried. No other cases occurred.

On the 8th of September, a negro woman, twenty-eight years of age, living in the town, was taken with cholera and died after a few hours' illness. The next day a man who lived with this woman, and who had been in constant attendance upon her during her illness, was taken and died after eight hours' illness. It was supposed that this man had been employed upon some of the river-boats, but it cannot be definitely determined.

September 9, a white man named Sowers, who lived some five miles north of Osceola, was attacked with cholera and died the same day. It is not known where he contracted the disease. He lived three-quarters of a mile from the river; was extremely poor, and worked at any employment he could obtain. That just before his attack he had obtained some work, is shown from the fact that the day before he died he had purchased a quarter of beef, and, as he and his family had been deprived for some time of meat of any kind, they gorged themselves.

From this point, however, there is no obscurity in the transmission of the disease. Sowers lived in a cabin which was one of a group of similar structures that had been formerly used as quarters for negroes. The

other cabins were occupied by families named Waddell, Lucas, and Cabels; and in each family a fatal case occurred.

A man named Maples, who was exposed to the infection at the quarters where Sowers had died, was taken ill at his home, some miles distant, and died, after twenty-four hours, on the 14th of September.

September 15, a Mrs. Ashley, who had been visited by persons from the infected houses, was taken with cholera and died the next day. A few hours after she was attacked, her daughter, three years of age, sickened and died about the same time as her mother. These two cases were nursed by their relatives, and among them three other cases occurred, two of which terminated fatally.

During the course of the epidemic, twenty-three well-defined cases of cholera occurred, in addition to those which have been already noted. Fourteen of these cases occurred in the persons of males, nine in females. Fourteen were whites, nine were blacks. Seven of the cases died, sixteen recovered. Seven were in the persons of children, of whom three died. The greatest age noted was eighty-one years; this patient recovered after an illness of six days.

During the epidemic, one medical man died of cholera. He had, however, not been exposed directly to the infection, having been for many months an invalid.

So far as can be ascertained, but in one instance was the disease carried to any great distance in the country. After the death of Maples on September 14, his brother, at whose house he had died, moved westward with his family. The journey was undertaken in wagons. It was afterward known that cholera broke out in his family while *en route*, that Maples had died in a camp, after but a short illness. Some effort has been made to trace up this family, but nothing can be learned of them after they left the camp at which Maples died.

The treatment adopted was calomel and camphor in full doses, and opium was used with extreme care. Alcoholic stimulants were avoided, and in their place chloroform and chloral hydrate were exhibited. In one case hypodermic injections of morphia sulphatis, gr. ¼, with chloral hydrate, grs. ij, were used with beneficial results.

Carbolic acid, permanganate of potash, bromo-chlorallum, chloride of lime and quick lime were employed as disinfectants. It was noticed that wherever the free use of disinfectants was instituted the disease was arrested; but the utmost difficulty was experienced in securing disinfection in families living in the country.

Chicot County.

The history of the epidemic as it affected Chicot County is contained in the following letter:

Chicot, Ark., *November* 5, 1874.

My Dear Doctor: The first case of genuine cholera occurred at this place on the 19th of May, 1873, in the person of Joseph Fowles, a man of regular and steady habits, and who was at no time during my acquaintance with him ever guilty of any personal excesses. He was an engineer by profession, and ran an engine upon the Little Rock and Pine Bluff Railroad from this point to Collins station, a distance of about twenty-eight mlles, and was of necessity exposed a good deal at night to the inclemency of the weather.

On the Saturday night previous to his attack, he came into my office to consult me, thinking that he had experienced a slight chill, which was followed by a moderate fever. I gave him a prescription, with

instructions to report to me the next evening, if he had another chill. He did not return. On Monday morning he was much better, so much so that he felt able to take charge of his engine. About two hours after leaving Chicot, he left the engine at a way station to go to stool, and when he returned, remarked to his assistant that he believed he had discharged at least two gallons from his bowels, and that he felt chilled through. They administered to him such stimulants as they could get, but he continued to grow worse until they reached Collins, where he was put to bed, and received the care of the physicians of that place. The engine returned to Chicot as rapidly as possible for me. I reached Collins about 8 o'clock p. m. Although he had received all the care and attention that could have been given him, he continued to sink. I found him collapsed, and at 10 o'clock p. m. he was dead.

This is a fair history of all the fatal cases that occurred in this vicinity; and in every case in which the disease was allowed for two hours after the first symptoms to go on without treatment, no impression could be made by any treatment and the attack was fatal. Four cases yielded to the free administration of chloral hydrate in twenty-grain doses, repeated every twenty minutes until the severity of the attack was arrested. The majority of the cases were laborers upon the railroad; and those of them who were careless in their habits, intemperate, and who lived upon badly-cooked vegetables, were the most frequently attacked.

My impression is that the disease originated here. We have fallen into the habit of attributing all the ills to which the human flesh is heir in this portion of the country to malaria. Whether this is scientifically true, I am not prepared to say. I do know that, so far as I was able to discover, there was no local cause for cholera that had not existed here for nearly two years previous to the outbreak of the disease. About this time usually we have been in the habit of having intermittent fever in its mildest form; but during the prevalence of the cholera not a single case of intermittent fever occurred, nor was there any evidence of fever of any kind shown in the community during the forty days that cholera prevailed.

The disease appeared at many places along the banks of the Mississippi river almost simultaneously, proving to my mind conclusively that the predisposing cause of the disease was to be found in some peculiar condition of the atmosphere. At certain seasons along the line of the Mississippi river, when the atmosphere becomes impregnated with that subtle influence which we call malaria, certain diseases prevail, which are more or less severe according to the intensity of the poison. Thus, in certain conditions of the atmosphere we have intermittents, in others bilious remittent, cholera, and yellow fever. These changes sometimes follow each other in regular succession, and as each new change occurs a different grade of disease predominates. Thus, during the prevalence of cholera last year, every change in the system of any character resulted in a choleraic tendency, and one month later the diseases were all intermittent; in three months the yellow-fever type predominated.

The cholera here was easily managed when treated in time; but if allowed to go on without medical interference, even for two or three hours, it was as severe as I have ever known it at any other place.

H. P. CRUTE, M. D.

Dr. ELY MCCLELLAN, U. S. A.

JEFFERSON COUNTY.

On the 25th of June a white man, named L. L. Martin, was attacked with cholera at Pine Bluff and died after an illness of about twenty hours.

Pine Bluff is located upon the right bank of the Arkansas river, forty-eight miles below Little Rock.

We have utterly failed to obtain any information as to the history of Mr. Martin, but his death leads to the history of an interesting group of cases, for which we are indebted to Dr. J. M. Holcombe.

Mr. Martin died of cholera June 26; four days later (June 30) Mr. Cosart, a son-in-law of Martin, and who resided in the same house, was taken with the same disease and died the next day. July 3, Mrs. Cosart was taken with the disease, but recovered. July 5, O. A. Bradshaw, a white man, forty-one years old, who had nursed Martin, was attacked with cholera, and died within ten hours; and the same day a negro woman, who was the cook in Bradshaw's family, also died of cholera.

Martin and Cosart lived in the lower portion of the city and upon the bank of the river. Bradshaw lived in the upper portion of the city, but quite close to a branch which flows through the town.

PULASKI COUNTY.

One of the most interesting demonstrations of the cholera-epidemic of 1873 is to be found in the records of the city of Little Rock, Ark. This beautiful city is located upon a high bluff on the south bank of the Arkansas river, three hundred miles from its mouth. The city has railway communication with Memphis, Tenn., one hundred and fifty-five miles northeast, by the Memphis and Little Rock Railroad, and with Saint Louis, Mo., three hundred and forty-six miles northeast, by the Saint Louis, Iron Mountain, and Southern, and the Cairo and Fulton Railroads; and with Austin and Galveston, Texas, over five hundred miles to the southwest, by the Cairo and Fulton, the Texas Pacific, and the International and Great Northern Railroads.

In 1870 Little Rock had a population of 12,380, of whom 7,101 were white.

The report of the vital statistics of Little Rock for the first six months of 1873, made by Dr. R. G. Jennings to the Arkansas State Medical Society, shows a total of but 315 deaths from all causes, as shown in the condensed recapitulation.

Diseases.	From April 1 to December 31, 1871.			1872.			From January 1 to June 30, 1873.		
	White.	Colored.	Total.	White.	Colored.	Total.	White.	Colored.	Total.
CLASS I.									
Miasmatic diseases	73	28	101	79	29	108	49	57	106
Enthetic diseases	.....	1	1	2	2	4	2	1	3
Dietetic diseases	5	.....	5	11	.....	11	3	.....	3
CLASS II.									
Diathetic diseases	3	.....	3	3	1	4	4	.....	8
Tubercular diseases	25	26	51	39	38	77	9	18	27
CLASS III.									
Diseases of the nervous system	17	17	34	46	15	61	22	15	37
Diseases of the throat, heart, lungs, and digestive organs	53	33	86	56	50	106	50	34	84

Diseases.	From April 1 to December 31, 1871.			1872.			From January 1 to June 30, 1873.		
	White.	Colored.	Total.	White.	Colored.	Total.	White.	Colored.	Total.
Diseases of the urinary and genital organs..	2	1	3	6	8	14	4	3	3
Diseases of the bones	1	.....	1	1	.....	1	.....	.....	.....
Diseases peculiar to females	1	.....	1	3	1	4	3	1	4
CLASS IV.									
Violent diseases	9	7	16	9	10	19	5	3	8
Unclassified diseases	14	31	45	25	31	56	10	22	32
Total	203	144	347	280	185	465	161	154	315
Children under five years (included above)..	71	61	132	95	79	174	35	59	94

It will be observed that the malarial diseases of Little Rock represent a greater number of cases than any other class. This is owing principally to the fact that a large percentage of cases either come here, saturated with the poison, for medical treatment, or are brought here, as is frequently the case, for interment.

The proportion of diseases of the miasmatic class, in Little Rock, is not above the general average of the country, and, as compared with that of the entire State of Arkansas, is believed to be greatly below the average.—[Extract from report on vital statistics.]

The first case of cholera which occurred at Little Rock in the season of 1873 was in the person of Mrs. Mary L. L., nineteen years of age, who arrived at the city on the 29th of June, from some point upon the Cairo, Little Rock and Fulton Railroad, in the northern division. Mrs. L., upon arriving, went to her home in a tenement-house in the southern portion of the city. The next day she was taken ill, and when first seen by Dr. Thompson, who reports the case, was in the collapse stage of cholera, and died after an illness of twelve hours. The excreta were carefully disinfected. Every precaution was adopted to isolate the case, and no spread of the disease occurred.

July 2, George Steel, a negro deck-hand on a steamer from Memphis, Tenn., was admitted late at night to the county poor-house. This institution is composed of a number of rough pavilion huts, each about 50 feet long by 20 feet wide. These buildings were in miserable condition. The ground under and around the huts was covered with *débris* of all kinds, concealed by rank vegetation. Upon being admitted Steel was placed in a hut with others of his color, but the physician of the institution, Dr. J. R. Dale, was not notified until the next day. The excreta of the case were thrown out into the yard, and when Dr. Dale arrived, at daylight on the 3d, the patient was collapsed. Immediate and energetic efforts were made to disinfect all that had come from the case. The ground over which the dejections had been thrown was treated with a strong solution of sulphate of iron, and the *débris* carefully removed. All soiled clothing was removed from about the patient, and every precaution was adopted, but by the 8th of July eight fatal cases of the disease had occurred, and some twenty others of the inmates had shown decided symptoms of the infection. In some of these cases the disease advanced to extremity, but the patients re-acted; in others the attack was confined to the prodromata. It is greatly to the credit of Dr. Dale to record that infection did not extend beyond the walls of the poor-house, as but for his very energetic action, the focus having been established, a most malignant epidemic would have occurred.

July 6, an Irish railroad-laborer named Kelly came into Little Rock from the line of the Cairo and Fulton Railroad. He went to a hotel of his order, in the eastern portion of the city, where he was taken with cholera and died after an illness of twelve hours. This case was attended by Dr. J. H. Lenow, who isolated it by every means in his power. The excreta were disinfected and thrown into the privy-vault, which was treated with decided quantities of sulphate of iron and lime.

On the night of July 5, a case of cholera occurred at the State penitentiary, which is on the western borders of the city, some half-mile from the poor-house. The case terminated fatally within ten hours. The subject was a convict named Johnson, whose term of service had nearly expired, and who from his uniform good conduct had earned admission to the class of individuals known as "trusties." To these men unusual liberties are granted; they can leave the prison during the day without guard, and may employ their day to their own profit. On the morning of July 5, Johnson left the penitentiary at an early hour and went into the city; his own account of the day was that he first worked in unloading a steamboat from Memphis, Tenn.; that job being completed, he went to the depot of the Memphis and Little Rock Railroad and aided to unload freight-cars also from Memphis; that among other material that he handled was a lot of railway-iron. He was absent all day, but returned as usual to the penitentiary before the hour of closing.

The building occupied as the Arkansas penitentiary is old, damp, and badly ventilated. The cells are arranged in tiers, honey-combing a mass of masonry; the whole inclosed under one roof, a house within a house. Each cell is furnished with a wooden bucket without cover which answers the purpose of a night-chair, and this bucket is placed within the cell and against the grated door, and there it remains from the hour of closing until reveille the next morning, by which time the air of the cells and the corridor is fœtid with the excretions of several hundred prisoners.

Johnson, however, was not lodged in an ordinary cell, but, with two other "trusties," occupied a strong room, having four large windows opening into the prison-yard, and so situated that the windows being open the draught of air would pass from this large room into the corridor around the tiers of cells. Shortly after he was locked up for the night, Johnson was taken with violent diarrhœa; the inevitable bucket was repeatedly used, and by midnight, when the attention of the guard was called to him, he was "purging, vomiting, and cramping violently." He was removed from the cell to the hospital, became fully collapsed, and died the next day.

July 6, a convict, named Roberts, whose cell was upon the first tier, and directly opposite that occupied by Johnson, was taken with cholera and died within ten hours. Three other fatal cases of cholera and several that recovered are reported to have occurred in the penitentiary, and the majority of the inmates were affected with diarrhœa. One of the fatal cases occurred in the person of a nurse in the hospital who had been in attendance upon prior cases. Owing to the death of Dr. J. H. Carroll, who was the physician to the penitentiary, and also the fact that a change had occurred in the wardenship, more accurate data cannot be obtained. From an old convict, a man of some intelligence, who during the "cholera-days" was the hospital-steward, we learn that disinfectants were freely used—carbolic acid and sulphate of iron in the sinks, lime in each cell, and chloride of lime in the corridor. The soiled clothing was treated with superheated steam. The dietary of the prison was

improved, and what threatened to become a most serious epidemic was arrested and stamped out.

This history is deemed of value as demonstrating that four times an alarming importation of cholera occurred in the city of Little Rock:.

I. In a dirty tenement-house inhabited by railroad-laborers.

II. At the county poor-house, where, if an especial effort had been made to offer an asylum to the contagion of cholera, human ingenuity could scarcely have succeeded better.

III. At a hotel frequented by the lower classes of society, those among whom cholera finds its readiest victims.

IV. At the State penitentiary, where, although its inmates are supposed to be secluded from society, it is shown that the disease was introduced in the person of a convict who had worked upon a cholera-infected steamboat from a cholera-infected city.

In either instance the demonstration was sufficiently positive to have originated an epidemic; yet at each point the health of the city was guarded and impending destruction averted by the energetic and efficient medical men in whose care the initial cases occurred.

During the investigation of the cholera demonstration at Little Rock, we were especially indebted to Drs. A. L. Bræysacher and P. O. Hooper for their valuable aid, without which our personal efforts would have been unavailing.

On the 22d of July cholera appeared at a negro settlement upon the banks of the Arkansas river, about sixteen miles below the city of Little Rock. This settlement was upon the Perkins plantation, was known as "The Quarters," and was occupied by about one hundred negroes. The inhabitants were a low class of negroes, filthy in their persons and cabins, and extremely poor.

The first case occurred in the person of a female, twenty years of age, who had the day prior to her attack eaten largely of unripe peaches. This case was at first considered by Dr. Reynolds to be one of cholera morbus; but the patient died, after an illness of twelve hours, fully collapsed.

The next day (July 23) three other cases of the same disease occurred, all of whom died within ten hours.

In the next few days the disease spread rapidly. Thirty-eight cases occurred, twenty-three of whom died. The last death occurred August 3, the subject having been attacked July 31. The last individual attacked by the disease was on August 1. This case was convalescent on the 6th.

It has been contended that "the residents at 'The Quarters' had been confined closely to their crops for a number of weeks previous to the outbreak of the disease, and it could not be ascertained that any newcomer had appeared on the place for at least several weeks previous to this outbreak."

It has, however, been ascertained that prior to the outbreak (it being impossible to establish the exact time) a trading-boat had stopped at "The Quarters" and had remained there for one week, and there is nothing to show that other boats had not made the same landing.

HELENA.

A group of cholera-cases having been reported at Helena, Ark., we communicated with Dr. D. A. Linthicum, from whom we have received the following information:

"But one family was infected with cholera in 1873. This family, consisting of seven persons, lived in a filthy, dirty cabin, upon the dividing ridge between East and West Helena. They were miserably poor. Their

diet consisted chiefly of fish. The water used was contaminated with organic matter. No member of the family had been away from home for months. They did not come in contact with river-steamers; they did not wash for any person, even themselves.

"The symptoms were marked. The attack was severe. In the family of seven individuals, six died in the course of three days; the first case terminating July 22, the last case July 25. All were whites; four were females, three males. Four cases occurred in the persons of children, aged respectively fifteen years, twelve years, three years, and eighteen months. The recovery was a girl fifteen years old, whose convalescence was slow and tedious on account of her chlorotic condition.

"The excreta of these cases were disinfected and buried, and their clothing burned. The last three cases were removed to a more comfortable house, and the infected cabin was burned."

These cases were regarded by Dr. Linthicum as being sporadic in character, produced by the filthy location and habits of the individuals, the miserable food which they ate, and the impure water they drank. It is considered by him that they had no connection with the cholera-epidemic of 1873.

CHAPTER VIII.

TENNESSEE GROUP.

TENNESSEE CONTRIBUTORS.

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Dr. E. T. Lewis, Houston County.
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Dr. A. Eldridge, Montgomery Co.
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Dr. W. J. Edwards, Obion County.
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Dr. Morton, health-officer, Nashville.
Dr. G. P. Henry, physician to penitentiary, Nashille.
Dr. T. A. Atcherson, Nashville.
Dr. T. G. Brocking, Nashville.
Dr. L. D. Hogle, Nashville.
Dr. W. R. Revels, Nashville.
Dr. J. T. Jonas, Nashville.
Dr. J. P. Dake, Nashville.
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Drs. Ransom and Byrn, Rutherford County.
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Dr. G. D. Cronchrist, Rutherford Co.
Dr. J. W. Davis, Rutherford Co.
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Dr. Thos. Lipscomb, Bedford Co.
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Dr. F. Painter, Hamilton County.
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Dr. E. M. Wight, Hamilton Co.
Dr. B. F. Gardner, Hamilton Co.
Drs. Goodwin and Barter, Hamilton County.
Dr. T. H. Roddy, James County.
Dr. F. K. Bailey, Knox County.
Dr. M. M. Alexander, Knox County.
Dr. C. Deaderick, Knox County.
Dr. D. S. Boynton, Knox County.
Dr. J. W. Stewart, Knox County.
Dr. S. M. Burnett, Knox County.
Dr. C. D. Riggs, Hamblen County.
Dr. E. L. Deaderick, Washington Co.
Dr. W. R. Sevier, Washington Co.
Dr. A. J. Williams, Anderson Co.

MAP OF A PORTION OF THE CITY OF MEMPHIS

Showing location of Cholera cases in Epidemic of 1873.

TENNESSEE.

SHELBY COUNTY.

Epidemic of 1873 *at Memphis, reported by Dr. J. H. Erskine, late president board of health.*

In submitting the following report of cholera as it appeared in Memphis in 1873, I must premise that after a close and careful investigation of all the facts I have been able to collect, I find them so general, not to say meager, that the best account I will be able to furnish will be cursory and brief.

It was brought by boat from the Lower Mississippi. The researches of Dr. J. C. Peters, of New York, who came South under the auspices of the New York board of health to investigate its origin, supply indubitable evidence of its prevalence in New Orleans in the month of February, and of its successive appearance at points higher up the river in March and April. The first case which occurred here was as early as April 15. It was attended by Dr. Samuel J. Morrison, in company with Dr. Jno. R. Frazer, one of the oldest and most highly esteemed practitioners. Both pronounced it cholera. It was in the person of an Irishman by the name of Kelly, who had but a few days before come up the river, on what boat is not known, and was lodging at 136 Front street, between Market and Exchange, in an Irish boarding-house, the surroundings of which were filthy. He died, after an illness of sixteen hours, in collapse.

The next case was an Italian by the name of Cuneo, who kept an eating-house immediately on the river at the point where the Memphis and Ohio and the Memphis and Paducah Railroads discharge their freight He died on the 30th of April in collapse, under the care of Dr. D. D. Sanders. It must have been from this case that the outbreak on the Paducah road so soon appeared.

The third case was a conductor on this road, Patrick Smith, who died twenty miles out from the city, but who lived in the square on which Kelly died, and by the nature of his vocation must have been exposed in the neighborhood of Cuneo's stand. He was attacked on the 1st of May, at his camp, section 26 of the road, and died on the 3d.

Almost at the same time cases occurred at another camp, seven miles nearer the city than this, and in both spread very rapidly, producing a panic, and scattering the laborers, some of whom returned to the city, re-introducing the disease. I think it more methodical, and will be more satisfactory, to detail thus early in my report the history of this local outbreak. I have obtained most reliable information in regard to it from Dr. Jno. E. Black, of Kersville, and from the chief engineer, Mr. J. L. Meigs, who has kindly furnished extracts from letters written at the time to the president, Mr. E. Norton. In a letter written on the 7th of May, Mr. Meigs says:

> A serious illness, resembling cholera, made its appearance on May 1, in a convict camp, section 19, Paducah and Memphis Railroad, and Mr. P. Smith's camp, section 26. The camps are seven miles apart. There were nine deaths on Friday and Saturday, May 2 and 3, the illness not lasting longer than twenty-four hours in any case. The contractor, P. Smith, died May 3, and a panic ensued among the men in sections 21 and 26. There have been five deaths since Saturday, and the disease has been less violent, though more protracted. Forty men in the convict camp, and two in Smith's camp, sick on the 6th. There have been during the last month excessive rains in that region, and the dead bodies of myriads of caterpillars have been washed into the streams and running branches, together with much vegetable matter, and the physi

cians attribute the illness to these streams. Up to the 10th, from the 7th, there were ten deaths, forty cases in all; none on section 26, where Smith died. At this date, the 13th, the disease is abating in violence in section 21, having disappeared from section 26.

I suppose the partial cause of this was the scattering of the men.

From a letter to W. F. Norton, May 19, the disease had disappeared, but from its outbreak had produced nineteen deaths. Mr. Meigs states that the company began to lay their track from Memphis northward May 3, and by the 20th had put down eight and one-sixth miles. The men working at sections 19 and 21 were convicts from the Tennessee penitentiary, while those at section 26 were hired laborers, who were generally sent from Memphis to section 26 on the Memphis and Ohio Railroad, as far as Shelby Depot, twenty miles out, where they walked twelve or thirteen miles to the Memphis and Paducah Railroad, and after the track-laying began the company passed the hands over the road to its terminus. Inasmuch as the disease appeared simultaneously at sections 19 and 26, seven miles apart, others must have been attacked here besides Smith, who conveyed it to section 26. No doubt the impure water rendered the disease more fatally malignant.

When the outbreak occurred at Lucy Depot, on the same road, in July and August, cholera had long existed as an epidemic in Memphis, and might easily have been communicated from the city, there being constant travel all along the line. Simultaneously with its appearance at our wharf, and its ravages on this railroad, it began at first slowly, and afterward more rapidly, to dot about in different parts of the city. A case came under the observation of my brother, Dr. Alexander Erskine, as early as the 4th of May, at least three-quarters of a mile from the river. This was so isolated, and had so little apparent connection with any other case, it was that far anomalous, and might at a glance have induced the belief of its spontaneous origin. Indeed, it had appeared on our coast so insidiously and noiselessly, and had entered Memphis so unheralded, the profession was taken by complete surprise, and in the daily press much acrimonious discussion followed among our editors as to its origin. This case was in a negress, named Augusta White, who lived near the corner of Orleans street and Marshall avenue, not far from the eastern limits of the city. She was in her usual health in the morning, had had no indisposition, was attacked about 11 a. m. with cholera, and died at 5 p. m. in collapse. Her residence was in a locality highly favorable to the development of the disease. She lived in a small neat cottage upon the edge of a large pond of stagnant water, filled with the filth of the lots whose rear sloped from the adjacent more elevated streets. It was under the declivity, and near it was the offensive water, whose surface was covered with a green vegetable mold of rank and noxious growth. The atmosphere was full of miasma, and supplied the *nidus* for the development of any malignant disease whose germs might be wafted to it. No contact, either direct or indirect, could be traced in this instance.

On the 8th of May Dr. G. B. Thornton admitted his first case into the wards of the City Hospital, after which it began to spread, and by the middle of the month became so general as to scatter the community, and soon thereafter became epidemic.

In its incipiency it was conveyed by direct or indirect personal contact; within a short time it was borne upon the winds to all points of the city.

With its first appearance there was exhibited an unusual epidemic condition of the atmosphere. Everywhere there existed a tendency to disordered bowels. The profession was busy from day to day prescrib-

ing for naught but diarrhœa, a diarrhœa which was all choleraic, sudden, painless, profuse, unexpected, passing out the contents of the intestines, and then colorless water, which soon became true rice-water stools. This was easily controlled if taken at once in hand, otherwise it soon became unmanageable; within a few hours nausea and vomiting set in, with prostration, extreme coldness, blueness, cramps, and collapse. Death soon followed, or reaction, feeble, partial, and slow, or febrile, with protracted, uncertain recovery. The epidemic did not, like yellow fever, confine itself strictly to localities; and while it is true that certain places suffered more severely than others, yet the poison was blown to every point of the compass. The negroes were the greatest sufferers, and those residing in the extreme southern limit were more generally and fatally attacked. The square and adjacent street in which cholera prevailed most fatally was one mile from its point of departure. This area is bounded by South or Calhoun street on the north, Clay on the south, De Soto on the east, and Hernando on the west; in this space there were about fifty families living, thickly crowded in small, ill-ventilated cabins; filthy, careless in habit and diet, purchasing cheap vegetables, stale and unsound, and using water from an alkaline well which, though apparently pure, disordered the bowels and developed diarrhœa. Dr. S. J. Quimby, who attended the most of these cases, states that this well was higher than the adjacent ground, and their privies could not have drained into it. The mortality in this section was fearful, sweeping away eighty persons, and extending up Calhoun street to the river, leaving in many families no surviving member. It is difficult to say why this section should have suffered more than others which were equally unclean and neglected.

The entire city was most favorable for its spread. Its sanitary condition was shameful and a disgrace. There was virtually no board of health and no health-officer. The existing board was absolutely powerless, and without a dollar to spend. It was embarrassed and restrained by an ordinance which limited it to advisory powers. It was optional with the city authorities to accept or reject their suggestions, and they were so supine and ignorant of sanitary laws that nothing was done until the epidemic was beyond control. There was such a disinclination to allow the medical profession to disburse public money, that it was only after the fearful lessons of cholera and yellow fever that the authorities yielded to the public demand and organized a board of health, with power to cleanse the city and destroy the sources of general disease.

When cholera was announced the streets were unclean, the alleys reeking with filth, the back yards, even in the case of our prominent citizens, who blushed to be made the subjects of public exposure, were full of slops and garbage. Vessels filled with the refuse of kitchens and laundries were emptied into the streets, to decay or be devoured by the swine, the only scavenger-carts of the city. Privies had remained unemptied for years, and were in many places running over with the foul accumulations. In many parts of the city ponds of water were undrained and stagnant, evaporating the filth the streets and lots which poured into them. The place was rife with the elements of a great plague, and only needed the specific germ to diffuse it widely and fatally amid a people who had forgotten that such things existed as the laws of health and disease. In both the epidemics of 1873 Happy Hollow was the starting-point, beyond which they soon attacked the entire city. Our atmosphere was at that time peculiar.* It was unseasonably cool, excessively damp, the rains being very heavy and constant. With the renewed heat after each succeeding rain the malignancy of the poison seemed to increase. By reference to the meteorological report herewith appended

the amount of rain-fall from April to August inclusive reached the mean of 18 inches; the range of temperature, 76° 8′.

Cholera prevailed in Memphis from the middle of May to the middle of August, and had scarcely disappeared when yellow fever followed. Like an invading army, while its vanguard was busy in Nashville and the interior towns of Middle Tennessee and North Alabama, its rear was still at work, and its effects still visible upon the stragglers who were doomed to fall victims along the line of travel upon which it had made its desolating march. As to its prevalence here, if we leave out those cases which were called choleraic diarrhœa, which yielded readily to treatment, and never passed beyond that point into actual cholera, the number of cases did not exceed a thousand, and I think fell beneath it. This must be regarded as within the limits of entire accuracy, because from the mortuary statistics, as gleaned from the books of the different undertakers, the only reliable source of information at that time, there died only two hundred and seventy-six persons with that disease. If we regard the choleraic diarrhœa as cholera—all the population had this—the percentage of deaths would become insignificant. I do not consider it pertinent to this report to detail the outline of the treatment pursued in the epidemic, inasmuch as it differed in no material point from what has heretofore been adopted. Without attempting to follow the march of the epidemic as it moved along the lines of all the roads leading out of Memphis, there was one locality it visited which I desire to detail on account of its fearful malignancy, and because of its proximity to the outbreak at the beginning of the season. It is the Depot Lucy, on the Memphis and Paducah Railroad, about fifteen or twenty miles from the city, and upon a plantation four miles out from the depot. It is easy to account for its appearance at the depot, for it began there in July and August, when it was everywhere else, and the communication with Memphis was unobstructed. There was a colored church, New Hope, at which the negroes were constant worshipers, while a gang of convicts worked near them on the railroad. We have no positive evidence, but the presumption is very strong that there was among the negroes one Jack, a constant visitor, who went to and fro to the plantation of a Mrs. Hill, at whose house lived an old man named Webb, blind and infirm, on whom Jack waited. Jack and Webb were attacked and died July 28, and the discharges of Webb were emptied carelessly out in the yard of the farm, and the vessels were washed near the well, from which all the residents drank. According to Dr. Thomas Peyton, who is authority for the following facts, and has most clearly reported them, "the well of water used by two or three families was curbed with poplar plank about twenty years ago. This had rotted near the surface, the ground being low all around it. On the 1st of August a rain fell to the depth of from four to six inches, burst the curb, overflowed the well, and washed into it the entire surface-drainage of at least 15,000 feet of ground. No attention was paid to this, and the water was used as before. It had become so offensive, that its use was at once forbidden, but too late to save the family, nine of whom died of cholera. In addition, two boys from a free school who used water from it, both died, as did also two negroes from an adjoining farm who drank from this well." Dr. Peyton says he traced all the cases to impure water. His description of the farm-yard of Mrs. H. presents a fearful picture of a disregard of every sanitary law. "I found yard sweepings, slops, rubbish of all kinds festering around the houses, old, rotten cabins crumbling down unoccupied, large banks of ashes rotting, the gatherings of years, moldy and green, beneath heavy shades, and a general neglect of everything around the premises. I had all this thoroughly

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cleaned, lime scattered everywhere, and the work was over. I passed through the epidemics of 1849, 1851, 1853, 1867, and up to this date, and must pronounce this the most violent I ever witnessed." The attack did not last more than from six to twelve hours, and from July 28 to August 5, and in that time nine out of twenty died.

I have thus attempted to give the origin, progress, duration, extent, and mortality of the invasion. By reference to the map, it will be seen that it developed in localities distant and separate, dependent upon surroundings more or less favorable to its spread. In some of these it was exceedingly malignant, in most of them mild and more controllable. It left the community enfeebled and alarmed, the more ready victims for yellow fever, which so soon followed. Since the disappearance of these, the health of Memphis was never better.

DAVIDSON COUNTY.

The city of Nashville is located upon the north bank of the Cumberland river, two hundred miles from its mouth. The city is built upon a limestone ledge which rises to an altitude of 175 feet above the river. This ridge extends in a southerly direction, attaining its greatest altitude at about eight hundred yards from the river-banks, thence descending for a distance of about six hundred yards to regain the level of the river. Upon each side of this ridge flow two small streams, Lick Branch upon the north, and Wilson's Spring Branch upon the south. The distance from one creek to the other upon a base-line is somewhat over one mile. In the space thus described is located the business portion of the city, and many of the finer class of private residences. From Cherry street, the third block from the Cumberland river, the descent to the bed of each stream is precipitous. The same is true of the streets south and west of Vine street, upon which street is located the State capitol building.

The banks of Lick Branch, (as shown upon the accompanying map,) for a distance of at least one mile back from the river, with a varying width of from a quarter to a half mile, are subjected to annual spring inundations. The principal streets crossing this low ground are upon causeways, bridged or arched to admit of the passage of the stream; but these causeways act as dams whenever the water rises above the level of the creek banks. Along the line of Lick Branch are several large springs from which a large portion of the lower class of the inhabitants obtain their water for all domestic purposes. To these springs special attention will hereafter be asked.

The banks of Wilson's Spring Branch are also subjected to annual overflows, which extend backward about half a mile with a width of about one-fourth of a mile. Upon this branch are found Hackberry and Wilson's springs, both favorite watering-places for the lower classes.

North and west of Lick Branch is a hill of considerable elevation, known as McGavock's, upon which has been built North Nashville. This portion of the city is occupied by dwellings, retail stores, cotton and other factories, and the United States barracks.

South and east of Wilson's Spring Branch is a considerable hill, known as College Hill, upon which has been built South Nashville. This portion of the city is occupied by private residences, the Nashville University, and at its height by the reservoir, from which flows the official water-supply of the city.

South and west of the valley, at the foot of Capitol Hill, through which flows a small stream emptying into Lick Branch, is high ground, crowned by Meridian, Saint Cloud, and Kirkpatrick Hills, at the base of

which lie the localities known as New Bethel and Rocktown, to which reference will hereafter be made.

Crossing the Cumberland river near Locust street, and following the line of Lick Branch, is the line of the Louisville, Nashville and Great Southern Railroad. This road passes upon an extensive trestle-work, crossing the various streets in this portion of the city. From the north-west this line of trestle-work is joined by the Saint Louis and South-eastern Railroad. At the foot of Capitol Hill, and on the west, is the line of the Saint Louis, Nashville and Chattanooga Railroad, which road is crossed by the line of the Tennessee Pacific Railway. Nashville is a railroad-center. Through cars for Louisville, Saint Louis, and Hickman, upon the north and west, New Orleans, Atlanta, Chattanooga upon the south and east, constantly pass through the city. If trains of all descriptions are considered, it will be seen that this city is in almost hourly communication with the outside world.

Nashville, a beautiful and attractive city, is possessed of filthy and repulsive suburbs. The small streets and lanes that surround the base of Capitol Hill are occupied exclusively by the lower classes. The houses are dirty and filthy in the extreme, the streets and gutters are filled with filth. Gutters and sewers upon either side empty into the branches, which afford the only efficient drainage of the city.

The banks of Lick Branch, from Watkins street to College street, are unoccupied, save in the street upon the lowest bench of each hill, while Wilson's Spring Branch flows through a dense population.

Upon the banks of Lick Branch, and in the western suburb of the city, is located the Tennessee State penitentiary. All drains from this institution empty into Lick Branch. From privies, urinals, cess-pools, kitchens, and wash-houses, drains empty into the branch.

Beyond the walls of the penitentiary, and upon the banks of Lick Branch, are several slaughter-houses that discharge their offal into the stream.

The facts herein stated have existed for years, and it is scarcely to be wondered that Nashville, at each visitation of cholera, has been a hot-bed for the epidemic.

The water-supply of the city is obtained from the Cumberland river at a point about three-fourths of a mile above the Edgefield bridge. The river-water is pumped into a reservoir, and from thence is supplied to the city. At the time these water-works were erected they were sufficiently above the town to secure pure water, but the growth of the city has been so great upon the east that, in addition to objections to be hereafter noted, the drainage from a considerable area of dwellings, after all rain-falls, is into the river immediately above the suction-pipes.

Water for domestic purposes is also obtained from the public wells and springs that have already been noted. Of the latter there is in constant use by a large number of inhabitants, *Judge's spring*, on the banks of Lick Branch, near Vine and Washington streets; the *Sulphur well*, on the same stream, between Hamilton and Washington streets; and upon the line of Wilson's Branch the *Bilbo spring*, on Stevens street, between Fairmount and Deluge; from this spring the inhabitants of Rocktown obtain their water; *Buck spring*, on Ash street, near Ewing avenue; the *Wilson spring*, on Vine street, near McEwen; the *Hackbury spring*, on Front street, near Molloy.

Standing at either of these springs and looking up at the great lime-stone ledge, suggests unpleasant thoughts to a reflective mind troubled with a thirsty body.

As additional evidence, we extract from a former report made to the Nashville board of health the following:

REPORT OF COMMITTEE ON HYGIENE OF BOARD OF HEALTH.

NASHVILLE, TENN., *August* 28, 1866.

"THE WATER WE DRINK."

* * * * * * *

"The mouth of Brown's Creek is about three-fourths of a mile above, and on the same side with the engines supplying the reservoir. The topography of the southern slopes from the city shows that a large basin of country emptied its drainage into this stream. The northern boundary of this basin is a ridge starting from the river at the city reservoir, running south of west through the university ground, north of the city cemetery, to Fort Negley, thence across a country in a line with the outer defenses of the city. All of that portion of the city south of this line is naturally drained into Brown's Creek. It is unnecessary to dwell in detail upon the immense amount of garbage and filth of every description which accumulates about tenements, and with every rain finds its way into this creek. The meadows and plains as far back as Trimble's Spring, a distance of about a mile and a half, are strewn with the carcasses of hundreds of animals of every description, besides being the great depot for the rubbish and garbage of the south end of the city. It would also appear from the great number of barrels and other evidences, that the cleanings of all the privy-vaults of the city were deposited, not only along the banks, but actually in the channel of this stream. There is also a large tanyard near the Nolensville pike, immediately upon its banks, the offal of which assists in poisoning its waters. Your committee would especially invite your attention to the fact that four cemeteries are drained into this creek, viz, the city cemetery, the Catholic cemetery, the Federal burying-ground, and Mount Olivet. It requires but a glance at the topography of the country to understand that all the escapage which drains from these resting-places of the dead naturally finds its way into this stream, and thence into the city reservoir. It is a matter of great astonishment to your committee that the authorities ever permitted cemeteries to be located anywhere up the river, and especially where it is so palpable that their drainage empties above the point from which the city is supplied with water. We would respectfully suggest that no burying-ground should be located south of the Harden pike. And we would recommend, in view of the above facts, that the attention of the city authorities be immediately invited to the propriety of changing the point of supply by removing the engines, &c., above the mouth of Brown's Creek, as the only remedy for a growing evil, which cannot, in the nature of the case, be abated while the city continues to extend in a southern direction. Indeed, a radical reform is clearly indicated in reference to this subject. The mere recital of the above facts is offensive to every refined sentiment of human nature, and will doubtless unite our entire population in an earnest demand to have the evil abated at whatever cost.

* * * * * * *

"In reference to the public springs your committee found them generally in a very bad condition. This is especially true of Wilson's spring, and the branch leading from it; also the spring at or near the barracks

of the Sixteenth United States Regulars, and the one on Broad-street pike, beyond McNairy street. The poor mainly use from those springs. Chemical analysis, as well as medical observation, sustains the conclusion that these waters are less pure (as will be seen below) and more fertile in producing disease than the river-water. Every consideration demands that the authorities should take immediate action in reference to their improvement. Instead of being nuisances to the neighborhood in which they are located, they might, with a small outlay of money, be made ornaments to the city, pleasant and refreshing retreats; and their waters, instead of being filthy and fertile in producing disease, would be pure and wholesome. A little money well invested here would be like the sprig the prophet threw into the fountain of Marah, which changed its bitter and poisonous waters into a sweet and refreshing stream.

"At our request, Dr. D. G. Sherman and Mr. J. C. Wharton have furnished us with a qualitative analysis of Cumberland river water, of Wilson's spring, and Judge's spring. These gentlemen, without any concert of action, have arrived substantially at the same conclusion. The former, after giving a detail of his various experiments, remarks that 'the foregoing examination proves the greater purity of our river-water (hydrant not muddy) by the comparative absence of chlorides, sulphates, carbonates, and organic matter.' Wilson's spring is shown to be most abundant in these impurities, especially in the organic impurity. A comparative quantitative as well as qualitative analysis, furnished by the latter, is as follows:

"*Cumberland River water, taken from the upper wharf, (analysis expressed in wine-gallons.)*

"One gallon contains:

	Grains.
"Organic suspended matter, (sediment and floating)	3.90
"Organic and mineral, (in solution and suspension)	9.50
Total	13.40

"The organic matter appears to be mostly vegetable. The mineral matters are as follows, and their relative proportion as indicated by their order:

"Silicate of alumina.

"Protoxide of iron.

"Chlorides of the alkaline earths, and alkalies.

"Sulphates of the alkaline earths, and alkalies.

"Wilson's spring water contains, in one wine-gallon, organic and mineral matters 30.80 grains.

"It will thus appear from the foregoing that the river-water is by far purer than the spring-water, and that Wilson's spring contained the maximum of both organic and inorganic impurities.

"It must be observed that these analyses were made after a very unusually protracted dry spell, when all the impurities would exist in a minimum quantity. It is generally conceded that the amount of organic matter determines its hygienic importance, and that an excess of these decaying elements determines to diarrhœa and dysentery.

"The popular theory at this time, and that which has the ablest supporters, is that Asiatic cholera is developed more frequently from the use of waters loaded with decaying organic matters than from any other cause.

"It is a fact admitted by the medical faculty of Nashville that, in the visitations of cholera, those who used the spring-water, and especially Wilson's spring, suffered very much more than those who used river-water.

* * * * * * *

"N. L. MADDIN, M. D.
"G. A. CHEATHAM, M. D.
"J. R. BUIST, M. D."

We have been informed that it was proposed to obtain the water-supply of the city from the Cumberland at a point some eight miles above the site of the present water-works and above the junction of Stone River. This having been accomplished, Nashville will be secured in a full supply of pure freestone water.

The privies of Nashville are either upon the surface or consist of pits dug to the surface-rock, into which a shaft is either drilled or blasted. The last applies to all water-closets, cess-pools, and house-drains. From the geological formation upon which the city is built, these pits are almost always dry and clean. We have been told by a gentleman of the city that twenty-five years ago, when he erected his present residence, he had a privy-vault blown out of the rock in the rear of his house, and that from that time to this, although it has been in constant use, he has never been obliged to clean it out. In the rear of the company-quarters of the United States barracks, situated upon the highest point of McGavock's Hill, is a large privy, which is daily used by a large number of men; the contents of this pit are constantly disinfected, rendered fluid by water, and then each day pumped up into a covered drain that leads into a covered cess-pool. Once in the cess-pool, which was formed by blasting into the rock, the excrement disappears. After each rain-fall the contents of all privies in the city are fluid, and are rapidly drained off, where, is a question of undoubted interest to the drinkers of water from the wells and public springs.

As shown upon the accompanying map, and as it has already been stated, the sewers and surface-drainage of the city empty into the two north and south streams; and, in addition, it will be remembered that Lick Branch receives the offal of slaughter-houses and the entire excrementitious matter of the penitentiary.

Dr. Bowling, in "An account of the cholera as it appeared at Nashville in the year 1873," writes: "Nashville has the best natural drainage of any town on the continent. Every drop of water that falls upon College Hill finds its way either to Brown's Creek on the south, or to Wilson's Spring Branch on the north, both of which go with rapid currents to the river. * * * On each side of this ridge are many springs, whose branches find their way into the larger streams which divide the lowlands on each side of Capitol Hill. These streams drain thoroughly the north side of College Hill and the whole of the south side of Capitol Hill. The north side of Capitol Hill plays water-shed to Lick Branch, which also receives the water from the south side of McGavock Hill, while the north side of this hill is a part of the water-shed of McGavock Spring Branch."

This description is most admirable, and were nature unobstructed or unmolested, were the country a wilderness, the natural drainage would be perfect, and nature's provisions all that could be desired. But Capitol Hill teems with human life; McGavock's and College Hills are covered with tenements. From all, the drainage is simply into the valley of each natural drain. The necessities of man have obstructed this

natural drainage, the streams are no longer "rapid currents to the river," and man has not rendered an equivalent for what he has destroyed. All that we have said of Lick Branch is recognized in the report of Dr. Bowling, before referred to. We quote from page 5:

"On each side of the creek, and between the fills, (each serving as a dam to keep back from the river the accumulating filth above,) exists a common deposit of every imaginable abomination, which lies rotting, seething, and weltering in the unobstructed summer's sun."

We are informed by competent authority that, prior to the explosion of cholera in 1873, the city of Nashville was in a very objectionable sanitary condition. No board of health, with power to act, had been in existence for several years. The sanitary history of this city shows a most lamentable negligence on the part of her authorities upon this most important matter. Cholera once having been developed, every effort was made to improve the condition of the city, but even then, as will hereafter be shown, much of the work of policing was performed by individuals from the point of original infection, who were thus constantly distributing the infection over the city.

During the month of May, 1873, the Nashville Industrial Exposition was the *furor* in the State of Tennessee. The city was full to overflowing with strangers from all portions of the State. Into this dense mass of humanity, on the 12th day of May, (as will hereafter be shown,) came a gang of convicts, from a cholera-infected camp upon the line of the Memphis and Paducah Railroad. Every one of these convicts, every one of their guards, was suffering from choleraic diarrhœa. True, after their arrival, they were shut up within the walls of the State penitentiary, whose walls should have formed a *cordon de santé* to the doomed city; but we have shown how the drain from the penitentiary—privies, cess-pools, wash-houses, &c.—emptied into Lick Branch, whose waters run through almost the heart of the city, and in close proximity to the springs from which so many of the inhabitants obtain their drinking-water.

The water from these springs is cooler and more palatable to many than is the river-water. When strangers are near a sulphur-spring, custom decides that it is "quite the thing" to drink of the water; how many of these unsuspecting strangers drank of these deadly waters can never be determined.

The shadow of a suspicion that the National Government might possibly assert a sanitary control over the great cities of the nation called forth an expression of public opposition of which the following is a sample:

"And why should it be necessary to have a national board for the exercise of such control? Is it possible that the large cities are so destitute of sanitary learning and experience that they must be remanded to the guardianship of a board commissioned by the General Government? We are willing for a while yet to do our own thinking in regard to public health and the needs of our own city, ready as this *sanitary ring* may be to do it for us at Government expense."

What is the experience of the city of Nashville that called forth this violent demand to work out her own salvation? Not cholera a time or two, as was stated among other misrepresentations, but whenever cholera has been upon the North American continent, Nashville has been decimated. Her noblest citizens, as well as the most degraded, have been counted victims by the score, simply because "doing their own thinking" has been productive of no sanitary reforms, has resulted in the utter ignoring the wise and prudent suggestions of her own sanitarians, and

the local defects that were present to add to the epidemic of 1833, were present to augment the severity of the same disease in 1873, and still exist at the close of 1874, while those to whom the vital interests of the city are confided debate upon the total abolition of the only sanitary institution within the city-lines, the board of health.

With the dispersion of visitors to the exposition, cholera was carried along the lines of all railroads leading out of the city of Nashville.

A strong and persistent effort has been made to prove that the disease of which so many convicts suffered at the camp in Shelby County was not cholera. The evidence, however, cannot be controverted. We are informed by Dr. W. M. Wright, the superintendent of Tennessee prisons, that during the latter part of April, 1873, he was notified by letter from the deputy warden in charge of a party of convicts, who were employed as laborers upon the line of the Memphis and Paducah Railroad, that a fatal disease had broken out among said convicts. Dr. Wright at once proceeded to said camp, which was some twenty miles from Memphis. The day he arrived at camp there were three or four deaths, one occurring in the person of a convict who had left camp in perfect health the morning of the same day, but who died within five hours of the inception of the disease. The disease was pronounced by the physicians in attendance to be malarial congestion, but the cases that Dr. Wright saw had all the well-marked symptoms of epidemic cholera, and as such he had no hesitancy in pronouncing it.

Dr. Wright ordered this camp to be broken up, and the men to be returned to the penitentiary. The deputy warden and several of the convicts were so ill at the time the party were moved that they were left in camp. The warden recovered, but the men died. Dr. John E. Black, of Kerrville, Tenn., reports that from May 8 he attended the convict-camp regularly every day, having from four to ten cases of illness each day; that on the 13th of May he prescribed for thirty-two sick men, three of whom were recently attacked; the remainder, however, were those cases that had been accumulated from April 30. May 14 the authorities removed the convicts to Nashville. Of the thirty-two cases, but one died. There had died previously eleven cases. Dr. Black writes: "It is safe to assert that there were sixty cases of genuine cholera, with many cases of premonitory diarrhœa among the convicts."

We submit herewith a most interesting letter from Dr. George P. Henry, the surgeon of the penitentiary, which throws much light upon the Nashville epidemic of 1873:

STATE PENITENTIARY,
Nashville, Tenn., December 15, 1874.

SIR: In response to your request, I have prepared the accompanying tabular statement of cases of cholera which occurred in the Tennessee State prison in the year 1873, with a hope it may aid you in your important undertaking.

The prison was erected in the year 1828, and was completed for the reception of prisoners about 1833; it is situated about one mile west of the public square, between Church and Cedar streets, 104 feet above the Cumberland river, (low-water mark,) and 47 feet above high-water mark, and on a level with the square. The headwaters of Lick Branch run parallel with and about 75 feet from the north wall of the prison-inclosure, one of its tributaries flowing within 10 feet of the northwest corner from a marshy flat scope of country. The fact may be mentioned that the cholera first made its appearance in this immediate vicinity in the year 1866. But to the prison and its sewerage. The prison-

inclosure proper embraces five acres, surrounded by a stone wall 30 feet high, the south wall being joined by the main building, in which are embraced the cells, hospital, officers' quarters, &c.; within these walls are the workshops, and in fact everything pertaining to the institution, save the laundry and female department, all of which are situated outside of the southeast corner of the wall. The number of female prisoners is thirty-five or forty. The sewerage for these quarters is unsatisfactory, running on the surface of the east wall and the west side of Carroll street for 100 feet, when it enters an underground sewer, and is by that conducted into Lick Branch, near the northeast corner of the prison-wall.

The first case of cholera outside the penitentiary, that came under my observation in 1873, occurred within 100 feet diagonally across West Carroll street, opposite the entrance of this surface-drain, before entering the sewer before mentioned; this was the case of Mr. Ensley, which proved fatal in twelve hours.

The grounds within the prison-inclosure have an inclination from south to north of about five degrees. The sewerage conveying offal and excrement from the interior of the prison-inclosure is very well constructed, and empties into the branch above mentioned about 75 feet from the north wall of the prison. The stench from that sewer has been the subject of very great complaint on the part of the citizens in that vicinity, so much so that this summer we have been compelled to adopt other means to get rid of the excrement, offal, &c.

The cells occupied by the prisoners at night have a space of 250 cubic feet, and are ventilated by a grating in the door of the cells, 14 inches square, opening into the main corridor. The prison is so much crowded that in most cases two prisoners occupy one of the cells.

The hospital arrangement consists of the two wards on the second and third floors of the south building, and are wholly inadequate in every particular, and we are frequently compelled to use cells for our sick.

The water used at the prison is furnished by the city water-works, and is such as is used by the citizens generally, the water used for drinking purposes being first conducted into a well 40 feet deep, in order to render it cool and palatable before use. This well and two others were formerly used for drinking-purposes during the summer-months, but in consequence of the opinion that the water was unwholesome, producing diarrhœa and other troubles, their use was discontinued, and the wells closed, which opinion was verified by a decided abatement of the diseases supposed to arise from their use.

On the 11th day of May, 1873, we had in the prison-walls three hundred and fifty prisoners, and of that number only twenty were on the sick-list. Early in May I was advised that some malignant disease had made its appearance among the convicts then at work on the Memphis and Paducah Railroad, West Tennessee, and that the mortality was frightful. The officers in charge, with commendable zeal, hastened to the relief of the unfortunate prisoners, and at once removed them to the city for treatment. On their arrival, seventy-five in number, I found the entire party troubled with diarrhœa, copious watery stools, accompanied in very many cases with nausea and vomiting, fever in many instances, all of this being based on a scorbutic diathesis. Now, what must be done, was the *questio vexata* with me. From a malarial district, in a broken-down condition from disease and fatigue, I would have been glad to have given calomel had I felt that it was advisable, but it was not, and I ordered at once such diet as I thought proper, having dubbed the disease scorbuto-malaria. I ordered vegetables, sour-krout, &c.,

my remedial agents being tincture of iron and quinine freely given, with chlorate of potash as an adjuvant. On the day after their arrival I was notified that one of my patients was in a dying condition, and, to my surprise, I found him in collapse, with all the symptoms of a genuine case of cholera. I made a post-mortem examination, which developed nothing peculiar, other than the gall-bladder was distended with a thick, tar-like substance. I will state that the deceased was in so much better condition than the others on their arrival the day before, and not having room in the hospital, I did not admit him, and yet the next day he was a corpse. I confess it surprised me no little. The remainder recovered rapidly, and in a few weeks most of them were at work. Sixteen of their comrades, who were with them on the aforesaid road, died, all being attacked and diseased alike; these sixteen were never removed from the road, but died suddenly, while others were sent, as before stated, to the city. Upon interrogating John Wyice and Richard Loney, two of those returned with the seventy-five, both white men, I learned that there were two camps of convicts on said road, about four miles apart, one in charge of a Mr. John Eastman, the other in charge of John Chambly; that the disease broke out suddenly at Eastman's camp, and almost immediately at the others. I learned further that the convict-labor was kept separate from the free labor, except the dumpers of the carts, who were free men. These men lived during work-hours with the convicts, but ate and slept in a house with the guards. I learned further that one of the guards was attacked with a similar disease and died; also that Mr. Chambly was attacked with the same disease, and barely escaped with his life, being unable to return with the convicts, but was left in Shelby County, where he ultimately recovered. From the record of the penitentiary hospital we form the following table:

Number of Sick Convicts reported at the Tennessee State Penitentiary from May 11 to June 7, 1873.

Date.	No. of convicts sick in hospital.	No. of convicts sick in cells.	Date.	No. of convicts sick in hospital.	No. of convicts sick in cells.	Date.	No. of convicts sick in hospital.	No. of convicts sick in cells.
1873.			1873.			1873.		
May 11	12	8	May 21	31	31	May 31	29	12
May 12	24	69	May 22	28	36	June 1	26	17
May 13	33	24	May 23	31	25	June 2	20	27
May 14	34	26	May 24	33	40	June 3	23	40
May 15	32	31	May 25	36	10	June 4	25	49
May 16	33	37	May 26	18	34	June 5	27	31
May 17	39	35	May 27	31	24	June 6	31	17
May 18	44	6	May 28	31	30	June 7	25	23
May 19	40	22	May 29	29	26	June 8	23	8
May 20	44	23	May 30	28	27			

On the 8th day of June, 1873, the fact was recognized that cholera was epidemic within the penitentiary-walls. John Thomas, a white convict, thirty years of age, was attacked and died within twelve hours. The prison-diet at the time being—

Breakfast: Coffee, bread, bacon or beef.

Dinner: Bread, bacon or beef, vegetables, and soup.

Supper: Bread, coffee, molasses or rice.

On this day I issued an order that all vegetables be withdrawn, also all fruits, and the diet to consist only of bacon, bread, rice, and coffee.

Only one who was present could imagine the consternation when it became known that the cholera had invaded the prison, and dozens were prostrated at once. Fortunately for me, I had able counsel in the person of Dr. Thomas Menees, whose cool, calculating mind added largely to any success we may have had. With such support I felt satisfied to make a square fight. The prison had been placed in a good sanitary condition, and disinfectants, such as lime, carbolic acid, sul. iron, bromo-chloralum, were used freely. With all the precaution, however, we could not check the disease, and our only hope was, if possible, to cure the unfortunate sick. Our treatment was as follows: Calomel and opium in small doses, repeated quite frequently. Quinine freely given, either by mouth or hypodermically, with blister to stomach and bowels, and in collapse, beef-tea saturated with chloride of sodium. In the main this constituted our treatment. The hospital being insufficient, we occupied a large furniture-room, which allowed each prisoner that was sick a reasonable amount of air.

Much diversity of opinion existed in the city among medical men as to the cause of the trouble. Many contended that while it exhibited many symptoms characteristic of Asiatic cholera, yet that disease could not be traced to that source from whence it generally made its appearance on previous occasions, and again that the course of the disease did not in every particular map out true Asiatic cholera; that this was something very similar, but evidently a native disease, wholly independent of anything like a germ from India or elsewhere; while others simply asserted that it was cholera, and that they had nothing to do with its origin.

It is proper to state that among the convicts who had been working on the railroad were four female convicts who had been employed as cooks. All four were seriously ill on their return to the penitentiary. Mr. Ensley, the first case taken sick outside the penitentiary-walls, lived directly upon the drain from the female department of the penitentiary.

Very respectfully, your obedient servant,

GEORGE P. HENRY,
Physician in charge of Hospital.

Dr. E. McCLELLAN,
Assistant Surgeon U. S. A.

Through the kindness of Dr. J. D. Plunket, president of the board of health, to whom we are indebted for many acts of courtesy and for efficient aid in the prosecution of our researches, we were honored by a meeting of the physicians of Nashville, who were actively engaged in the treatment of the epidemic of 1873.

At this meeting much valuable information was obtained, and the causes of the epidemic in the city ascertained beyond a doubt. We submit accurate minutes of the meeting.

Minutes of a meeting of the physicians of Nashville, Tenn., held December 16, 1874, at the rooms of the Board of Health; present about fifty gentlemen.

Shortly after 7 o'clock p. m., Dr. J. D. Plunket, president of the board of health, called the meeting to order, and stated that its object was to aid Assistant Surgeon McClellan, United States Army, in obtaining the *facts* connected with the late epidemic of cholera.

Dr. John Maddin suggested that as Dr. Henry was the penitentiary physician at the time the cholera broke out in that institution, he might probably be able to give some very important facts.

Dr. HENRY. In reference to the cholera in the penitentiary: On the 12th of May, there were some seventy-five convicts sent from the Memphis and Paducah Railroad. All of them were sick, more or less, with diarrhœa, nausea, vomiting, and some of them with fever. On the 13th of May one of them died with symptoms of the cholera. With that the disease continued on until the 8th day of June, when we decided that we had an epidemic of cholera in the prison, and cut off vegetable diet. Dr. Menees came to my assistance. We had a great many sick. After the sick convicts arrived from Memphis we fed them on sour-krout and vegetables, and subsequent to this, after the 8th of June, we treated the patients with quinine, calomel, and opium. I heard of a case of cholera outside of the prison. Dr. Morton saw the patient first. It was a young man named Ensley. He died on Carroll street on the 22d day of May. I heard of no other case in the city for several days afterward. On the arrival of the convicts from West Tennessee I did not suppose they had cholera. I called it malaria. They had a good deal of scurvy. The physicians then claimed that it was cholera, and believed that they traced it to that section. I know of no case that occurred earlier than the 22d of May. We have a female department outside of the prison-walls. The women who came back with the prisoners were quite sick. The sewerage of the prison ran into Lick Branch at the time of the epidemic, and we paid a good deal of attention to the sanitary condition of the prison.

Dr. MENEES. So far as the beginning of the epidemic is concerned, I will say that on the 25th of May Dr. Buist felt unwell and was making preparations to leave the city. He requested me to go and see a little patient whom he had been called to see in North Nashville, on Summer street, beyond Jefferson. Several hours after he made the request I saw the patient, who was a child about one year old. When I saw her she was in a collapse, in a dying condition, and she did die soon after my arrival. I supposed it was a malignant case of cholera infantum running a very rapid course. A few days after that I was called to see a colored fellow on High street south of Broad. I found him in a collapse, pulseless, shriveled, and having cholera discharges. Upon inquiring into the history of the negro, I learned that he had been engaged in digging a well on Thursday. On Friday he did not feel well and took a dose of medicine, and then lingered on until Sunday, when he died. I attributed his death to his neglect in working in the water and in taking imprudent medicine. Cases transpired here and there until the morning of the 9th of June. On that day I was engaged by the lessees of the penitentiary to assist Dr. Henry. There had been a violent explosion on the day and night before of what was supposed to be cholera. There had been three deaths during the day and night. I learned that they had been eating vegetables, and had been acting a little imprudently. It was a violent outbreak of the disease. Upon arriving at the prison I found Dr. Henry struggling with a number of very sick patients in the hospital. After passing through the hospital, we went around through the wings where there were patients for whom there was no accommodations in the hospital. We requested the lessees to furnish better and more extensive accommodations, and they kindly agreed to allow us the use of the building known as the hemp-factory, into which the patients were transferred. We put them upon a restricted diet, and cut them off from using green vegetables and fruit, making a selection of such as we thought admissible. It will be remembered by gentlemen here that on the 9th June there was an unusual explosion of the disease throughout the whole city. We put the patients upon what we conceived to be proper

treatment, using calomel, opium, and camphor when the case was far advanced, and we used it boldly until the diarrhœa and vomiting were checked; and we used also quinine very freely, which I thought aided very materially in the rebuilding and convalescence of the patients. As to what benefit it would do when the case was in an explosive stage, I am not prepared to say. Under these circumstances we uniformly, before collapse came on, succeeded in arresting the vomiting by the introduction under the skin of a solution, using quinine and dry calomel, in any way we could get it to remain. The convicts were engaged at work at the gas-works, and at the capitol. They would be taken with the disease at these places, and by the time they would reach the prison they would be in a state of collapse. I had heard Dr. T. L. Maddin say in 1866, that in cases of collapse of cholera, to use salt-water in small quantities and frequently repeated; I did so, and succeeded in rallying a few patients. In 1873, profiting by this experience, I dissolved the salt in essence of beef, and in cases of collapse gave it to the patients about every five minutes, and would find them pulseless and cold and shriveled, yet, under the administration of this salted beef-tea, I have seen the shriveled form begin to fill up, the cold surface resume its heat, the pulseless wrists begin to beat again with vibrations of life, and the eyes illumine again with the light of convalescence. We had more than one case of that sort. I might hesitate to speak of these things if it was a matter behind the screens, but it is a matter of public record. In regard to the management of these cases, we did not rely upon the opiates; we relied upon using the calomel and opium freely, feeling that, when there was a disease that had seized upon the vitals of a patient with a violence that would destroy him in a few hours, we had better do something to rescue him. I used opium and calomel freely in the early stage of the disease. Upon observations of others, I began to use calomel, opium, and camphor in 1849. With the use of these agencies, before the body is drained of its serum, you can as certainly arrest the disease of cholera as you can that of malarial fever. With regard to the statistics of the penitentiary, I suppose we treated, in the hospital and out of it, about four or five hundred patients. There were about five hundred prisoners and *attachés* at the penitentiary, and almost every man, woman, and child there were affected with the epidemic. From the 9th of June to the 12th of July there were twelve deaths. There were some who had old chronic diseases, and when they were attacked by the cholera they would die.

Dr. MORTON. On the morning of the 28th May, I was called upon to go and see Mr. Ensley. I will say that I had but very little to do with the cholera when it was raging here last year. I find from my diary reports that I waited on a few individuals. There are other gentlemen here who had much experience in the treatment of cholera whom I would like to hear dwell upon this subject.

Dr. HENRY. The first case we observed was that of Mr. Ensley. I forgot the date, and called upon the family, and they told me that it was on the 22d May. Dr. Morton saw the patient in the morning, and I saw him in the evening when he was dying. He died on the 22d of May, so the family told me.

Dr. COMPTON. The cholera epidemic began and was upon the city as an epidemic before I believed it existed among us. I did not see any case for eight or ten days after I heard there was cholera in our midst. I was doing a general practice. About the 8th or 10th of June I was called to see a case under the Capitol Hill, on Gay street. I found a marked case of cholera. While there I was called to five or six patients,

all of which proved to be cases of cholera with the exception of two. I inquired where these patients worked, and learned that they were general paupers and idlers, working no place and living on cheap food bought from the market, and green groceries, and drinking water from a spring. I called the next evening and found that some of them had been relieved, from the medicine I had given them. Two of them were dying from opium. They were blacks and whites, and very poor. It was a constant run here and there. None of them were using hydrant-water. I was called the next day to see a class of people living near the place known as the magazine property. I found a neighborhood of poor waifs living in cheap houses, not over two hundred yards from the Franklin pike. In the first house to which I went I found a child dead in bed; the father in the bed with collapse, another child in collapse, three little children playing about, and the mother walking around. I saw them at half past 7 in the morning, and at 11 o'clock the father was dead, the little child in collapse was better, and two of the little children that been had running about were dead. I then went to other houses in the neighborhood, and found dead and dying in all of them. All of them were living on cheap purchased food, and drinking from a sulphur spring. I was not called to the family living in the Bilbo house. A man and his wife and six children lived within a stone's throw of these houses, and not a case occurred among them during the epidemic. They got their water from a deep well on the grounds. They would not permit their neighbors to come in and get water on account of their being such a great annoyance. On the hill above Rocktown the people drink water from a surface spring, and are living on garbage, cheap stuff. I was called over into New Bethel and saw patients dying, and learned that they were using water from a surface spring. On Rolling Mill Hill I learned the same fact. I found isolated cases of cholera during the last epidemic in Edgefield, across the river; they may have been cholera morbus. One of the patients died. Mr. Chambley came here sick about the 9th of June from near Memphis, where he had been working a number of convicts on a railroad. The newspapers stated that these prisoners were dying down there. There are two springs down between Pearl and Gay streets, near the trestle. There are a number of springs around there that families get water from.

Dr. WINSETT. I was living in what is called Rocktown, within one hundred yards of the Bilbo place, and used water out of a well 60 feet deep. There were four persons in my family; neither one of us had the cholera. We lived judiciously and on good diet; took care of ourselves. A family lived across from us and used water from the same well. A little girl was taken early in the first week of June, at 7 or 8 o'clock in the evening, and at 11 o'clock at night she died. I do not know what kind of diet the family used. Only two families used water out of that well. The balance of the families around there used water out of surface springs. Four persons who lived right back of my house died.

Dr. HENRY. There were about twenty convicts at work at the capitol at the time the case occurred near there that Dr. Compton spoke of.

Dr. PLUNKET. Dr. Atchison reported a case of a negro man who had gone into the Hackberry Spring district from the penitentiary, and died of cholera.

Dr. CONNELL. A father and daughter were attacked with the cholera at Parrish's. One died and the other recovered. After the 7th or 8th of June there was no question as to the character of the disease at all among the physicians, but before that time there was some doubt.

Dr. COMPTON. I know of five or six deaths among women in places

where there was no cholera, and where it did not spread. Upon inquiry I learned this of their history: that they were washerwomen, and had washed the clothes of cholera patients. I saw them in North Nashville, beyond the limits of our hydrants.

Dr. MENEES. It will be remembered that under our system here the convicts were hired out at various points, and that at the time of the outbreak of cholera here they were working at the capitol, gas-works, and other points in the city. At this time the lessees of the penitentiary very generously extended the aid of the prison in sending out their carts to aid in cleaning up the city.

Dr. MCCLELLAN. On the 20th day of May a negro woman, named Rhoda Edwards, was very low with the cholera, and on the 30th of May died of consecutive fever. I obtained the record of that case from the Colored Benevolent Society. I counted the number of cases recorded on their books. I found a half-dozen negroes who knew all about the case, but could not find out what doctor attended her. In regard to these early cases of cholera, there is one point that is of importance which has not come up yet for consideration, and that is the occurrence of the Exposition, and the strangers that were brought into the city from elsewhere. Does the Exposition have any bearing upon the epidemic?

Dr. HENRY. During the Exposition hundreds of people visited the penitentiary, and went through it every day.

Dr. JOHN L. MADDIN. I saw the first case of cholera on the 5th day of June in the bottom to the left of the Chattanooga depot. I saw cases all over the city among all classes of society. I saw them among people who drank hydrant-water and well-water. The second case I saw was on Rutledge Hill on the 6th of June. This is a very healthy place. My experience was the same as that related by the other gentlemen. My brother saw an old lady; she ate her breakfast, and at 11 o'clock she was in collapse, and died about two hours afterward.

Dr. MCMURRAY. I saw the case on Rutledge Hill on the night of the 4th of June. I prescribed, and went back next morning, and the patient was dead. I began to inquire into the case, and they told me that he had come home in the evening before and drank buttermilk for supper. The next case I saw was near Buck spring, in a high location. I think that was on the 6th. I went to see the patient the night before, and found him in a collapse. As I was returning next morning to see him, I met Dr. Bowling and I asked him if he had seen any cholera in the city. He said no. I told him that this was the first epidemic I had been in, and that if this was not a case of cholera I did not know what the books meant. He went with me to see the patient, and on coming out of the house he said that it was really the cholera. The man died four hours afterward. He worked very hard the day previous to his death, and drank a good deal of water. He ate a good many cold vegetables for supper.

Dr. HUGHES. I did not refresh my memory with my books before coming here. My first case was on the 26th of May, at No. 116 South Summer street, beyond Broad, in a little frame house not far from the Wilson Spring Branch. A negro man about thirty years old had been sick with diarrhœa for two or three days. When I saw him he had what I though were symptoms of cholera. Dr. T. L. Maddin passed my office, and I asked him if he had seen anything of cholera in his practice. That man died in about forty-eight hours after being attacked. I do not know his history. The next case I saw was a negro woman on Front street, between Church and Broad, about 9 o'clock in the morn-

ing; I found her in a state of collapse. I think that was on the 28th of May. My next case was a Mrs. Jones, on North Summer street, near Cedar. I was called to see her about 1 o'clock in the day, and found her suffering from what I believed to be the cholera. I asked if she had a family physician. She said that she had—Dr. Williamson. I told her she had better send for him. I passed along there that night and learned that she was dead. This was about the 4th of June. About 11 or 12 o'clock that same night I was called out to see a lady that had the diarrhœa; that was on the corner of Cedar and McLemore streets. On my return I found an order to call at Jones's again; when I got there, about 1 o'clock in the morning, I saw a little girl six or eight years old in bed. I gave my opinion that it was cholera. She died the next morning about 8 o'clock. My next case was on Union street, between Summer and High streets, very near Dr. Bowling's office. She was a nurse for a family, was taken sick on Saturday night, and died on Sunday night. That was the first Sunday in June. About this time the epidemic became general, and my experience does not teach me that it was confined to any particular locality. I found the patients drinking branch and spring-water. (The first five cases I saw died.)

Dr. COOK. I saw a great deal of the cholera while it prevailed here. The first case was about the last of May, and was a patient of Dr. Winston. She was a negro woman, and lived above Buck Spring, on Ash street, near Ewing's avenue. A lady was also sick in the same neighborhood; both of them died, the negro woman dying that same night. This was the first case of cholera I ever saw in my life. It was not admitted by the profession that there was cholera in the city until after the 6th of June. This patient died at 4 o'clock on the morning of the 5th of June. She had eaten a hearty dinner, especially snaps. It was the Maury family, a mother and two sons. The cholera existed more alarmingly in New Bethel, a mile or two from where the Maurys lived. This was a little village inhabited by negroes entirely; they lived in huts 8 by 10 feet. The first house I visited I found two persons dead and five children sick; two of them with cholera and three with the measles. Three of the children died, and the other two recovered slowly. The cholera prevailed there for several days, and nearly every person on the hill had it. There was not a house there that was free from it. These negroes were exceedingly poor, badly clad, badly housed, and still worse fed. Some of them told me that they had not eaten anything for two or three days. They got water from a spring below. I think the cholera originated in the neighborhood of springs. I only remember one isolated case; a gentleman died in Edgefield, who did business in the city. He went home at night, and about midnight was taken with cholera. I saw him the next morning. He was suffering from discharges. I gave him calomel, camphor, and opium, and succeeded in checking his discharges. He died in three or four days afterward. His name was Henderson. He drank water in Nashville.

Dr. SCHIFF. The first case I saw was on the 5th of June, on Market street, a few doors below Union. She had just come here from Huntsville, Ala. She had a very light attack. About a week or two later she was attacked with flux. The second case I saw was on Capitol avenue a day later. I did not see many cases in the suburbs. I saw a few cases in South Nashville, but none of them proved fatal.

Dr. RAINEY. I had three cases six miles from the city, in a very healthy section of the country. They occurred within a few hundred yards of each other. Two of the patients were not very regular in their

habits, but the other was; two of them died and the other got well. They used water from an excellent spring. This was at the Hope Institute, to the left of the Murfreesborough pike.

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It is submitted that the evidence presented in the foregoing pages fully establishes the introduction of cholera into the city of Nashville. This evidence will admit of recapitulation.

On the 11th of May a gang of convicts arrived at Nashville from the line of the Memphis and Paducah Railroad works. The camp which they had left was infected with cholera. A number of their comrades had died. The deputy warden was so ill of the disease that the party were sent from their camp without him. We have in evidence the statement of Dr. Wright, the superintendent, that he had ordered the men returned to the penitentiary on account of the cholera being epidemic at the camp they then occupied. Dr. Erskine, of Memphis, has shown how this camp became infected.

Upon their arrival at the penitentiary the entire gang, some seventy-five or eighty in number, were placed in the buildings with the convicts who had not been away from the institution. In this convict-gang were four women, who had been employed as cooks and washerwomen for the working-party.

The entire gang were sick with diarrhœa when they arrived, and were at once placed under treatment. The four women were dangerously ill for some time. On the 13th of May a returned convict died in the penitentiary hospital of cholera. He had not been very sick when he arrived from Shelby County, and was therefore treated in his cell, where a few hours before his death he was found collapsed. It has been shown how the drainage of the penitentiary is managed, and this fact opens the way to the development of the initial cases in the Nashville epidemic of 1873.

On examining the records of a colored benevolent association, and inquiring as to the cases there on record, we found that a negro woman named Rhody Edmonds, who lived east of the penitentiary and directly upon the drain from the female department, was taken with cholera on the 20th of May, but that she did not die until the 31st. The case was described accurately by several persons who had been in attendance upon her.

May 22d, Mr. Ensley, the case reported by Drs. Henry and Morton, died of cholera. The house at which this man lived was nearly opposite the exit of the drain from the female department of the penitentiary; a narrow street only divides his property from the prison.

June 1, a negro man, who had some three or four days previous been discharged from the penitentiary, died of cholera at a shanty on South College street, near Wilson's Spring. It was found upon investigation that several of the convicts had been discharged after their return from Memphis. The majority were negroes, and at once resumed their former social status in the city.

From these cases and from such means did the epidemic strike the city of Nashville. It has been shown that convicts were employed upon the State capitol grounds, that they were employed in cleaning the streets, and that the fatal cases that occurred at the penitentiary were among men thus employed. It has been shown that, during the exposition, the penitentiary was daily visited by large numbers of individuals. Could human ingenuity have devised a more effectual mode for the dissemination of the disease than that which was adopted? Nashville

suffered in 1873 from the obstinacy and bigotry of her officials, as she had suffered in past years from the same cause.

The efficient moment for action was lost amid the discussion and heated feeling that grew from the discussion as to the nature of the disease. We are strongly of the opinion, from facts that have come to our knowledge, that prior to the cholera explosion an epidemic of malarial fever was upon the city. There are no records from which this may be proved. We gather the fact from conversations with prominent physicians; and that the knowledge of this existing disease masked the judgment of the cholera opponents. How fatal was this error the death-roll demonstrates.

Dr. Bowling has collected statistics showing that from June 7 to July 1 there had occurred 244 white deaths and 403 colored deaths, a total of 647 deaths. This number includes the 72 deaths of June 20, "the Black Friday." It is known that large numbers of negroes died who were buried by their friends, and of whom no record was made. This is especially true of the localities described as Rocktown and New Bethel. It is computed by parties who had every opportunity of obtaining full information that, from the inception of the disease to its close, at least one thousand deaths occurred. There is, however, no possibility of obtaining absolute information upon this point.

The map of Nashville, which accompanies this report, designates the localities at which the disease was most virulent. It is not intended to convey the impression that cases of cholera did not occur upon Capitol and other hills. The epidemic was confined to no special locality, although it exhibited points of greatest malignancy, and fully sustained the theory that cholera will exist wherever it is carried and wherever local causes exist that favor the rapid reproduction of the specific cause.

The cholera was carried to various points in Davidson County from the city of Nashville. One of the most interesting demonstrations we present in the following account of

THE EPIDEMIC OF CHOLERA IN 1873 AT GOODLETSVILLE, TENN.

By Dr. I. R. Kirkpatrick.

Goodletsville is a station on the Saint Louis and Southeastern Railroad, twelve miles northwest of Nashville.

On the 16th of June I was called in consultation with Dr. Robert Guzzard to visit a negress at the residence of Mr. Payne, at Ridgefield Junction, ten miles north of Nashville. The woman, who was about thirty years of age, came from Nashville, the evening before, to serve as cook in the family of Mr. Payne. She had been suffering for some days before she arrived from diarrhœa, and she came from one of the suburbs of Nashville, in which tenements occupied by negroes are closely packed in narrow lanes and winding alleys, the abodes of filth, wretchedness, vice, and misery. The woman cooked supper for the family, and at about 3 o'clock a. m. of the next day was taken with severe and alarming symptoms. She received no medical attention until about 10 o'clock a. m., when she was found fully collapsed. She was treated with calomel, opium, camphor, aromatic sulphuric acid, without obtaining any good results, and she died in a few hours.

A few days after the death of this woman I was called to see one Forester, a laborer upon the railroad. He had drunk a large quantity of water the day before, and had eaten for supper, among other things, a mess of cold boiled cabbage. He was taken with severe vomiting and

purging at 3 o'clock a. m. Being absent from home, I did not see this case until 1 o'clock p. m., when I found Dr. P. Byrne in attendance. The characteristic symptoms of cholera were present in their most aggravated form, attended with rapid prostration and approaching collapse.

The treatment had been calomel in decided doses, and sinapisms. We immediately gave a hypodermic injection in each arm of the following:

℞. Quinine, gr. viij.
Acid. sulph. aro., gtt. x.
Spt. ammon. aro., ℥j.
M. Morphiæ sulphas, gr. ¼.

Ordered that he should have as much ice, and iced water in which a quantity of salt had been dissolved as he wanted; and of this he drank largely. Chicken-soup, seasoned with salt and cayenne, was given, and dry frictions with flannels ordered.

The next day there was apparently no change in his condition; the same treatment was continued, with the addition occasionally of a solution of chlorate of potash as a drink, and the following pill every four or five hours:

℞. Calomel, gr. xxiv.
Pulv. opii, gr. viij.
Pulv. camph., gr. x.
M. Ft. pil. No. viij.

In two days, by careful nursing, reaction was established, and he slowly but surely advanced to recovery. This was one of those extraordinary recoveries of which we may occasionally boast, and it was due, no doubt, to the hypodermic injections and the free use of salt and iced water. Had we met with the same success in every case that attended our efforts in Forester's case, it would be a pleasure to write this article, but the facts are demanded.

There was but very little, if any, diarrhœa, cholera morbus, or dysentery before the occurrence of the first well-defined case of cholera, but after that case there was not much skirmishing before the enemy showed his strength, and such was the panic produced by the rapidly-fatal cases that occurred, that the majority of residents supplied themselves with medicines and medical advice; a precaution which saved many lives and greatly lessened the mortality of the epidemic.

There was nothing new or peculiar in the symptomatology of the disease as it came under my observation. In some cases the discharges were slightly colored, and in many cases cramps were wanting.

The line of treatment which was adopted will be found laid down in the following case:

June 20, was called to see J. D., a stout, vigorous fireman upon the railroad. He presented all the symptoms of cholera in an aggravated form. Absolute rest was enjoined, ice and iced water were allowed, and one pill of calomel, opium, and camphor (the formula for which has already been given) was ordered to be taken every two hours. Alternating with the pill, a teaspoonful of the following mixture was given:

℞. Acid. sulph. aro., f℥x.
Tinct. opii, f℥v.
M. Aqua camphoræ, f℥iv.

June 21.—Still vomiting and purging, but not so frequently. Complains of great weakness; thirst intense. Continued treatment, with

the addition of chlorate of potash treatment. Later in the day an injection per anum of the following was ordered:

℞. Quinine, gr. xx.
Tinct. opii, gtt. xl.
M. Spt. vini galici, ℥iv.

To be repeated every four hours.

June 22.—At 4 o'clock a. m. patient easy, seemingly improved. At 10 o'clock a. m. much worse, rapidly passing into collapse, having involuntary discharges, ice-cold extremities, profuse perspiration, &c. I hurriedly gave him a hypodermic injection, in each arm, of quinine, aromatic sulphuric acid, spirits of ammonia and morphia. Returned in three hours, expecting to find him dead, but found a radical change for the better. All the symptoms were under control, and reaction was fully established.

As an evidence of the virulence of the epidemic, another group of cases is offered.

Was called to see J. C., aged twenty-one years, a healthy farmer, and found him in profound cholera collapse after but a few hours' illness. The acid mixture was injected into each arm, and the exhibition was repeated many times in various portions of his body. He was wrapped in a sheet wrung out from iced water and covered with blankets, but he died in a few hours. This death was followed by the occurrence of three other cases in the same family within a few days, two of which were fatal.

Some cases were very slow in convalescing, which state was accompanied by an irritable condition of the lower bowel and an inability to control it.

SUMNER COUNTY.

Gallatin, the county town of Sumner County, is located upon the line of the Louisville and Nashville Railroad, twenty-five miles northeast of Nashville, and three miles north of the Cumberland river.

The history of the cholera epidemic at this point is given in the following letter received from Dr. H. A. Schell:

The urgent duties devolving upon me during the cholera epidemic of last year prevented, in a great measure, my keeping a record in detail of cases as they occurred; however, I will endeavor as nearly as possible to furnish you the more prominent particulars of its history.

The first case occurred May 29, in the person of a mulatto widow named Lucy, aged about seventy years, who had returned the evening prior to her attack from Nashville, where she had been on a visit of a few days. She had a diarrhœa for several days, which she attributed to an over-indulgence in vegetables while in Nashville. No remedies had been used until 6 o'clock a. m. on the 29th. Symptoms becoming urgent, Dr. Malone was called. He thought the case a suspicious one at least, and if cholera morbus, very aggravated. Gave morphia hypodermically, ordered sinapisms and heat to the extremities, ice, and left calomel and bismuth. After his second visit, Dr. Malone was so firmly impressed with the belief that the case was one of genuine epidemic cholera, that he invited me to see it. As it was not convenient to go immediately with the doctor, I called by myself about an hour later. Four o'clock p. m. I found the patient semi-conscious, voice husky and whispering, tongue cold, fingers shriveled, no pulse; in short, collapsed. Died at sunrise on the morning of the 30th.

In view of Lucy's age, together with the imprudent indulgence in articles of diet to which she was unaccustomed, fatigue and exposure to the sun she had undergone, the change of water to which she had been

subjected, and the positive denial of there having been a case of cholera at Nashville, we agreed to diagnose the case cholera morbus.

On June 1, James Stepleton, colored, aged about twenty-four years, a habitual drinker, who had also been visiting Nashville, from which city he had returned at the same time as Lucy. He also had diarrhœa, for which no remedies were employed save whisky. On the day of his attack he arose early and went as usual to sweep out a saloon for which he was a waiter; before completing his work (his diarrhœa having increased in its severity) he became so much exhausted as to require assistance to get him to his home. Drs. Tompkins and Bresh attended him, and diagnosed the case to be Asiatic cholera. The man died in collapse at 2.30 o'clock the same evening, having been ill less than ten hours.

These cases occurred in different portions of the town, but at each locality the ground was low and flat, surface-water abundant except when very dry, scarce any drainage, and hygienic surroundings in general very bad. No new cases supervened in these localities for several days; in fact, we were beginning to hope that the efficient use of sanitary measures would ward off the threatened epidemic, but our people could not be aroused until too late, when the disease was fully developed.

Case No. 3.—Amanda Munday, colored, aged about forty years, was attacked at night about four days after the death of case No. 2. She lived on the lot next adjoining the saloon where James Stepleton was taken seriously ill. The common privy was built on the division-line. The excreta for case No. 2 were not disinfected either at the saloon or at his home, and Amanda used habitually this privy. She collapsed, and died within twelve hours.

On the evening of the same day, a colored woman, aged thirty years, who lived on a lot adjoining the one of Amanda Munday, was attacked, collapsed in four hours, and died in six hours. During the next forty-eight hours the disease became epidemic in this locality, and several new cases occurred in the immediate vicinity of the house at which case No. 1 had died. At the locality where cases 2, 3, and 4 had died, and which was near the depot of the Louisville and Nashville Railroad, the disease raged severely, and spread in a northeast direction up a hollow, where there is a negro settlement. The water these people used might properly be called seep-water, it being obtained at a depth of from 10 to 25 feet.

The disease in the neighborhood where Lucy (case No. 1) had died was more circumscribed; in fact, it confined itself to the immediate locality, with now and then a case, for a week or more. These people obtained their water from a town-pump that supplied all the business-portion of the town, and is at the bottom of a hill.

The district next attacked was on Main street, only a few doors east of the public square. Mrs. J. White, aged about twenty-five years, was attacked about 3 o'clock a. m. on June 13. Dr. Malone saw her about 6 o'clock a. m. I saw her an hour and a half later. Had rice-water discharges when first seen, collapsed two hours later, and died at noon. The father of this woman lived in the immediate vicinity of cases Nos. 2, 3, and 4. He did not remove from his house; his daughter visited him constantly, and although there is no direct history of her having contracted the disease from the infection of the locality, it is quite fair to presume so. She had premonitory diarrhœa for several days as we learned after her death. The surroundings of this patient and the immediate neighborhood were anything but cleanly; in fact, the lots back and adjoining were most miserably filthy. After the death of Mrs. W., several

negro families living on the back lots suffered from the disease, each losing one or more members. A white family living next door to Mrs. W. had three cases, but all recovered. From this immediate locality the disease did not spread.

The next locality attacked was on the southwestern part of the town, outside the corporation limits, and nearly three-quarters of a mile from the infected vicinities. This point was at the cotton-mills. There was constant communication with the town. Preparations were being made to rebuild the factory, which had been destroyed by fire the winter before. A number of negroes who lived in the second infected district were employed on this work. The mill-buildings are upon high ground, but bounded on the north and west by swamps. The cemetery where all the dead from cholera were buried is northwest of the mills, not exceeding three hundred yards distant, and only separated from the factory-grounds by a narrow street. These grounds, during wet seasons, are covered with water. The water-supply for the factory is in most part obtained from bored wells; one of these is 100 feet deep, another is 70 feet, and a third is fed from surface-water.

The next portion of the town attacked was the highest and most cleanly portion, but was not far from the point at which case No. 1 had died. The patient, a mulatto woman twenty-six years of age, was first seen an hour after her symptoms became alarming. She had premonitory diarrhœa for several days; was a servant in the family at whose house she was taken ill, but slept at her own house, which was quite close to that in which case No. 1 died, and she had frequently visited Lucy during her illness. This woman was severely ill, but recovered. Following this case, three cases occurred in the family to whom she was servant, one of which terminated fatally. Among the family living in the adjoining house three cholera cases occurred, with one death; and some ten or twelve cases occurred upon the same street, with two deaths.

A few cases occurred out of town, of which I know nothing, save in one family. A young lady who resided at Nashville visited her grandmother, who lived about two and a half miles from Gallatin, for safety during the epidemic. She was taken with cholera at midnight on the 25th of June, a few days after her arrival, and died at daylight. The servant-woman of this family took the disease, and died in a few days. The other members of the family left the house.

Numbers of our citizens who deserted the town went to Epperson Springs, a watering-place some twenty-two miles from Gallatin, situated on a high ridge, with good surroundings. Several cases of cholera occurred there among those who had left the town, resulting in two deaths—one a white boy some five or six years old, the other a servant-man about twenty-four years. The disease did not become epidemic.

A white man named Mungals, who lived in the county, some twenty miles from Gallatin, visited Nashville on business in June. On his return home he sickened and died of cholera. All the members of his family had the disease—his wife, son, son-in-law, and his daughter—all of whom died except the daughter. A negro family waited on the Mungals; all took the disease and died. A man named Parker visited the house during the epidemic, and also died. The other neighbors, becoming panic-stricken, deserted their homes and fled to the hills, when the disease abated.

At Gallatin the disease began to abate in the latter part of July, and by the middle of August had disappeared from among us; neither did there appear another case among any of our citizens, large numbers of whom had abandoned their homes during the epidemic and were now

returning. But in the early part of September we had two more cases under the following circumstances. The colored people's fair was going on at this time. One Brown, white, aged about thirty-five years, whose business was traveling with some kind of lottery-trap or game of chance, was there. A few days before he had left Lebanon, Ky. On the second day after his arrival, about noon, having had diarrhœa for a day or two previously, he was violently attacked at the fair-grounds with cholera. He came immediately to town, had all the attention that could be afforded him, but at 8 o'clock p. m. was collapsed, and died at 3 o'clock a. m. the next day.

A white man, twenty-six years of age, came to Gallatin about the same time Brown did, but from an altogether different direction and locality, chanced to meet Brown at the hotel, went with him to the fair-grounds, visited him while sick, and after Brown's death was frequently in his room. Two days after the death of Brown this man was taken with cholera; was collapsed in four hours; reaction took place during the next seventy-two hours, but he died of consecutive fever on the fifteenth day. This man had been on a debauch for ten days or two weeks prior to his attack.

The dejections from these two patients were disinfected and buried; the bedding and clothing were burned; the bodies were disinfected. No other cases occurred.

About one hundred and twenty deaths occurred from cholera at Gallatin, four-fifths of whom were negroes. Very few cases occurred among those who observed proper hygienic precautions. The cases of disease which were seen early and which were properly cared for, for the most part recovered. Those who drank to excess and ate freely of the coarser vegetables, when attacked seemed to defy all remedies. Excitable, nervous, easily-alarmed subjects were most susceptible to attack, and succumbed to the disease most readily. The majority of the cases occurred at the early hours of the morning.

The weather during the entire time of the epidemic was wet and cloudy, with frequent thunder-storms. There was but one day during the month of June that it did not rain.

From a careful study of this demonstration, I am convinced that the dejections from both stomach and bowels, as is also the cadaver after a certain stage of decomposition has taken place, are capable of generating a specific poison peculiar to cholera, and upon which the propagation of the disease depends; that certain conditions of the atmosphere, together with animal or vegetable decomposition, either or all, tend to intensify the malignancy of the poison; that the lungs, stomach, and probably the skin are the avenues by which it is conveyed; that by proper hygienic regulations and the free use of disinfectants the disease may be "stamped out," and that precautions in the same direction are safeguards against the disease; that the water-supply has no influence in propagating the disease, except it be directly infected with cholera-poison.

Very many different modes of treatment were tried, but from my observation, and that of the professional gentlemen who saw the disease with me, anti-spasmodics and anodynes, calomel, with or without bismuth, together with external means—sinapisms, artificial heat, ice, &c.—proved most effectual.

Yours, very truly,

H. A. SCHELL.

DR. E. MCCLELLAN,
Assistant Surgeon U. S. A.

The man Brown, who is noted by Dr. Schell as having died of cholera at Gallatin early in September, was present at the Marion County fair held at the town of Lebanon, Ky. He was a perfectly sober man, who supported his family by a "dollar-store" enterprise, with which he visited the county fairs of Kentucky during 1873.

On the 29th of August, while at the town of Lebanon, Brown complained of a diarrhœa, for which he was treated by the writer. The next day, (August 30,) although he was not entirely over his diarrhœa, he left town upon the noon train. During the ensuing night the Marion County epidemic of cholera was developed.

BEDFORD COUNTY.

Shelbyville, the county-town of Bedford County, is located upon a limestone bluff upon the banks of Duck river, which stream flows around the northern and eastern sides of the town. The bluff slopes upon the north and west to the level of the river; this valley is, however, denuded of alluvial deposits, and presents all the geological characteristics of the bluff, upon which is the business portion of the town and the residences of a large proportion of the inhabitants. That portion of the town which is built upon low ground consists of small houses and the cabins of negroes; with the exception of the Murfreesborough turnpike, which is lined by the residences of the wealthier citizens.

Shelbyville is the terminus of a branch of the Saint Louis, Nashville and Chattanooga Railroad, by means of which road the town is in daily communication with travel north and south. The town has about 3,000 inhabitants.

The water-supply of the town is in the greater part obtained from a series of springs that line the foot of the bluff. One, a bold stream, issues from beneath a ledge of rocks; its line follows the course of the river, and it can be traced for miles from its point of exit by means of sink-holes, from which water can be obtained at all seasons of the year.

Upon the high ground the majority of the houses are supplied with wells, which are in all instances formed by blasting into the rock. The houses of the best class are furnished with cisterns. The privies are either upon the surface of the ground or consist of shallow pits blasted in the rock.

The sanitary condition of the town of Shelbyville during the early months of 1873 is described as being bad; but it is to be supposed that in this it differed in no particular from inland towns of its class. In these small towns no attention is paid to public hygiene until absolute danger awakens the supine authorities. In the town of Shelbyville, as in so many others of its class, the hot-bed was most assiduously prepared for the arrival of cholera, and when the disease became a positive presence, valuable time was lost in discussing the theory that the disease had originated from miasmatic causes.

It is impossible to obtain full lists of the cases of cholera that occurred at this town, although from a personal inspection and conference with the medical gentlemen of the town, much valuable information has been obtained.

As to the origin of the disease, it is determined that on the 31st of May, Mr. H. J. George, who resided some four miles northeast of the town of Shelbyville, returned to his home from the city of Nashville, where he had been a visitor to the Exposition. Mr. George was suffer-

ing from diarrhœa when he arrived; this diarrhœa continued unchecked for two days, when the symptoms of cholera were developed, and when he was first visited by his physician he was found to be profoundly collapsed. This case terminated fatally in twenty-four hours from the occurrence of the violent symptoms.

The day after Mr. George's death (June 4) his widow was attacked with cholera, from which she recovered only after a long and tedious illness.

Mr. William George came to his brother's house with his family to assist in taking charge of the sick prior to the first death. This gentleman and his young child were both attacked with cholera, to which they had only been exposed at this house. The father recovered, the child died.

On the 15th of June, Caroline Thompson, a negro woman, who lived in the lower portion of the town, was taken with the diarrhœa, which was ascribed to some imprudence in diet. As the diarrhœa increased, the exhaustion became pronounced, and attention was first called to her case by her having been found upon the floor of her cabin in an unconscious state. The case, however, was protracted; she reacted under treatment, but died of consecutive fever upon the 19th.

Upon the day that Caroline Thompson died, a Mr. Vance, who had been a clerk at the Battle House at Nashville, but who had left that city on account of the cholera, was taken violently ill at his home at Shelbyville; the symptoms of cholera were fully developed, and he died after an illness of eight hours. This man had been in Shelbyville for some five or six days before he was attacked by the disease, but upon each of these days he had complained of a diarrhœa which was exhausting him. He, however, did not remain quiet, but was constantly visiting in the town, and to his presence the diffusion of the disease throughout the town can in great measure be ascribed. The two cases that have been noted were not the only residents of Shelbyville and its vicinity who had been within the area of cholera-infection at Nashville. During the early days of June this town was full of individuals returning from the Exposition. Whether others were at the time suffering from diarrhœa it is not now possible to determine, but enough is known to prevent the case of Caroline Thompson from being considered as an isolated demonstration of the disease.

On the 19th of June a third cholera-case occurred. Sarah Davidson, a negress, who had nursed Caroline Thompson, was also taken with the cholera, and died after a short illness. During the night of the 19th and 20th of June a young child, the daughter of Mr. Vance, died of cholera.

June 20, the husband and mother of Sarah Davidson were taken with cholera, and both died after short illnesses.

After the death of Mr. Vance his widow went to the house of her father, a Mr. Russell, who lived about one mile south of what may be considered as the infected district of the town. At Russell's house was now congregated a family of seventeen individuals. Among these individuals seven cases of cholera followed the arrival of Mrs. Vance. Two of these cases terminated fatally.

Caroline Thompson, Vance, and the Davidsons had been visited by large numbers of individuals. In these early cases no effort was made to disinfect the excreta, which were thrown upon the ground in rear of the houses.

From these cases the disease spread and became epidemic. Each of the three houses became a focus from which the disease radiated; but the

family of Caroline Thompson, consisting of her husband, two daughters, and three sons, escaped entirely, although each adjoining house became infected.

The epidemic having been established, numerous instances of the infectiousness of the disease occurred. Multiple cases in families were frequent; in many houses six and eight cases occurred. One notable instance is related by Dr. Lipscomb. At a cabin which was occupied by a negro family several cholera-deaths occurred. The cabin was abandoned and remained unoccupied until after the epidemic was supposed to have been arrested, when a man who was sick with rheumatism moved into this cabin. On the second day of his occupancy he sickened and died of cholera.

The physicians of Shelbyville recognized the importance of treating all cases of simple diarrhœa, as the inception of an attack of cholera. They report that all such cases were amenable to treatment; that at this stage the disease was within human control; but that whenever the disease advanced to the stage of full development but little good could be accomplished by therapeusis. Several cases of recovery from profound collapse are, however, reported.

It is stated that some four hundred cases of the disease, more or less well marked, were treated at this town during the epidemic, with some eighty deaths. The treatment that was found to be the most effective was calomel, in full doses, combined with small doses of morphia, absolute rest, and a free supply of iced water.

After the epidemic influences were fully established, a most active system of disinfection and general police of the town was attempted.

At Wartrace, a station of the Saint Louis, Nashville and Chattanooga Railroad, in Bedford County, and also the eastern terminus of the Shelbyville Branch Railroad, a few cases of cholera occurred.

Early in June an aged negress, named Kitty Stokes, who lived with a man who was employed as a laborer upon the railroad, was taken with cholera, and died after a few hours' illness. During her illness she was nursed by one Newton and his wife. A few days after the woman's death Newton was taken with cholera, but recovered after a tedious illness, during which illness three of his children took cholera and died.

Later in the month a negro man, employed upon the construction-train of the railroad, was put off at Wartrace in the collapse stage of cholera, and died in a short time.

In each of the cases enumerated, after that of Kitty Stokes, disinfectants were employed.

Wartrace is a village of about fifty inhabitants.

RUTHERFORD COUNTY.

A STATEMENT AS TO THE CHOLERA EPIDEMIC OF 1873 AT MURFREESBOROUGH, AND RUTHERFORD COUNTY.

BY DR. J. B. MURFREE.

Murfreesborough is a healthy, well-located town, in very nearly the geographical center of the State of Tennessee. It is upon the line of the Nashville and Chattanooga Railroad, thirty-two miles southeast from the city of Nashville. The town has a population of about 4,000 inhabitants. During the month of May, 1873, cholera appeared in the city of Nashville, but was not early recognized, having been designated as cholera morbus or sporadic cholera. The Exposition at Nashville was

open during this time, and attracted many visitors from all portions of the State; large numbers went from Murfreesborough. During the entire epidemic no attempt was made to quarantine the town; no attempt was made to prevent the introduction of the disease from Nashville; on the contrary, the freest intercourse possible existed between the two cities. Murfreesborough is situated on rather an elevated plain, and the drainage is good except at two or three points. There is a small stream of water coursing through the southwestern portion of the town. Its channel is broad, and is composed of dirty, miry clay; the declivity is very slight; consequently the stream is sluggish. Its banks are only elevated above the usual plane of the water 12 or 14 inches, and recede from the stream on the same level, in some places as far as one hundred yards. After heavy rains this whole bottom is inundated, and, the drainage being so imperfect, the water is retained until absorption and evaporation effect its removal.

During the spring of 1873 a great deal of rain fell, and this bottom was almost constantly covered with water, which could find no way of escape. During the epidemic the vast majority of the cholera cases occurred in persons who either lived in the vicinity of this branch or whose daily vocation required them to pass it more or less frequently during the day. It is not believed that this marshy district originated cholera, but it is believed that it aided its development; that there the cholera germ found congenial soil, a proper *nidus* where it could rest and multiply. The Nashville and Chattanooga Railroad passes through this marshy flat, making three crossings of Lytle's Creek.

The water-supply is obtained from wells scattered over the town, and from three large and fine springs. The character of the water is limestone, pure and cold. Many private houses are provided with cisterns.

The sanitary condition of the town was not good prior to the development of cholera in 1873. The streets and by-ways were filthy; the majority of the privies were upon the surface. As soon as the disease developed, a scavenger-force was organized, and the general police of the town was made as rapidly as it could be effected.

On the 1st day of June, Littleton Rucker, a negro man some forty-three years of age, who resided at Nashville, came to Murfreesborough to visit his relations. Immediately after he arrived he was taken with cholera, and passed almost immediately into the stage of collapse. There was remarkably little vomiting and purging. The case terminated fatally after an illness of about ten hours. This man was sick and died at a cluster of negro cabins known as Bethany, on the eastern suburbs of the town. The excreta of this case were disinfected, and no case of the same disease occurred in the vicinity of the house at which this man died during the entire epidemic.

June 12 a negro woman fifty years of age, living in the northwest portion of the town, was taken with cholera; she was sick eight days, but recovered. This woman had not been away from home, excepting to visit a sick daughter who lived quite close to the railroad depot. Her husband, a blacksmith, at that time was working in a carriage-shop near the region of cholera-infection. The house of this woman was not frequented by strange negroes, but they had much company among their friends and neighbors.

June 14, Millie James, a negro prostitute and the keeper of a bagnio, was taken with cholera, and died after an illness of twelve hours. The house of this woman was much frequented. Being quite near the railroad depot, many of her customers were railroad hands; and it is known that persons from Nashville were at the house.

June 15, Mattie Tate, a white prostitute who lived in the house of Millie James, was attacked with cholera, but recovered; and on the 17th her two children, aged respectively five and two years, were taken sick with the same disease, but recovered, the first in three, the other in five days. This woman was the mistress of a man who was a town policeman.

Mattie Tate had nursed Millie James. A negro woman named Williams was also constantly with both cases, and on the 20th she was taken with the same disease at her house, about two hundred yards distant, and died the next day. After a few days' time the husband of the last case was attacked and died, and subsequently two other cases occurred in the same house.

A negro woman living in a small room had three children aged respectively three, five, and seven years. These children were attacked with cholera at varying intervals. The mother, destitute of that instinct which causes even the brute to care for its offspring, grossly neglected her children. Sarah Ledbetter, a colored woman who lived in an adjoining room, but who was in no wise connected with these children, seeing them neglected by their mother, with a courage, devotion, and self-sacrifice which ought to constitute her a heroine, gave up her employment and devoted her whole time, day and night, to caring for these neglected little ones. Two of the children died; one recovered. Within a few days after the termination of the last case Sarah was herself attacked, and after a severe and well-nigh fatal illness recovered.

Believing that the cholera-germ was contained in the dejections of the patients, I was particularly careful to direct the nurses to promptly remove and bury them.

The disease was attended with all the symptoms which characterize Asiatic cholera: the vomiting and purging, the rice-water discharges, spasm of the muscles, collapse, suppression of urine, husky voice, and pinched features were well marked, and left no room to doubt the nature of the disease. There were 142 cases of cholera, with 53 deaths, showing a mortality of more than one-third. Of the total number of cases, 30 were whites and 112 were blacks.

The treatment which gave the most satisfactory results was absolute rest, light diet, morphine, calomel, and quinine, with counter-irritation by blisters, and the maintaining the temperature of the body by artificial heat. I insisted very strongly upon every one who complained of any gastric or intestinal disturbance taking their beds and quietly remaining here until relieved; and I feel satisfied that some recovered from the disease by strictly observing this injunction, while others lost their lives by disregarding it. As an instance, I cite the following case: I was called early one morning to see a little girl with cholera. It was a violent attack, and the entire family were greatly excited, but particularly the father, who busied himself in running to and fro upon every errand. He soon began to complain of diarrhœa and pains in his bowels. I told him that he must lie down and keep perfectly quiet, but he positively refused to leave his child. Finally he became so much prostrated that he was forced to take to his bed. He soon collapsed, and died in a few hours. That this man's death was hastened, if not produced, by his refusing to take his bed early in the attack I have no doubt.

At the inception of the disease I used the following formula:

℞. Morphiæ sulph., gr. iv.
Hydrarg. chlor. mit., gr. iv.
Quiniæ sulph., gr. xvj.
M. et fiat pilulæ, No. vij.

One to be given every hour or two hours, as the urgency of the symptoms required.

When there was thirst or nausea, bits of ice were allowed to be swallowed; iced water was given in small quantities whenever desired. When the vomiting became excessive I used the ice freely. Put 20 grains of calomel upon the tongue, to be swallowed with a sup of ice-water; applied mustard over the stomach, and injected morphia hypodermically. During the stage of collapse I gave alcoholic stimulants, and endeavored to maintain or to raise the temperature of the body by dry heat. When convalescence began I gave my patients a bitter tonic, with iron, and ordered them a light but nutricious diet, still insisting upon rest and quietude.

A number of points in Rutherford County were infected after cholera became epidemic at Murfreesborough.

Dr. L. W. Knight, residing five miles south of Murfreesborough, reports the occurrence in his practice of ten cases of cholera, seven of which proved fatal. Of these cases five were males, five were females. Four were whites, six were negroes; seven were married, three were unmarried. The respective ages range from six to thirty-five years; four cases occurred in one family, three cases in another, and one case in three others. The treatment adopted was morphia, calomel, stimulants, sinapisms, and ice.

Dr. J. J. Rucker, residing five miles west of Murfreesborough, reports in his practice, from June 27 to July 19, twenty cases of cholera, but two of which were fatal. Of these cases twelve were males, eight were females; seven were whites, thirteen were blacks; eleven were married, nine were single. The ages range from three to forty years. In two instances two cases occurred in families, the other cases were isolated.

The treatment adopted was opiates, with calomel, and enemata of capsicum, nut-galls and quinine, sinapisms, absolute rest, ice.

Dr. R. I. Turner, residing five miles southwest of Murfeesborough, reports the occurrence of twenty cholera cases, of which five were fatal. Of these cases twelve were males, eight were females; eight were whites, twelve were blacks; eleven were married, eight were single, one was a widow. The ages range from eight months (a fatal case) to forty-nine years. Four cases occurred in one family, four in another, while duplicate cases occurred in several instances.

Dr. Thomas J. Elam, residing six miles southeast of Murfreesborough, reports five cases of cholera. These cases were all treated at the inception of the disease with opium, calomel, and quinine. Absolute rest. No deaths occurred.

Dr. G. D. Cronchwait, of Florence Station, reports five developed cases of cholera, one of which was fatal; and a large number of cases in which the disease did not advance beyond the premonitory stage. Treated by opium and calomel. "The stomach was emptied by a brisk emetic in cases in which it was loaded. Calomel seemed to produce more actual stimulation than any other remedy."

Dr. Joseph W. Davis, of Smyrna, reports five cases of cholera, two of which were fatal. Treated by calomel, quinine, morphia, and stimulants. "From his observation cholera prevails only as an epidemic, and it is not believed to be contagious or portable."

Dr. R. B. Haines, of Jefferson, reports nine cases of cholera, six of which were fatal; two cases in the persons of children, two and three years of age, both of whom died. One recovery was in the person of a man seventy years of age. The treatment adopted was calomel, opium, and quinine, in small doses.

WILSON COUNTY.

Lebanon, the county-town of Wilson County, is located in a fertile country, thirty miles due east of Nashville, with which city it is connected by railway. It is a town of some little importance; at it is located Cumberland University. The manufacturing interests are represented by large cotton and woolen mills.

The town is built upon an elevated limestone ridge, and around a large town spring, which empties into Sinking Creek. This creek, which rises in the hills four miles south of Lebanon, flows through the town and empties into Bartin's Creek, one mile below. During the summer months this creek is dry, but after heavy rains the current is rapid and the bed of the stream is thoroughly cleansed.

Two miles east of Lebanon is Spring Creek, and one mile west is Bartin's Creek. The country watered by Spring Creek is generally high and healthy, and free from malaria. The water is pure and clear and the stream never runs dry. The country watered by Bartin's Creek is liable to malarial diseases. The soil is black, soft, and porous. During the summer months Bartin's Creek is dry. During freshets it leaves large deposits of mud in its bed and on the low places along the banks.

The Big Spring, from which the town is supplied with water, rises at one corner of the public square, and gives off a stream of sufficient volume to wash thoroughly the bed through which its waters flow. It is shown that the natural drainage of the town is good. In 1849 Lebanon had been desolated by cholera; and in 1873, as soon as it was known that the disease was epidemic at Nashville, every effort was made to place the town in the very best sanitary condition.

On the 6th day of June, two young men named Wilkerson and Whitmore arrived at Lebanon from Nashville. On the 8th Wilkerson was attacked with cholera, and died the same day. On the 10th Whitmore fell sick with the same disease, and died upon the 12th.

July 17.—Three negro women who had been at Nashville were taken with cholera; two died within twenty-four hours, one made a tedious recovery.

July 18.—Seven cases of cholera occurred, three of which terminated fatally. The disease having become epidemic, spread rapidly over the town, confining itself to no particular locality. Every street and neighborhood had its few cases of cholera, and from the town the disease was carried into the country. Three miles from Lebanon, lower down Spring Creek, were two fatal cases. Four miles east of Lebanon, one case died. Four miles down the creek was another fatal case. There were no cases on Bartin's Creek, nor any on Sinking Creek, outside the limits of the town.

Nine-tenths of those who died, and the history of whose cases could be had, had been imprudent in eating vegetables, or had neglected cases of diarrhœa; frequently both. No case is known of a cholera death where the subject had been prudent in diet, and had taken treatment early. A few doses of astringent medicines, in incipient cholera, with absolute rest, in the cases of persons who had been prudent in diet, invariably gave prompt relief. Dr. J. L. Fifte, to whom we are indebted for this report, writes: "I gave quinine by the stomach, the bowel, and under the skin, and gave it freely, and in a great many cases; but I am sorry to say, contrary to my expectations, for I did believe it would *cure* cholera, it seemed to do but little if any good. Once I believed I could cure cholera by the hypodermic use of quinine; now I know I cannot. With the present lights before me, if it becomes my misfortune to deal with cholera again, I shall rely on small, but frequently repeated doses

of calomel and opium, with large and frequently repeated doses of ice, as a general treatment."

To Drs. S. M. Anderson and G. L. Robinson we are indebted for much valuable information, received through our friend, Dr. Fifte.

Cholera appeared at the town of Lebanon on the 8th day of June, 1873, and the epidemic influences remained in force until July 17.

Seventy-nine cases of cholera are reported as having occurred in the town of Lebanon; of these twenty-six died. Of the total cases, forty-five were males, thirty-four were females; thirty-six were among whites, forty-three were blacks. Of the fatal cases, eleven occurred among the whites, fifteen among the blacks. Of the total cases, nineteen occurred among those whose ages were less than twenty years; eleven of these were less than ten years old. Of the cases which occurred between one and ten years of age, five died, six recovered. Of those between ten and twenty years of age, but one died.

September 27.—A negro man named Martin was attacked with cholera, and died after an illness of ten hours.

We are indebted to Dr. J. Bryant, of Shop Springs, for an outline of the cholera demonstration at that village. Shop Springs is a little village on the Sparta turnpike some six miles southeast of Lebanon. It is one mile from the line of Spring creek, a high, healthy, and non-malarial neighborhood. To this village cholera was carried from Lebanon. The first case occurring June 26, and the epidemic continued until July 3. Ten cases are reported, four of which terminated fatally. With but a single exception the disease was confined to the whites; those who died were all whites. Two cases occurred in the persons of infants; one two years, the other eighteen months old; both died. The two other deaths occurred in adult males, one of whom attempted to arrest the premonitory diarrhœa by a whisky debauch. The other was attacked after neglecting a diarrhœa for some five days. Of the total cases, but three occurred in the persons of females. Dr. Bryant treated the cases under his care with calomel and opium, in alterative doses.

Montgomery County.

Clarksville is located upon the right bank of the Cumberland river, at the point of junction of the Red river, fifty miles northwest of Nashville, and one hundred and ninety-nine miles northeast of Memphis. The town is located upon the Memphis division of the Louisville, Nashville and Great Southern Railroad, and in 1870 had a population of about 2,500 inhabitants.

Clarksville is a clean, prosperous town, built upon a bluff, and is exceedingly well drained. The water supply is obtained from cisterns; very few families use water from wells. Privies are upon the surface. This town is the center of a considerable tobacco trade.

On the 23d of June, two negroes employed upon the railroad, came into the town. They were guilty of great indiscretion in eating and drinking, and the same night were both attacked with cholera. One of these men recovered after an illness of eight days, the other died upon the third day after his attack. It is supposed that these men had been at points along the line of the railroad that were infected with the disease. These cases were followed by the occurrence of six other cases, which are dated from the 28th of June to the 14th of July. Four occurred in the persons of negroes, two among the whites; four were females, two were males. In but two instances did two deaths occur in the same family. One a father aged twenty-eight years and his female child twelve

months. The other a negro woman aged fifty-eight years, and her daughter aged twenty-three years. Those first noted lived on the highest portion of the city, and used cistern-water; the occupation of the man was that of a bar-keeper; those last noted were both laundresses by occupation, lived upon low ground, and used spring-water.

PALMYRA.

We are indebted to Drs. A. Eldridge and J. F. Outtaw for the following outline of the epidemic as it occurred at Palmyra, Montgomery County.

Palmyra is a small town situated on the south bank of the Cumberland river, and directly upon the Louisville and Memphis Railroad. The town is surrounded by large hills divided by narrow bottom-lands leading from the river. These bottoms are subject to frequent overflows. Previous to the appearance of cholera in 1873, there had been an unusual high rise of the river after vegetation had advanced, which caused the decay of a great deal of organic matter. The water in domestic use is strongly impregnated with lime, and is as a general thing obtained from springs.

The first case that Dr. Eldridge was called to see did not prove as severe as those that followed. The epidemic commenced at a house that was nearest the bottom that had been inundated, and was about three hundred yards from the river. The disease seemed to follow that side of the street, house by house—one at a time—until it reached the river. These cases were the most severe. All the deaths that occurred were on that side of the street, and so far as could be observed there was not a single case of cholera, except those who contracted the disease in this locality. There were several cases in the country, but they had been in this immediate locality just previous to their being taken with the disease. After about ten days or two weeks the town was deserted, and there were no new cases, though we had strong symptoms of cholera all over the neighborhood for several weeks.

Dr. Eldridge is of opinion that there was a local cause for the disease.

The Cumberland river is navigable, and during the season many of the boats upon the stream were infected with cholera. Palymra is twelve miles southwest of Clarksville and sixteen miles northeast of Erin. The epidemic is reported as commencing at Palymra on the 8th of June, and, therefore, was prior to the outbreaks at Clarksville and Erin.

MARSHALL COUNTY.

The village of Farmington is located in the eastern portion of the county of Marshall, fifty miles south of Nashville, and fifteen miles west of Shelbyville, Bedford County; with the last named the village is in daily communication.

It is represented by Dr. Nowlin that Farmington is located in the center of the great geological basin of Middle Tennessee; that the section of country is decidedly malarial. That all diseases of 1873 were of a malarial type, and opened the way to cholera. That an epidemic of dysentery followed that of cholera. That in the winter of 1873–'74 there was a marked epidemic of typhoid fever. After the outbreak of cholera the malarial diseases subsided, and that, with the exception of dysentery, the year 1874 was the healthiest season known for many years.

The history of the cholera outbreak at Farmington is, however, as

follows: On the 17th of June, a young man named Scott Carpenter arrived at Farmington after a visit to the Exposition at Nashville. Carpenter was accompanied by a friend from Nashville, and when they arrived both were suffering from diarrhœa. This friend remained at Shelbyville, where in a few days he died of cholera.

June 18, Carpenter was taken with cholera at Farmington. His attack although violent was not fatal, and after an illness of eight days he was pronounced to be convalescent. Four days from that time other cases of the disease made their appearance, and before the epidemic subsided sixty cases occurred, many of which proved fatal.

It is claimed by some of the physicians of Farmington that the disease was of local origin, and that Scott Carpenter could not have been the means of introducing it, from the fact that only those persons who drank water from a certain well in the village had the disease. Families who obtained all their water from this well, suffered in nearly all their members; where only certain members of a family drank of it, they alone were affected. "The sick-bed of Scott Carpenter was just *forty steps* from this well."—(Extract from letter of Dr. Nowlin, August 19, 1874.)

We have failed to elicit any information on the subject of disinfection, but as by the principal physicians of the town the disease is not considered *contagious*, it is safe to presume that disinfectants were not used; and that this well was infected from the excreta of Scott Carpenter, although the assertion is made that this did not occur. If the sick-bed of this young man was but *forty steps* from the well, the ground or the privy where his excreta were thrown must have been within the area of drainage of this well, and it is certainly more plausible to suppose that, in the natural course of events, the water became infected, than it is that a special providence existed for that well, which prevented any of the excreta from reaching the water.

In two localities beyond the town did the disease occur. Farmington is located upon the banks of Rock creek, and upon what is known as the Horseshoe Bend. Upon this creek, one-quarter of a mile from town, lives a family named Coffey, four in number, three of whom had cholera. This family were certainly within the area of infection; they were so close to town that undoubtedly it was resorted to for domestic purposes; and persons going to or from the town of necessity passed their house.

Half a mile from the town, down the creek, lived a family of negroes named Mayfield, seven of whom had the disease, with three deaths. It is hard work to establish the fact that a family of negroes remained constantly at home, in the mind of any one familiar with the southern negro. They are utterly unaccountable for their actions, and after ranging over a country-side all night, visiting friends, &c., will invariably insist that they had not been away from home. This Mayfield family were certainly near enough to visit Farmington many times each day, and it is far more rational to suppose they did so than that they abstained for weeks from going to the town.

It is asserted that the floods of the early spring of 1873 filled the springs, from which these two families obtained their drinking-water, with vegetable matter; and because two families who lived between Mayfield's and the town did not have the disease, *ergo*, the water of the spring infected the Mayfield family.

Two other individuals living in the country had the disease, which lasted from June 18 to August 5, but they both confessed to have been in the town.

HAMILTON COUNTY.

Chattanooga, the county-seat of Hamilton County, is a city of 6,000 inhabitants, located in the valley and upon the east bank of the Tennessee river. The valley in which this town is built is bounded upon the north and west by the Tennessee river, on the south by Lookout Mountain, and upon the east by a range of high hills.

Chattanooga is a railroad center, being the eastern terminus of the Saint Louis, Nashville and Chattanooga Railroad; the southern terminus of the East Tennessee, Virginia and Georgia Railroad, the northern terminus of the Alabama Central, and the western of the Western and Atlantic Railroads.

The city is divided (as is shown upon the accompanying map) into five wards. The first four are supplied with water from the Tennessee River, which water presents no peculiarities. The water-supply of the Fifth ward is obtained from surface-wells and cisterns. This water is strongly impregnated with carbonate of lime. At the foot of the hills around the city many springs are found, yielding water of the same character.

The drainage of the city is very imperfect, although not more so than the majority of southern towns; the only measures that have been provided are upon the surface. The privies consist of pits dug into the red or yellow clay, or they are upon the surface of the ground.

The sanitary condition of the city at the time of the outbreak of cholera was not more imperfect than it usually was at the same seasons of former years; an apathy as regards the possible introduction of the disease possessed the majority of the residents of the town, and but few precautionary measures were adopted. Even after the arrival of the first case from Nashville, and after the earlier cases among the residents of the city had occurred, few efforts were made to stay the disease. The dejections of the cholera-sick were thrown out upon the ground, and upon or into masses of *débris*.

Under the supervision of Health Officer Van Deman, a thorough system of disinfection was adopted. We present in full the report of this gentleman, and, in addition, a most interesting paper, from the pen of Dr. E. M. Wight, of Chattanooga.

CHOLERA IN CHATTANOOGA, TENN., DURING THE SUMMER OF 1873

By J. H. VAN DEMAN, M. D., *late Health Officer of Chattanooga.*

During the latter part of May, 1873, the cholera first appeared in Nashville, Tenn., and raged there with great violence until about the first of July, when its decline commenced, and a few days more numbered it among the things that were in that city. Previous to its disappearance there the first case was noted in Chattanooga, Tenn., one hundred and fifty-one miles south of Nashville, and it was that of a brakeman running upon the Nashville and Chattanooga Railroad. Before leaving Nashville he had frequent attacks of diarrhœa, and the *very day of his departure* was seized with that peculiar painless diarrhœa; he, however, came on his train to this point, was taken with vomiting and purging, rice-water discharges, in fine, with all the symptoms of cholera well defined. Collapse set in, and in a very few hours he was ready for his coffin.

Several other cases of a similar nature appeared within the next twenty-four or forty-eight hours, and all among the employés of that road, or the Alabama or Chattanooga Railroad, every patient either having left Nashville, Tenn., or Birmingham, Ala., where the disease was then

raging, with cholera symptoms, or had been exposed to the infection *while there.* Our next case was a Mrs. Richards, the proprietress of a boarding-house, where most of the railroad employés connected with these different railroads were in the habit of stopping when in the city. This patient had a well-marked attack of cholera, and the violence of the same was so great that she lived but a few hours. From these cases it spread rapidly, first among the railroad men, then in the immediate neighborhood of their boarding-house, and very soon we discovered the disease, well discernible all over the city, being felt slightly upon the hilly parts of the city, but very severely in the lower, flat, and marshy regions. Indeed, I might say, without fear of contradiction, that nine-tenths of all persons here who were attacked with cholera either lived in these marshy and low grounds, or else transacted business there during the day, and came home at night only to procure their natural rest; and the most fatal of all these cases enumerated was in the limestone formations, where it cropped out close to the surface. The disease also "laid in wait," so to speak, for our poverty-striken, the destitute, where squalor, filth, and dissipation did most abound, though a few of our very best citizens succumbed to the scourge.

The first case of cholera that appeared in this city was upon the 23d of June, 1873, and rapidly spreading over the different wards, until July 4, when it apparently had reached its acme, then gradually subsiding until July 16, when it disappeared for about one month, and then, returning for a few days, more fatal in its nature, left the city, may we hope, never to return.

Our mortality for the first few days was greater among the white than the colored population; males more than females, and adults more than children; but soon it changed its base, and the poor ignorant negroes suffered terribly, probably owing to their diet, their peculiar habits of cooking, their filth and utter disregard of cleanliness, (as a class,) &c.

In proportion to those attacked, the mortality was about one in five, and while the population of our city, at the outbreak of the disease, was supposed to be about twelve thousand inhabitants, now, during its visitation, we lost, *from all causes*, about one in seventy; by cholera alone one in every two hundred; and when we consider that our whole number of deaths from all sources, *during the same period of time* in 1872, was only forty-three, while this year it footed up one hundred and seventy, this difference then being justly charged to "cholera account," we see our death-rate becomes a fraction over one in every one hundred of our entire population. During the progress of the epidemic, about two thousand of our population left the city for what they supposed were more healthy locations; but of that number who "refugeed," seventeen died from that which was reported to us as cholera, showing that they must have had the germs of the disease in their system when they left, and that their mortality was at least as great, if not greater, than those who remained at home among their friends and nurses, took care of their persons, lived carefully, washed cleanly, ate sparingly, and were governed by the advice of their physicians, whose services could be procured when needed.

We have heretofore stated that the mortality was greater among the inhabitants of the lower and marshy portions of the city; and when we state that fully one-half of our people live upon the hills, and that only five deaths are reported from among them, and all the rest are designated as having lived in the low lands of the city, the statement becomes still more apparent.

Again, an indiscriminate use of vegetables during its visitation here paved the way very plainly for its attack, the free use of them and fruits being almost equivalent to certain death; while those who abstained from their use entirely either were not attacked at all, or, if they were, recovered with but little medication. During the epidemic our local authorities prohibited their *sale*, and *recommended* that no one should even use them, and this being seconded by the entire medical faculty, their order and recommendation were very generally observed. In proof of this statement, we would cite the following facts: On the last days of June the daily death-rates dropped down to a point where we were consoling ourselves that the pestilence was about to leave us. By some means the fruit and vegetable gardeners found out that the sales of their products were to be stopped, and at once they almost gave them away; the effects of which were seen immediately by the mortality reaching its acme upon the 4th of July—being directly attributable to the free use of their vegetables and fruits. Second. On the 16th of July the last case of cholera was seen in the city, and on the 20th the embargo on fruits and vegetables was raised. About the 1st of August, 1873, cholera again re-appeared and raged with *great severity* (within very narrow limits) for a few days. This attack could be traced directly to the intemperate use of unsound water-melons and fruits, occurring as it did almost exclusively among the negroes and a miserable class of whites, but little superior to the negro. And this last attack of cholera did not cease until the embargo was again laid upon all fruits and vegetables, when it promptly yielded.

During the past two years, as health-officer of this city, I have kept a complete record of all deaths that have occurred, with the cause of the same; and during this epidemic an official copy of said record of the day before was published by our daily press, which, being published every morning, did much to quiet the excited public, calming the fear of the timid, nerving the hopeful, and at once "bringing to grief" those old croakers who are always ready and more than willing to magnify statements to the injury and detriment of not only the public, but also of their infinitesimal narrow-minded souls.

Nearly every town between Nashville and this place suffered more or less from cholera during its visitation to the former place, except Stevenson, Ala., (where no one sick was allowed to be put off the train,) and, fortunately for them all, it subsided there simultaneously with its decline at Nashville, spending its whole force upon *our city* after its disappearance there—the same existing in all the towns south of us, the cholera disappearing *with them* at the same time as it did with us.

In Nashville, during its prevalence there among the soldiers on duty, is an item of note. Upon its introduction into that city, Dr. D. G. Caldwell, the surgeon in charge, advised the removal of the troops to some high point, far distant from the city, which was accordingly done; and having pitched their camp some eleven miles distant on a beautiful grassy knoll, near splendid waters, and considerably elevated above the surrounding country, he proceeded to quarantine them there, endeavoring to protect them from all outsiders; and strict guards being set, no one was allowed to return *to* the city, and if from any cause whatsoever the order was disobeyed, the one violating it was not allowed to return to camp. Strict sanitary rules and regulations were laid down and enforced, and the result was just what we would foresee; that not a single case of cholera appeared from that day in the camp, while of the few who remained in garrison at Nashville, most of them were attacked, and some of them with fatal results.

In regard to the sanitary condition of this city at the *onset* of the scourge, I have but little to say; but *then* our local authorities aroused themselves and took very active measures to have every place put in the very best sanitary condition possible. Human excrementitious matter was either at once buried or disinfected. Local cleansing, and the disinfection of most every part of the city was resorted to and enforced by especial sanitary police; lime, carbolic acid, sulphate of iron, (commercial,) &c., &c., were freely used; and to their especial use, and the untiring energies of our mayor and a few of our council who remained in the city, unawed by the danger everywhere around them, to them and the entire medical faculty, their aid and instruction freely given at all hours, and the truth *published every morning* of the mortality the day before, we owe the rapid decline of the disease in this city.

From Chattanooga it spread along the line of our railroads, proving fatal in about the same proportion of cases as here (except in those towns where trains were not allowed to stop, and in such places no one was attacked.) Knoxville, Jonesborough, and Greeneville, in East Tennessee, suffered more or less from the pestilence, and in proportion to their sanitary condition, so their mortality-record shows. In the latter place the mortality was fearful; at least one-half of the citizens there having contracted the disease, and their ratio of deaths about the same as in other places—fully one in every five, and all owing to their wretched sanitary condition; a large spring, from which most of her citizens drew their supply of water, having been contaminated by poisonous matter being thrown upon the hills contiguous thereto, which after the first shower destroyed the purity of its flow.

In Birmingham, Ala., at a height of 650 feet above the level of the sea, with a clear, compact, and yellow clay soil, underlaid in some places with shales of limestone, the mortality was the most fearful of any one city in the South. The first case appeared there about the 1st of June, 1873, shortly after its appearance in Nashville, and being upon the line of the North and South Railroad, one of the links of the great southern chain leading from Louisville through Nashville to the South, the cause of the disease, or rather the locality from whence it came, was perfectly clear. Here, its course was very singular; from the date mentioned, only one case appearing every five days until the 21st of June, then one every day for seven days, and from three to ten every day for the next fourteen days, when it suddenly disappeared, at about the same time of its subsidence in Chattanooga; and while it did not seem to be so very contagious then, it was plain to be seen that it culled its victims from the low and filthy portions of the place, where poverty and squalid wretchedness prevailed, and where the free use of limestone-water was indulged in by the people; and while the moderate use of vegetables did not seem detrimental, still it was noted that those who used them indiscriminately suffered most when attacked. The mortality was here, as is usual in other places in the South, greater among the colored citizens than the whites; among males than females; among adults than children; greater where sanitary rules were disobeyed than among those who adhered to them strictly. The whole number of deaths from all causes in this city was, from June 1 to July 18, (from its outset to its subsidence,) one hundred and seventy-five, while cholera claimed one hundred and thirty of that number, and this, too, in a population of less than four thousand inhabitants, when all were at home; but as all but five or six hundred had left the place for more healthy climes, the mortality is fearful to contemplate.

From these facts thus briefly set forth as to cholera, a few inferences

may advantageously be drawn: That a strict quarantine should be observed between every city and place where cholera is known to exist, allowing no trains of passengers to land, nor the removal of any clothing from the infected district to other places. That a strict observance of well-established sanitary rules and regulations should be had in every town and city, and, "cleanliness being next to godliness," should be enforced; pure water only should be used—spring, river, or cistern—in preference to limestone-water.

OBSERVATIONS ON THE CHOLERA EPIDEMIC AT CHATTANOOGA, TENN., IN THE SUMMER OF 1873.

By Dr. E. M. Wight.

Through Supervising Surgeon United States Marine-Hospital Service.

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The rain-fall in the early part of the growing season of 1873 was very great, extending through March, April, May, and the first days of June. The season was like that of 1867, excepting that the rain was distributed through a somewhat longer period of time, and the river-rise in March, although it covered some of the lower parts of the town, was less by nearly 20 feet than that of 1867. Vegetation in June of both these years was very luxuriant; in 1873 it was remarkably so. The rains ceased about the 10th of June, and from that time until after the cholera-epidemic was over, there was very little rain. A gentle wind from the southwest prevailed during most of the time.

Nashville, where cholera had prevailed for a month previous to its appearance in Chattanooga, is northwest from this place one hundred and fifty-one miles by rail.

On the very day when it first made its appearance here, June 20, seventy-eight deaths occurred from it in that city. On that day two men were attacked in Chattanooga, both having come from Nashville a day or two before. One of these died on the 22d. Three deaths from cholera occurred on the 23d, and from one to ten died from this cause every day after, excepting three, until the 15th of July following.

After the cholera had taken possession of our town, but few more cases occurred at Nashville or along the line of the Nashville and Chattanooga Railroad. It seems to have been traveling, and to have moved its forces as it went, leaving only its dead and wounded upon the battle-field at its departure.

Nearly all the small towns on the railroad-route from Nashville to this city suffered from its visitation, between the 15th and 30th of June, and thus far I have not been able to find an account of a single case occurring this side of Nashville prior to the 20th, excepting within a few miles of that city.

All cases occurring on the line of the Nashville and Chattanooga Railroad had a traceable connection with Nashville or some other cholera-cases, so far as I can learn.

Here, our first twelve cases of authentic and trustworthy diagnosis had direct connection with Nashville, either by a visit to that city a day or two previous to the attack, or by daily association with the employés of the Nashville and Chattanooga Railroad Company, and all the cases which occurred up to the 1st of July could be traced to contact with

some other cholera-cases or locality. After that time we were seized so effectually by the "cholera-grip" that cases began to take place on their own account, so to speak, and so continued up to the 15th of July, which was the commencement of the intermission, which lasted until *the opening of the water-melon trade*, on the 1st of August.

Our worst day was July 3, on which nineteen deaths occurred, there being five from cholera five from *cholera morbus*, four from *unknown* causes, one from *cholera infantum*, one from marasmus, one from congestion of the liver, one from *general* debility, (whatever that is,) and one from diarrhœa.

The greatest number of cholera-deaths occurred on the 7th, when there were ten reported, there being but eleven deaths in all—(the one being from dysentery.)

It is a fact to be noted here, that during the days when cholera was worst here, it was taking its departure from Nashville, or had already taken it.

The whole number of deaths reported at the office of the city physician, from the 20th of June to the 20th of July, which, for the sake of comparison, although cholera ceased on the 14th, is made to cover one month of the year 1873, was one hundred and seventy-three, sixty of which were recorded as having died of cholera.

The whole number of deaths reported at the same office for the same period of time in the year 1872, was but forty-three, the increase in the number of deaths (with an increase in the population of about one-twelfth) being one hundred and thirty; more than four times as many dying this year than the year previous in the same time. Calculating from all causes, after deducting from the whole number of deaths the sixty reported as cholera, the number will still remain three times as great as that of last year.

The number reported as cholera should have been much larger, as false reports were often made by irregular practitioners, and several were unlawfully buried outside the city, of whom no report was made; but for the sake of facts, the official report is taken as it was made at the time.

Aside from this cholera month, however, the number of deaths during the warm months of this year were less than those of the previous year, one of these months affording but few more than half as many deaths as the same month the year before; so this increase of deaths could not be from its being a sickly year, aside from cholera and its influences.

The whole increase of deaths for that month—the difference between forty-three and one hundred and seventy-three—may be justly charged to the account of cholera, there being sixty killed by it directly and seventy indirectly.

Our population being twelve thousand, we lost from all causes during that month one from every seventy of our whole people. By cholera the loss was one from every two hundred. Charging the increase on the loss of the previous year to the cholera account, the deaths become a fraction more than one from every one hundred.

Of the sixty deaths from cholera, twenty-five were white people and thirty-five were colored. The mortality among the blacks was five times as great, in relation to their number, as among the whites.

In the commencement of the epidemic, however, cholera was confined almost entirely to white people. Of the first eleven deaths, ten were whites, and the other was more white than black, a mulatto, and all but one of these eleven *had been exposed to cholera* by direct contact with persons infected, or with those who were daily exposed to such

contact. As before stated, the first two had been in the city of Nashville but a few hours previous to their attack. Three more who died from this first eleven were daily associated—sleeping and eating in the same house—with men who visited Nashville every other day, in the performance of their duties as employés on the Nashville and Chattanooga Railroad.

Fully three-fourths of all the deaths were from that class accustomed to hard labor and poor living.

The disease was confined almost entirely to the low parts of the town. One-half of our people live upon the hills, and from this half there were but five deaths, the other forty-five occurring in the lower flats and valleys. This is partly accounted for by the fact that the poorer classes live mainly in the lower flats of the city, and their habits of life are such as to invite the attack; while the class of well-to-do people, who dwell upon the heights, exercised more discretion as to their diet, and lived in a more comfortable manner generally.

While the alarm was at its height, about fifteen hundred people left the city, as reported by the sanitary police. Some were able to emigrate in good order, having means and conveniences for comfort, while others went, actuated solely by fear, and looking only to escape the danger which they thought so imminent. Of the fifteen hundred who "refugeed," seventeen died in the country from what has been reported as cholera, and about half as many more died from other causes. Twice as many deaths from cholera, in proportion to their number, occurred among those of our people who fled to escape it, as among those who remained comfortably at home. This alarming and unusual mortality among those who left home was due, in a great measure, to their improper diet after leaving the town; their lack of medical attention; their improper and indiscriminate use of "anti-cholera mixture," "cholera cure," "sure preventives," and all the laudanum and camphor they could carry; and the development of the cholera, which they certainly must have had about them, and carried with them, by undue and ill-timed exposure, and change of food and water.

It was observed that during all this time of the stay of epidemic cholera, there was a "cholera feeling" existing among all classes of the community. It was not a matter of fancy in all cases, for many of the most sensible and least fanciful men and women felt its influence for days. There was certainly something in the condition of the atmosphere decidedly oppressive and prostrating. This is further shown by the deaths occurring at the time, in so greatly increased numbers, from diseases other than cholera.

Regarding the contagiousness of cholera as an undecided question, the manner of its working here becomes very puzzling and incomprehensible. Certainly those who were employed to nurse the sick and care for the bodies of the dead were very frequently attacked. Those who were attacked with the disease were almost invariably persons who had associated with cholera patients. Three of our physicians were at one time sick with it, and one came near losing his life.

At the house of a poor widow in the Fourth ward a little boy, six years of age, lay sick with pneumonia following measles. The family was visited on the night of the 21st of June by two men who left Nashville that morning, one of whom then had choleraic diarrhœa and afterward died. There was no cholera at that time anywhere in that neighborhood, and but two or three cases in the city; yet on the 23d, two days after, that little boy was in the collapse of cholera. Four days

after, two other children of the same family were attacked, and soon after the mother. Both the children died.

A family living within about 50 feet of these people, who assisted n nursing them, were attacked two days after, and both man and wife died. This last-named family was nursed part of the time by a colored woman who lived in another part of the city, where there had been no cholera, and who was attacked the day after she returned home, and died in a few hours. The next day a black man was taken sick in the same house, and died in a few days of cholera.

The boy who drove the dead-wagon that carried the pauper dead to the cemetery, after bearing company with more than thirty dead from cholera to their place of final rest, himself took the disease, and was buried with those whose coffins had been his seat.

From ten men employed to bury the dead, five were attacked, and three died.

A colored woman employed by the Board of Health to care for two children whose mother had died of cholera, instead of destroying the infected bed-clothing as directed to do, thought best to save a portion, and the bedding was saved and well washed, but the washer-woman was dead before the clothing was dry.

A poor travelling stranger came to the city, and, late at night, took lodging in an unoccupied cabin, recently vacated by deaths from cholera. The stranger was found dead in the cabin the next day.

These facts seem to me to indicate that our cholera was contagious, communicable by contact alone, without any other assisting circumstances. It seemed, too, to be more than contagious, for it had power to go wherever it was invited. It was so tenacious in its grasp, and had its victims so well prepared for its visit, that it was only necessary to violate a simple law, or disregard a sanitary rule, to be in danger of the terrible chastisement of this skeleton demon.

This completes, briefly, an account of my observations during the first visit of the scourge.

The return, which took place two weeks after the first abatement, was a matter of entirely another sort, and the statements here made would not apply to these later cases in many particulars. It did not return as an epidemic, nor did I know of any cases occurring during August, the time of the second visitation, except invited by some gross indiscretion, mainly the ingestion of fruits and vegetables, the excessive use of alcoholic liquors, and riotous living.

There were fourteen deaths during the second visitation, all occurring during the first half of August.

JAMES COUNTY.

Ooltewah is a post-village of James County, of about one hundred and fifty inhabitants, located upon the line of the East Tennessee, Virginia, and Georgia Railroad, fifteen miles northeast from Chattanooga. The village is located upon rolling table-land, at the foot of a range of high hills. The water-supply is good, obtained from wells, and is limestone in character. The privies are upon the surface of the ground; otherwise the town is in good sanitary condition.

Dr. T. H. Roddy reports that the first cases of cholera that occurred at Ooltewah, in 1873, were among families who had fled from Chattanooga after the disease became epidemic at that city. The first case occurred July 10; the disease came on after a painless diarrhœa of a few days, was well-defined in its characteristics, but the patient recovered after an illness of eight days.

July 18, a man arrived from Chattanooga, with a diarrhœa from which he had been troubled from four to six days. After his arrival at Ooltewah, he went upon a drunken spree; the next day his diarrhœa had increased in severity, and the drinking was continued; the next day, July 20, cholera was developed, and he died after an illness of ten hours.

July 21, a white female from Chattanooga was taken with cholera, and died after fifty-two hours.

July 31, a white female, also from Chattanooga, was taken with a diarrhœa, which continued for five days. She was exceedingly imprudent as to her diet, eating water-melons and cucumbers. August 4, she was taken with cholera, and died after an illness of twenty hours.

Thirteen cases of fully-defined cholera, with six deaths, are reported. Of these cases, seven occurred in the persons of males, six in females; all were whites. Three of the fatal cases were attendants, or lived in the houses at which the deaths of the individuals who had contracted the disease at Chattanooga had died of cholera. All the cases exhibited a painless diarrhœa, which was neglected until violent and urgent symptoms occurred. In addition to these cases of developed cholera, Dr. Roddy reports a number of cases of choleraic diarrhœa, which were characterized by large, watery evacuations, which were attended with prostration and with relaxation of the sphincter ani. This condition occurred especially among the attendants of the cholera sick. All cases that submitted to treatment and regimen during the stage of painless diarrhœa recovered. The treatment consisted of calomel, camphor, and hypodermic injections of morphia and quinine.

Greene County.

Greeneville, the county town of Greene County, is located upon the East Tennessee and Virginia Railroad. The town has about one thousand inhabitants.

We have been unable to obtain from the profession of Greeneville a detailed statement as to the epidemic of cholera at that point. The following, however, are the main facts:

About the 20th of June a Dr. Mallony, residing at Greeneville, returned from a visit to the city of Nashville, cholera being at the time epidemic at the last-named point. After his return Dr. Mallony was attacked with cholera, but recovered. The next person attacked was one Piper, a near neighbor of Dr. Mallony. This case terminated fatally, and the body was carried some ten miles into the country for burial. A Mr. Stevens attended the funeral, contracted the disease, and died. One Miller was present when Stevens was taken with the disease; Miller went for the physician, and then returned to his home, some four or five miles distant, where he also was taken with cholera, but recovered after a tedious illness.

No other case occurred at the residence of Mr. Stevens, but several occurred in the vicinity of Miller's house. From these cases the disease spread and became epidemic.

We present the following paper:

THE CHOLERA OF 1873 AT GREENEVILLE, TENN., INCLUDING TOPOGRAPHY AND SANITARY CONDITION OF THE TOWN.

By A. B. Tadlock, A. M., M. D., *Health Officer, Knoxville.*

On the 24th of June, 1873, William Rule, then mayor of Knoxville, Tenn., received a telegram from H. H. Ingersoll, esq., of Greeneville, as follows:

"To Hon. William Rule, *Mayor, &c.*

"One of our physicians is sick and the other exhausted. Can you send two immediately? Answer.

"W. H. H. INGERSOLL,
"*For the Citizens.*"

Mayor Rule, on receipt of this telegram, hastened to solicit my going, and desired me to choose another physician to accompany me. As the next train left for Greeneville within less than an hour, I had no time to consider, and but little for arranging my affairs, but consented to go, and named four or five physicians from among whom he could select; however, none of them were found able or willing to leave that day, and I went alone.

Arriving at Greeneville at about 4 o'clock p. m., I at once commenced visiting patients with the resident physician, Dr. Smith. We first went to the house of Mr. F. Mitchell, which was a two-story frame, large and commodious, situated on high, rolling ground, with the best of sanitary surroundings; nothing objectionable could be seen. One child, six or eight years of age, had died that day; another was violently ill, and died a few hours afterward, when the third (Ruth) was also taken violently. Of this one I had exclusive charge, studying every feature of the case, and watching it with extreme anxiety night and day, actually serving in the capacity of nurse, sitting by the pallet on which the dying child lay, and sometimes, worn-out and overcome, reclining on the bed on which the other two had died. I mention this to show how much I was exposed, and yet escaped an attack of the disease, to which I may have occasion to refer to hereafter.

All of the family were affected, more or less, but only one other (with the exception of a young man visiting the family) had what could be called cholera. I must not neglect to state that I had the benefit of consultations with Dr. Boyles, Dr. W. R. Sevier of Jonesborough, and Dr. Frank A. Ramsey of Knoxville, all most reputable and eminent physicians.

In the treatment of little Ruth, who died of uremic fever eighty-eight hours after her attack, the remedies used were at first, in the main, tinct. ergot and chlo. potass. Afterward, in consulting with Dr. Boyles, it was agreed to administer a large dose of calomel; subsequent remedies were varied according to symptoms and circumstances.

In answer to a letter of inquiry, I received the following from the father of little Ruth, which will be of interest here:

"Greeneville, Tenn.,
"*August* 19, 1874.

"Dear Sir: Yours of the 17th received and contents noted. Our daughter Ruth, that you attended, was two and a half years old. We use cistern-water, (acknowledged to be the best in town.) It is from

forty to fifty yards from the privy; the privy is down the hill from the cistern, at least 25 or 30 feet below the level. It had been cleaned out late in the winter, and had no rain let in it since the 1st of April. I am satisfied in my own mind that the first case of cholera that appeared here was that of young Mallony. He returned from Nashville on Sunday, and on the Tuesday following he took it at Godfrey's Hotel. Piper, the first case that died, lived down the hill from the hotel some hundred or so yards. Ivah, the last that took it, got well; her case was mild. She was six years old. Our children had used no vegetables or fruits for two weeks before they took sick. They had been fed on boiled milk, boiled middling, toasted light-bread, and rice. None of them had been within two hundred yards of any one that had the cholera.

"F. E. MITCHELL.

"Dr. A. B. TADLOCK, *Knoxville, Tenn.*"

I have given the report of this case and the family because of its importance for future reference.

Having finished our visit and consultations at Mr. M.'s, we, Dr. S. and myself, started for a ride of about three miles into the country and back. Our course was down the creek, which drains the town and suburbs and flows in a southerly direction. About three-quarters of a mile from town I saw case No. 2, just taken sick, which at Dr. S.'s request I prescribed for, and subsequently treated till recovery. Other members of the same family were affected more or less.

In reference to the topography and sanitary relations of the town, it will be seen that this case is significant, and will be noticed further on.

Riding about three miles farther down the creek I saw the third case, and thence across the country about a mile we struck another stream, which ran parallel with the one above mentioned, but had not its origin in the town. Here I saw cases four and five, daughters of a well-to-do farmer. These were the first cases occurring on this creek, and were entirely occasioned by the family having communication with diseased persons on the other creek; subsequently one or more cases occurred on this creek, supposed to have had the same origin.

We then returned to town, arriving between sundown and dark, and having visited several more patients with Dr. S., I took lodgings at the Godfrey House, (the hotel mentioned in Mitchell's letter.)

But few people as yet had left the town, though greatly alarmed at the fatality and constant spreading of the disease. The most of them yet disbelieved the character of the distemper; hence my opinion was sought with eagerness, and it being given in the affirmative, with advice for all to leave town that possibly could get away, caused a stampede the next day, which left the town almost deserted, and no doubt was the means of saving more lives than could have been preserved by any other means known. By thus fleeing the deadly pestilence, that seemed to lurk in every habitation, and contaminate the water, and every breath of air or morsel of food, there can be no question that scores of them escaped immediate death. Truly, the kind words of thanks and appreciation from the Ex-President of the United States and many citizens, assuring me that when the people returned my services should be recognized substantially and in a manner commensurate with the deed, would seem but natural and faithful expressions (expressed or understood) of a religious or civilized people. However, after the people returned, it took the magnates three months' deliberation to allow me the paltry sum of $100, and that in a warrant which after eighteen months I had to sue for, and enjoy a stay of eight months more. (Be-

sides furnishing medicines from my private case to fill prescriptions, I had to pay my hotel bill and full railroad fare.) I have mentioned this not only as a warning to physicians having such calls to risk their lives, but to add evidence of the low valuation by the people of professional services and of sanitary preventive medicine.

I remained in Greeneville seven days and six nights, making (night and day together) one hundred and one visits, and prescribing in the aggregate for over sixty patients. Only three or four cases occurred after I left. Five of my patients died, two of whom killed themselves, I am satisfied, by using too freely patent medicines, of which an abundance disgraced the mantel-pieces of nearly every house; and I have been informed that the very liberal fathers of the town council voted an appropriation to thus supply the poor, thus furnishing the death-warrant, and making each one his own executioner. Nothing better, however, could be expected.

The whole number of deaths from cholera at Greenville and vicinity was estimated at forty.

The remedies I used I have furnished in detail on a separate sheet, and it is not important here to mention it.

Topography.—Greeneville is located in Upper East Tennessee, about 36° 20′ north latitude, at an elevation of 1,580 feet above the level of the sea; has a population of about 1,039, (United States census 1870;) and is the county-seat of Greene County. It is situated immediately on the line of the East Tennessee and Virginia Railroad, about seventy-five miles east of Knoxville. Silex, limestone, and clay are the predominating elements of her earth foundation.

The town is built upon very hilly ground, and is surrounded on the south, east, and north by high detached hills, with gently rising ground to the west.

The basin thus formed and occupied by the town receives, through the deeply furrowed ravines and hollows, the surface-drainage from this extensive water-shed.

The water-supply is furnished by cisterns, wells, and springs. Near the center of the town is a very large spring, affording water for a bold stream, which flows southward, and, with the accession from numerous small springs along its banks, affords sufficient water-power for a grist-mill at the lower part of the town.

After the creek has passed between the two hills situated on the south and east, it flows through valleys mostly made into meadow-land. Thus this stream is the natural and only drain for the whole town. Its fountain-head, and the smaller springs along the banks, furnish water and spring-house facilities for a large portion of the inhabitants. Whether these waters, leaping from the creviced rocks, having passed under numerous cess-pools and sinks, are as pure as Castalia's fountains, I can afford to leave uncriticised. Entertaining the supposition that they are pure when first they sparkle in the sunlight and begin their dance over the pebbly way, let us see how long that virgin purity is likely to be maintained, and examine if its purity is any longer an important element.

Spring and creek water contaminations.—Some of the above-mentioned ravines and hollows, which traverse the town in almost every direction, have been washed by the surface-drainage until large gutters or ruts have been made, over which Cloacina (for convenience, rather than for a holy regard for the ocular and nasal functions of human kind) had planted her modest temples. Again, she laid her foundations all along the banks of the creek, irrespective of the close vicinity of springs and

spring-houses below, in which butter, beets, cucumbers, melons, &c., are kept to cool; while her pit-less representatives, dotted all over the hills, added in wet weather each its quota of unclean rills, flowing down to the adjacent streams, which were visited by rats and other unclean animals, carrying with them into habitations filth and pestilence. In addition to this, the time having arrived when it was considered necessary to empty the vault at the court-house of its contents, which had not been done for a great many years, the authorities had this mass of putrefaction conveyed to one of the adjacent water-shed hill-sides and there deposited; this was done a short time before the cholera made its appearance, and many of the barrels in which it was transported were said to remain unemptied, exposed to the rain and hot summer sun.

The supposition was entertained by some that old cholera germs were thus exposed and developed into activity, and that this was the cause of "the prevailing epidemic," as the disease was here termed.

This is by no means my opinion, but that the disposition of such material in the heat of summer offered the most favorable opportunity for the elementary development of malarial disease, and furnished inviting nests for the incubation and rapid diffusion of either native or exotic disease-germs cannot be questioned.

Still more reprehensible was the frequent and uncivilized practice of some stores and residences being entirely unprovided with privy accommodations, in which case the fecal matter was deposited upon the surface of the ground—thus exposed to the elements and to the depredations of animals and insects. Is it any wonder, then, that the streams became contaminated, and the springs at high tide received an impure sediment which subsequently mixed with and poisoned the articles of daily food and drink?

Agencies of communication.—We have already seen what extraordinary facilities were here offered for the incubation, development, multiplication, and spreading of any contagious or infectious *materies morbi;* let us for a moment examine the very feasible means ready at hand for its successful application to the human system.

While other agencies were most effective in the general spread of the disorder at this place, we think it clearly shown by the course of attack that the creek conveyed and introduced *ab initio* the first fruits of the infection. The first fatal cases giving warning of the true type and malignancy of the distemper occurred in families living along the creek, even to the distance of four or five miles below the town. One whole family was swept away, and several others lost one, two, or three of their members. Besides using the infected water of their springs along the banks, as stated above, their domestic animals drank out of the creek, the women washed their clothing, and no doubt in some cases washed also the butter and vegetables, which, besides supplying their own tables, by barter partly supplied the town.

Case No. 2 belonged to a family that used water from a spring which rose on the edge of the creek in low meadow-ground. No. 3, a mild case, was located on this creek three miles below town; but Nos. 2, 3, 4 and 5, all were attacked several days after the greatest fatality of the same neighborhood, and after the whole town had become as it were a pest-house or hospital, and Nos. 2 and 3 seem to have been caused by a second installment of the infection from the town.

Having seen how numbers were poisoned from creeks and adjacent springs, the inquiry becomes pertinent, How was the disease communicated to the dwellers on high ground, (Mr. Mitchell and many others are examples,) who used cistern-water exclusively? The answer is easy

when we consider the instincts and habits of insects and domesticated animals, and their acknowledged liability to disease.

The disposition of excrementitious matter has been shown to be favorable for the attack of these creatures. Thus the swine becoming affected and leaving their poisonous droppings upon the streets, which, being pulverized into impalpable powder, was inhaled. Rats and mice poisoned in the same manner would seek their hiding-places in houses and become a prey for cats, or in seeking to satiate their thirst would fall into cisterns and wells. Flies also contaminated whatever food they touched, and poisoned the very air of the nursery. It has been remarked that these insects die during cholera epidemics, and such was notably the fact in this instance, for they lay dead everywhere, and frequently, in spite of fly-brushes, they dropped into various dishes on the dining-table, until, when the disease had disappeared, scarcely a living representative remained.

It may be therefore easily understood why children whose clothing is most frequently washed and changed, and who play about the house with the domestic animals, and those who, on account of poverty, live poorly and go much from house to house, are more generally and fatally attacked.

The history of this epidemic at Greeneville furnishes a sad comment on the neglect of sanitary laws, and shows the great need of National and State boards of health.

I will conclude by stating that though myself perceptibly affected by the contagion, I attribute my comparative escape to my not drinking any water or eating cold food, and to the avoidance as far as possible of the inhaling of mephitic air.

KNOXVILLE, TENN., *January* 1, 1875.

HOUSTON COUNTY.

Erin, Houston County, Tennessee, is a village of some three hundred inhabitants, located on the line of the Memphis division of the Louisville and Nashville and Great Southern Railroad, as it passes through the valley of Well's Creek. This valley is surrounded by a chain of hills, having a limestone base, which open on the west to admit Well's Creek and opens again on the east for its exit. Well's Creek empties into the Cumberland River six miles east of Erin. The Tennessee River is distant sixteen miles to the south.

The village is located at the narrowest portion of the valley, which at its eastern end is not more than thirty rods wide. The soil is wet and boggy, being constantly fed with springs which flow from the base of the hills. At the lower end of the village there was a slough about one hundred yards long, lying parallel with the line of the railroad, and over this slough was erected the railroad depot, a hotel, and a number of business houses, all clustered together along the platform of the depot—the rear of all these buildings resting on piles. These buildings have been erected within the past ten or twelve years, immediately over the ground formerly occupied by a saw-mill and tan-yard, the *débris* of which has never been removed; and as this is the lowest point in the valley, whenever there is a washing rain, or the creek overflows its banks, the deposit of decaying animal and vegetable matter at this point is augmented; and as the prives of the town are all above ground, a considerable amount of the mixture is human excrement. The rear rooms of most of the business houses are used as dwellings. The dwellings of the poorer classes are upon the low ground on the north of the

railroad, while those of the better class are upon the surrounding hills. The water supply of this village is obtained from the creek, from the springs at the base of the hills, and from surface-wells.

The excessive rains of June, 1873, had washed into the slough already described excrementitious matter from privies, stables, and hog-pens, with all the *débris* on the surface of the ground. The slough under the majority of the houses was covered with a "green skim," and from it an intense odor was emitted.

On the 22d of June a man named Osburn, who was employed as a fireman upon the railroad, arrived at his home in Erin, in the immediate vicinity of this slough, sick with cholera, having been taken with the disease at Clarksville, twenty-six miles distant, and died after an illness of eighteen hours. The excreta in this case were not disinfected, but were planted in the "hot-bed" prepared for them.

June 23.—A Mrs. Dowdy and a negro named Daily, who had both been in contact with and who lived in the immediate vicinity of Osburn, were attacked with cholera, and both died, the first in twenty-four, the second in eight hours.

June 25 and 26.—Each had a fatal case of the disease.

June 28.—Six cases are reported, three of whom died.

During the month of July eight cases of cholera are reported, with five deaths; and from August 3 to the 16th, twenty-three cases of cholera occurred, ten of which died; a total of forty-two cases, with twenty-two deaths. Thirty-seven of these cases were whites, five were blacks; thirty were males, twelve were females. Four cases occurred in the persons of children between six and three years of age.

Four fatal cases of the disease occurred in the surrounding country, in each of which the infection was distinctly traced to the town. The majority of those who were able to do so left the town during the epidemic; of those who remained nearly all suffered more or less with diarrhœa.

At the time of the epidemic Erin was a center-point of the railroad trains, as both day and night trains met, and there was generally three or four sets of employés constantly at the town. From each freight-train, as it arrived, the caboose was uncoupled, and, with the train-hands as occupants, it stood upon a side-track until the schedule-time for again joining a train. The construction-train had its headquarters at this point, and many of the workmen upon it resided in the village.

The occurrence of the entire epidemic cannot be attributed to the arrival of Osburn sick with cholera on the 22d of June, although his was undoubtedly the initial case of the outbreak; for we find that on June 28, Thomas Fentress, a negro employed upon the construction-train, arrived at his home in Erin sick with cholera, and died within ten hours of his arrival. On July 30, Henry Johnson died of cholera a few hours after his removal from the same train; and on August 3, Bill Patrick also died, and his body was removed at Erin from the work or construction-train.

The symptoms presented by these cases differed in no way from those generally ascribed to the disease. In the cases of the four children, two of whom were members of the same family, there was, however, no premonitory diarrhœa. In each instance the child was awakened toward daylight with a diarrhœa, which from the first effort was copious and watery; the stage of collapse being reached rapidly.

It is reported by Dr. E. T. Lewis, of Erin, to whom we are indebted for much of the material of this statement, that while no case which became fully collapsed recovered, yet those who were attacked and who

applied for medical aid at the onset of the disease, and who carefully carried out the directions received as to absolute and perfect rest, were almost invariably relieved.

The treatment from which the best results was obtained was calomel in full doses, combined with opium; the latter in grain doses, repeated every four or five hours.

Every effort was made to improve the sanitary condition of the town. Sulphate of iron and lime were used as disinfectants.

KNOX COUNTY.

CHOLERA AT KNOXVILLE, TENN., IN THE YEAR 1873.

BY F. K. BAILEY, M. D., *late Health-Officer.*

Knoxville, Tenn., lies about on the thirty-seventh degree of north latitude, and is the principal town in the eastern division of the State. It is situated on the north bank of the Tennessee (late Holston) River, and, as will be seen, in a favorable location in regard to health. From the river there is an abrupt elevation to the height of from 100 to 115 feet, which extends northward nearly half a mile, on still ascending ground. This plateau, from east to west, is bounded by creeks (First and Second) which empty into the river at about right angles, and is that portion upon which the original town was laid out in 1792. About the year 1812 the village was extended eastward across First Creek, and quite a number of houses erected west of Second Creek. The land lay in commons, or was cultivated for crops, for more than half a century.

In 1838 the town began to extend northward. The ascending ground alluded to above as extending northward suddenly drops about 100 feet, to a low strip of land which was originally known as the "flag-pond." Along this depression is laid the track of a railroad connecting Bristol, Va., and Chattanooga. Farther north, and a short distance from the railroad-track, is a slight elevation which gradually rises till it reaches a high ridge three miles from the river. The present town, with its suburban additions, extends about a mile north and south, and nearly the same distance east and west. The surface-drainage, except in the locality upon which the railroad is built, is almost perfect. The soil is a solid ferruginous clay, intermixed with a fragile limestone rock, which is filled with seams, and in some places cavernous openings, through which water can pass off to an unknown depth, but probably on a level with the bed of the river.

The streets, although narrower than in more modern laid out cities, are very well graded and generally provided with gutters, which carry off water falling from the clouds, immediately either to the creeks or the river. The creeks descend rapidly and give fall enough for mill-sites. The creek-bottoms are rocky, a formation made by the outcropping of the underlying solid structure of the general surface. Numerous ravines which ran across, at different angles, the whole original site have been filled from time to time with material taken from cellar-excavations; the removal of hillocks, and the ordinary *débris* formed in the gutters and back yards of buildings. Streets and alleys have also been leveled across these ravines, and hence more or less of the surface is composed of made ground. The drainage being so good on account of the general surface not being level, but little noxious emanation can arise from this filling and the general grade formed, without prejudice to health, except along the railroad-track.

The original water-supply for the inhabitants came from numerous springs which for ages appear to have gushed forth along the edges of the creeks and the river-bank. The water from these springs is as pure as any of the kind, and is never rendered otherwise except when the streams are flooded by heavy rains.

Cistern-water has been used extensively in families from the earliest days of municipal existence, especially at points remote from the springs. For many years no house of any pretensions has been erected without being provided with a large and substantial cistern, and a filter more or less effective attached. The mildness of the climate renders it practicable to have cisterns easily constructed, it not being necessary to go below a frost-line as in the more northern States.

Likewise, from the fact that it is not necessary to provide against extreme cold, there are less cellars made in which to store vegetables in winter. Hence there is comparatively little of decaying matter under the houses to cause sickness. In fact, but few lay by a store of vegetables and fruit, the main dependence being upon small purchases made at short intervals in the market.

There are no low places of any extent in which water can become stagnant, even in the suburbs, except where the grading of streets has interfered with natural drainage.

There are no animals slaughtered very near the city limits, but the slaughter-houses are in some instances along the banks of one of the creeks, and more or less impurity finds its way into the stream to pass on to the river.

Comparatively little animal matter, however, is deposited for any length of time, as the rapid current and frequent floodings from rain tend to carry everything away.

No sewerage system has as yet been inaugurated, but the United States Government building (court-house and post-office) is drained by means of a deep sewer, which empties near the river into one which was already made. Some of the property-owners along the street through which it passes have made openings into which they may discharge drains, and one gentleman has already availed himself of this opportunity, in order to carry off sewage from his premises.

His example will soon be followed by others, and before many years there will probably be a plan devised for supplying the city with water from the river, and this movement will forcibly suggest the sewer system.

One important drawback to the present and future health is the manner in which privy-vaults are constructed, or rather their non-construction. For nearly a century the soil has been filling up with effete matter accumulating in a series of privy-vaults which have been at times dug, used, filled, and others substituted.

Whether animal matter has to any extent been conveyed by percolation through the soil to the several springs is uncertain, but we are told of one instance in which coloring matter was found to have been carried from a tannery to a spring from which many families procured water. This occurred in 1854. The probability is, however, that surface-water only is likely to affect the water-sources which nature so abundantly supplies.

It will be seen, then, that the natural location of Knoxville is favorable to health, and that time, with improvements made from year to year, have not served to render it insalubrious.

Cholera prevailed here in 1849, 1854, and 1866. It was very fatal at each period, and the people had the usual dread of the disease.

During the month of May, 1873, there was noticed a tendency to looseness of the bowels and cholera-morbus. There were also cases of vernal remittent fever, and more than the usual number that assumed an intermittent type. It is common every year more or less to meet with diarrhœa among children from April to July 1, and no apprehensions were felt that it would be more severe or general during this season than usual in others preceding. Early in June, however, the disease began to be choleraic, but of a mild type and easily controlled. Among the adult population cholera-morbus made its appearance about the middle of the month. Both white and black were attacked, but none died for more than a week after the first case occurred. The number of deaths from all causes in May and June was below the usual ratio.

Case I.—The first case that was considered undoubted cholera, was a patient of Dr. C. Deaderick. He was taken, about 5 p. m., June 24, with severe vomiting and purging. The doctor saw him very soon after his attack, and found that collapse had already set in. At 8 o'clock his voice was sepulchral; skin of the characteristic doughy feel, and the hands presenting the "washerwoman's" appearance; pulse imperceptible at the wrist at 8.30 o'clock a. m., beating 110 at the temporal region. From this time there was jactitation, hippocratic visage, and coldness of the tongue. Died at midnight.

I learned the following facts in the history of this man: He was about fifty years of age, married, and in comfortable circumstances; full, sanguine temperament; imprudent in all his habits; a great eater, gross in appearance, and weighing about 225 pounds. Drank daily of whisky. On the morning of his attack he remarked to some one that he had no fear of cholera, and, with an oath, stated that he could eat vegetables to any amount with impunity. Those who took dinner with him state that he ate very freely of cucumbers, green beans, and other vegetables, drank a quantity of cold water, and during the afternoon was seen to take whisky and ice-cream.

This man lived a short distance north of the railroad, and there was nothing of a local character to particularly excite the disease.*

Case II.—June 23, at 7 o'clock p. m., I was called to see a white woman, about thirty-two years old, married, and advanced about seven months in utero-gestation. Forty minutes previous to my calling she was taken with a copious evacuation from the bowels, attended with nausea and vomiting. Pulse small and feeble, but about natural in frequency; extremities cool; tongue coated white, with a brownish color at the base. There had been severe cramping in the stomach, together with spasms of the arms and muscles of the neck from the commencement, and when I entered the room she was unconscious, lying with closed eyes, and the muscles generally rigid. She had walked since noon about half a mile in the hot sun, and on returning drank freely of water.

The family came from Georgia about the first of the month, and she had not felt well since their arrival. Her husband was intemperate, and inattentive to her, and she was in a state of mental depression.

I gave at once, dry, upon the tongue, sub. nit. bismuth, gr. v, calomel, gr. i, sulp. morphine, gr $\frac{1}{6}$, and sub. carb. soda, gr. vi, to repeat in an hour, and sinapisms to pit of stomach and extremities.

At 8.30 there had been no return of symptoms. Slept a few minutes.

* In the report of the case of Robert Brown, the first one that proved fatal in Knoxville, it is proper to add that he kept a boarding-house for the accommodation of railroad-men, who stopped off from trains coming from Chattanooga, and the seeds of cholera might have been brought by some of these boarders

24th, 9 a. m.—No vomiting or purging through the night; able to sit up in bed.

This case, although wanting in the characteristics of true cholera, was severe, and suggestive of what we had reason to fear. I noticed the peculiar odor, which in former epidemics had been very obvious; still, the urine was free, the voice clear and sharp, and the diagnosis noted as cholera vulgaris.

The apartment occupied by this woman was in the rear of a saloon, and the premises far from clean. Conditions personal to the patient were sufficient to induce vomiting and purging, and they were, walking in the sun, &c., as stated.

Case III.—Jacob Eastuday, German, aged fifty, with a large family; teamster; was taken about July 1 with cramping and vomiting, with purging early in the morning, after having been wet on the previous day without changing his clothes. Died at night. Could not learn any definite history of this case, but was informed that he sank from exhaustion, after vomiting and purging all day. Habits, intemperate for years. He lived in the northern limits of the city proper, but not in an unhealthy locality; causes must have been wholly personal.

Case IV.—July 3, Mrs. R., widow, about forty-five years old, died at 8.45 p. m. Taken sick on the 1st, with choloraic symptoms, and employed a homeopathist. Was no better on the morning of the 3d, and then sent for Drs. James Rodgers and F. A. Ramsey, of this city, who decided the case to be one of true cholera. I have no details of symptoms or of treatment. This case occurred in the old part of the city, and near Second Creek. The surface condition of this locality was good, but on the lot were two privies, one of which had been used for thirty years, and still open. The other was recent.

Dr. Ramsey informs me that a fatal case of cholera occurred in the same house in 1854, and, as the old privy was still open, the germ might have remained, waiting for circumstances favorable to developing the disease.

Case V.—A white man of sixty; lived near the river, west of the city limits, nearly half a mile from Case IV, and still more remote from the others. Had cholerine for some days, which had been kept at bay by some means, but on July 4 he relapsed, after drinking freely of cold water.

Case VI.—July 9, Fanny Nelson, a colored girl, aged twenty-one, slender, but not sickly; at 9 o'clock p. m., vomiting and purging violently; dejections watery and nearly odorless; great prostration. Pulse 90 and small; tongue slightly coated; distress at præcordia, but no cramping; extremities warm and somewhat moist; urine very scanty. Gave calomel, gr. ii, pulv. doveri, gr. v, at once. Sinapisms to stomach and ankles. Small pieces of ice to be slowly dissolved in the mouth.

10th, morning.—Less vomiting; stools of a yellowish tinge; much prostration; jactitation and insomnia. Gave bismuth and morphine every two hours; iced tea. 9 o'clock p. m., has slept some; one or two stools, but no vomiting.

11th, 8 o'clock a. m.—Slept nearly all night; amelioration of all the symptoms. Without further details I will say that this girl slowly recovered her usual health. The disease evidently was controlled at first, but the symptoms were characteristic. This case was near First Creek, but in an old house, and location bad.

Case VII.—William Johnson, white, married, and about forty years of age. He was taken on Saturday, July 13, at an early hour. A friend

gave him some homeopathic pills, which was all that he had as medicine during the day and succeeding night.

Monday morning Dr. Burnett was called in, and also Dr. Boynton. When first seen he was in a state of collapse. Morphine hypodermically, stimulants, enemata of laudanum, and other measures were adopted, but without avail. I called in frequently during the day in the capacity of health-officer, and will say that no better marked case of true algide cholera ever occurred. (The house nearly opposite the one in which case VI occurred.) Johnson was living alone, his family having gone to the country to avoid cholera. He prepared his own food, and, it is said, would not properly cook it because it would take him from his work as a mechanic. He lived on green corn, side meat, and some bread poorly baked.

Case VIII.—"Aunt Vina," a colored woman, about fifty years of age. July 11, I was called to visit her, and found that she had had some diarrhœa since the 7th, which, with a feeble condition from previous sickness and exposure, reduced her very much. Stools watery, and vomiting freely of a colorless substance; great depression; pulse slow and small; extremities warm and moist; tongue coated; very thirsty, and is constantly tossing about in the bed, but does not complain of pain; eyes sunken; features so much changed that she is scarcely recognizable; voice feeble, but not husky; urine scanty; slight cramping in the legs at times. Gave nit. bismuth, gr. v, calomel, gr. ii, sulph. morphine, gr. $\frac{1}{6}$, dry, on the tongue, every three hours. Sinapisms to the extremities and pit of stomach. Ice in small lumps to be dissolved in the mouth.

Saturday, 12.—Nine a. m., stools are changed to a brownish-yellow; not copious or very frequent, but offensive. Took but three powders, when the stools changed in color. Less vomiting. To take bismuth and morphine every two, three, or four hours, as required.

Sunday, 13.—Appearances improved. Slept some during the night. Stools dark and bilious, voided only once in three or four hours. Small quantity of urine. Pulse about 80. Soft, creamy coat on the center of the tongue, with the tip and edges red. Can retain rice and chicken soup.

Monday, 14.—Is no worse. Can raise up on one elbow; some sleep during the night. To continue bismuth and morphine; rice-soup.

Tuesday, 15.—More gastric disturbance and great thirst; frequent attempts at vomiting, and passes small green stools with some consistence; scarcely any urine voided. To continue same treatment.

Thursday, 17.—Has failed in forty-eight hours fast. Some stupor, and is roused with difficulty. Gave stimulants, with quinine and sulph. acid dilut. Six p. m., is unwilling to swallow anything but water, and that is taken with difficulty. Patient died at 2 a. m., Saturday, 19.

This case occurred in the same house as Case VI. I have given details, from the fact that gastro-enteric symptoms set in at an early stage, with dark stools. Recovery might have been obtained in a younger and more vigorous person, for the morbid appearances were not more severe than those of Fanny Nelson, (Case VI.)

Case IX.—Leanna H———, a very light mulatto, aged twenty-four years, mother of five children.

July 9, 4 o'clock p. m.—She called at my office complaining of a "load in the stomach," but no nausea. Gave her a dose of calomel with bismuth, to be taken as soon as she arrived at her house. Called next morning and found that the cathartic had moved the bowels; but there was nausea and vomiting, with some coldness of the extremities, husky voice, and pinched features. Gave bismuth and morphine in free doses; sinapisms, and only a small allowance of drinks.

16th.—Gradual improvement, and to-day she had a natural evacuation. This case was decidedly choleraic, and arrested by timely treatment.

Case X.—Rosa H., member of the same family, had diarrhœa when Leanna was taken. A decided dose of calomel at once arrested the looseness, and she was about the next day.

Case XI.—July 13.—A French lady, patient of Dr. J. M. Boyd, was taken with characteristic symptoms. Prompt medication arrested the disease. On Monday was apparently doing well, but Tuesday morning relapsed, and she died at 7.30 p. m.

Case XII.—Spencer K———, an African of sixty or more, and husband of "Aunt Vina," was taken suddenly, July 13, with diarrhœa, which continued some hours. I gave calomel and morphine, which operated at night. On Monday morning he was able to be about the house and take care of his wife, but was very feeble. On Tuesday he kept about, but on Wednesday morning I found him vomiting. Gave him a small dose of bismuth and morphine, but he soon went into collapse, dying at 4 or 5 o'clock p. m. He was intemperate, and broken down generally.

Case XIII.—Julia, daughter of the above, aged sixteen, a stout, healthy girl, was taken with diarrhœa while her mother lay sick, but it was at once checked by a dose of calomel and bismuth.

Case XIV.—July 18, Friday, a young man, patient of Dr. Burnett, was taken sick, and before medicines could be effective, went into collapse. He lingered till the 22d at 5 o'clock p. m. There were some indications at one time of a rally, the stools changing in color, and slight reactionary fever coming on.

The above, commencing with Case VI, all occurred on Crozier street, which runs parallel with First Creek, about one-fourth of a mile from its mouth; all but two were on adjoining lots within a short distance from each other. The water used by these families was procured from a spring which bubbles from the bed of the creek, and available only when at a low stage. After heavy rains the spring is overflowed, and often the water is used when mixed with the flushing of rains.

Up to July 26 a few cases occurred in different localities, but no more deaths than those reported above.

Case XV.—Pleasant M. Miller, aged sixty-four years, white, rather feeble health from exposure in the Army, and pensioned therefor, father-in-law of Johnson, (Case VIII,) who was in attendance about thirty-six hours upon Johnson, and upon his death took the corpse to his house nineteen miles distant. It is said that he took the bed-clothes upon which his son-in-law died into a wagon and rode upon them. Miller soon after sickened and died. It was reported that two daughters of Miller, and the physician who attended the family, all died within a few days. They lived in a healthy, rural locality, and it is evident that the disease was communicated as above stated. There were also other cases in the vicinity, but no more deaths.

July 30, a negro man, forty-five or fifty years of age, died after a few hours' illness. He was very intemperate, and had been drinking freely just before the attack.

Case XVI.—July 30. I will give verbatim a history of this case as already reported in the Nashville Medical and Surgical Journal, April, 1874.

"On the mid-day train Mrs. P., a married woman of thirty or more, came to her home in this city from Jonesborough, one hundred miles northeast. On the 26th she went to Jonesborough in response to

a dispatch stating that her mother was sick. She found both father and mother sick, and they died on Monday and Tuesday. Sunday night she was taken with diarrhœa, and started for home at 7 o'clock on Wednesday morning. While in the car she vomited, and was very much depressed at 1 p. m. When I saw her, out of five nights she had only slept four, and the death of her parents added to her weakened condition. Her extremities were warm; pulse weak, but slow and somewhat full; voice natural in tone, and no washerwoman's hands; tongue slightly coated, but red; urine secreted in small quantities. Prescribed as follows: ℞. calomel, gr. viii, sub. nit. bismuth, grs. xv, sulph. morphine, gr. s. s. F. pulv. No. 4, sig., one every two hours, dry, on the tongue. Sinapisms to extremities and pit of the stomach.

"There was no vomiting or purging after her arrival until about 4 o'clock. The stool was green, and the vomited matter also tinged with greenish yellow. At dark there was increased gastric irritation, with more depression. Before midnight the hands and feet became cold; vomiting increased, countenance more dejected and eyes sunken. Involuntary stools passed off in bed; tongue cold; no cramping till about midnight, when it commenced in the legs. At daylight the pulse ceased to beat, hands and forearms cold, also legs to the knees; emaciation rapidly going on; vomiting of green water, with curdles resembling the green scum upon frog-ponds.

"At noon on Thursday she was still living; voice not changed in key, and stronger than it was last night; vomits everything swallowed.

"At 6 p. m. pulse slightly perceptible; extremities still cold; stools passing involuntarily, and so much as to run through upon the floor. No urine passed during the day; vomiting continuous, of a dark bilious character; tongue coated, and brown in color; thirst intense, only appeased by ice, or iced water, which is rejected after a quantity is accumulated. Takes iced brandy.

"Friday, August 1, 8 o'clock a. m.—Still living, but general appearances unchanged since last night. Vomits a dark-colored substance, with water, which she is constantly begging for; pulse barely perceptible, and not more than 80.

"Saturday, 2d, 7 o'clock a. m.—No vomiting or purging since yesterday; pulse slightly improved in volume, but not in strength; inclined to wander after sleeping; feet some warmer, but hands still cold, and mottled red and purple; no urine since Thursday that can be ascertained.

"Sunday, 3d.—Died at 2.30 a. m. This case, although choleraic in most points, was more of the nature of gastro-enteritis. She informed me that her first vomiting and purging were dark in color, and attended with pain and distress in the præcordia.

"The flow of urine for the first few days, absence of the husky voice and shriveled fingers, indicated another pathological condition than true cholera. Warmth was kept in the extremities some time after the radial pulse was nearly imperceptible."

Case XVII.—A few days after this woman died, Jennie, a young sister, single, and about twenty years of age, was taken, but I did not attend her. The symptoms were violent vomiting and purging, depression, and rapidly-failing strength. She lived about two days.

The house in which Mrs. P. died was the same one occupied by Case XI. Whether the one influenced the other is uncertain. Mrs. P. being attacked at Jonesborough, might have contracted the disease there, but the predisposition may have been carried with her.

Case XVIII.—Isaac, brother of Jennie and Mrs. P., was taken about August 1, and barely escaped death. He was in the room of Mrs. P. for

most of the time of her illness, as also Jennie. They had gone to another place before being taken sick, but must have been predisposed from exposure and want of rest, &c.

Case XIX.—On Monday, the 11th, a girl, aged fourteen, feeble, scrofulous diathesis, was taken with diarrhœa, which, at 8 o'clock, became profuse. Collapse soon ensued, and death occurred at 2.30 a. m. on the 12th. This girl was of poor parentage, and for four years or more had been subject to palpitation and severe pain in the chest. The family were of the worst character in all their habits, and during the day the deceased, with an older sister, had eaten unripe peaches. The house was in a low ravine where filth had accumulated for years, and the privy was foul. Dr. Burnett was called, but collapse had occurred, and remedies were of no avail. The locality was less than two blocks from where Case IV occurred.

Case XX.—August 14, an old man, white, of low, uncouth habits, was reported sick with cholera, and Dr. Stewart saw him. He lived in a suburban neighborhood, northeast from the city, and the house was a mere hovel. Died at sunrise on the 15th. At the suggestion of Dr. J. R. Ludlow, who was also in attendance, the hot pack was used, which was the only case where it was tried during the season. On one corner of the lot on which this man lived was a large pile of manure, which had accumulated from the keeping of a cow. He had been advised to remove it, but insolently refused.

Case XXI.—August 15, Mrs. S., aged fifty-five or more, mother of numerous adult children, was taken at noon with profuse diarrhœa, watery and involuntary stools. Had some looseness for a day or more, but paid no attention to it. I saw her at 4 o'clock p. m., with Dr. Boyd, the attendant. Pulse slow and soft; extremities warm; no nausea. Tongue had a yellow coat; no pain; voice a little husky. Had taken eight grains of calomel and three-fourths of a grain of morphine.

16th.—Some improvement. Recovered. This case was on Second Creek. Will refer to locality further on.

Case XXII.—Sunday, August 17, a man, white, aged forty-eight, died this a. m. at 6 o'clock. He was a carpenter, and worked during the previous week till Friday. Walked in the hot sun on Saturday, which aggravated a diarrhœa which had been troublesome for two or three days. I visited the house after his death to inspect the premises, and found a daughter—

Case XXIII—who had been walking the streets the preceding night as "nymph du pave," much depressed from fear, and a diarrhœa attended with vomiting. I gave her calomel, gr. vi, at once. She was better next morning (Monday) from effect of cathartic. Followed up with morphine and bismuth, and she was well in a week.

Case XXIV.—August 17, colored infant nineteen months old. Found it in collapse at 6 o'clock a. m. Died at noon same day. I gave it calomel, gr. iii, which acted at once, bringing away seeds and skins of tomatoes, eaten the day before.

Case XXV.—The mother of above, when I called to see the child, was nearly collapsed, with profuse diarrhœa, soapy and brownish; great distress at stomach; great jactitation and depression. Gave calomel, gr. v, at once, repeated at 10 a. m. and 6 p. m. Bowels moved from its effect before dark.

18th, 9 o'clock a. m.—Better and made a good recovery.

Case XXVI.—On the 15th, the day on which Mrs. S. (Case XXI) took sick, I was subsequently told a young girl, niece of Mrs. S., was taken with diarrhœa, and also a child of five years. In the same neighbor-

hood some six or eight cases occurred on the 16th, some of which were decidedly choleraic. I saw none of these cases. Their medical attendant told me they were all relieved by calomel and morphine.

A spring from which most or all the families procured water was found to be impure from surface-water; all were advised to substitute rain-water, and no more cases occurred. The family in which Cases XXIV and XXV occurred, and also Case XIX, used water from this spring. The street upon which most of these families lived ran parallel with Second Creek, and there is a large tannery near. There is a dam near the tannery, made to direct the water into a mill-race. Into the pond thus caused more or less fleshings of hides and the excrement of a privy find lodgment. This privy is used by about twenty-five men, and has no pit or vault. In dry, hot weather a very offensive smell arises from this locality. In previous epidemics cholera had occurred in this same neighborhood, and it is very certain that its prevalence was influenced by the conditions mentioned above.

Case XXVII.—About August 1, a young man employed on the East Tennessee, Virginia and Georgia Railroad, by the name of Dunn, was brought into the city from the station. He was a patient of Dr. J. M. Boyd, and I saw him only while on an official visit to the house. Complete collapse did not obtain, but the symptoms were characteristic. He was treated with calomel and opiates, and after a struggle between life and death for five or six days, he rallied and made a good recovery. This man had frequently passed through Jonesborough and Greeneville while cholera was prevailing in those towns. He did not reside here, and consequently brought the disease with him. No case occurred in the house where Dunn lay sick.

Case XXVIII.—About the same time Dunn was brought in, a young man by the name of Perry was attacked. He was treated by Dr. Boyd. Treatment, mercurials and opiates. This man had suffered intensely from fear of cholera all summer, and would not eat anything but bacon and bread, from a notion that vegetables would induce the disease. He was sick about a week, and made a good recovery.

Case XXIX.—Mrs. D., wife of Case XXII, and mother of Case XXIII, was taken August 18, very suddenly, about 3 o'clock p. m., with copious diarrhœa, but no vomiting. I saw her within thirty minutes, and gave at once, calomel grs. viii, and sulph. morph, grs. $\frac{1}{8}$; sinapisms and rest in bed.

19th, 9 o'clock a. m.—Bowels moved freely and copiously with green stools; some vomiting attending the action of the bowels.

22d.—Had improved slowly, with no more untoward appearances, but to-day there was a relapse of vomiting, with some purging. Pulse very feeble, countenance sunken, voice weak, but not unnatural in tone; tongue whitish yellow; great thirst for iced water; feet and hands clammy, but not cold. Gave morphine, bismuth, soda; sinapisms. This woman slowly recovered, but the case was aggravated by her mental condition. Fear of cholera, added to grief from the loss of her husband, and the conduct of her daughter, contributed as a cause. There is no doubt of the choleraic nature of her attack; but the disease was gastro-enteric in its development, and was well-nigh fatal to life.

Case XXX.—August 21. A strong colored man, an industrious worker in an iron-mill for four years past; aged about forty years. He had diarrhœa for some days, but paid no attention to it. On the 20th he ate cabbage freeely at noon, and had indulged for some days in the use of watermelons. I did not visit the premises till after his death, but was informed he was taken at night (21st) and died before morning-light. No

evacuation from the bowels after collapse set in, but he vomited freely. The locality is near Second Creek, above the tannery spoken of. He had used water from a spring upon the edge of the creek and near the mill where he had worked.

Case XXXI.—August 22. Reuben Emmett, colored, aged sixty or more; hand-cart drayman; habits good, and generally respected. He had two evacuations before noon yesterday, but kept about till nearly dark, when he went home. Dr. Stewart, his physician, states that he had rice-water stools, and died at 2 a. m. next morning. He lived on a high elevation east of First Creek, and had used cistern-water. His diet had been unrestricted. The premises were neat and tidy.*

Case XXXII.—August 3, S. B. Scott, aged about thirty; bilious sanguine, and intemperate for a few months past. He had been in the city every day lounging about in the saloons, but lodged in a building on the banks of First Creek, east of the city. There was a very filthy privy on the premises, having been used by workmen in a tobacco-factory. Stools watery and very copious; very much prostrated, but complete collapse did not occur. Treated with calomel, bismuth, morphine, sinapisms, and rest on the back. Slowly recovered, but left in a feeble condition.

I was constantly engaged in treating cases and visiting infected localities till August 24, when an attack of fever prostrated me, and rendered it impossible for me to be about much till the disease was checked.

I will add, however, as *Case XXXIII*, Hon. T. A. R. Nelson, an eminent lawyer and jurist, who was taken August 23 with some diarrhœa, to which he paid but little attention. During the night he was worse, and sunk before 9 a. m. The symptoms were reported by his physicians as decidedly choleraic. It is said that he abstained from fresh beef for some time, but ate fruit freely. Timely interference undoubtedly would have saved him.

During the last days of August and the first two weeks of September, about two cases occurred upon the extreme borders of the corporation and along the banks of First Creek. This was northeast from the center of the city and not far from a slaughter-house, which was reported as being so situated that the offal and other filth found their way into a spring near by, as well as the creek. The subjects were principally adults of both colors, and soon succumbed.

There were some cases which occurred during the summer, the subjects coming from abroad. One was a young man from Missouri who was attacked on the journey, but the initiatory symptoms made their appearance before he started. He was much prostrated, and life was despaired of for a few days. He came from Troy, Mo., and told me that cholera was prevalent in the town before he left.

Another case was that of a man who came here from some place in Virginia with the intention of leaving soon. He was attacked within a week, and died with undoubted choleraic symptoms. The disease was not prevalent in the place from which he came, but he passed in his journey through infected towns.

Knoxville is a favorable locality for the prevalence of cholera, being underlaid with lime-formation, and the springs are loaded with lime-

*In the case of Reuben Emmett, who lived upon the elevation, I am told by Dr. Stewart, his attending physician, that the chamber-vessels were emptied outside the door upon the ground during a shower of rain. They were living upon the edge of a ravine, and everything emptied upon the ground was carried down the hill. Within a few days there were five or six cases of cholera near and just below the house of Emmett.

salts. A majority of the cases occurred in localities where the spring-water was most used for drinking and cooking purposes. Comparatively few were affected who lived in the higher and best-drained places. As a general rule, it was found that an old neglected privy stood on or near an infected house, and the grounds about the premises were reeking with the wash from cess-pools, and in very many instances from pig-pens, which became exceedingly offensive in hot weather.

As soon as it became evident that cholera would prevail among us, the city council appointed a board of health with sufficient authority to abate nuisances; but, in addition, the writer was made health officer, with almost unlimited authority to act in the enforcement of sanitary measures. It was deemed of great importance to prevent, if possible, the occurrence of a second case in the same house, and generally this effort was successful.

The plan was to use a solution of sulphate of iron in every privy about the city, and where a case occurred it was strictly insisted upon. Solution of carbolic acid was placed in the chamber-utensils used by the sick, the cholera or diarrhœa dejections were buried immediately, and the clothes either burned or boiled at once in water with lime or carbolic acid added. Lime was distributed very generally through the city, and all had it to sprinkle in damp places, or where secretions had been emptied. The sale of unripe vegetables and fruit was prohibited, and water-melons were contraband. A special police was appointed whose duty it was to visit every place where a case was reported, and to see that the proper precautions were carried out. Dry earth was extensively used for filling up privy-vaults which had become offensive, and in a great many instances there were new privies ordered to be constructed without delay and the old pits filled up.

The city practitioners were all very attentive to sanitary details while giving attention to patients. There was a general concurrence on the part of the people to use any and every precaution which experience and good sense seemed to suggest.

One very common precursory symptom complained of by those attacked was a feeling of heaviness, as if there was a "load in the stomach." Some said they felt as if a ball the size of the fist had been swallowed. This feeling was generally accompanied by constipation for a short time previous. Diarrhœa, unattended with vomiting, was generally considered salutary, because there was more or less relief from the gastric distress. It will be seen that most of the persons whose cases are described above were over twenty years of age. While adults were most liable to the disease, those in feeble health from previous sickness or bad habits were most obnoxious.

While it is not proposed to offer any theoretical opinions regarding causes, it will not be amiss to state some leading facts which are at least suggestive.

The first case that occurred in Knoxville was that of a man who had not been out of the city to become exposed. There had been many cases before any one was found with the disease who had been away. There is no way in which we can suppose that cholera was brought here from abroad through the ordinary lines of travel.*

* In this paragraph Dr. Bailey seems to have overlooked the statement which he had previously made, that the first cholera death occurred in the person of a man who kept a boarding-house which was frequented by railroad employés engaged between Knoxville and Chattanooga; and that at later dates a sufficient number of cholera-infected persons arrived at Knoxville from infected districts to account for the diffusion of the disease.—E. McC.

The cases were scattered here and there, to-day one in the north and to-morrow another in the south part of the city. It would seem that a general predisposing cause was operating; that local or personal influences, in conjunction with the predisposition, excited an attack What these several influences may be, no one has been as yet able to determine.

It will be seen that the most effectual remedial agents employed in treating the cases above described were calomel, bismuth, and the preparations of opium. Where collapse had obtained before medical aid was called, recovery was rare, and only resulted, it would appear, where vitality was so strong that life being prolonged, sufficient time elapsed for remedies to be effective.

The whole number of cases that occurred in the city and suburbs it is impossible to ascertain. The total could not have exceeded one hundred and twenty, and the number of deaths did not probably reach forty-five.

I will repeat the following facts which were mentioned in my report upon cholera, as published in the Nashville Medical and Surgical Journal for April, 1874. It is in reference to a family which came from Chattanooga, arriving in Knoxville on the 1st or 2d of July, as subsequently ascertained.

On their arrival in the city, one of the number, a boy of eight or nine years of age, had diarrhœa. His mother took him to the office of Dr. J. M. Boyd, who prescribed for him. They went the same day into the country four miles distant, and the next day some of them had cholera, and, within a few days, six died. None of the residents of the neighborhood had cholera, but were troubled with diarrhœa, which was easily controlled.

The county authorities immediately sent a physician to the locality, and authorized him to use whatever measures were requisite to check the disease from spreading. I am informed that the bedding and clothing of the affected family was burned at once. From the fact that no one died except those who came from Chattanooga, we see the disease was pretty effectually stamped out. This locality is well known in this section as Fountain Head, and is the source of First Creek, so often mentioned in this paper. There is a large spring from which the creek takes its rise, and near by is a camp-meeting ground. I have never visited the place, but am told that the family referred to above did not live near the spring or creek, and that it is not probable that any excrement could have found its way into the stream, to be conveyed to the city. It will be seen that the first cholera cases in this city occurred during the week previous to the arrival of the family above, and that the disease was not conveyed by them to our midst. If this family had stopped in town, and occupied some uncleanly tenement, they might have spread the disease in our thickly-settled city, but having left immediately, such a source of disease was obviated. There are so many contingencies of which we have no cognizance in the movements and doings of mankind, that we cannot say what causes have operated to spread disease in a given locality. From the fact that a great proportion of the cases which occurred in and around Knoxville were on the line of this same creek, and that as the season advanced this fact was more apparent, it is presumable that cholera-germs had been conveyed by some means in the water and deposited upon the banks. Just outside of the city limits was a slaughter-house but a few rods from the creek, and it was ascertained that the wash of the establishment found its way into a spring from which many families in the infected district

procured water. This would render people more liable to contract any disease which was prevailing at the time, even if no specific germs were conveyed from the decomposition of offal around a slaughter-pen.

Since writing the above I have been told that the family referred to *did* empty some of their utensils in places where the contents could be washed into the creek. On their way there must have been dejections left near, if not upon the banks of, the creek.

A woman died of cholera about one mile from the city limits on the road taken by this family, and the privy used by her family was immediately over the stream.

It seems altogether probable, from what can be gleaned from one source and another, that the waters of both First and Second Creeks were in some way infected, because a great majority of all the cases which occurred in the city were along their banks.

Obion County.

Union City is located in Obion County, at the junction of the Mobile and Ohio Railroad with the Nashville and Northwestern Railroad. This town is one hundred and fifty miles from Nashville and ten miles from Troy, the county-town. On the west bank of the Obion River there lies a belt of land some two miles wide, which is crawfishy and subject to overflow. The soil is thin; black on top and lying upon a bed of whitish clay. Next comes a belt of land about three miles wide extending from the outside of the belt of overflowed lands to the hill. The soil of the second belt is a rich alluvial, very dark and deep, and remarkably productive. In almost the center of this last belt Union City is located.

The water of this town is obtained from wells and cisterns. The wells are from 10 to 50 feet deep. In some portions of the town they yield freestone-water, but in the great majority of instances the water is hard. The drainage of the town is good.

June 25, a Mr. J. A. Cardwell, who had, while at Nashville a few days previous, been in attendance upon friends sick with cholera, was attacked with the same disease. Later on the same day Mrs. Cardwell was attacked, and the next day their young child. All three cases recovered.

July 1, George Frank, a German baker, who had in his employ several refugee bakers from Nashville, was seized with cholera and died after a few hours' illness. The Nashville men lived at Frank's house.

July 7, a lady whose residence was at no great distance was attacked and died after an illness of a few hours. After the last case the epidemic influence seemed centered at the house of Dr. S. T. Evans, who had attended all the previous cases. At this house there were eleven persons at a dinner on the 13th, and on the 15th six individuals who had been present were dead, and three others died within the next forty-eight hours. Dr. Evans was himself attacked and barely escaped with his life.

From these houses the disease spread to the town and county. Sixty cases are reported, of whom twenty-eight died.

Anderson County.

Clinton, the county-town of Anderson County, is located upon the right bank of the Clinch River, and upon the line of the Knoxville and Ohio Railroad, eighteen miles northwest of Knoxville and one hundred and seventy-five miles east of Nashville. In 1870 Clinton had a population of about one thousand inhabitants. The town is located in an elevated, healthy, and fertile country.

On the 10th day of July, 1873, a white woman who had been on a visit to Knoxville was taken with cholera. When first seen by Dr. H. M. Hollingsworth, who has been kind enough to furnish us with a report of this demonstration of the disease, she was purging, vomiting, and cramping. Collapse was imminent. She was treated by sinapisms, friction, and a mixture of tincture ferri, tincture opii, and acid muriatic was exhibited in full doses every hour.

In two hours the vomiting, purging, and cramps were arrested; reaction was fully established. The next day she was placed upon doses of calomel and ipecacuanha. The secretion of urine was re-established, and a good recovery was effected. The excreta of this case were carefully disinfected with sulphate of iron, and buried.

Every effort was made to isolate the case, and no case followed that could in any way be connected with it.

July 18, a white man, named Hutchinson, who had come into Clinton to mill, from Knox County, was found fully collapsed from cholera, and died before any medical assistance could be procured. Hutchinson had arrived the evening before and remained overnight at the house of the miller, who reported that he had heard him get up two or three times during the night and go down-stairs. As he called no one, no attention was given to the occurrence, but at daylight the next morning he was found lying upon the porch profoundly collapsed. Disinfectants were freely used wherever it was supposed that he could have had a dejection, and no illness occurred at the house or in its vicinity.

August 10, a white man, named Cross, was taken with cholera, after a visit of some days to Knoxville. He was treated by hypodermic injections of morphia and atropia, by which the cramps were effectually relieved. The tinct. of iron, opium, and muriatic acid was used internally. In this case the urine was suppressed for thirty-six hours. The man recovered. Active disinfection was again employed.

A fatal case occurred at a later date in the person of a negro man who received no medical aid during his illness, but of this case we have been unable to obtain any particulars.

Wallace Cross-Roads is a post-village of Anderson County, situated in a fertile valley. The village is well supplied with pure limestone-water, and has always been considered an unusually healthy locality.

During the latter part of the month of August, 1873, a Mr. Reynolds, from Knoxville, visited this village, and was entertained at the house of Mr. William Wallace. During his visit Mr. Reynolds suffered from acute diarrhœa, for which he received no medical treatment other than domestic remedies. No attention was given to the dejections of his case, which was voided in the privy used by the family.

On the 29th of August Mr. Wallace was taken with cholera, and died after a few hours' illness. So intense was the alarm induced by this death that the body was buried during the night.

August 30, Edward Reed, a young white man who had nursed Mr. Wallace, and who had prepared his body for the grave, was attacked with the same disease, and died the same day.

September 1, two members of the Wallace family were taken with cholera, but recovered.

These cases were followed by the outbreak of the disease in two other families, whose infection can be clearly traced to the original case. In one of these families three deaths occurred between the 12th and 15th of September, one being in the person of a female infant but one month old.

HAMBLEN COUNTY.

Russellville, the county-seat of Hamblen County, is located in the New Market Valley, upon the line of the East Tennessee and Virginia Railroad, two hundred and thirty miles east of Nashville, forty-eight miles northeast of Knoxville, and twenty-six miles west of Greeneville.

The first case of cholera at Russellville in 1873 occurred in the person of a peddler who had just returned to his home from Knoxville. On the 15th of July this man was taken with diarrhœa, which he proceeded to cure by the use of whisky, and in the attempt became very drunk. The next day he was taken with cholera, from which disease he died upon the 19th instant.

July 19, a man returned to his home at Russellville from Tate's Springs, a small watering-place some twelve miles distant, at which point some two or three cases of cholera had occurred in the persons of refugees from Knoxville. On the day of his return this man was taken with cholera, and died in a few hours.

July 20, the widow of the first case was taken with cholera, but she recovered. July 24 the mother of the last case, who resided in the same house, took the disease and died after a lingering illness.

At this point the disease remained in existence until August 10. It is noted that all cases which were treated in the first stage of the disease recovered.

This demonstration is of interest from the fact that to this town can be traced the individual who originated the epidemic of cholera in the counties of Garrard and Lincoln, of the State of Kentucky. It was near Russellville that Mr. Bewley lived; at this town he was treated by Dr. C. D. Riggs for an exhausting diarrhœa; from this town, during the prevalence of the epidemic, Bewley started upon the journey which terminated at Lancaster, Ky.

WASHINGTON COUNTY.

Jonesborough, the county-town of Washington County, is located upon the line of the East Tennessee, Virginia and Georgia Railroad, eighty miles east of Knoxville. We present the following narrative of

EPIDEMIC CHOLERA OF 1873 AT JONESBOROUGH, TENN.

BY W. R. SEVIER, M. D.

It is to be regretted that no record of the number of cholera-cases that occurred at Jonesborough in 1873 was kept. From memory a record of thirty deaths has been made. Of that number, fifteen were white and fifteen were negroes. Sixteen were males; fourteen females. Two cases were under one year of age; one case was ten years old; three cases were between ten and twenty years; five cases were between twenty and thirty years; two cases were between thirty and forty years; three cases between forty and fifty years; ten cases between fifty and sixty; one case between sixty and seventy years; two cases between seventy and eighty; one case between eighty and ninety years.

Jonesborough is the oldest town in the State of Tennessee. In 1870 the town had about 1,500 inhabitants. The location is most admirable, in a beautiful and healthy valley surrounded by stately hills, and having an altitude of 1,734 feet above tide-water. The health of this community prior to the advent of cholera was all that could be desired, no sickness of an epidemic form having occurred for several years.

The water-supply of the town is abundant and of pure limestone, obtained from springs and wells. A creek of considerable size flows along the southern side of the town, having its origin some half-mile outside of the corporation limits.

The first case of cholera occurred June 29, 1873, in the person of a refugee from Greeneville. This case was violent in its character, but the patient recovered. The next case was on the 4th of July, and was also in a refugee from the same place. Both of these cases were assiduously nursed by one of our poorer class of citizens. The last patient was taken by this man to his residence, a humble but healthily-located dwelling. The patient slept overnight in the family room. The next day he was removed to a vacant house some two hundred yards distant, where he remained until he recovered.

The next case in succession, and the first among the resident population, was the wife of the man who had so kindly cared for the stranger. This woman died on the fourth day of her illness. Four laborers, negroes, who belonged to the gang working on the gravel-train of the railroad, were the next to exhibit violent features of the disease. Two of these men died within a few hours after their attack. A third, who lived one mile from town, recovered; but his mother, a feeble woman, who occupied the same house, contracted the disease and died. The fourth died of consecutive fever some weeks later.

The disease now rapidly assumed the character of a malignant epidemic. The majority of our population fled.

The periods marked by the greatest fatality were respectively 29th and 30th July, and the 1st August. The estimated mortality up to this period was fully 50 per cent. The general plan of treatment had been based on the use of mercurials, opiates, quinine, brandy, sinapisms, &c.

The results were anything but satisfactory. True, many gratifying, and in some instances surprising, recoveries took place; but, on the other hand, a number of deaths occurred, which I am now sure would not have resulted under the treatment subsequently employed.

An anxious desire, stimulated by the appalling mortality referred to, to comprehend more clearly and satisfactorily the true pathology of the disease, led to a more diligent examination at the bedside; to a more correct grouping and analysis of symptoms; and finally, to a result in theory and treatment eminently satisfactory and successful.

The disease known as Asiatic cholera is essentially "toxicæmia," or blood-poisoning, and the facts and arguments supporting this theory are as follows:

1st. Some patients when first visited were found to be in a dying condition, while inquiry revealed the fact in individual cases that the patient had suffered but little purging, perhaps but one or two discharges, and no vomiting at all. The most rapidly fatal case we had was that of a negro man who belonged to the grave-digging force; he died in a little more than four hours after the attack, notwithstanding the entire absence of both vomiting and purging. A near relative of the writer died in the town of Greeneville after some ten or twelve hours' illness, who suffered but two discharges from the bowels and no vomiting.

2d. A case occurred where death ensued twelve or fourteen hours after all discharges had ceased, notwithstanding the best directed and most diligent efforts at stimulation and alimentation.

3d. The mental lethargy, depressed condition of the heart and arteries, feeble respiration, suppressed functions of skin, liver, and kidneys, are

not singly but collectively of value as symptoms of such poisoned condition of the blood.

4th. The separation of the constituent elements of the blood, coupled with the rigid cramping of the voluntary muscles, points to the same fact.

5th. The almost uniform effect of remedies of conceded disinfectant and depurative virtues was the prompt amelioration of symptoms. Believing such to be the correct theory in regard to the pathology of the disease, I expressed the opinion that "chlorine, in some of its multitudinous combinations," would be found the effective remedy. The reasoning and facts were submitted to my friend, Dr. Deadrick, who promptly and cordially co-operated with me in the practical application of the theory and the remedy.

The first case selected was that of an unfortunate *nymph du pave* who had been pulseless for several hours. A strong solution of chlorate of potash was injected hypodermically over each breast, and 1½ to 2 grains administered internally every half-hour to hour. Twenty-four hours afterward she was found to be still living, but still destitute of pulse. The tincture sesq. chlor. ferri was then ordered in doses of 10 to 15 drops every half-hour to hour. Another twenty-four hours passed, and she was found to be still living, but still pulseless; she was then placed on sol. perchlor. ferri without appreciative advantage. She died, having been more than sixty hours as pulseless as a stone. A recovery might, perhaps, have been obtained in this case, but for a miscarriage, which occurred a few hours after the attack.

The litmus test applied the day before to the ejections and dejections of a lady dying of cholera revealed the strong alkaliuity of these discharges. In view of this fact, and that the features of a well-developed case of cholera indicated it, I ordered the following:

℞. Tr. sesq. chlor. ferri, ʒvj.
Hydrochloric acid, ʒj.
Tr. opii, ʒj. M.

Sig. 15 to 30 drops to be taken in a wineglassful of water every half-hour to hour, according to diarrhœa.

Caution.—Do not give from a spoon or metallic vessel. Use no mercurials while taking this mixture.

In cases unattended with vomiting and purging, the mixture was advised to be used as directed until unmistakable evidences of reaction appeared. The dose suggested, I am satisfied may, in cases requiring it, be safely doubled, tripled, or even quadrupled; but not, of course, at such short intervals as are designated for smaller doses. A negro woman, suffering an attack of diarrhœa, took a tablespoonful of the mixture undiluted. No ill effect or even inconvenience was sustained, beyond the copious and loud eructations of gas from the stomach. A gentleman gave to his child, nine years old, a teaspoonful. The cholera was in each case promptly arrested; a second dose not having been required by either. The security from its effects, in such cases, is doubtless due to the alkalinity referred to.

The diet in connection with the plan of treatment is regarded as a matter of some importance. I prefer rich animal broths, such as beef-tea, essence of beef, chicken-broth, &c., to rich milk, for the reason that the latter will form curds with the mixture, which may prove irritating and indigestible, and which will necessarily engross the most important element in the prescription in their formation, to a considerable extent at least.

Of some forty-five or fifty cases occurring after the formula was adopted,

we lost but two, both old brain-cases; one laboring under copious serous discharges from the ear, coupled with loco-motor ataxia, and the other a case of hemiplegia of right side of many months' standing. Shortly after the beneficial effects of this plan of treatment were established, the remaining part of our population, as well as those living in infected districts elsewhere, were advised to employ the mur. tinc. of iron in doses of 11 to 15 drops every four to six hours, as a preventive means. The suggestion proved salutary, as it is not remembered that a single person contracted the disease who had rigidly conformed to the prescription. Two ladies who had been refugees were attacked on the day of their return; but it is understood that they had used the tincture irregularly, and perhaps in insufficient doses. Their cases yielded readily to the use of the mixture. From 4 to 6 drops of muriatic acid, used in like manner, would probably prove equally protective; but owing to the necessity generally existing during such epidemic prevalence of the disease for the use of such a tonic, I prefer the tincture of iron. The addition of a single drop of the acid to each dose, however, would doubtless increase its efficacy as a preventive.

I take occasion here to repeat a conviction expressed elsewhere, viz: that under the opportune use of the means indicated, and leaving out of the calculation that class of cases afflicted with pre-existing disease of vital organs, the mortality from cholera will not exceed 10 per cent.

GENERAL OBSERVATIONS.

Much has been said and written of cholera, its diagnostic and prognostic features, which our observation of the epidemic in question failed to verify.

The "quick pulse" and "cold skin, covered with a clammy sweat," were of such unusual occurrence as to be undeserving the importance of symptoms. The skin was, indeed, in nearly all instances of icy coldness, but generally dry; while the pulse, as often as otherwise, excepting in force and violence, exhibited no departure from its normal standard. The contracted pupil was not observed in any case, except as the result of narcotism.

The "painless diarrhœa" constituted, generally, the initial stage of the disease; while vomiting and purging, coupled with "rice-water discharges," were characteristics of the malady in a more active and advanced stage of development. There were, however, exceptions in which the last-mentioned symptoms were not prominent, and a single case in which they were totally absent.

Death rarely results, we think, in cholera from exhaustive discharges. The most rapidly fatal cases will, we conceive, be found to be of that character where they do not exist; for the reason that such discharges are in a large measure eliminative—the method and the channel through which nature seeks to rid herself of the poison. The excretory functions are all suppressed, and in the emergency, should the only remaining outlet, through the medium of the bowels, be closed, the pent-up poisons will only act with more deadly certainty and vigor.

Suppression of urine was a very common feature of the disease as it existed among us. I drew from a male patient, on the fourth day after I had been called in consultation, something over an ounce—the first discharged in about five days. Dr. Deadrick drew from a female patient, on the fifth day, one-half ounce, the first voided within that period; yet both patients recovered without any untoward symptoms.

The catheter was introduced in each case simply for the purpose of ascertaining the condition of this important function.

Important questions here naturally arise touching the probable existence of uremic poisoning in this class of cases. The general symptoms of uremia, as an idiopathic affection, so far as the nervous system is concerned, do not correspond with those observed in cholera. We do not think that such is the case; and the most plausible explanation we can probably offer for the non-existence of the disease is to be found in the greatly impoverished and altered condition of the blood, and the vicarious discharge of urea through the bowels.

This explanation will, perhaps, suffice in that class of cases where copious vomiting and purging exist, and where these symptoms are absent death generally ensues too soon to be ascribable in any measure to such a cause.

The confident assurances given to us during the past year that cholera made its attacks only "in the still watches of the night," were negatived to such extent that we may literally and truthfully say "day and night were alike" to it. Nor was it more regardful of topical features; its visitations not more frequent nor more ruthless to the dwellings by the water's side than to those occupying more elevated and airy situations.

Opium and brandy were, in some instances, found serviceable during the initial stage of the disease. This is principally and particularly true of the latter; its *modus operandi* being, doubtless, the same as in the bite of venomous serpents. But, while this is true, it must also be said that narcotism and intoxication were alike found to be conditions which co-operated powerfully with the original morbific cause in the rapid destruction of life.

Opium in full and repeated doses is, we conceive, under any circumstances to be avoided as a practice fraught with hazard, and not infrequently followed by irretrievably mischievous results.

Circumstances of local or general filth serve to undermine the health, and thus predispose to atttacks of cholera; for we hold it as an axiom that those laboring under enfeebled or deranged health suffer most in this, as in all other epidemics. We shall have occasion to observe, moreover, in the further examination of this subject, that all such causes are to be regarded in the light of tributary sources of supply for the poison generating cholera. Therefore, "cleanliness next godliness" becomes a fit motto for general observance by municipalities, families, and individuals.

What is the peculiar nature of the morbific principle? Where does it emanate, and in what manner does it operate to produce the symptoms witnessed in the disease? These questions have constituted the theme of elaborate and profound discussion for more than fifty years past, and yet all that has been said and written has been designated as the "endless and perplexing literature" of cholera. At the risk of being classed among the contributors of this same sort of material, we shall offer some facts and some observations which we hope may not be deemed altogether unimportant.

In a report to the American Public Health Association on the subject of this epidemic, we employ the following language: "If it be true, as physiologists assert, that hydrochloric acid naturally exists in the stomach of every healthy person, we need not task ourselves very greatly to comprehend the design of the great Creator in placing it there. It was, by virtue of its antiseptic power, to prevent the decomposition of our food before its appropriation by the assimilative organs."

With the view of testing the solvent power of the acid, we instituted a series of experiments, the grand result of which was that fresh beef digested in water containing 33 per cent. of the acid for four and a half hours at 100° Fahrenheit, and subsequently allowed to remain in the cholera-mixture for twenty days longer, showed no appreciable solvent effect whatever. *The beef, however, when removed was remarkably firm, free from taint, and in a perfect state of preservation.*

The known virtues of chlorine as a disinfectant, and those of its compounds, chloride of sodium, chlorate of potash, bichloride of mercury, chloride of zinc, &c., as antiseptics, give collateral support to this opinion touching the true office of muriatic acid in the stomach.

These experiments appear to negative the opinion so uniformly expressed by authors touching the office of this agent in the system. That its solvent virtues may be enhanced by the presence of pepsin, as suggested in a communication from my eminent friend Dr. J. W. Draper, or by that of acetic or other acids of the stomach, we are not prepared to deny; but, in the absence of any proof of this fact, we are compelled to recognize its prominent and principal virtues, as demonstrated by experiment, to be those of an antiseptic. If we are correct in our opinion respecting this property and office of hydrochloric acid in the stomach, it will readily be seen that its influence and importance are far greater than have heretofore been ascribed to it.

As a familiar but striking illustration of its effects in the way indicated, we instance the result from a surfeit, particularly of animal food; *a diarrhœa emitting a highly putrescent odor usually succeeds.* Here the amount of food is simply in excess of the amount of acid present in the stomach, and decomposition necessarily follows. One or two doses of muriatic acid, or of the hyperchlorinated tincture of iron, will generally suffice to correct the evil. But the field of its operations is not restricted to the stomach. It has been found equally efficient in correcting cholera and other poisons after they have entered the circulation. It will, therefore, be readily understood why the existence of atmospheric poisons, as during the epidemic prevalence of cholera creates, so to speak, a double demand for hydrochloric acid in the stomach. If the supply of this agent is sufficient to repress the septic tendencies of our food, and to correct the poisons which are continually entering the circulation through the medium of the lungs, no detriment to health will follow; but if the supply is insufficient to meet this increased demand, the food will undergo decomposition, septic poisons will be generated, and we shall thus have, figuratively, "a fire in both front and rear"—poisons without and within—operating to produce the same results.

In view of these facts, we can more fully understand why certain articles of diet have been known to provoke an attack of cholera. The exciting cause may be a highly-poisoned condition of the atmosphere, or it may be a piece of putrid pork in the stomach of the patient.

Before adverting to the effects of certain classes of morbific agencies in support of this opinion, we wish to express our individual regret that authors have generally found occasion to devote so little space to a consideration of the diseases produced by them; for the causes are by no means uncommon, and the symptoms are of the most alarming character. For the twofold purpose, therefore, of exhibiting the importance of this defect, as well as the influence of a class of poisons closely related to, if not identical with, those producing cholera, we instance—

1*st. The effects resulting from eating putrid meats.*

Among other symptoms enumerated by Apjohn are: Absence of fever,

vomiting and purging, an extremely cold skin, a small pulse, and *a suspended condition of the secretions.*

2d. *The symptoms occasionally following the eating of cheese, boiled custard, &c.*

We have not had access to a single author, besides the one just quoted, who devotes even a passing notice to the disease resulting from these causes. Fortunately, however, our own experience supplies the desired information. In the year 1864 or 1865 a malady suddenly made its appearance in Cincinnati, Ohio, characterized by an absence of fever, purging and vomiting, violent cramping of the voluntary muscles, cold skin, feeble pulse, and a general and extreme prostration of the vital powers, &c. We do no injustice to our intelligent professional friends there, who were engaged with us in the treatment of the disease, when we say that much difficulty was experienced and much care exercised before we were able to determine whether the disease was or was not a genuine form of cholera. It was ascertained, however, the next day that all the cases owed their existence to a cheese sold by an honest German at "Lower Market" the day previous. All who partook of it were similarly affected.

We witnessed in this town, some two years since, similar results from eating boiled custard, a whole family, consisting of husband, wife, children, two guests, and servant, all "down with the same complaint" at the same time.

The cause of illness is apparent in cases resulting from the use of putrid meats; but there was no appreciable taint or impurity of any kind in either the cheese or the custard.

We have adduced the effects of these respective agencies for the purpose of exhibiting the parallelism of results from the palpable and impalpable poisons. "Like causes will produce like results" is an axiom not less true, *cæteris paribus*, we conceive, in medicine than it is in physics. If decomposed organic matter *en masse* will produce the results observed from eating such substances, the same poisons will produce the same effects in an aeriform or miasmatic condition, modified, it may be to some extent, by the presence of exhalations from decaying vegetable matter. The former, perhaps owing to their condensed form, will require less time to operate than the latter.

* * * * * * *

Neither local nor general filth controlled, in any measure, the presence or character of the disease. A rigid surveillance was kept up by the municipal authorities for fully a month prior to its advent; and the town, for once at least "within the memory of the oldest inhabitant," was considered clean. Nor was defective drainage or ventilation observed to exist in connection with any residence visited by the disease.

A very general belief occupies the public mind that persons drinking limestone-water are peculiarly liable to its attack.

We are not disposed to attach much importance to this popular conviction; but it must be admitted that the epidemic in its recent and in former visitations has given some ground for this belief. If it were possible for the lime, existing in the water, to displace the hydrogen and give us chloride of lime, instead of muriatic acid, in the stomach, we should regard the matter as plausible at least. But the possibility and probability of such displacement and combination in the alleged presence of acetic and other acids, are questions which we leave to the solution of the practical chemist.

UNION COUNTY.

A Mr. Pleasant Miller, who lived some eight or ten miles from Loy's

Cross-Roads, Raccoon Valley, was at the city of Knoxville during the epidemic of cholera, in attendance upon his son-in-law who died of the disease. Upon his return home Miller was taken with the same disease. He was attended by a Dr. Lewis. Miller lived several days. On the last visit of Dr. Lewis to Miller's house he found his patient dead. Before he left the house Dr. Lewis was himself taken with the disease, and died after an illness of a few hours.

After the death of Miller, his son visited the family of Mr. Caswell Sharp, living at Loy's Cross-Roads. This young man had been constantly with his father during his illness. While at Mr. Sharp's, young Miller was taken with a diarrhœa, attended with exhaustion; from this, however, he recovered after a few days' illness.

This case was followed by the death of Mrs. Sharp from cholera, and later by the occurrence of three other fatal cases in persons who had been in attendance upon Mrs. Sharp, and several cases of choleraic diarrhœa.

CARTER COUNTY.

Elizabethtown, the county-town of Carter County, is located upon an island at the confluence of Watauga and Doe Rivers, and is a short distance off the line of the East Tennessee, Virginia and Georgia Railroad. The town is situated in a mountain-district; the water-supply is good but strongly impregnated with lime. The natural drainage of the country is good. Numerous sink-holes collect the surface-water. By some this feature is supposed to influence the water of springs which may be in their vicinity.

The first case of cholera that occurred in this county in 1873 was in the person of one Perrion Daniels, a white man, seventy years of age, who was taken with cholera July 30 and died August 1. This man had just returned from Jonesborough, where he had spent some hours with a friend sick of the same disease. The day of Daniels's death his son was attacked, but recovered. These cases were followed by three others, all of whom had been in contact with the first case, but all recovered.

HAWKINS COUNTY.

Rogersville is a small village of six or eight hundred inhabitants, and has always been noted for its healthfulness and the longevity of its inhabitants. It is a valley shut in by hills and mountains. A small creek (Crockett's) runs through the town and acts somewhat as a sewer. A branch railroad some fourteen miles in length connects the town with the East Tennessee and Virginia Railroad at a point called the Rogersville Junction. The town is distant by a straight line twenty-five miles from Greeneville.

The first case of cholera occurred about the 6th of August, 1873, in the person of a man named Drain, an engineer on the branch railroad, he having been exposed to the disease by nursing a cholera-case at the junction some two or three days previous. Mr. D. lived in a house on the creek near the grave-yard of the Presbyterian church, and used well-water. The water was not good, and suggested the probability of its percolating from the grave-yard. The atmosphere at this time was very close, oppressive, hardly a leaf stirring. Vegetation very rank. The privies of the town at night-fall very offensive; no disinfectants had been used.

The morning after Drain's death there was a general stampede of citizens, many persons leaving with their families and thus considerably reducing the population. Those that remained scattered lime, used sulphate of iron, carbolic acid, and attempted to purify the atmosphere.

Drain's clothing and bedding were burned and his house disinfected. His family removed to Knoxville.

On the 23d of August, two cases, both colored men, occurred on the same creek. These cases having been seen early, recovered, although slowly. On the same street, about three or four hundred yards from the house of the first case, a Mr. John Spitzen was taken on the 24th of August, and died the next day. Other cases followed in rapid succession. The citizens having been impressed with the importance of early treatment, most of the cases recovered. The total number of cases about twenty-five; the total deaths three, or one in every eight cases. No case reaching the stage of collapse recovered.

After the first cases the disease was not confined to any particular locality, but was scattered all over the village. Of the twenty-five cases, none occurred in families using cistern-water; those only were attacked who used spring or well water.

The treatment found most efficacious at first was calomel, morphia, and quinine, with external applications. This was afterward abandoned, and the treatment recommended by Dr. Sevier, during the epidemic at Jonesborough, substituted. This method of treatment was found to be efficacious. Ice and iced water were used freely.

Dr. J. R. Walker, to whom we are indebted for this history, writes: "The impression made upon my mind at the time was that the disease was portable; that it was brought to Rogersville from the junction by Drain; that it found a suitable nidus in the condition of our village, and that it propagated itself somewhat as other epidemics; that those individuals who used well or spring water were more liable to the disease; that the disease was very amenable to treatment if seen early, but that in the later stages no treatment was effective. Among the number of well-marked cases of the disease who recovered from the attack, three individuals were never again in good health. One died from organic disease of the stomach, the other two from chronic diarrhœa."

GREENE COUNTY—*Continued.*

In the narrative of the epidemic at Greeneville, Tenn., a note of some importance, for which we are indebted to Dr. James F. Breyles, was, through an unavoidable accident, overlooked. As this note contains some facts of importance, it is inserted at this point.

On the 1st of July, some days after the cholera-explosion of 1873 at Greeneville, ex-President Andrew Johnson was attacked with the disease. Shortly after the inception of the disease, Dr. Breyles was called to the charge of the case. "Found him laboring under a severe attack of what was undoubtedly epidemic cholera. Had copious rice-water discharges, attended with nausea and cramps. In great haste we administered calomel, gr. xx, with directions to his attendant to watch the effect, and if it did not procure consistent discharges in a given time, to repeat the dose. In three hours it procured a mixed evacuation. According to directions, a second dose, of the like amount, was given, which, in about five hours, produced the desired effect."

Mr. Johnson stated the next morning that all his uncomfortable feelings subsided when the cathartic effect of the medicine was procured.

After procuring consistent discharges in this case, whenever the bowels were too active, they were checked by an astringent mixture. Absolute rest of both mind and body was enjoined; the diet given was bland, with mucilaginous drinks. His recovery was slow, and could not be considered as fully established until after a lapse of about fifteen days.

CHAPTER IX.

ILLINOIS GROUP.

The narrative of the cholera-epidemic, as it affected the State of Illinois, is herewith presented so far as reliable statistics could be obtained. That other localities than those herein noted were infected with the disease is well known, but from the majority of them we were unable to obtain any information, while from others the facts were too meagre to admit of narration.

ILLINOIS CONTRIBUTORS.

Dr. Benjamin C. Miller, sanitary superintendent, Chicago.
Dr. John Reid, Cook County.
Dr. M. Tucker, Cook County.
Dr. W. M. Boyd, Cook County.
Dr. George Dale, Cook County.
Dr. C. I. Simons, Cook County.
Dr. N. S. Davis, Cook County.
Dr. L. Bedford, Cook County.
Dr. W. E. Quine, Cook County.
Dr. W. Martin, Cook County.
Dr. H. Hayman, Cook County.
Dr. E. G. H. Mitzler, Cook County.
Dr. J. P. Rose, Cook County.
Dr. F. M. Wilder, Cook County.
Dr. H. P. Merryman, Cook County.
Dr. C. E. De Wolf, Cook County.
Dr. P. Metzmacher, Cook County.
Dr. A. W. Bosworth, Cook County.
Dr. G. Hepert, Cook County.
Dr. S. A. McWilliams, Cook Co.
Dr. A. H. Cook, Cook County.
Dr. Deanhurst, Cook County.
Dr. C. C. Buckley, Cook County.
Dr. E. W. Lee, Cook County.
Dr. L. Sauer, Cook County.
Dr E. R. Smith, Cook County.
Dr. G. G. Gull, Cook County.
Dr. Befeler, Cook County.
Dr. D. Cooley, Cook County.
Dr. E. V. Anderson, Cook County.
Dr. E. Landis, Cook County.
Dr. F. B. C. Bockins, Cook County.
Dr. S. D. Twining, Cook County.
Dr. N. I. Lund, Cook County.
Dr. V. E McClure, Cook County.
Dr. R. H. Harcourt, Cook County.
Dr. R. H. Bringham, Cook County.
Dr. F. Meyer, Cook County.
Dr. F. Hemotin, Cook County.
Dr. H. Wanzer, Cook County.
Dr. W. E. Frazier, Cook County.
Dr. C. D. Hews, Cook County.
Dr. J. J. Gordon, Alexander County.
Dr. G. G. Pabhler, Alexander Co.
Dr. C. W. Dunning, Alexander Co.
Dr. H. Wardner, Alexander Co.
Dr. T. Lawrence, Alexander Co.
Dr. J. D. Culley, Hendricks County.
Dr. Thomas, Greene County.
Dr. Brewster, Greene County.
Dr. Higbee, Greene County.
Dr. A. W. Foreman, Greene Co.
Dr. W. Vance, Randolph County.
Dr. W. M. Pierce, Washington Co.
Dr. J. McIlwaine, Washington Co.
Dr. Pace, Washington County.
Dr. J. J. Fyke, Marion County.
Dr. F. B. Haller, Fayette County.
Dr. E. Day, Jackson County.
Dr. R. T. Higgins, Fayette Co.
Dr. J. H. Stewart, Scott County.
Dr. E. L. Herriott, Jersey County.
Dr. W. O. Langdon, Jersey County.
Dr. A. K. Van Horn, Jersey County.
Dr. J. T. Pollock, Randolph County.
Dr. Patrick Gregg, Rock Island County.
Dr. Thomas Galt, Rock Island County.
Dr. F. B. Schultz, Jackson County.
Dr. L. H. Spencer, Jackson County.
Dr. G. M. McHenry, White County.
Dr. F. J. Foster, White County.
Dr. C. Cook, White County.
Dr. E. L. Stewart, White County.

Assistant Surgeon M. W. Wood, United States Army.

DATES OF INITIAL CASES.

Alexander County	May 2d and June 16
Cook County	May 24
Jackson County	June 18
Greene County	June 21
Marion County	July 5
Saint Clair County	July 8
Jersey County	July 15
White County	July 16
Scott County	July 20
Washington County	August 3
Knox County	August 14
Rock Island County	September 3
Warren County	Date not given.

ALEXANDER COUNTY.

Through Dr. Thomas Lawrence, of Goose Island, we have received the following interesting narrative of an outbreak of cholera that occurred in his vicinity during the early days of May, 1873.

During the month of October, 1866, the steamer Belle of Memphis landed at Goose Island, Illinois, and buried the bodies of three persons who had died on the boat from cholera.

Early in the spring of 1873 a saw-mill was located upon the ground, a portion of which was occupied by these three graves. Before, however, the buildings were completed, the old graves were opened, and the boxes containing the remains of the cholera dead were removed to new graves that had been prepared at some little distance. Early in the morning of May 3, the day after this work had been performed, Dr. Lawrence was called to see a man named King, who was one of the party who had been employed in the removal of the coffins, and found him in the collapse stage of cholera. He died within a few hours.

During the next eight days eleven cases of cholera occurred among employés of the saw-mill or in the persons of individuals living in the immediate vicinity. Of the eleven cases eight were fatal within a few hours of the attack.

Effort has been made to obtain a more elaborate history of this demonstration, but without success, owing to the illness of Dr. Lawrence.

CAIRO, ILL.,

Is located upon a narrow point of land formed by the confluence of the Ohio and Mississippi rivers. The location of the town is low and subjected to frequent inundations. This town is the southern terminus of the Illinois Central and the Cairo and Vincennes Railroads, and the northern terminus of the Mobile and Ohio and the Cairo and Fulton roads.

The facts upon which the account of the demonstration of the disease at Cairo is based have been obtained through the kindness of Dr. H. Wardner, of that city.

On or about June 15, 1873, a negro man from New Orleans died of cholera on Commercial avenue, in the city of Cairo. He had been ill only a few hours. The location was most miserable, and was occupied by negro river-boatmen.

On the 20th of June a white man, from Memphis, Tenn., was found

LAKE MICHIGAN
LINCOLN PARK
DOUGLAS PARK
15 WARD
14 WARD
13 WARD
12 WARD
19 WARD
18 WARD
17 WARD
16 WARD
20 WARD
11 WARD
8 WARD
4 WARD
7 WARD
6 WARD
5 WARD
TWENTY SECOND ST
MAP of PART of
CHICAGO
Showing the
DISTRICTS in which CASES
OF CHOLERA
occurred during the Summer of
1873
PUBLISHED BY
RUFUS BLANCHARD
132 Clark St. Chicago
FOR THE
BOARD of HEALTH

drunk upon the streets of Cairo. He was taken to the city jail, where at midnight he was attacked with cholera. Early in the morning he was discharged, and a few hours later was found lying on the streets in a state of collapse. He was at once removed to hospital, where he died in a few hours.

June 23, the wife of the jailer, whose room was immediately over the cell that had been occupied by the man from Memphis, took the disease, and died after an illness of about seventy-two hours.

July 1, the wife of a German died, after a few hours' illness, of cholera. Where she had come in contact with the infection was not ascertained.

July 4, an Irish widow woman, who kept a filthy fish-stand and lunch-table near the depot of the Illinois Central Railroad, on the Ohio levee, died of cholera after twenty-four hours' illness.

August 16, a negro man from Carmi, Ill., arrived at his home in Cairo. He was having rice-water discharges when he arrived. In six hours he was collapsed, and died within twenty-four hours.

These cases are given by Dr. Wardner as the only instances of cholera occurring at Cairo during the summer of 1873. When it was announced that cholera was in the United States the city authorities caused the city to be thoroughly policed. All low, damp places, all privies, water-closets, and cess-pools, were disinfected with sulphate of iron, carbolic acid, and lime. The cases that occurred were, with the exception of the Memphis man, isolated, and their excreta thoroughly disinfected. It is undoubtedly the fact that by this thorough system of disinfection the city of Cairo escaped a most serious epidemic; for the narrative of the epidemic, as it affected the counties lying upon the Ohio river, demonstrates that during the summer of 1873 the river-steamers between New Orleans, Cincinnati, and Saint Louis were all infected to a greater or less degree with cholera.

Cook County.

REPORT ON THE CHOLERA-EPIDEMIC IN CHICAGO AND VICINITY DURING THE SUMMER OF 1873.

By Ben. C. Miller, M. D., *Sanitary Superintendent.*

Chicago, in common with many places in the West and Southwest, during the summer of 1873, was visited by epidemic cholera.

The cholera, since its birth in India, has at different times swept over the world, carrying death and terror in its course. Sanitary science has done much to rob this most terrible of diseases of many of its terrors, and in no epidemic has it been more clearly shown than in this. The disease struck hardest where sanitary laws were least observed; but where good water, perfect drainage, and a strict observance of sanitary laws were observed, the disease was to a certain extent controllable.

The cases of cholera occurring in and about Chicago during the summer of 1873 were principally in the Fifth ward, south of Thirty-seventh street and west of State street, and in the adjoining town of Lake, which is a continuation of this district, being separated from the city by Thirty-ninth street. This district is a low, flat plain with sandy soil, no sewerage, and imperfect surface-drainage, the house-drains emptying into the open street-gutters in front of the same.

The water used at the commencement of this epidemic was from shallow wells supplied with surface-water, the wells being ordinarily from

5 to 15 feet in depth, walled up with pine boards, with the water varying from 2 to 10 feet, according to the state of the weather.

The inhabitants of this district are principally foreigners—Germans, Swedes, and Poles—the families living in small rooms poorly ventilated, and subjected at all times to the ill-effects of overcrowding.

From the beginning active measures were taken by the officers of the board of health; people were warned not to use the water from surface-wells, and the board of works were requested to supply the district with lake-water. This was done on Butterfield street on June 24; Burnside street on July 13; Arnold street June 10 to 20. At Thirty-ninth street public hydrants were placed for the benefit of the town of Lake. Then the wells were fouled with carbolic acid, so that they could not be used for drinking or culinary purposes. There were outside of this district thirteen cases of death reported from cholera in different parts of the city, the most of them from two to four miles from where the first cases occurred, and in one exception in districts where filth and overcrowding was the rule. No direct connection from the district where the disease first prevailed and where most of the cases occurred was established, but no doubt the disease was carried from that portion of the city infected to the various points in different parts of the city, as many persons fled the district as soon as the disease was known to be cholera. There were six cases in the Fifteenth ward, (five miles from the district,) two in the Third, one in the Eighth, three in the Sixth, one in the Thirteenth, and one in the Twelfth.

The first case that occurred here was on May 24, at No. 444 Arnold street, in the person of John McFee, a bridge-builder, who had been working near Memphis, and left on account of the cholera. When he arrived in Chicago he had diarrhœa, which remained unchecked, and after a week or ten days developed active symptoms, which resulted in death.

The second case occurred at 945 Butterfield street, on June 10, in a Danish family named Anderson, two miles from the first case. [In this house a man named Lang was sick with what was supposed to be typhoid fever; he had lately arrived in this country by way of New Orleans. At that time it was not suspected that the disease might be the continued fever of cholera. He recovered and left the house. The house was occupied by several Danish families, and was very much crowded.] After an illness of twelve hours the patient died. The case was reported as "death from cholera morbus."

The third case occurred in the same house; a daughter of Anderson was attacked on the 12th day of June and died in ten hours.

The fourth case, the wife of Anderson, was attacked on the 14th, and died on the same day, after an illness of twelve hours.

The fifth case occurred June 25, in the same house, in the person of F. Boessel, who had assisted in nursing the Anderson family. Within nine hours from beginning of active symptoms he died.

The sixth case occurred June 30, at 922 Butterfield street, almost directly across the street, in the wife of F. Boessel; she had removed from 445, but had been present during the sickness of the Anderson family, and had cared for her husband during his sickness. She died the second day of the attack.

The seventh case occurred on July 5, on Arnold street, between Thirty-eighth and Thirty-ninth streets, a woman who had nursed the woman at 922 Butterfield street. She died the same day she was attacked.

The eighth case occurred on the same day on the corner of Wentworth

avenue and Fortieth street, a person who had nursed the seventh case and proved fatal.

The ninth case occurred at the corner of Arnold and Forty-first street. This person had nursed the eighth case; it proved fatal. The house in which this case occurred was on the west side of the street. The excreta from the patient were thrown out in the street in front of the house on the east side of the street in which the tenth case occurred; from this point the disease spread over the southern portion of the district. Other cases occurred in the vicinity of 945 and 922 Butterfield street, and from this point the disease spread south on Butterfield and South Dearborn streets.

Upon the retirement of Dr. Rauch I was appointed sanitary superintendent, and visited the district for the first time with Dr. C. J. Simons, a physician residing in the district, and visited ten or twelve cases.

Dr. Simons was appointed a special sanitary inspector to enforce the sanitary regulations of the district. Thorough disinfection was done by the sanitary police, carbolic acid being used largely with sulphate of iron in the water-closets and for the disinfection of excreta. The above disinfectants were also placed, free of charge, in different portions of the district and the people urged to use them. Every house in the district was visited daily, and all cases of diarrhœa hunted up and reported to the inspector, who took care of them immediately.

A cholera-hospital was opened for the care of patients, and all cases from boarding or tenement houses taken there. A home was also opened for the care of children in families where cholera occurred. All children were promptly sent there, bathed, and clean clothing put on them, and every care and attention given to their diet. Before the opening of the home the disease was as frequent among children as among adults, but of those sent to the home, thirty-five in number, only one case occurred, and that did not prove fatal.

In the cholera-hospital twenty-one cases were admitted, many of whom were in the stage of collapse; these invariably died. Of those removed early in the disease, a large percentage recovered. Of the whole number admitted, eleven died and ten recovered. The active measures used, the thorough disinfection and care taken, after a time, with the use of pure lake-water, and the isolation of patients, seemed to control the disease. The cases that occurred here were evidently similar to those that occurred at Evansville and Mount Vernon, Ind., and Nashville, Tenn.

On September 8, John Sheen was attacked with the disease on his arrival in the city, he having just come from Evansville, Ind. His case presented all the symptoms, and was in every respect similar to the cases that occurred here. The case terminated fatally after an illness ot one day. After this time no case occurred in the city. The first case it is stated came from Memphis. The second, third, and fourth cases had lived in the city for some time, (but in the house with the patient supposed to have typhoid fever.) The fourth case was an immigrant who had been in the country two weeks, and in the house (No. 945 Butterfield street) one week. He had been feeling ill for a day or two, and after a dose of cathartic medicine was taken with purging and vomiting, and died in nine hours. After this, all cases occurring here were in persons of residents, with the exceptions of eight or ten immigrants who had been in the city from two days to two weeks. At the time, the history of these cases, (immigrants,) in the press of business, was neglected, and many points that would be of the utmost value in tracing the course of the epidemic lost.

The effects of cleanliness on families and individual cases was marked. Those who observed sanitary laws, attended to the disinfection of excreta, and who were prompt in calling a physician, with few exceptions recovered, and the occurrence of a second case in such families was rare.

On the other hand, where the excreta was not cared for and the vomit permitted to lie on the floor, and the bedding (principally feather-beds) used without being properly cleaned and disinfected, and where no attention was paid to ventilation or personal cleanliness, several cases would generally occur, and, as a rule, prove fatal.

As but few cases were reported at the health-office until they had proved fatal, and then the treatment was not given, we had no data, aside from the cases at the cholera-hospital, by which to form an estimate of any plan of treatmen .

Dr. Simons, special inspect r, who had charge of the cholera district and hospital, reports that no treatment was pre-eminently successful.

The following will show the order of the value of the different methods of treatment:

I. The antizymotic (sulphurous acid) was perhaps the most satisfactory.

II. Anodyne, hypodermic injections, and Squibb's mixture.

III. Alteratives, calomel, &c.

Of the cases neglected in the beginning, 50 per cent. died under all treatment; of the cases taken early in the premonitory diarrhœa, before vomiting had occurred, 90 per cent. were saved. I think the percentage given in both cases much too high, taking the cases that occurred at the hospital.

The prescription used in the antizymotic plan was composed as follows, with the morphine varying to suit the case, (Squibb's:)

℞	Sulphurous acid	℥ij.
	Sulphite magnesia	ℑij.
	Tr. capsici	ℑiv.
	Aqua	℥ij.
	Morphia	q. s.

Dose: As a preventive, half teaspoonful morning and evening, without morphia; as a remedy, with morphia, teaspoonful every half to one hour.

The annexed tables will show the number of cases, average duration of disease, and the meteorological conditions during the time the disease prevailed in the city.

At South Chicago, ten miles south of the city, on the Michigan Southern Railroad, several cases occurred similar in every respect to those occurring in the city. Cases also occurred at Roseland, on the Illinois Central, and also in the immediate vicinity.

Tabular statement of fatal cases of cholera and cholera morbus reported to the Board of Health; also of fatal cases occurring south of the city limits.

Ward.	May.	June.	July.	Aug.	Sept.	Total.
Third	.....	.....	2	.....	.....	2
Fifth	.....	4	14	3	2	23
Sixth	1	.....	1	1	.....	3
Eighth	.....	.....	1	.....	.....	1
Twelfth	.....	.....	.....	1	.....	1
Thirteenth	.....	.....	.....	1	.....	1
Fifteenth	.....	.....	.....	4	2	6
Hospital	.....	.....	.....	10	1	11
Total	1	4	18	20	5	48
Cases south of the city limits reported to board of health	.....	.....	3	12	2	17
Interred at Oakwoods Cemetery from outside the city limits—not reported	.....	.....	1	8	6	15
Total	.....	.....	4	20	8	32
Grand total	1	4	22	40	13	80
Average duration of the disease	2 weeks.	16¼ hrs.	45 hrs.	40 8-10 h.	35 hrs.	
Cholera morbus	.....	.....	16	8	8	32
Cholera morbus, (south of city limits)	.....	.....	2	1	1	4
Total	.....	.....	18	9	9	36
Total number fatal cases cholera and cholera morbus	1	4	40	49	22	116

* * * * * * * *

A few medical gentlemen of the city of Chicago deny that epidemic cholera existed in that city during the year 1873, contending that the fatal cases that occurred were cases of septic cholera, and that there existed sufficient local causes to account for their occurrence. In this view of the case we present a most interesting letter from the pen of a careful observer:

CHICAGO, ILL., *September* 5, 1874.

MY DEAR SIR: In compliance with your request, I have the honor herewith to furnish a brief statement of some of the local influences to which the inhabitants were subjected in the principal districts of Chicago in which the so-called Asiatic cholera epidemic prevailed during the months of May, June, July, August, and September, 1873. These influences may very properly be considered under the heads of—

a. The situation;
b. The water-supply;
c. The drainage;
d. The food; and,
e. Other hygienic influences.

There was reported in May, 1 case; in June, 4 cases; in July, 18 cases; in August, 20 cases; and in September, 5 cases, (*vide* report of board of health.) Brevity forbids a more lengthened description of the situation than this. This district is one of the lowest parts of this notoriously low city. The soil is a very porous, sandy loam, underlaid by a stratum of quicksand; near the surface of the ground water stands throughout the year. The water-supply was from surface wells of the kind known as "drive-wells," (*i. e.*, sections of fenestrated pipe successively driven to the required depth, and through which the water was obtained by suction-pumps,) and was so obviously impure that the inhabitants were accustomed to first pump out the *stagnant* water from the pipe and use that only which succeeded, and which was freshly

filtered, (for some know these wells as filter-wells.) An average specimen of the *purest* water, which I carefully examined, was found to contain 91+ grains of oxidizable organic matter to the gallon. Yet this water contained no impurity visible to the naked eye until after standing for some hours. The specimen which I examined I pumped into a clean vial, quickly closed it with a new cork, immediately covering the cork and neck of the vial with sealing-wax.

The only drainage artificially provided was that obtained by the ditches on either side of the roadway, from which only sufficient earth had been removed to raise the roadway to a height sufficient to render it passable during the wet seasons, at which time only light-draught wagons can safely venture upon these streets. The privies, where such luxuries existed, were of necessity very shallow, from 1½ feet to 4 feet in depth, and sufficiently near to the wells to insure their contamination. In many cases the excreta were either voided upon the ground or into vessels which were emptied upon the ground. The refuse from the kitchens, garbage, and slops of every kind, were generally thrown from the back-doors of the houses upon the ground.

It will readily be seen, thus, that the principal source of drainage was through these wells, which were frequently driven to a depth of 7 or 8 feet; generally, however, but about 6 feet.

The inhabitants were composed largely of the families of unskilled laborers, who, on account of their ignorance and imperfect knowledge of the English language, were imposed upon to such an extent that $1 per day was considered good wages among them.

From this pittance, in many instances, large families were fed and clothed; rent from $8 to $18 was to be paid; and a part was to be laid by for the home of which they all expect sooner or later to become possessors.

Their meat-supply was of the poorest; the meat-market in the vicinity, compelled to sell them meat from 3 to 7 or 8 cents a pound, was unable to furnish for them any but the poorest of Chicago's poor meat, (for it is a well-known fact that a large part of the meat sold in the city is such as will not pay for transportation to eastern markets, *vide* board of health report.) The animals on their arrival here are assorted; the poorer ones, the weaker ones, and the maimed ones, are turned over to the slaughter-houses here, for the supply of the Chicago market, and the better ones are forwarded; and yet Chicago has *one* meat-inspector!

Something of this may be learned by consulting pages 166 and 167 of the board of health report; from which we learn that, among many other articles, there were condemned: 611 quarters of beef, 21,880 lbs. corn-beef, 13,434 heads of cabbage, 2,476 dozen eggs, 2,693 musk-melons, 2,067 lbs. fish, &c., &c. And as to how much was eaten that should have been condemned we can only conjecture. And these things were furnished to poor people to enable them to live *cheaply!* Their supplies of vegetables were obtained from hucksters, who each morning obtained from the markets the unsalable and stale articles which had been left over from the previous day; thus they were enabled to sell cheaply!

Some of the other unfavorable hygienic influences to which these poor people were exposed were—

a. Personal filthiness;
b. Customs of life;
c. Overcrowding, and consequently—
d. Defective ventilation;
e. Proximity to sources of emanations of foul gases; and—
f. Prevalent winds.

These people were very filthy in their persons; whole families were often crowded into a small room reeking with filth; sleeping between filthy feather-beds; keeping the windows closed, in many instances, to prevent draughts.

In the direction from which the prevalent winds come (*i. e.*, the southwest and the west) are located the great Union stock-yards, the slaughter-houses of the city, several rendering establishments, where the dead animals of the city are disposed of, (of which we learn from the report of the board of health that there were 11,347 during the year 1873;) large glue factories are also located here; and, but a few feet distant from the greater part of this district are the tracks of the Lake Shore and the Rock Island Railroads, on which were kept standing long trains of empty cattle-cars, filthy in the extreme.

An idea of the odors from these sources may be obtained from a consideration of the fact that many times, when the southwest wind came up suddenly, vomiting and purging were caused even among the acclimated.

The board of health thus sum up the causes of the offensive smells:

a. The filthy condition of the slaughter-houses;

b. The operation of rendering;

c. The contamination of the river by their sewage;

d. The deposit of offal within the city limits and adjacent thereto.

The mean temperature for the eleven weeks ending August 30, 1873, and during which time this so-called Asiatic cholera prevailed, was 72¼° F., and that the rain-fall during this period was 6¼ inches.

Very respectfully,

M. W. WOOD, M. D.

Dr. E. McCLELLAN,
Assistant Surgeon U. S. A.

Doctor Wood's letter is of great value, as demonstrating the sanitary condition of the locality in which the disease occurred. It would have been difficult to have found a locality presenting more favorable aspects than this; the hot-bed for the propagation of disease was made ready, but cholera did not appear until after the Memphis and New Orleans arrivals.

JACKSON COUNTY.

This county is in the southern portion of the State of Illinois, bordering on Missouri. The county is bounded on the southwest by the Mississippi river, and is intersected by the Big Muddy river and other streams. The epidemic of cholera in this county, so far as we are able to obtain information, was confined to the town of Grand Tower, which town is the terminus of the Grand Tower and Carbondale Railroad, and is also a stopping-place for river-packets.

The information which we have been able to collect is embraced in the following letters:

I.

GRAND TOWER, ILL., *October* 21, 1874.

MY DEAR DOCTOR: In forwarding you a statement of the few cases of cholera Asiatica which came under my observation during the prevalence of the disease in 1873, I would remark that nothing new was developed, or at least detected, giving any new features to this formidable malady, and nothing new discovered in regard to its remedial management. In Grand Tower the disease was of a sporadic character, and it did not manifest its usual portability or contagiousness, as two persons only were attacked by it in the same house.

All or nearly all the cases of cholera that occurred here, of which the previous history of the patient could be obtained, were found to have been induced by some departure from their usual habits—some excess in eating, drinking, or physical exercise—some palpable violation of the hygienic laws of health.

The first cases in this portion of Jackson County occurred on Big Muddy, about six miles from this place, in a locality rife with malaria.

Very respectfully, &c.

E. DAY, M. D.

Dr. E. McCLELLAN, *U. S. A.*

II. GRAND TOWER, ILL., *November* 12, 1874.

MY DEAR DOCTOR: I herewith acknowledge the receipt of your favor of the 28th ultimo, asking for further information, in addition to that already communicated in my report, relative to the exposure of my patients of last year to cholera infection.

In regard to my first case, William Potter, after the most patient inquiries, I am unable to ascertain that he had been in any way exposed to the infection of cholera; indeed I think that, up to the time of his attack, no cases had yet occurred in the city. He was not away from his home or neighborhood for some months prior to his attack, with *one exception.*

On the 4th of July, contrary to his usual habits, he walked five or six miles into the country, (the heat of the weather at the time being excessive, the thermometer ranging from 96° to 100° in the shade,) drinking freely of water, and returned home the same day much fatigued. He visited no locality where the disease existed. On the evening of the 5th of July he was taken sick with probably prodromic diarrhœa. I saw him for the first time at 7 o'clock a. m. on the morning of the 6th, and found him in a state of collapse, almost pulseless, vomiting and purging, with cramps, and with a cyanosed skin. He rallied under treatment, but sank again and died early on the morning of the 7th.

The evacuations from the bowels of this patient, on the morning of the death were of a *dark red color*, resembling beef-brine, very thin and containing much flocculent matter. This peculiarity of color in the evacuations was observed by Dr. Spencer with his cases of cholera which terminated fatally on Big Muddy River, in June of the same year.

My second case was McCoy, a colored man, who came from Cobden, Ill., about the 20th of August. He had had a diarrhœa for a week before the attack of cholera. Was engaged at the Big Muddy Iron-Works in this place, and on the morning of the 28th of August, at 10 o'clock, was taken sick. I visited him for the first time at 2 o'clock p. m., and found him in a state of collapse from cholera; vomiting, rice-water discharges, cramps, and the vox choleraica. He died at 10 o'clock p. m. August 28. In this case I also failed to discover any exposure to cholera infection.

A negro woman named Dye, the mother-in-law of McCoy, who had nursed him during his illness and had washed his clothing after his death, was taken sick on the 1st of September and died the same evening. No other cases occurred in this neighborhood.

My third and last case was J. S. Duncan. He was an active business-man, although he had suffered for many months with chronic diarrhœa. On the 30th of August he walked from the city to the Big Muddy River, and returned the same day, a distance of about twelve miles. He was taken sick early on the 31st. I visited him for the first time about 4 o'clock p. m., and found him in a state of collapse from cholera, with

all the usual symptoms. He never reacted, but died about 12 o'clock the same night. No other cases occurred in this neighborhood.

It is possible that this patient may have been exposed to the infection while in the locality he visited on Big Muddy, as the cholera first made its appearance there in June, although I can obtain no proof that he visited this exact nidus of the disease.

Very respectfully, &c.,

E. DAY, M. D.

Dr. E. McCLELLAN, *U. S. A.*

III. GRAND TOWER, ILL., *November* 3, 1874.

DEAR SIR: In answer to your inquiry concerning the cholera cases reported by me, I find, upon inquiry, that Cummings (my first case) had only been a short time in this locality. His history prior to this is unknown. He was a fisherman by occupation, very dissipated in his habits, and had been upon a prolonged debauch when he was attacked. In his case the disease lasted but a few hours, and he died fully collapsed. Of the individuals who were about him during his illness, five cases occurred during the next four days; of these cases three died. The exact number of persons who were present in his sick-room I cannot now ascertain, but think they were about fifteen.

Respectfully,

L. H. SPENCER, M. D.

Dr. E. McCLELLAN, *U. S. A.*

Prior to the occurrence of the first case in the town of Grand Tower, Dr. Spencer reports ten cases as having occurred on the Big Muddy River, six miles from the town. The first of these cases occurred June 18, the last July 3. Of the first ten cases five were fatal.

July 4, the patient of Dr. Day walked out into the country six or eight miles. The next day he was taken with cholera. From the 7th of July, the date of death of Dr. Day's first case, until the 28th of July, there are eight cases reported as having occurred at Grand Tower by Doctors Spencer and Schulz. Of these eight cases five were fatal.

From July 28 to August 28 but one case is reported, viz.: on August 7, by Doctor Spencer. This case terminated fatally, but the record does not show whether this case occurred in the town or on the Big Muddy.

August 28 a negro man, from a point on the Illinois Central Railroad, (Cobden,) forty-two miles north of Cairo, Ill., died with cholera after a diarrhœa of a week's duration.

August 30, a gentleman walks out to the Big Muddy, and dies of cholera the next day.

September 1, the mother-in-law of the negro who died on the 28th, takes the disease and dies.

September 3, Doctor Spencer records a recovery in the person of a lady living near the Big Muddy.

A total of twenty-four cases is reported, fifteen of which were fatal.

WHITE HALL, GREENE COUNTY.

White Hall is a small prairie town of Greene County, Illinois, about twenty-five miles southwest of Jacksonville, with which city it is in railroad communication.

At this point the earliest cases occurred July 4 and 5, in the persons of Mr. and Mrs. Peter and Mr. Charles Ballou, who all three arrived at White Hall, bringing the body of the father of Mrs. Peter, who had died

of cholera at Louisiana, Mo. Of these cases Mr. Peter died; the other two recovered.

It is stated that at an earlier date (June 21) a young man named Morris, who was a Saint Louis "drummer," had an attack assimilating cholera, from which, however, he was ill but a few hours.

A few cases followed the arrival of the Peter family, two of which proved fatal.

We are indebted for the foregoing particulars to Dr. E. Thomas, of Greene County.

Marion County.

Odin is a small town of Marion County, located at the intersection of the Ohio and Mississippi and the Chicago branch of the Illinois Central Railroads. The town is sixty-five miles east of Saint Louis, one hundred and twenty-one miles north of Cairo, and about two hundred south of Chicago.

We present the following extracts from a communication of Dr. J. J. Fyke, of Odin, in which the facts of the demonstration are narrated:

"The first cholera patient was a young man who had been at work harvesting in the bottom. He had been eating and drinking more than he was accustomed. He returned home in the evening of July 4 with a diarrhœa. During the evening he wandered about town, and at two o'clock a. m. was seized, while at the railroad depot, with vomiting and cramps. When first seen by a physician he was in collapse, and he died about five o'clock p. m. It is stated that there had been several deaths of the same disease in the neighborhood (near the Mississippi river) where he had been working.

"On the evening of July 7 there was a violent storm of wind and rain, by which most of the privy-vaults in the town were filled to overflowing, and on the 8th cholera became epidemic in the town, continuing in force until the middle of September.

"The weather was very warm, with occasional showers of rain. The streets and alleys were in a very dirty, filthy condition. The water for domestic use was all obtained from shallow wells, and is limestone in character. Most of the wells were filled from surface-washings during the storm. From two to three cases occurred every week until the middle of September, when the authorities put a force of men to work cleaning the streets, when the disease suddenly disappeared. The cases that died were not seen by the physicians until in collapse. Nearly every person in the town had more or less of the premonitory symptoms, but they yielded readily to treatment whenever they were taken in the early stage. The treatment consisted in external warmth, the use of opium, mercury, carbolic acid, camphor, quinine, ammonia."

Saint Clair County.

We have received information as to the cholera epidemic of 1873 as it affected two townships of this county.

I. Lebanon, a small town upon the line of the Ohio and Mississippi Railroad, twenty miles east of the city of Saint Louis, having a population of about two thousand. This town occupies a high and well-drained site, and is the center of a rich farming district.

Dr. R. F. Cunningham, of Lebanon, furnishes the following history of the epidemic:

"The first case of cholera occurred July 4, in the person of Charles Schmidt, aged twenty-three years, living six miles northwest of the

town, who at 9 o'clock a. m., in the harvest field, was taken with diarrhœa, which increased in violence; was accompanied with vomiting, and cramps of the extremities. At noon I was sent for; arrived at the case about 2 o'clock p. m.; found the patient in collapse, and with all the characteristic symptoms of cholera. He died in an hour after my arrival.

"There had been up to this time in the district no indications of the disease, nor had there been more than the usual number of cases of simple diarrhœa. It came upon us like a thunder-clap from a cloudless sky.

"At the time Schmidt was attacked with cholera there were three strangers, of whose history I know nothing, at work in his (Schmidt's) harvest-field. These men also having diarrhœa, became alarmed, and leaving the field in the afternoon, came to Lebanon. On the road their symptoms increased in severity so much that it was with difficulty they reached the hotel on the railroad one mile south of the town. In a short time after their arrival I was called, and found one man in the beginning of, and another well advanced in, the second stage of the disease. Although actively treated, both died. The third man left the town, and his fate is unknown.

"July 7.—Mrs. S., aged forty-four, and her daughter, aged seven years, (the mother and sister of Schmidt,) were taken during the night with diarrhœa, followed by vomiting and cramps. They were immediately placed under treatment, and both recovered.

"July 8.—Charles Busch, aged thirty-five years, living one mile from Schmidt's, and nearer town, was taken with the premonitory symptoms, but recovered.

"July 11.—Two children of C. Haas, aged respectively eleven and thirteen years, living one mile nearer town than Busch, were taken with cholera; one died, the other recovered.

"July 17.—George Drissell, aged thirty years, died of the disease.

"July 19.—Mrs. Busch, the wife of the third case, was taken with cholera, and died the next day.

"These cases were followed by eight others in the same community, of whom three died.

"All of these persons were well-to-do Germans, whose manner of living was as is customary with their nation. The time was during and just after harvest, when their indulgence in food and drinks was greater than usual, and no doubt acted as predisposing causes, aided by the exhaustion consequent upon increased work and intense heat. The district in which they lived was a rolling country, timbered with oak, hickory, and black-jack, which latter growth, from its abundance, had given the name to the lower portion of this settlement. A creek flows diagonally through the settlement, but all the farms are upon high or rolling ground. The district is not considered unhealthy. The soil is a dark loam, and the subsoil clay. The water is slightly limestone, and is obtained by digging from 25 to 30 feet. There was no accumulated filth outside the habitations. The wells were in fair condition and the water good. There was no local cause known to me by which the disease could have been produced.

"It will be remembered that two of the harvest-hands on Schmidt's farm died of cholera at the railroad hotel on the 5th day of July. Seven cases of cholera occurred among persons living in the vicinity of this hotel, three of whom died.

"This district lies at the foot of the ridge on which the town of Lebanon is built, and is distant about one mile from the town proper. The

town during the entire season was unusually healthy, there being no more, if there were as many, cases of common diarrhœa as is usual at that season of the year."

From Dr. F. W. Lytle, also of Lebanon, we learn that the funeral of Schmidt was attended by his neighbors, and that among them the subsequent cases occurred. That in the depot-addition to the town of Lebanon there were seventeen cholera-deaths, being 10 per cent. of the population of that portion of the town. That in addition to these deaths fully one-half of the residents suffered from diarrhœa.

The treatment adopted was calomel and opium, in moderate doses often repeated; hypodermic injections of morphia; sinapisms to abdomen; embrocations of ammonia and turpentine; chloroform, tinct. capsicum and camphor, with alcoholic and diffusible stimulants in the last stages.

Caseyville.

Caseyville is a small town of Saint Clair County, Illinois, upon the line of the Ohio and Mississippi Railroad, ten miles west of the city of Saint Louis, Mo. The location is decidedly in a malarial region, being surrounded on the east by a broken hilly country, and on the west by the Mississippi bottom, which is interspersed by small lakes of stagnant water.

On the 8th day of July, 1873, a child of Patrick Roach, a section "boss" on the Ohio and Mississippi Railroad, was taken ill with what at the time was considered by Dr. L. T. Miller, who was called to attend the case, an attack of cholera infantum. The child had not been out of the village, but the father was constantly exposed to passing trains, and to contact with other railroad employés. The case terminated fatally in a few hours.

The next day the father was taken with vomiting, purging, and cramps; rice-water dejections soon occurred, and collapse was imminent. This man had been troubled with a looseness of the bowels for a day or two, but had utterly neglected it. A few hours after Roach was attacked, his wife was taken with the same disease and passed rapidly through the stages. At the end of the first twenty-four hours Roach seemed to be reacting, but the wife presented every symptom of approaching dissolution. At the end, however, of the next twenty-four hours this condition of affairs was reversed: the wife reacted and made a tedious recovery, but the man relapsed and died.

In a house adjoining that occupied by the Roach family lived one Shannon, whose daughter, a girl twelve years of age, repeatedly visited the sick-room in the Roach house. This girl was taken with cholera and died after a short illness. During her illness she was visited by her brother, who lived several squares distant; he took the disease and died, but without infecting any other person in his house.

The disease next appeared in the family of one Clark, who was a near relation of the Shannon family, and whose family had been in constant attendance upon the previous cases. John Clark, jr., aged about eighteen years, was the first attacked, and in rapid succession his sister, sixteen years old, his aunt, his mother, and young brother were attacked; the first four proved speedily fatal. In this family the imperative orders of Dr. Miller were not carried out. The dejections were permitted to remain in the room and upon the floor.

William Schaeffer, aged about thirty-five years, who lived close to the Clark family, and Thomas Booth, who lived in a portion of the Roach

house, were next attacked, and died; but the disease did not spread from them, with but one exception.

A son of A. J. Bunker, who lived about a block from where Schaeffer had died, was next attacked, and died. The father had been in attendance upon Schaeffer, and passed constantly from the sick-room to his own house.

A son of John Jones, aged about eight years, whose mother had been frequently in the sick-rooms of the Clark family, was attacked with cholera, but recovered.

Dr. Miller is strongly of the opinion that many of these cases might have been saved had they been subjected to treatment at the inception of the disease. He reports that a great number of cases occurred of diarrhœa, attended with exhaustion, that yielded to rest and treatment.

As to the use of disinfectants, Dr. Miller writes: "So soon as I became satisfied that we had true cholera in our midst, I advised the strictest cleanliness in all families affected by it. I urged upon the town authorities the necessity of having all the premises disinfected, and all nuisances about the town abated. At first my advice was unheeded; all seemed to treat the matter lightly, as though each case would be the last, not seeming to comprehend the necessity of disinfection. But when they saw it beginning to be a serious affair they all went to work. Crude carbolic acid, chloride of lime, and copperas were freely used in all necessary locations. From the time we began the use of disinfection not a single new case of the disease appeared; whether from the use of disinfectants, or coincidently, I am, of course, unable to say. Disinfection was continued about one week, when, the excitement and the cholera having subsided, it was discontinued."

JERSEY COUNTY.

Grafton is a small town, of about 1,500 inhabitants, located on the Mississippi river, and receives its supplies by river transportation.

The following letter contains the only information we have received as to the epidemic at this point:

GRAFTON, ILL., *October* 29, 1874.

DEAR DOCTOR: While our little town of only about 1,500 inhabitants, and they scattered over a considerable territory, is never subjected to such demoralized sanitary conditions as that of large, compactly-built cities, and especially those of the warmer climates, we are left untrammeled in many of the speculative suppositions that are connected with the latter localities, and we should be able to arrive at a more concise conclusion as to the nature and cause of the disease under consideration in this locality than in many others.

In very close proximity to our town are extensive rock quarries. Consequently a goodly portion of our population are laborers and quarrymen, mostly Irish, many of whom are transient residents, of bad habits, and crowded into low boarding-houses. But, instead of this being the class attacked, the disease of 1873 occurred chiefly among those in good circumstances, who could not possibly have been exposed to a poison emanating from a previous case.

Some of these patients used cistern-water, others well-water of good character.

In 1866 the first cholera case was in the person of a blacksmith of dissipated habits. Nearly all the cases that followed were transient residents who lived in crowded boarding-houses.

In 1873, except in two instances, but single cases occurred in the

same house, and in the two exceptions there was no reason to believe that either one was induced by contagion.

In 1866 we were of the opinion that the disease was transmitted from the city of Saint Louis, as it prevailed there at that time extensively.

In 1873 it was claimed by some of the leading physicians of that city that they did not have a genuine case of Asiatic cholera, and but very few cases simulating it; so there is but one rational conclusion that we can arrive at, so far as can be observed in this locality, and that is that the cause existed in the atmosphere in certain localities of the town, probably in the shape of poisonous gases, producing the disease in those systems most peculiarly susceptible at the time of contact.

Not being a microscopist, I was not able to examine the blood; but there was one peculiarity I wish to mention that I have never observed in any other cases; that is, on the introduction of the hypodermic needle, after penetrating the epidermis, it would then go any length without meeting with scarcely any resistance, and the skin could be raised by it, as if almost the whole covering was detached from the tissue underneath.

As a prophylactic I advised from one to two grains of quinine, taken two or three times a day; and although I have no positive proof that it did good, I have the satisfaction of knowing that no one who took the medicine was attacked with the disease.

Respectfully,

E. L. HERRIOTT, M. D.

DR. E. MCCLELLAN, *U. S. A.*

The first case at Grafton occurred on the 15th day of July in the person of a white laborer.

The second case occurred July 16 in the wife of a ship-carpenter.

The third case occurred July 17 in the wife of the superintendent of the stone quarry, and upon the same day the two young children of a white laborer were attacked.

July 18 the wife of a contractor was taken ill.

July 19 a German shoemaker was attacked.

July 30 a white laborer and the wife of a white laborer are both reported.

July 31 a white female, the keeper of a boarding-house, was taken sick.

August 2 a widow lady was taken sick. All the preceding cases terminated fatally. Two other cases are reported, both of whom recovered; one the wife of a prominent physician of the town, the other a laborer.

It is submitted as a comment upon the list of cases which Dr. Herriott has kindly furnished, that they all, with but a single exception, occurred in the class of persons who would be most exposed to an insidious infection.

The epidemic is next reported in Jersey County, at the town of Delhi, a small town upon the line of the Chicago and Alton Railroad, fourteen miles northwest of Alton and thirteen miles from Grafton. At this point, on the 20th day of July, a young man named Watson was taken with cholera, and died after an illness of twenty-four hours.

July 22, Mrs. Fuller, the mother-in-law of Watson, who had nursed him, was taken with cholera, and died within ten hours. Four other members of the same family were subsequently attacked and three deaths occurred.

During the remaining days of July four other cases occurred at Delhi, with one death.

August 17 a young man named Sunderland was taken with cholera. In this case, although collapse was profound, reaction occurred and he recovered.

A brother of Sunderland came from a distance to assist in nursing him. On the 22d of August this young man was taken with cholera, and died after a few hours' illness. The same day the father was attacked and died within twenty-four hours. Subsequently, four other members of the same family, and Dr. Langdon, who had been in assiduous attendance upon them, were attacked, but all five recovered. The house at which these cases occurred was upon a high hill, and removed from all malarial influences.

Dr. Langdon reports that in the families where cholera occurred every member suffered with diarrhœa. "I must say that this location is about the last place you would expect to find cholera, being very high and well drained. The town is small and scattered, and all the cases that occurred, except one, were in good, clean families. From July 20 to August 25 I treated over twenty-five bad cases of cholera morbus and diarrhœa."

The treatment adopted was eliminatives, with astringents and stimulants, warm applications, frictions, &c. Disinfectants were use in every case.

White County.

Carmi, the county town, is situated in the center of a rich agricultural country, located upon the west bank of the Little Wabash River, and at the point of junction of the Cairo and Vincennes, and the Saint Louis and Southeastern Railways. This town has about two thousand inhabitants, fifty of whom are negroes. The district is decidedly malarial, although the community has not in previous years suffered to any extent from epidemic diseases. The town is built upon a bluff, which is broken and irregular by ravines, which had been formed by the drainage into the river. The soil is a rich alluvial upon a sandstone base. The water-supply is obtained principally from wells of from 18 to 20 feet in depth. The better class of residences are, however, supplied with cisterns. The privies consist of pits dug 6 or 8 feet.

In 1873, cholera having become epidemic at the city of Evansville and the town of Mount Vernon, the first thirty-six miles, and the latter eighteen miles east of Carmi, an effort was made to place the town in a good sanitary condition. A board of health was organized, which consisted of Dr. E. S. Stewart, who was at that time the mayor of the city, and Drs. Linthicum and Cook. All *debris* possible was removed and destroyed, stables and other out-houses were cleansed, privies were disinfected, and every possible precaution was taken to leave no spot in condition favorable to the rapid propagation of the cholera-poison, should it be carried into the town. Early in the epidemic a pest-house was organized, to which cases were removed.

About the 13th day of July, a man named Frederick Sell went to Evansville, Ind., to attend the funeral of his father-in-law, who had died at that city of cholera. On the 15th he returned to his home at Carmi, and the next day (July 16) was attacked with cholera. Sell was a brick-maker, lived near to his yard, and a number of the hands in his employ lived in the house he occupied. After an illness of eight or ten days he recovered and was able to resume his business.

During the evening of July 16, William Sell, aged 16 years, the son

of Frederick, was attacked with cholera. The disease was fully developed. After being collapsed for some hours, reaction was established, but committing some imprudence he relapsed, and died upon July 20.

July 19 a Mrs. Taylor, who occupied a portion of the same house, was attacked, and died at an early hour the next day.

July 21 Mrs. Sell and her daughter, and a man named Haffala, who was in the employ of Sell, were taken sick; the women recovered, but the man died after an illness of eight hours.

July 22 a man named May, also an occupant of the same house, was attacked and died.

July 24, a man named Deitz, who also lived at this house, died of the same disease.

July 25, a young child of Sell also died.

During the progress of these cases, the excreta had been buried, after careful disinfection with carbolic acid; but as it was determined that this process had not reached all the material that had become infected, the survivors were removed, and all articles of bedding and clothing were destroyed with fire. From this house the disease spread and became epidemic in the town. Thirty-four cases are reported, with fifteen deaths, as having occurred after the last case at the Sell house.

On the 31st of July, a Mrs. Burrell was attacked with cholera at her home in Carmi, and died after a few hours' illness. Before she died, her brother, Mr. Rabstock, a farmer, living some five miles north of Carmi, came to visit her. He remained until after the death of Mrs. Burrell, when he returned at once to his home. The next day Rabstock had diarrhœa, which was neglected for several days, and on August 5 cholera was developed, from which he was not convalescent until September.

August 10, Mrs. Rabstock was taken sick and died after a few hours' illness. Before the death of the mother, her three children had been taken with the same disease, one of whom died.

August 11, a young daughter of Rabstock was taken ill; she reacted, but, being excessively imprudent, the disease was redeveloped, and she died on the 16th.

This family had been nursed during their illness by a married daughter and her husband, named Swale. After the death on the 16th, the survivors moved to a house some miles distant that had been unoccupied for a length of time; but on the day after their removal both Swale and his wife died of the same disease.

During the illness of Mrs. Burrell, a young man of depraved habits, named Honn, who lived at Phillipstown, a small village nine miles east of Carmi, came to town and got upon a spree. He slept the night at Mrs. Burrell's house and the next day returned home. After a few days, during which he neglected a diarrhœa, he was attacked with cholera, and died after an illness of ten hours. He was nursed by his sisters, Mrs. Ray and Miss Honn, and by his brother.

August 8, two days after Honn's death, Mrs. Ray was attacked, and died the next day.

August 12, the brother was attacked, but recovered after a serious illness.

August 14, Miss Honn was attacked and died.

August 15, Mrs. Honn, who had been in attendance upon her husband, who was still ill, and upon her two sisters-in-law, took the same disease and died.

August 16, Dr. George B. Tucker, who had attended professionally this group of cases, also died.

August 31, a man named Birdsong, who had been at Carmi upon a spree for several days, was taken with cholera at his home in the country, three miles west of the town. The disease was developed at 3 o'clock a. m., and at 1 o'clock p. m. he was dead. Every member of his family suffered from diarrhœa, but by rest and active treatment all recovered.

A total of fifty-five cases are reported as having occurred in White County, of which thirty-four terminated fatally. Of these cases thirty were males, twenty-five females. Fifty-four were in the persons of whites, one was a negro. Twelve cases occurred in individuals less than twenty years of age, six of whom died.

SCOTT COUNTY.

CHOLERA AT EXETER, ILL., IN 1873.

BY W. C. CARVER, M. D.

Exeter is one of the oldest towns in Scott County. In selection of site, in a sanitary point of view, it competes favorably with any in the State, being a rural, picturesque village of between four and five hundred inhabitants, built on the brow and sloping side of a hill, around the base of which winds its serpentine course the Mauvaisterre Creek; the soil a mixture of clay, loam, sand, and gravel, the clay largely in excess of the other constituents. Through the subsoil, and for a considerable depth, is plentifully distributed lime and sandstone, with underlying strata of bituminous coal. The water-supply of the town is from wells, which vary in depth from 28 to 40 feet. This water is very hard, impregnated with lime, and during times of drought becomes very foul.

The Mauvaisterre Creek is skirted on either bank by ranges of hills and bluffs, with their corresponding valleys, gulches, and ravines; the latter are filled in many places with old and decaying drifts, the relics of spring freshets, &c.

From statements of old settlers I learn that Exeter has been at other times visited with cholera. First in 1834, when the disease prevailed as a general epidemic throughout the country. Again, in the fall of 1848, the disease appeared in that village. This time it was a local attack, a few cases, however, being taken from Exeter to neighboring towns. Some time about 1852 or 1853 the disease again appeared at Exeter; on this occasion the disease was purely local, and the general conditions were similar to those preceding the last epidemic of 1873.

The spring of 1873 was ushered in unusually early; vegetation growing abundantly and luxuriantly under the genial influence of early spring's warm sun. Early in the month of March the severe winter suddenly gave way, and a season of rain followed; about the middle of the month we had a very heavy rain, which overflowed the banks of the Mauvaisterre, sweeping large amounts of *débris*, plentifully mixed with dead hogs, &c., into the ravines already referred to. The receding waters left them saturated with moisture, to become in a short time beds of foul, putrefying matter. The weather soon settled down to a steady warmth: April, attended with its showers; May, with little rain and very warm weather; June came in hot, dry, sultry, and oppressive. The wells beginning to fail; many entirely dry; all very low, muddy, and brackish; the creek, ordinarily a running stream, was dried up to ponds, stagnated, over whose surface a foul green mold was spreading

itself. The piles of rotting filth and garbage in the ravines along the creek, decomposing and fermenting, diffused their nauseating odors and disease-producing germs through the air, perceptible for considerable distance. By the middle of June there were but very few wells that were not dry; good, pure drinking-water could not be had at all. The weather had grown more oppressive and humid, yet few people complained of ill feelings, only that produced by the heat. The nights were but small improvements on the days, persons arising in the morning stupid, dull, tired, and altogether unrefreshed.

On the 22d day of June occurred the first case. The subject, a man somewhat advanced in years, is suddenly seized with vomiting and purging; soon he has cramps, speedily followed by collapse and death.

Now we come to the question—What was the cause of this case of cholera? What conditions or morbid processes were combined in the production of this dreaded disease? Can we satisfactorily explain or find the conditions by which this affection sprung into existence?

First, let us look more closely into the antecedents or previous history of this case. We find upon inquiry that it is not an imported case, as is generally the fact. The man has not been from home for over four weeks, only to visit some neighbors and relations; none of those visited, before or afterward, having any signs or symptoms of cholera. The well furnishing water for the house was strongly impregnated with lime, very low and muddy; it was, however, situated far above the chance of contamination from the creek.

So far as can be ascertained he had not been near a person having choleraic diarrhœa, or cholera in any of its stages, and did not use a privy at all, but had been in usual good health for a long time preceding the day upon which he was attacked. At noon of the day of the attack he had indulged to excess in green-gooseberry pie, and had a moderate diarrhœa; he had been drinking the water from the well. This is about all we can learn of the preceding history of this case. Two milder cases occurred about the 26th or 27th, which recovered. On July 4, the fourth case was reported in the person of an elderly woman. This woman was attending a pic-nic about four miles distant from her home; she was taken to a neighboring house, where she died in a few hours. She, too, had been using impure water, but had not eaten anything to excess. About the 20th of July the disease had reached its height, continuing without abatement until the second week in August, when it began to decline, the last case, a fatal one, occurring on the 3d of September.

As to the propagation of the disease: After its origination or outbreak more than one-half of all the cases can, without doubt or question, be put outside the possibility or probability of contagion or infection. The smaller half may have been in some way related to intercourse with those sick of cholera.

Meteorological conditions.—The months of June, July, and August are now memorable for their intense heat, sultriness, and close atmosphere, and the absence of the usual pleasant summer winds and showers, the thermometer ranging from 90° to 104°, (Fahr.,) with a barometer indicating constant high atmospheric pressure of 29 to 30½ inches. On the 5th of July a very heavy rain-storm passed just east of Exeter. The rain fell in torrents, and in such volume as to again cause the Mauvaisterre to overleap its normal boundaries, flooding the fields and lowlands adjoining the creek, sweeping before it immense quantities of wheat from the shock, green growing corn, weeds, &c., into the ravines, where were already rotting vast beds of organic vegetable and animal matter. Here they were left by the receding waters to rot, putrefy, and stink. From

this date to September 1, little or no rain fell, the weather each day seemingly growing hotter, vegetation and fruit prematurely ripening and drying up from drought and hot sun. The atmosphere appeared perfectly stagnant; evidently deficient in ozone and in negative electric condition, thoroughly saturated with the emanations from the beds of decomposing organic matter and ponds of stagnant water, the creek again being dry. These various poisons loading the air, on being wafted about by the light winds, were disseminated throughout the neighborhood.

The epidemic extended over a period of ten weeks, reaching its height about four weeks from its origin, or the time when the first case occurred, June 22. From the 20th of July to the 20th of August there was little or no abatement; from this time, however, there was a gradual decline, the last fatal case being reported September 3.

Thus we have four weeks disease increasing, four weeks stationary, and two weeks decline. Six of the cases that occurred at Bluffs may be traced to one source or origin, a person bringing it from Exeter. Those of Chapin were imported cases, two of them having been in attendance on those sick of the disease. Fifty-three cases occurred at Exeter, twenty-six of which proved fatal. Allowing 500 population to that village, it would make one in nine and a half of the inhabitants attacked, with a death-rate of one for every nineteen persons, and a proportion of 50 per cent. deaths for the number of persons attacked, and 6 per cent. of the inhabitants.

The grand total number of cases, mild and severe, so far as it is possible to ascertain, including Chapin, Exeter, Bluffs, and Maples, is sixty-nine, with a death-rate in this number of forty-one cases, about 65 per cent. fatal. * * * * * *

Bluffs is a small village of about one hundred and fifty inhabitants, situated on the line of the Toledo, Wabash and Western Railway, four miles east of Naples and the Illinois river.

The village is built upon a dark, rich loam, with a moderate admixture of sand overlying a stratum of clay. The water is good, but strongly impregnated with lime.

The first case of cholera at Bluffs occurred in the person of an employé of the railway company, who was attacked July 17, at 8 o'clock a. m. The attack was pronounced, but the patient recovered after an illness of ten days. Disinfectants were freely used, and no other cases occurred in the house. The second case of the series occurred August 8, in the person of Mrs. Hatfield, a lady forty-two years of age, who resided one mile east of Bluffs. She had neglected a diarrhœa for two days, and, when first seen by her physician, was purging, vomiting, and cramping violently. The characteristic symptoms of cholera were present, and the patient died at 9 o'clock a. m. of the 10th.

August 12, at 7 o'clock a. m., Mrs. Sarah Smith, a daughter of Mrs. Hatfield, was taken with a copious painless diarrhœa. This lady, who was twenty-four years of age, and at the time four months pregnant, had, some days before her mother was taken with cholera, arrived from her home at Exeter, which town she had left on account of the cholera. When first seen by the physician, but an hour after the first rice-water discharge, Mrs. Smith was rapidly becoming collapsed.

She was actively treated with stimulants, opium, and camphor. At 3 o'clock p. m. had fully reacted; pulse 126 and of considerable volume; surface of body warm and bathed with a moderate perspiration; secretion of urine re-established. At 8 o'clock the patient, to use her own

words, "felt very good." Has had some sleep. Pulse 110. Is not so thirsty; has taken some beef-tea.

During the next two days this lady continued to improve. On the 15th her husband and sister were taken with cholera and died, after but a few hours' illness. The effect produced upon Mrs. Smith was most depressing, but no re-development of the disease occurred.

August 16, Mrs. Smith learned unfortunately of the death of a second sister and a brother-in-law, who had left them but the morning before in perfect health, and who resided at Chapin, some eight miles east of Bluffs. The shock produced by this intelligence was so profound that the patient could not be roused; but she lingered in this condition until the 23d, when she died. Upon removing her body from the bed, it was found that the bed was covered with blood, in which a fœtus, with the placenta, &c., was found. She had aborted without evincing a sign of such complication, and had undoubtedly died of uterine hemorrhage.

The cases of the daughter and son-in-law of Mrs. Hatfield, who died at Chapin, present some points of importance. Upon learning of the illness of the mother, these people had left their home and hastened to her sick-bed, the daughter coming one day in advance of her husband. The daughter remained at Mr. Hatfield's about three days; her husband but one day, when he returned to his home. This man, on reaching home, was taken with a mild diarrhœa. At noon he sent for a physician, who found him purging rice-water. The wife was immediately telegraphed, and she returned on a train, reaching Chapin at 4 o'clock p. m., to find her husband dead. A coffin was hastily constructed, and about sundown the body was taken to the place of burial. On the way to the grave the wife was taken with cholera, and in three or four hours was dead.

In the same family, Mrs. Hatfield's two daughters, aged fifteen and eighteen, and one son about eight years old, remained; of these the youngest daughter and the son had cholera in a mild form; both recovered, the older one escaping without any symptoms of the disease. One of the nurses, (a female,) about one week later, took the disease and died; but she had during this week another patient in Exeter, three and a half miles distant, and had washed the clothing of the bed of her charge, who had also died of the disease. Four of these cases, the two first and the two last, were under the care of other physicians, and I have no correct knowledge of symptoms or treatment.

As to the sanitary conditions of the house where so many cases occurred:

The house, a one-story frame structure of four rooms, and a cellar 6 feet 2 inches deep. It is situated upon an elevated point, three or four hundred feet above the level of the bottom-land, one mile east of Bluffs. The house is on the southern edge of a two-acre clearing, closed in on the east, north, and west by timber; on the south there is a gentle slope of about half a mile of cultivated land; this slope terminates at a creek, which at this season of the year is dry. The soil is a mixture of loam, clay, and sand, and very productive. The drainage by nature is of the very best, as during a heavy fall of rain all accumulations are washed away. The house above ground was clean, well lighted, and thoroughly ventilated. The cellar was in a very neglected condition, pervaded with a close, musty air, which was perceptible in the room above it. The water-supply for drinking purposes and house use was furnished from a well on the premises 28 feet deep, at this time almost dry, and utterly unfit for use.

As means of preventive and disinfecting, I had the cellar cleared of

garbage, whitewashed, well aired, and sprinkled with chloride of lime; carbonate and chloride of lime scattered liberally about the premises. In the house carbolic was the chief agent, but bromo-chloralum and the sulphate of iron were also used.

I attribute the severity of the disease in this house mainly to the water-supply and crowded condition of the house, there not being sufficient room for so many persons, as the cooking and eating were all done under the same roof, and in close proximity to those who were sick. I allowed no more water to be used from the well.

On the morning of August 16, a man seventy-three years of age was taken with profuse and exhausting diarrhœa. For some two or three days previous he had complained of a looseness of his bowels, for which he had received some treatment, but without much effect. The symptoms were rapidly developed, and at 10.30 o'clock p. m. he was dead.

Three other cases occurred, one of which proved fatal. Disinfectants were freely used in all cases.

WASHINGTON COUNTY.

HISTORY OF THE CHOLERA EPIDEMIC OF 1873 IN WASHINGTON COUNTY, ILLINOIS.

BY DR. W. M. PIERCE, *of Addieville, Ill.*

As an important part of the history of the cholera epidemic of 1873, I propose to give a brief account of the disease as it occurred in Washington County, Illinois. In the preparation of this paper I shall use only such material as came under my own immediate notice, or such as I know to be entirely trustworthy, the general correctness of which can be attested by several other medical gentlemen of this and adjoining counties who visited the locality during the prevalence of the epidemic.

Washington County is bordered on the north and west in part by the Okaw or Kaskaskia river, a stream of considerable size, with wide bottoms, subject to frequent overflows. Emptying into this river from the east are several large creeks, with low banks and muddy beds, and on one of these creeks, divided by it into two nearly equal parts, is Okawville, a village of between three and four hundred inhabitants. Okawville is near the line of the Saint Louis and Southeastern Railway, which runs through the county from northwest to southeast, and which has its termini at Saint Louis and Evansville, and it was at this place that the epidemic assumed a malignancy scarcely ever equaled in this country.

Cholera prevailed in several localities along the line of the Southeastern Railroad early in the summer, and was more than usually fatal in Mount Vernon, Ind., and Carmi, Ill.

During the month of July very heavy rains fell in the west end of the county, and the creek upon the bank of which Okawville is situated was very high, flooding the country around the town and depositing a large amount of organic matter, the washings of the prairie fields above the town, in close proximity thereto. Unusually hot weather succeeded, and miasmatic diseases, which are very prevalent in this locality, began to make their appearance and threatened to be of a more than ordinarily severe type.

On the 11th of August, H. H., a merchant, living near the center of the town, was attacked with cholera. He had returned two days before from Saint Louis, where cholera was then prevailing, and where he had

doubtless been on a debauch, as he was of dissipated habits; and though he apparently improved for several days, he finally died on the thirteenth day from the date of attack. Although the physician in attendance pronounced his disease Asiatic cholera, the citizens generally were incredulous, and no precautions were taken to prevent the spread of the disease. Living in the most public part of the town, and acquainted with all the citizens, many visited him before and after his death; no disinfectants were used, and every possible facility was given for the spread of the disease. As a natural consequence of this imprudence, in a few days other cases occurred. On the 18th, M. B., female, aged thirteen, living near the residence of the first case, sickened, and died on the 20th. An infant in another family took the disease and died.

Mrs. Catherine Wolff was taken on the 20th, and lived but a few hours. Her husband, Philip Wolff, was attacked the same day she died, and died that night. And now the cases followed each other in rapid succession. Whole families were swept away before the breath of the pestilence, and though many fled the plague-stricken town, very nearly a fifth of the inhabitants fell victims before the epidemic ceased its ravages, which was about the close of September.

Addieville is a small village, a station on the Saint Louis and Southeastern Rairoad, four miles east of Okawville. It is on the open prairie, and there are no surroundings that indicate any local miasmatic influence. Several families left Okawville about the 1st of September on account of the cholera, and occupied an unfinished house in Addieville. About the 20th several men, putting up a new line of telegraph-wire on the railroad, boarded in the village and lodged there at night. Among these was a young man, George Carroll, who resided at Mount Vernon, Ind., and who had an attack of choleraic diarrhœa in July. As I learned subsequently, this man had a return of the diarrhœa while working near Addieville, and several times deposited his dejections in a barn near the house occupied by the families from Okawville, and used by them for the same purpose. On the evening of the 20th of September, Mrs. J. G., one of the occupants of this building, a remarkably robust, healthy young woman, was stricken with the disease. Notwithstanding the most energetic and persistent treatment, she died the next morning. The next morning I was called to George Carroll, the young man from Mount Vernon, and found him far gone in a collapse. He died the same day. F. G., husband of the first case, came into my office about noon of the same day, and said he "believed he had cholera." He had not vomited, did not even feel any nausea, no cramping. There was no one to attend him, as the families living in the same house had all left as soon as his wife was attacked, and no one else could be procured, so I put him on a lounge in my office, and gave him all the attention I was able. Nothing that was done, however, seemed to have the slightest influence on the course of the disease, and before morning he died. Henry Schafer, blacksmith, living near the house where Carroll boarded, and using water from the same well, died on the 21st. Fritz Hugo, who had worked on a house in the village on the 20th, had gone a few miles in the country. On his return home he was attacked, and died the night of the 21st. C. G. M., a farmer in comfortable circumstances, living a mile south of Addieville, came into town on the 21st, and before I was aware he entered the office from which the corpse of F. G. had just been removed. On the 23d he was attacked with the disease, but recovered, though for some days he seemed very near death. There were but two other cases outside of Okawville, in this county, that I have

any knowledge of, and both of these cases can be traced directly to that point. The Rev. Mr. Fithian, a travelling minister, stopped all night in Okawville the night of the 29th of August. On the 31st he walked from Ashley to Richview, three miles, and became overheated, the weather being quite warm. In a few hours he was attacked with cholera, and died in twelve hours. A young lady, Miss J. W., was visiting at the same house in Okawville at which the Rev. Mr. Fithian staid all night, and left for home the same day. On her arrival at Ashley, fifteen miles from Okawville, on the same railroad, she also was stricken with the disease, but recovered. On the next day after these two persons left, the family of W. C. B., where they had been visiting, was attacked, and six cases occurred in three days, all of whom died. The young man, W. W., who was first attacked, had been nursing F. Cruze, who died of the disease three days before. No precaution, sanitary or otherwise, was taken to prevent other members of the family from becoming infected; from which neglect resulted eight cases and seven deaths out of the twelve persons who were in the house on the night of the 29th.

In summing up the cases which occurred in Washington County we have: Okawville, forty cases, no recovery; Addieville, six cases, one recovery; Ashley, one case, one recovery; Richview, one case, no recovery. Total, forty-eight deaths and two recoveries.

There are several points of more than ordinary interest presented in the foregoing imperfect history.

1. The remarkable mortality, uncommon, I believe I may say unprecedented, in any former epidemic in this country. The only approach to it is a well-authenticated account of a cholera epidemic that occurred, strange to say, within four miles of the present location of Okawville twenty-five years ago. On that occasion a man who had been to Saint Louis, where the disease raged at that time, 1850, had a mild attack of cholera on his return. In a few days sixteen cases and fifteen deaths had taken place in a small neighborhood of a few families. The conditions were very much the same as those in Okawville in 1873.

2. The intensity of the disease at this particular locality, Okawville, in connection with its low, malarial situation, and the violation of all hygienic or sanitary precautions to arrest or control the epidemic. True, the disease was nearly as fatal at Addieville; but of the six cases that occurred in that vicinity, two were residents of Okawville, another had worked in that place shortly before, and Carroll, the young man from Mount Vernon, Ind., died from a relapse of the disease. The young lady who had the disease at Ashley had only been on a visit to Okawville. So we find that of the four persons who had an attack, who were not residents of Okawville, two died and two recovered, a mortality not excessive.

3. At Addieville, where the most rigorous measures were adopted for its arrest by disinfectants, and the destruction of bedding and articles of clothing contaminated by contact with the disease, it was stamped out in two days.

4. Two factors are evidently necessary for an epidemic of cholera—a nidus for the disease such as existed in an eminent degree at Okawville, and a specific poison, just such as we can trace from New Orleans to Memphis and Nashville, Tenn., and then to both termini of the Saint Louis and Southeastern Railroad, Saint Louis and Evansville, Ind. We frequently have at Okawville a like condition, as far as miasmatic influences are concerned, but we have no cholera, because the specific poison is wanting. Bring the two conditions together, and let there be the

same criminal neglect of all the precautions that experience has taught to be indispensable in controlling this dread disease, and we will always have just such disastrous results.

5. The total inefficiency of any medical measures, either as prophylactics or as treatment, after the invasion of the disease, is noticeable. As far as could be seen, those who were vigorously and thoroughly medicated, and those who had no treatment, fared alike. There seemed to be absolutely no antidote to the morbific agent that did its work in a few brief hours, and there seemed to be no power in the systems of those attacked to rally. In such epidemics we have as yet no remedy; how important, then, to make such impossible by guarding against their invasion, or by such sanitary measures as experience has proved, in numerous instances, to be efficacious in their management.

Knox County.

Galesburgh, a city of ten thousand inhabitants, is situated upon the Chicago, Burlington and Quincy Railroad, one hundred and sixty-five miles southwest of Chicago.

At this city, so far as our information reaches, but one case of cholera occurred during the epidemic of 1873.

On the 14th of August a young man named Cowan was taken from a train on the railroad on account of an attack of cholera. He had just come from the city of Burlington, Iowa, where it was reported that several cases of cholera had occurred in the portion of the town he had visited. At 12.30 o'clock p. m. the patient was profoundly collapsed, and at 6 o'clock p. m. he was dead. Disinfectants were freely used. No other cases of the disease occurred.

Rock Island County.

The city of Rock Island is located upon the Mississippi river, two miles above the mouth of Rock river. It derives its name from an island in the river, which is three miles in length and which presents a perpendicular front of limestone 20 or 30 feet high. The main channel of the river is upon the west side of the island. This city has communication with the city of Davenport, Iowa, upon the opposite bank of the Mississippi, by a bridge and by steam ferries.

On the 3d day of September, 1873, Joseph Hertzberg was found by Dr. T. Galt to be in the collapsed stage of cholera. The surface of his body was cold and of a dusky hue; the face was pinched and with an anxious expression; tongue and mucous membrane of mouth cold; hands and feet shrunken and wrinkled; great prostration; cramping in the muscles of the legs; constant vomiting and purging, and suffering from extreme thirst.

It was ascertained that he had spent the previous Sunday in Davenport, where cholera was at the time epidemic. He had a painless diarrhœa in the morning when he went to his work; it continued through the forenoon. At dinner he ate some soup and drank two bottles of soda-water. After dinner he started to return to his work, but was obliged to go to bed. Shortly after he was seized with vomiting and cramps. The treatment adopted was hot fomentations, sinapisms, stimulating applications and frictions, the hypodermic use of belladonna. No remedies could be given internally, as vomiting was continuous. In five hours from the time at which he went to bed he was dead.

Disinfectants were freely used in the water-closets and drains. The excreta were disinfected as soon as voided. The privy, which had been

used by the man during the forenoon, was disinfected. After death, the bed and clothing were burned. The room was fumigated, scrubbed and whitewashed.

This case occurred at a third-class boarding-house, full of people who were addicted to the use of beer and bad whisky, very untidy in their dress, and irregular in their habits.

No other cases occurred in this house or in the city of Rock Island, and this is undoubtedly due to the prompt measures taken at disinfection. We are indebted to Dr. T. Galt and to Acting Assistant Surgeon Gregg, U. S. A., for the report of this case.

At the time of the cholera epidemic at Davenport, in 1873, there were stationed at the Rock Island Arsenal five commissioned officers of the U. S. Army with their families, and about seventy soldiers and ordnance mechanics. A *cordon de sante* was established as regards Davenport. One enlisted man escaped through this cordon, went to Davenport, got drunk, and remained all night in the room of a person ill with cholera. Upon his return to the post he was secluded; no ill effects occurred to the post by his imprudence, nor was he himself ill at any time.

In 1872 the city of Rock Island adopted the Holley system of water-works, and during 1873 the supply of river-water was abundant, taking the place of the well-water formerly used. It is noted as a significant fact that the opposite city of Davenport had made no such provision, and that in that city the supply was obtained, as in former years, from wells and cisterns. One city escaped the epidemic; the other suffered severely.

Warren County.

Monmouth is located upon a beautiful prairie, and upon the line of the Peoria and Burlington Railroad. The town has a population of about four thousand inhabitants.

At this town no epidemic of cholera occurred, although one death from the disease is reported as having occurred in the person of a man who had been the few days previously at Burlington, Iowa.

Little York is a small village of Warren County, situated about twelve miles northwest of Monmouth. The village has from eighty to one hundred inhabitants; is located on a prairie about eighty rods from a stream known as Cedar Creek. The first case occurred in the person of a merchant who had just returned from Burlington, Iowa, where he had been on a business visit. Six other cases occurred among the persons who were in communication with his sick-room, all of whom died.

Villa Ridge.

Dr. J. W. Mott reports but two cases of cholera as having occurred at this place.

I. Willis Ware, a negro, thirty-five years of age, a deck-hand on a Mississippi river steamboat, came to his home about one mile east of town on the 28th of June. He was taken with cholera a few hours after his arrival; the symptoms were fully developed, but he reacted and recovered.

II. Ray Rice, a negro, aged sixty, the father-in-law of Ware, and who lived in the same cabin, was taken with cholera July 2, and died within ten hours.

No other cases occurred.

CHAPTER X

MISSOURI GROUP.

MISSOURI CONTRIBUTORS.

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Dr. W. M. Gross, Wayne County.
Dr. James A. Ward, Lincoln Co.
Dr. J. Baker, Cole County.
Dr. S. V. Sterner, Morgan County.
Dr. Isaac Moore, Saint Charles Co.
Dr. J. L. Thomas, Saint Charles Co.
Dr. G. B. Winston, Cole County.
Dr. C. A. Thompson, Cole County.
Dr. A. C. Davison, Cole County.
Dr. O. Elston, Cole County.
Dr. R. E. Young, Cole County.

Surgeon B. F. Clements, United States Army.
Acting Assistant Surgeon Charles Reiss, United States Army.

DATES OF INITIAL CASES.

Saint Louis County.....May 11.	Cole County .....June 22.
Marion County.....June 6.	Lincoln County .....June 22.
Pike County .....June 13.	Saint Charles County..June 26.
Wayne County.....June 14.	Howard County.....July 17.
Butler County... .....June 19.	Morgan County .....August 18.

NOTE.—It is known that cholera was epidemic in the counties of Boone, Iron, and Saint François, but we have failed utterly to elicit any information from the physicians of those counties.

SAINT LOUIS COUNTY.

Many conflicting statements have been set before the public as to the epidemic of cholera, as it affected the city of Saint Louis, Mo., during the spring and summer of 1873. At one time it was announced that no cases of the epidemic type had occurred, but that the disease made its appearance about the middle of June in isolated and sporadic cases. Again great stress is laid in some quarters upon the expressed doubt of several of the most distinguished physicians of that city, "that there was a single genuine case of epidemic cholera in that city during the entire season." In the annual report of the health officer, the subject is disposed of in the following words: "The disease appeared first in the southern portion of the city and lingered there until it had very nearly run its course. Much of this part of the city is situated upon low ground and is supplied with water from wells and cisterns, many of which have been long in use, and in many instances the water had become impure, as was shown by chemical analysis. The population here is dense, much overcrowded in tenement-houses or living in houses built upon alleys back from the street. To this add ill ventilation, dampness of soil, neglected water-closets, deficiency of connection between premises and sewers, want of "traps" where there is such connection, and you will no doubt have the chief circumstances and surroundings which contributed to the virulence and continuation of the disease in this locality. As the disease began to subside in the southern part of the city, it leaped over the central portion and for a time lodged in the northern part of it; here, too, in localities in many respects in similar condition to those in the southern part of the city."

Despite the statements and assertions which have been noted, it is an ascertained fact that an epidemic of cholera existed in the city of Saint Louis from the month of May to that of October, 1873; that the disease was imported into that city from a cholera-infected locality, and that the epidemic influences were confined to certain localities of the city, in which foci of infection had been established.

Every effort has been made to obtain full and complete lists of the cases of cholera that occurred, with but, however, slight success. We have received from the health officer a list of three hundred and ninety-two fatal cases of cholera, and one hundred and thirty-seven fatal cases of cholera-morbus. The records of but very few non-fatal cases could be obtained. We have, however, succeeded in obtaining the particulars as to the early occurrence of the disease, which are herewith presented in a series of three distinct papers.

I.—EPIDEMIC CHOLERA AT SAINT LOUIS, MO., IN 1873.

BY WM. L. BARRET, M. D., *formerly health-officer.*

(Through supervising surgeon United States marine-hospital service.

The first cases of cholera that occurred in the city of Saint Louis during the epidemic of 1873, or the first cases of cholera morbus, as cholera cases were usually at that time designated by the attending physicians, and invariably recorded by the clerk of the board of health, whether pronounced by the physician in attendance to be cholera or cholera morbus, came under my observation as the then health-officer of the city.

I obtained the history of each of the early cases; examined the local and general sanitary surroundings of the places at which they occurred,

tried to ascertain the cause or causes that led to the propagation of the disease, and directed the execution of such measures as were thought most expedient to stay the spread of the malady.

The first case of the epidemic was that of John Washburn, who died on the 11th of May, 1873. The history obtained of the case was, that Washburn had recently returned to Saint Louis from New Orleans, in which latter place cholera was then prevailing. Within a few days after his arrival he was taken sick with what his physician regarded a severe attack of cholera morbus and of which he died after the lapse of a day or two. He was taken ill and died at 1515 South Seventh street, where he lodged and had retained a room during his absence in New Orleans. This case, as most of the cases occurring in the early part of the epidemic, was reported to the board of health as one of cholera morbus, and attracted no special attention until several days after the death had occurred and other cases of the same kind manifested themselves in the same house. Within a week from the occurrence of this death, five or seven other persons residing under the same roof were attacked with severe diarrhœa, vomiting, muscular cramps, collapse, and finally death; symptoms similar to those which characterized the first case mentioned. In addition to those who died, several others were affected in the same manner, and only recovered after a dangerous and protracted illness.

After the occurrence of the first two or three deaths, I visited the place in company with Dr. D. V. Dean, the city chemist, and then obtained much of the information already related, and learned the further interesting and important facts. After the death of Washburn, who it appears was without friends or legal representatives, the sick-chamber and the furniture and effects contained in it were left wholly undisturbed, and securely closed, in its exact condition at the time of his demise. The room thus converted into a hot-bed for the prolification of disease was very small, with low ceilings, dark, and illy ventilated. We learned that it had at all times been very filthy, but was most repulsively filthy at the time of its closure. The bed-clothes and floor were said to have been repulsive in the extreme, and filthy with the substances ejected from the stomach and excreted from the bowels of its former occupant during his last illness. Unfortunately, the occupants of the house had taken alarm at the terrible sickness and fatality that had so suddenly fallen upon them, and connecting their misfortunes with the filthy, vacant room, had it emptied, cleaned, and most of its contents destroyed before our arrival, so that we were unable to make a personal examination of its original condition, and therefore enabled to report only the statements of others.

The house in which, as above indicated, I believe the cholera epidemic of 1873 had its origin, is one of the oldest tenements in the city. It is an old-fashioned log-house, weather-boarded on the outside, and was probably constructed in the infant days of the city. It constitutes one of the few remaining monuments of a former civilization. It is one and a half stories high, and contains eight rooms, including those in the second or half story, which are in reality only attic rooms. Four of these rooms are on the first or ground floor, and the other four immediately over them. It was in one of these attic rooms that the first case occurred. The logs of which the house is built are decayed and moldy, the rooms are low in pitch, poorly lighted, and badly ventilated. This is true of the first or ground floor, while the second floor is nothing more than a very poor garret.

In this small structure four families resided, comprising in all eighteen persons; and within a week of the first death seven of the eighteen

persons died, while several others were dangerously ill, and only escaped death after a tedious lingering illness. The general sanitary surroundings of the house were fair. The house is built upon high ground, the natural drainage of which is good, and the sanitary condition of the neighborhood in which it is situated, as indicated in the perfection of its sewerage, the character of its buildings, and the character and number of its inhabitants, is of average excellence. I may as well state here, however, that the northern and southern portions of the city, taken as a whole, are the most deficient parts of the city in point of sanitary perfection. In these districts each successive epidemic, of whatever nature, that has visited the city for years, has been generated, and its strength has here been fostered. The local sanitary surroundings, aside from the presence of the infected room, the defective construction of the tenement, and its overcrowded, ill-ventilated condition, already alluded to, were of the worst kind. The sewer connecting with the privy-vault was obstructed and the vault full to overflowing, while the sewer ran within eight or ten feet of a well sunk in alluvial soil. This well derived its water from surface-seepage, and, if I remember correctly, was found, upon examination, to contain fifteen grains of organic matter to the gallon, and to be strongly contaminated with sewage. The sewer above mentioned probably communicated with the well, and this well was the only source of water-supply with which the tenants were provided.

The house was whitewashed, renovated throughout, and disinfected. The privy and sewer were also cleaned and disinfected. The well was closed, and the premises supplied with hydrant or Missouri river water. Subsequent to the enforcement of these measures no other cases occurred at the same place during the time I was connected with the health department, and, so far as I have learned, no other cases occurred there during the epidemic.

The next two cases that occurred were those of two employés at the nail-mill, on the Iron Mountain Railroad just north of the United States arsenal, and about seven or eight blocks southeast of the locality in which the first cases occurred. These persons had resided in the city for a long time prior to their sickness and death, and I could not connect their illness with any foreign contagion. One of the victims resided on Sidney street, about four squares distant from the mill. The other resided at the mill. Both were taken suddenly ill with the symptoms of cholera while at work in the mill. The discharges were rice-water in character, the muscular cramps were severe, the skin became blue and shriveled, the voice was lost, the urine suppressed, and they collapsed and died within a few hours of the first attack. The residence of the one who lived on Sidney street was high, cleanly, well lighted, well ventilated, and well drained; in all respects healthful except in one particular, and this defect consisted in the use of cistern-water, that on examination proved to contain four or five grains of organic matter per gallon; but no contamination with sewage was detected. The sanitary surroundings of the mill, where both had worked all day and were taken sick, were not so good. The mill is situated in a low bottom and just on the bank of the Mississippi river, where the malarial influence is perhaps as strong as in any other locality in the city. At the base of the mill runs a deep ravine or open sewer; indeed, it collects the offal and surface and sewer drainage of a large and populous district of the city. This ravine during the dry summer weather contains very little water, only small stagnant pools here and there throughout its length. In the bottom of this ravine, surrounded on almost every side by stagnant sewer-water,

that was on a level with its top, the mill company had sunk a well, and from this well the hands of the mill were supplied with water to drink and cook. An examination of the water by Dr. Dean demonstrated that it was very richly impregnated with organic matter, (I think seven or eight grains per gallon,) and that it responded promptly to the test for sewage contamination. In other respects save those mentioned, viz, its malarial location and the dangerous quality of the water-supply, there was no other cause that I could detect at the mill to engender disease. The prophylactic measures adopted at this place were confined to a closure of the well, and I believe no other cases occurred there. The third instance was that of a German woman, on the corner of Columbus and Lami streets. This locality is in the same part of the city and not more than ten blocks removed from the places where all the other cases occurred. Here we found a low, filthy, German boarding-house, of which the deceased was the landlady. The house in which the case occurred was defective in all respects of sanitary importance, and supplied with water from a well sunk in made ground and strongly contaminated with organic matter, but contained no free ammonia.

The fourth and last instance of an outbreak that occurred during my régime was the case of a negro man near the corner of Ninth and Pine streets. This was clearly an imported case. The man was a boatman, and had only returned to the city from New Orleans two days before his death. He landed in the city with the premonitory diarrhœa, and on the second day after his arrival was seized with cholera and died in eight or ten hours.

After the occurrence of the last case mentioned—and the cases above enumerated include all that occurred prior to the 2d of June—my connection with the health department ceased, and I have no further knowledge of interest concerning the progress of the epidemic, and have been unable to obtain any other.

Dr. D. V. Dean, the city chemist, who continued to observe the course and causes of the epidemic, has informed me that in a large proportion of the cases afterward reported the use of impure water in the infected families was demonstrated.

The frequent association of the use of impure water-supply with the occurrence of the disease stimulated a pretty thorough examination of the water-supply of the city, and particularly that derived from wells. In many instances wells apparently *very dangerous* were being used without the production of ill-health.

I saw none of the cases above enumerated in life; but they were all attended by competent physicians, who had abundant opportunities for observation in former epidemics, and I think their impartial diagnoses are entirely trustworthy.

Some of the deaths occurring in May and in June were reported as cholera morbus, when the attending physician was firmly convinced they were true cholera, because the disease was not then recognized as epidemic, and they did not wish to create a sensation or excite public alarm, and others of them were reported as cases of cholera, but recorded by the health authorities as cholera morbus for the same reasons.

My own conviction is, that all the deaths reported as due to cholera morbus were really cases of true cholera, or were engendered by the choleraic influence then undoubtedly prevalent. Such a thing as nine deaths from cholera morbus between the 11th of May and the 1st of June, and thirty-two deaths from the same cause during the month of June, was never before heard of in Saint Louis, and, I venture to say, will never occur again, except under similar influences, viz, an epidemic

tendency. It is true that every year we have a few deaths, rarely more than half a dozen, from cholera morbus; but the victims are those whose general health is already enfeebled by age or chronic disease, and they never occur until the latter part of July and 1st of August, when the weather is oppressively warm and the supply of green vegetables and fruits is abundant in the markets. These articles at that season, sold in a stale, green, or decayed condition, are invariably the exciting causes in our sporadic cases. The cases that occurred at the commencement and toward the close of the epidemic were milder, yielded more readily to treatment, and were less strongly marked in their choleraic features than those which occurred at the height of the epidemic, and these peculiarities are true, I think, of the whole epidemic, as compared with the epidemics of 1866 and 1867.

The epidemic in Saint Louis was almost wholly confined to the northern and southern portions of the city, and in its progress from the south to the north, the direction in which it extended, it seemed to jump over the central part of the city.

The northern and southern parts, as already mentioned, are those parts in which the sanitary improvements are least perfect, where the population is least intelligent and least provident. The central part of the city is that in which the sewer system is most perfect, the streets broadest and cleanest, the tenements most airy and comfortable, the public water-supply almost, if not quite, universally enjoyed, and in which the characteristics of the population is the reverse of those attributed to the northern and southern parts.

The means adopted by the board of health to crush out the epidemic and prevent its spread was the stoppage of the use of impure water, in all instances where its use was detected, and a disinfection of the premises where cholera cases occurred, together with a general renovation and disinfection, so far as it could be effected, of all houses and their surroundings where the disease showed itself. This included cellars, privies, sewers, &c.

The first case, as will be seen from the inclosed list, occurred on the 11th day of May, and the last on the 26th of October. The total number of cholera morbus cases was 137; the total number reported or recorded as cholera was 392. These numbers make a total of cholera and cholera morbus combined of 529.

The facts set forth present a true account of the invasion of this city by the disease, and give a correct history of the first eleven or twelve cases.

II. The Cholera epidemic of 1873 at the Quarantine Hospital.

The Quarantine Hospital, a public charity of the city of Saint Louis, is located upon the west bank of the Mississippi river, twelve miles south of the city. The Iron Mountain Railroad passes in close proximity to the hospital, and affords rapid transit to and from the city. At this point is also located the city pest-house, to which patients are conveyed by wagon transportation. Daily communication exists between the hospital and that portion of the city of Saint Louis which is known as Carondelet.

At this hospital, on the 26th day of May, a female named McAnnally was suddenly seized with cholera and died after but a few hours' illness. This woman had been an inmate of the institution for some time, was under treatment for syphilitic rheumatism, and had not been away from her ward for weeks.

In the same ward, and occupying the next bed to Annie McAnnally,

was a woman named Duncan, with two children. This woman was sick with diarrhœa for some days before Annie was taken with cholera. Before Annie died Mrs. Duncan was taken with cholera, and died at an early hour on the 27th, and at a later date her two children died of the same disease. It was subsequently ascertained that Mrs. Duncan had absconded, with her children, from her home in the extreme southeastern portion of the State.

June 3.—A man named James Watt was carried to the hospital from a river-steamer in the collapse stage of cholera, and died within a few hours. No record was made as to the boat from which he was removed, other than the fact that she was from Memphis, Tenn., and bound for Saint Louis.

The epidemic was at first confined to the female ward in which McAnnally and Duncan had died, and to the male ward in which Watt died; but cases were soon developed in other wards. The disease assumed a severe and fatal type. From the 16th of May to the 15th of September, sixteen fatal cases occurred, with many of recovery; of the last mentioned no record was preserved. Of the fatal cases twelve were males, four were females. The ages ranged from one month to fifty-two years. All were white.

Dr. R. S. Anderson, the medical superintendent, is kind enough to inform us that "the treatment adopted was experimental. Internally, astringents, opiates, carminatives, stimulants, and cathartics were employed in different cases. Hypodermic injections of both morphia and atropia were resorted to. Externally, frictions with mustard, hot baths, and general applications of warmth were used." Disinfectants were freely used. The patients were isolated as completely as was possible, and scrupulous attention was paid to cleanliness and the removal of the excretions.

III. The following letter from Dr. Charles Reiss, late Acting Assistant Surgeon United States Army, presents the history of the second group of cholera-cases which occurred at the city of Saint Louis in 1873:

"SAINT LOUIS, MO., *November* 1, 1874.

"SIR: I have the honor to transmit herewith a list of the cases of cholera which came under my observation during the epidemic in the year 1873.

"Early in the morning of May 28 I was called to see a man at the corner of Ninth and Lynch streets, named Dinert, who had come home sick from his work at the Saint Louis Railroad Fastening Company's shops. These shops are situated due north of the United States barracks, upon the banks of the Mississippi river, or rather, on the Iron Mountain Railroad, between the barracks and Dorcas street, in the southern portion of the city. I found the man Dinert to be suffering from cholera.

"Upon my return home I was called to return in haste to the same locality, and there found an aged lady named Roberts also attacked with cholera. In a few hours both cases were dead. These being the first cases of the disease, and as they occurred at the same place, my attention was given to discovering the cause of the outbreak. I had heard nothing of cholera in the city up to this date, although bowel-complaints were frequent. I had prescribed for several cases at these works, in the persons of new-comers to this city from points upon the lower river; among them a man named Butler, who had for some time a troublesome and exhausting diarrhœa. This man had made constant use of the privy which was also used by Dinert and Mrs. Roberts.

"As will be seen by the accompanying diagram, north of the mill is a row of tenement-houses occupied by the employés. These houses are built upon a lime stone ledge, which upon the north has been extensively quarried. The water used by both the workmen at the mill and the occupants of the tenement-houses, was obtained from a well which had been dug in the quarry. Standing at the mouth of this well, it was found to be some 20 feet below the level on which the buildings stood; that it (the well) was surrounded by pools of stagnant water, and that it was flanked east and west by the weather beaten limestone rocks exposed by the former quarry-work.

"Upon the bank, and at the edge of the quarry, were a number of privies for the use of the workmen and their families. These privies consisted of pits which had been dug into the surface-rock, and the section of the rock below these privies was full of crevices. The water of the well was clear, cold, and odorless.

"I had the well closed at once, and caused the locality (houses and privies) to be thoroughly disinfected with carbolic acid and copperas. Instructed the people to use the dirty river-water which the establishment pumped for manufacturing purposes, rather than the clearest well-water of the neighborhood.

"I heard and saw nothing more of cholera, although bowel-complaints continued to be frequent until June 12, when I was called to see another employé of this company, but who resided on Dorcas street, where a great many of his fellow-laborers lived at the time. This point is within three or four blocks of the mill. The people lived in small houses that were furnished with wells in close proximity to privies, which, owing to the rock-formation, were very superficial.

"The treatment which I adopted was strictly symptomatical—opiates and stimulants, with ice.

"Very respectfully, your obedient servant,

"CHARLES REISS, M. D.,

"*Acting Assistant Surgeon, United States Army.*

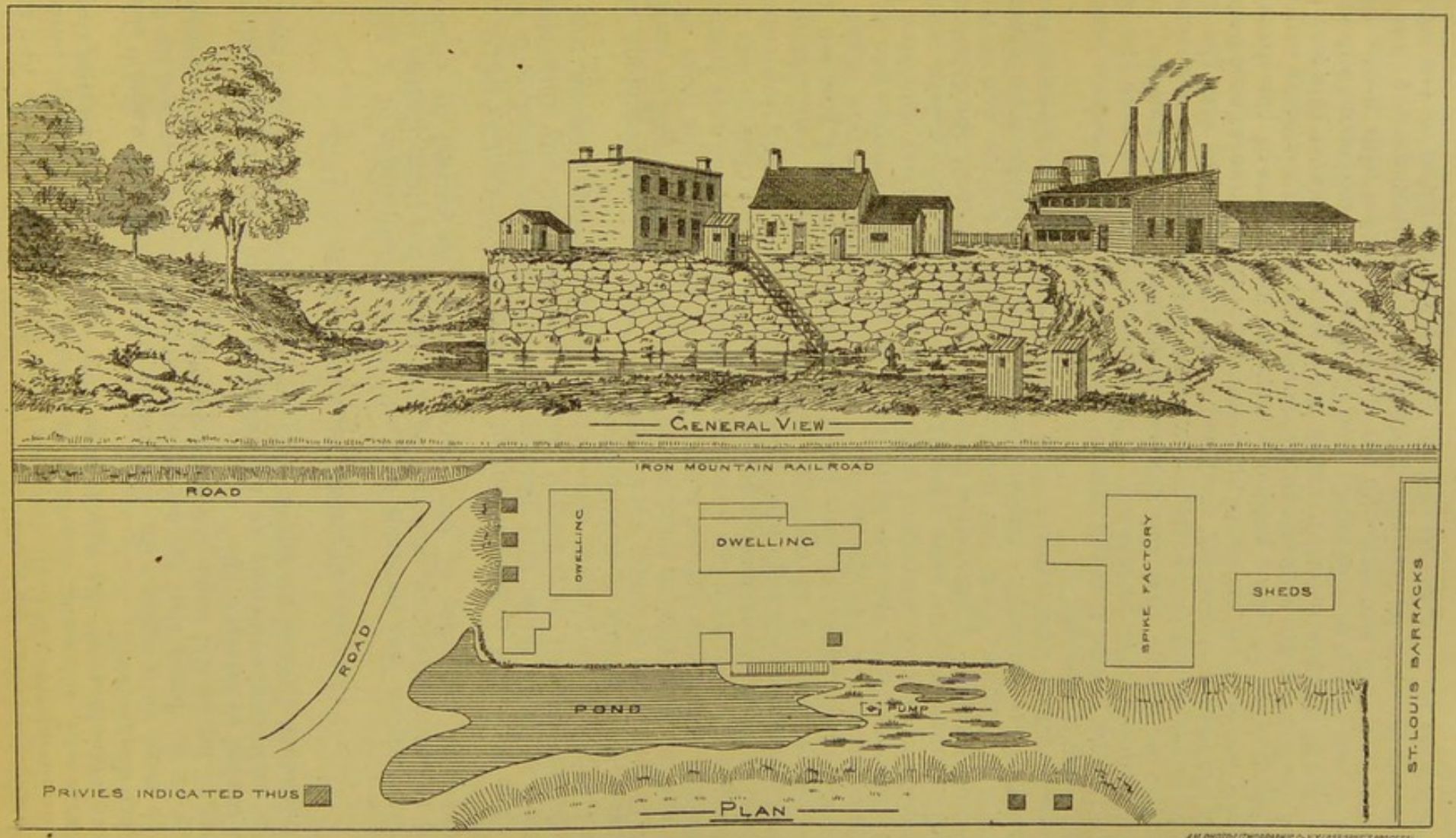
"Asst. Surg. ELY MCCLELLAN, U. S. A."

It is well to note that upon the river immediately above the locality described by Dr. Reiss, is a point on the levee at which steamboats land, and at which they are frequently tied up for cleansing purposes.

It was undoubtedly from the three points of infection that have been described that the epidemic at Saint Louis in 1873 originated. The case of May 11, although classed as cholera morbus, was certainly connected with the cholera which, at the time, was epidemic at New Orleans, and at many points upon the Lower Mississippi River.

There can exist no doubt that the case which occurred at the quarantine hospital on the 26th of May was infected from the female who so soon thereafter was a victim of the disease herself. The evidence as to the cases of May 28 is certainly conclusive. It was from these cases that the disease spread. The violence of the epidemic was confined to the southern sections of the city, in which the infection had been developed.

About the middle of June the board of health became aware that cholera was in the city. The health-officer in his annual report states that "steps were taken to at once place an abundant supply of disinfectants at all the police stations and substations throughout the city, and through the aid of the police-force printed and verbal notice was given to all persons who were not able to purchase disinfectants for


General View
Iron Mountain Rail Road
Road
Road
Dwelling
Dwelling
Spike Factory
Sheds
St. Louis Barracks
Pond
Pump
Privies indicated thus
Plan

themselves, of the ample gratuitous provisions which had been made for the disinfecting of their premises; and through these means, and the vigilant and unceasing efforts of the board and its officers, all places where cholera made its appearance were constantly visited and thoroughly disinfected."

We most fully agree with the Health-Officer when he states "that there is no doubt that the active and energetic course pursued by the board of health did much toward preventing the spread of the disease, and tended to stamp it out."

As additional evidence, we reproduce from the Saint Louis Medical and Surgical Journal an article from the pen of the accomplished senior editor:

"CHOLERA-EPIDEMIC IN SAINT LOUIS IN 1873.

"As early as May (possibly in April) we had indications of a tendency to bowel-affections, although in that month but three deaths were reported at the office of the board of health as caused by cholera morbus.

"The time and exact location of the first case of cholera which occurred in Saint Louis this year cannot now be ascertained, as it was doubtless reported as a case of cholera morbus. Our city authorities were active in furnishing disinfectants at the police-stations, free of expense to all unable or unwilling to pay.

"In the month of June, bowel troubles became more prevalent, and 35 deaths from cholera morbus were reported to the board of health. This was at the time deemed a very large number of deaths from cholera morbus, as we were not aware that cholera morbus was ever commissioned to do any considerable amount of killing, while cholera has persistently sustained its high pretensions in this regard, cutting down about one-half attacked in all countries, whatever treatment or obstacles interposed. In the month of July the mortality, as published, reached the absurd number of 210 deaths from 'cholera morbus.' It now began to be suspected that the less alarming name of cholera morbus had been adopted to prevent disturbing trade; and it was generally conceded by medical men that we were passing a mild epidemic of cholera, which opinion received confirmation from the mortality-report the following month of August, when 109 deaths from cholera morbus and 80 from cholera were reported. September reported 50 deaths from cholera morbus and 12 from cholera, after which the disease disappeared from the mortality-reports.

"Having passed through several epidemics of Asiatic cholera, particularly that of 1849, in this city, I felt sufficiently familiar with the disease to be certain that the disease designated 'cholera morbus,' last year, in our mortality-reports, was genuine cholera; and I have no doubt that the improved sanitary condition of the city, together with the universal custom of physicians to make free use of disinfectants immediately on being called to visit a patient giving any indications of the disease, and the fear lest the epidemic should increase in severity, causing care on the part of citizens, helped to check the disease. However this may be, the disease passed over us lightly, and the present 'heated term,' although hotter than 1873, and although our markets are filled with fruits, *often stale*, yet it is rare to hear of a death from cholera morbus, and thus far (September 16) no sporadic case of cholera has appeared on our health reports.

* * * * * * *

"The following table shows the monthly mean temperature and rainfall during the period the disease lingered about the city:

May, 66.2 F.; quantity of rain, 3.91 inches.
June, 68.5 F.; quantity of rain, 5.24 inches.
July, 69.2 F.; quantity of rain, 5.88 inches.
Aug., 68.9 F.; quantity of rain, 0.04 inches.

"During the month of September the disease disappeared from the city. The total number of deaths from cholera, by the board of health published, was 92; total during the same time of cholera morbus was 395.

* * * * * * *

"If it can be shown that cholera originates in the valley of the Mississippi as well as that of the Ganges, the opinions of sanitary scientists throughout the civilized world are in error, and their efforts to exclude the disease from Europe are absurd, if not farcical.

"The International Council, just in session at Vienna, on this subject having unanimously agreed to its only origin being the valley of the Ganges, and having proposed certain precautions by land, and quarantine by sea, to confine the disease to as limited space as possible, where it is indigenous, what argument or evidence our health-officer has so well authenticated and so conclusive as to outweigh the combined opinions of the most eminent leaders in sanitary science in this country and abroad, does not yet appear.

"Again, we are compelled to demur to the statement that cholera morbus was epidemic in Saint Louis in 1873, at the time cholera prevailed. The cholera-germ theory being generally received, we may concede a case to become dangerous or otherwise, as a larger or smaller dose is received and the system has more or less power of toleration or resistance to the poison. The case may appear one of simple diarrhœa, with or without vomiting. That such cases are as properly cholera as a mild case of variola with a few pustules is a true case of variola, and not something else; hence the large number of deaths reported in 1873 as from *cholera morbus*, with a comparatively small number of deaths from cholera, we think should have been reversed, as cholera morbus simple, we repeat, has but little of the killing agent in it."

At our request, Dr. William S. Edgar has been kind enough to prepare the following statement as to—

DEATHS FROM BOWEL-AFFECTIONS IN SAINT LOUIS DURING THE YEARS 1872, 1873, AND 1874, AS PUBLISHED BY THE BOARD OF HEALTH.

"It should be observed that sufficient care in the nomenclature or diagnosis has not been observed—a large portion of those set down to *summer-complaint* being cases of cholera infantum, and a large portion reported as cholera morbus were doubtless cholera. Notwithstanding these inaccuracies, the report may be of some value as showing the increase of mortality from the epidemic influence.

	1872.	1873.	1874.
Deaths from diarrhœa	138	132	117
Deaths from dysentery	144	132	97
Deaths from cholera	.....	383	2
Deaths from cholera morbus	53	147	28
Deaths from cholera infantum	255	439	349
Deaths from summer-complaint	68	112	63
Total of all ages, from bowel-affections	658	1345	656

"The only variations in the above from the published mortality-reports are in the number of deaths from cholera in place of cholera morbus, as corrected in the health-office; also, in the number of deaths from cholera infantum being as much *greater* as the deaths from summer-complaint are *less* than the published reports—the totals from *all bowel-affections* each year corresponding exactly with the published reports from the health-office. The cholera epidemic influence of 1873 is boldly outlined by comparison with the deaths from bowel-affections the year before and the year after, being respectively 656 and 658, while the year between it was 1,345. Who can doubt that a specific influence operated that year to increase the mortality?"

We have received, through the courtesy of the officers of the board of health, a record of 392 fatal cases of cholera that occurred during the period from May to October, 1873.

Of these cases there occurred in that portion of the city which is—

	Deaths.
South of Choteau avenue	184
North of Washington avenue	135
Between Choteau and Washington avenues	5
West of Grand avenue	8
At the city hospital	60
Total	392

In the southern district the first case was reported.....May 28.
In the northern district the first case was reported .....July 9.
In the central district the first case was reported.....June 1.
In the western district the first case was reported.....June 27.
At the city hospital the first case was reported.....June 22.

In the southern district the last case was reported.....October 2.
In the northern district the last case was reported.....October 15.
In the central district the last case was reported .....August 23.
In the western district the last case was reported .....July 30.
At the city hospital the last case was reported.....September 30.

The following tables are presented, as being of some statistical value:

I.—*Sex and color.*

Males, white	198
Females, white	179
Males, blacks	12
Females, blacks	3
Total	392

II.—*Condition in life.*

	No.
Single	179
Married	182
Widowed	31
Total	392

III.—*Ages.*

Under 10 years	80	From 60 to 70 years	18
From 10 to 20 years	42	From 70 to 80 years	8
From 20 to 30 years	64	From 80 to 90 years	1
From 30 to 40 years	84		
From 40 to 50 years	63	Total	392
From 50 to 60 years	32		

IV. *Number of deaths in each month.*

May	2	August	132
June	34	September	34
July	184	October	6

V. *Table of intestinal diseases.*

Month.	Dysentery.	Diarrhœa.	Cholera morbus.	Cholera infantum.
May	2	3	10	4
June	19	3	40	70
July	18	19	33	135
August	22	27	24	127
September	37	43	15	95
Total	98	95	122	431

Every effort in our power was made to secure a record of recoveries; in this we were uniformly unsuccessful, even at the City Hospital; although a list of fatal cases was furnished, our request for a full list was met with no response. By Dr. F. F. Prewitt, who was resident physician during the epidemic, and from whom we received much courteous consideration, we were informed that 183 cases were treated at the hospital, of whom 114 were discharged cured. These figures, taken from the annual report of the resident physician of the city hospital, show a discrepancy of nine cases between that report and the statement of the health-officer, and would swell the death-roll to 401 cases.

We were also informed by Dr. Prewitt that carbolic acid and sulphate of iron were freely used throughout the hospital; that the treatment consisted in the hypodermic use of morphia, and the exhibition of calomel in small doses.

During the epidemic one assistant physician was attacked with the disease, but recovered. One inmate of the hospital, an old man, died of cholera.

We were informed by Dr. George Homan, from whom we received kind attentions, that the first case that came under his observation was a female who had arrived by steamboat from some point on the lower river. To Dr. Walter Wyman we are indebted for much valuable information.

MARION COUNTY.

Hannibal, a city of some ten thousand inhabitants, is located upon the banks of the Mississippi River, one hundred and fifty-three miles above the city of Saint Louis. This city has railroad-communication with all points east and west.

The information which can be obtained of the cholera epidemic of 1873, at this point, is of the most meager description, from the fact that all the notes of the epidemic which were in the hands of Dr. James G. Hickman, the city physician, were lost.

We learn, however, that the first recognized case of the epidemic occurred on the 6th day of June, in the person of an aged negro. This case, however, recovered, but during his convalescence his wife and two daughters, who occupied the same house, died of the disease. Where this negro came in contact with the disease, or how he contracted it, is not stated. Other cases followed in rapid succession, and at least one hundred deaths occurred.

The disease was almost entirely confined to the district known as South Hannibal, which is built upon a low flat, subjected to overflow. In this district the water-supply is obtained from wells and cisterns. The privies were in bad condition. The disease was confined to the lower classes of society. In houses where one case occurred, others were almost sure to follow if the people remained in the house.

An attack of the disease could not always be traced to improper food. The disease caused no uneasiness among the citizens, and the large majority will never believe that cholera, as an epidemic, existed among them.

Palmyra, the county town of Marion County, had no cases of the disease.

PIKE COUNTY.

The epidemic of 1873, as it affected this county, was developed at—

I. *Louisiana*, a town of about 3,500 or 4,000 inhabitants, located upon the west bank of the Mississippi River, one hundred and fifteen miles above the city of Saint Louis, and upon the line of the Chicago and Alton Railroad; which road at this point crosses the Mississippi River.

On the 13th of June, Sam Early, a negro deck-hand upon a Mississippi River steamer engaged in the Memphis trade, was attacked with cholera at the town. He was treated by Dr. S. B. Ayres, with calomel and opium, and recovered. An active system of disinfection was instituted, but on the 18th a negress named Williams, at whose house Early had been sick, was taken with the disease and died within twelve hours. Disinfectants were again employed, and no new cases occurred until the 24th, when three negro men, who were also deck-hands upon a river-steamer, arrived at their homes in Louisiana, from Memphis. These men all had diarrhœa, and complained of malaise when they arrived. In each of these men cholera was rapidly developed. Two of them recovered after having been collapsed, one forty-two, the other forty-eight hours. The third case died after a lingering illness. June 25, a negro named Shannon, also employed upon a river-steamer, was attacked and recovered.

At this time the railroad company was engaged in the construction of the bridge across the Mississippi River. A large number of hands were employed on this work, who lived in crowded and dirty boarding-shanties; among these people the disease next appeared, and from them it spread to the city. It was noted that those persons who used the water from wells, which is strongly impregnated with lime, suffered more severely than any others. Dr. Pearson was informed by the two survivors of the three cases which he reports, that prior to their leaving Memphis they had been at the house of one of their friends, who was sick just as they were, and that some members of the family had died.

We have received a record of thirty-eight cases of cholera that oc-

curred at Louisiana from June 13 to October 1. This is, however, by no means a full record, but we have been unable to obtain returns from other physicians. Of these thirty-eight cases, twenty-one were fatal. Twenty-nine were whites, nine were negroes. Twenty-five were males, thirteen were females. The ages ranged from six months to fifty-six years. Five cases were in the persons of children of less than ten years of age, all of whom died.

Dr. Jno. S. Pearson states that at least 250 cases of cholera occurred at Louisiana, 75 per cent. of which were fatal.

Dr. Ayres reports favorable results obtained from calomel, morphia, subnitrate of bismuth, and carbonate of ammonia.

Dr. C. Pearson used, with some advantage, quinine and strychnia; and Dr. Jno. Pearson obtained favorable results from strychnia and galvanism.

The disease, having been contracted by the employés and other workmen on the Chicago and Alton road, was carried westward along the line of that road.

II. *Clarksville* is a small town of Pike County, located upon the Mississippi River, fifteen miles below Louisiana.

The following letter shows that while at Louisiana there was no difficulty in recognizing and isolating the initial cases of the epidemic, the physicians in other portions of the county failed to trace the connection, although the same causes would affect both localities. The same boats that brought cholera-infected negroes to Louisiana touched at Clarksville; and the county which is tributary to Clarksville is traversed by the Chicago and Alton Railroad.

"CLARKSVILLE, PIKE COUNEY, MO.,
"*November* 4, 1874.

"DEAR SIR: I find upon inquiry that the initiatory case of cholera in this section of the county occurred about twelve miles from this point. It was in the person of a colored woman, the cook and house-maid to one of our most wealthy families. Her diet consisted of just such as the family used. The sickness occurred during the absence of the family, but it is hardly to be supposed that it was induced by any inordinate indulgence in diet, since she had always been used to the best the country afforded. This farm is situated on the waters of Ramsey's Creek. Near its head and in the valley of this stream nearly all the cases occurring in this section were found. This is pre-eminently a limestone valley. The stream is about twenty miles in length, and drains a very wealthy and productive valley of about an average width of three miles. This valley lies in a northwestern direction from the mouth of the stream, and is bounded on both sides by rows of knobs approaching to the size of mountains. Springs and wells of living water abound in all parts of this valley, and their water is used for domestic purposes by a large number of the inhabitants. This water is strongly impregnated with the carbonate of lime.

"It is not known that this woman had any connection with any one from whom it is possible that she could have received the germs of the disease; neither had any of the cases which followed in quick succession on this any connection with her; but in every case, so far as I have been able to get the data, the patient had been drinking freely of this limestone water. In the Brown-family epidemic, which consisted of seven cases, I know that they all used this character of water. They used water from a

well situated near a smoke-house, where they usually kept several sacks of salt. The roof of this house was in bad condition; during each rain the salt was wet, and from it the ground was impregnated. The well was without curbing, and had not been cleaned out for fifteen years. The yard was filthy. These, coupled with the fact that the family was an intemperate one, both in eating and drinking, seem to be sufficient causes for the ravages of the disease in this family.

"All the cases in this valley amounted to about thirty-four, with twenty-one deaths. The treatment adopted was calomel, morphia, vegetable astringents, aromatics, sinapisms, and stimulating injections. This plan of treatment was found eminently satisfactory.

"J. R. BUCHANAN, M. D.

"DR. E. MCCLELLAN,
"*Asst. Surgeon, U. S. A.*"

WAYNE COUNTY.

Mill Springs is a station upon the Saint Louis division of the Iron Mountain Railroad, one hundred and thirty-four miles south of Saint Louis, and thirty-two miles north of Poplar Bluff.

At this town, on the 15th of June, a railroad-employé, a man thirty-five years of age, was taken with the cholera, and died after a few hours' illness. The next day a married female was attacked, but recovered after an illness of a few days.

June 17, a man forty years of age, also an employé of the railroad, was attacked, and died after an illness of three days. Three other cases occurred, two of which were fatal.

Although the disease was distinctly brought into the village by railroad-employés, it is claimed that the cause is to be found in imprudence in diet and in intemperance. It is noted that all who had the disease were intemperate, and that all who avoided alcoholic excesses escaped.

The solution is found in the fact that all the six cases were connected. The disease was introduced by railroad-man No. 1; from him Mrs. Witham was infected, her infant being the next case; then railroad-man No. 2, then Henry Witham, and finally Mrs. Maples completes the group.

BUTLER COUNTY.

Poplar Bluff is a small village of Butler County, and a station on the Saint Louis and Texas division of the Iron Mountain Railroad, one hundred and sixty-six miles south of Saint Louis. It is also a terminal point of the Cairo, Arkansas and Texas Railroad, being seventy-one miles from the city of Cairo.

In the month of June, 1873, this town was in a filthy condition; the railroad-extension brought into it a large number of Irish laborers, who lived in boarding-shanties in utter defiance of all sanitary requirements. On the 19th of June a man named Axtel, who was a contractor upon the railroad, arrived from Saint Louis. The disease was fully developed soon after his arrival, and he died within ten hours. Although the necessity was strongly urged by Dr. James A. Greer, no precautions were adopted, and the body was allowed to remain until it was in an advanced stage of decomposition before it was buried. Those persons who remained near his body were the next attacked, and from them the disease was communicated to others and became epidemic.

We have been unable to obtain reports from all the physicians of this town, Drs. J. A. Greer and J. Nixon alone responding to the application

for information. By these gentlemen twenty-one fully-developed cases are reported; of them fifteen proved fatal. Many of these cases ran their course very rapidly. Two cases are reported in which the fatal termination was reached in one hour after the disease was developed, and three others in which it lasted but from two to six hours.

Dr. Greer reports that fully 90 per cent. of the cases were from the lowest class of the community, and among the feeble and old. Those persons who were addicted to intemperance were especially liable to the disease.

In the cases which have been reported great care was had to disinfect and bury all the discharges and to disinfect soiled clothing.

COLE COUNTY.

Jefferson City, the capital of the State of Missouri, is situated on the south bank of the Missouri River, which stream is a mile wide at that point. The city is built upon broken bluffs, with high hill-lands extending south for miles. The location has been considered perfectly healthy, there being no local causes of disease, other than the supposed miasmatic region of the rich and fertile bottom immediately opposite, on the north side of the river.

In past years this city has been visited two or three times by epidemic cholera; in 1849 in a fearfully aggravated and fatal form. In 1867 the city was threatened with the disease, but by resorting to the most active disinfection the danger was averted. In each instance the outbreak has been traced to exotic cholera-germs transported by the traveling of cholera-patients.

Jefferson City being upon the line of the Missouri Pacific Railroad, and also the southern terminus of the Chicago and Jefferson City branch of the Chicago and Alton Railroad, is in constant communication with the cities of Saint Louis, Mo., and Chicago, Ill.

The earliest record of cholera which can be obtained at Jefferson City, in the epidemic of 1873, is reported by Dr. C. A. Thompson, as having occurred on the 22d of June, in the person of one Saunders, who had arrived the day preceding from the city of Saint Louis. This man was seriously ill, but was convalescent by the end of the month. June 27 a negro man named Scruggs, who had been working at the fair-grounds, was taken with cholera and died the same day.

With these cases the demonstration subsided, and no cases are reported until the 26th of July, when cholera suddenly appeared in the Missouri State penitentiary, in the person of a convict named Miller; in a few hours a convict named Williams was attacked; both cases terminated fatally within a few hours.

These men both belonged to a gang of convicts who had been employed in loading stone from a quarry upon the river-bank on a Saint Louis boat. In this work the men crossed and recrossed the Missouri Pacific Railroad track innumerable times each day.

July 30 two other men in the same gang were both attacked with cholera; one died. From this date the disease became epidemic in the prison, but was confined to one building, and to the shops at which the men worked whose cells were in that building.

From Dr. R. E. Young, the surgeon of the penitentiary, we have received much valuable information.

"Except in four cases that occurred at the penitentiary, no exciting cause could be found. In two cases it was said that green grapes had been eaten, but sixty other men ate of the same kind of grapes and

were not attacked. Four days elapsed between the first two and the third case; the last had no chance to eat grapes.

"Great care was taken in the male department of the penitentiary in regard to diet, ventilation, and disinfection, and thirty-four cases occurred. Among thirty females closely crowded together in a poorly ventilated building, no cases occurred. No connection existed between the male and female departments. Nineteen of the cases occurred in the persons of men employed outside the prison walls. One man only was on night-work. Fifteen were in the persons of men working in the shop. Only five slept in poorly-ventilated cells. Of the nineteen outdoor laborers, sixteen used a common privy. The fifteen who worked in the shops used a privy under which flowed a stream of water. One guard, who used this last privy, and was exposed to the drain from it, was attacked and died. Of one thousand men and women within the walls, nine hundred and seventy-five were treated for diarrhœa during the cholera epidemic. In all cases the liquid purged and vomited was at some time free from bile. Rice-water discharges occurred in all the cholera cases, with cramps and vomiting. In the majority of the cases a cyanosed appearance was present. In all cases the urine was either suppressed or notably decreased. The breath was cold and the temperature lowered.

"Of the thirty-seven cases not one occurred in the day. Twenty occurred before midnight, sixteen after midnight but before day. Of the thirty-seven cases, twenty-two were strong, active men, doing daily labor. Fifteen at the time of their attack were sick of other diseases.

"The diet of the convicts at the time of the outbreak was wheat-bread, beef, potatoes, onions, tomatoes, coffee, and tea."

The drains from the penitentiary privies, &c., empty into a small stream east of the walls of the institution, at its junction with the Missouri river. During the epidemic two men arrived in a fishing-boat from Kansas City, and pitched a tent upon the river-bank, just opposite to the mouth of this drain. Both men died of cholera within a few days of their arrival.

From the penitentiary the disease was carried into the city. A total of sixty-three cases are reported. Of these, fifty-six were males, seven were females. The ages ranged from one year to seventy years. The condition of life was good in fourteen cases, and very bad in forty-nine. The social condition of the vast majority of the cases was unknown.

The treatment adopted was opiates, calomel, and astringents. Carbolic acid was exhibited in some cases. Ammonia was the stimulant most used.

Lincoln County.

Troy, the county-town of Lincoln County, has about seven hundred inhabitants. The town is located near the Cuivre River, about sixty miles northwest of Saint Louis.

We have no definite information as to how the epidemic originated at this point. Dr. J. A. Ward, who alone responded to our call for information, is of the opinion that it was due to atmospheric influences.

The first recognized case occurred in the person of a negro, on the 22d day of June. We quote from a letter of Dr. Ward, dated September 29, 1874:

"The first two or three cases of cholera caused an alarm among our people, whereupon an ordinance was passed by the city council ordering all the sinks, privies, cellars, &c., to be thoroughly cleansed. This was

done, and by the stirring up of the same, together with the newly-made streets, let loose all the noxious gases contained in the same, furnishing a cause for the disease, then almost everywhere in the atmosphere."

SAINT CHARLES COUNTY.

This county occupies a neck of land formed by the confluence of the Missouri with the Mississippi River. The county is well drained, and is alternately hilly, rolling, and level. It overlies a limestone base. Saint Charles, the county-town, is upon the Missouri River, twenty-two miles above its mouth. At this town no cases of cholera occurred in 1873, as we have been informed by Dr. B. W. Rogers.

Portage des Sioux is a small village of Saint Charles County, upon the Mississippi River, a few miles above the mouth of the Missouri. The information as to the epidemic of 1873 at this point, which we have been able to obtain, is contained in the following letters:

"PORTAGE DES SIOUX, MO., *October* 17, 1874.

"The cases I have given you are what I term *cholera cases.* I have been opposed by my worthy friend, Dr. J. L. Thomas, of this place, who terms them congestive fevers and congestion of the bowels. There was no suppression of urine in my cases of congestive fever, while it occurred in cholera cases. I claim that there are many differences between these disorders. As to the cause of this disease it is hard to determine. All of my cases were of the working-class, who mostly labor in the sun, and drink a great deal of water, perspire profusely during the day, and at night (which is the usual time of the attack) sleep in a draught of air. I am rather inclined to think that the disease is malarial, and absorbed during the hours of rest.

"In the treatment of the cases which came under my care, I relied upon large doses of calomel, with columbo and ipecacuanha.

"Respectfully,

"ISAAC MOORE, M. D."

Under date of November 20, 1874, Dr. J. L. Thomas, from Portage des Sioux, writes as follows:

"The epidemic commenced here about the 1st of July, and continued about two months, more or less. The symptoms were those of cholera epidemica, but the cases were confined to a very malarial district of two and a half or three miles in circumference. There were, I suppose, twenty-five or thirty deaths, the most of which occurred without medical aid. The locality in which it broke out was on a slough or back-water from the river. The Lineman family was quite large, and about two-thirds of them died. Their residence was almost surrounded by stagnant water. The water they drank was thought by many to have caused the disease.

"It is quite clear to my mind that the symptoms of this epidemic, from its incipiency to the last stages, was that of a bilious character. The attack was either ushered in with a slight chill, or ended as an intermittent. The symptoms were those of marked congestion: vomiting and purging; cramps slight; shriveling of skin of the fingers and toes; restlessness; intense thirst; dark hue of the skin; sunken eyes; profuse sweating; rose-colored specks or papillæ on the trunk. The discharges that I saw were not rice-water."

Dr. Thomas details his favorable experience in the use of quinine.

HOWARD COUNTY.

Fayette is a small town of about one thousand inhabitants, the county town of Howard County. It is located upon Bonne Femme Creek, about sixty miles northwest of Jefferson City. The Missouri river approaches within ten or twelve miles of the town at two nearly opposite points.

Howard County is the largest tobacco-producing county in the State; the surface is undulating, the soil remarkably fertile, and upon a limestone formation. The town has connection with the Saint Louis, Kansas City and Northern Railway.

The information that we have been able to gather of this demonstration of the disease is most unsatisfactory. We learn that the first case occurred late in July, in the person of a Swede who had been employed upon the railroad. This man had been drinking for several days, came into the town, was taken with cholera, and died after a few hours' illness.

The next ten or twelve cases occurred among railroad laborers with whom the first case had been in contact. They were living in an old stable that had been turned into a boarding-house for the railroad hands. These cases were all fatal.

From this locality the disease was carried into a negro settlement, and a number died. From this point the disease spread, and a number of the very best citizens of the town were infected. It is stated that a total of fifty-six cases occurred, and that but three of these cases recovered.

The free exhibition of calomel was found successful in the treatment of cases that did not advance to collapse.

MORGAN COUNTY.

Versailles, the county town of Morgan County, is the center of a fertile farming district, forty miles southwest of Jefferson City.

Drs. Thurston and Williams report that the first case of cholera in 1873, at this point, occurred on the 18th day of August in the person of a white man sixty-eight years of age, who had the day before returned from a visit to the State of Illinois.

The second case occurred August 26 in the person of Dr. John Boone. The record does not state whether or not Dr. Boone had been in attendance upon the first case. Both cases terminated fatally. Thirteen cases are reported, of whom eleven died.

These gentlemen report that they treated over one hundred cases of painless diarrhœa during the epidemic, and that the disease was always to be controlled when early attention was paid to the cases. It is also noted that where a tendency to collapse existed, opium did harm.

Dr. S. V. Sterner, also of Versailles, is of the opinion that "there was no real Asiatic cholera at that point in 1873, although there were some cases of choleraic diarrhœa attended with cramps."

CHAPTER XI.

KENTUCKY GROUP.

KENTUCKY CONTRIBUTORS.

Dr. J. W. Thompson, McCracken County.
Dr. J. W. Becker, McCracken Co.
Dr. B. Tauber, McCracken Co.
Dr. J. A. Maxwell, McCracken Co.
Dr. D. D. Thompson, McCracken County.
Dr. R. Saunders, McCracken Co.
Dr. P. K. Worthen, McCracken Co.
Dr. C. R. Royster, McCracken Co.
Dr. A. C. Wright, Warren County.
Dr. J. F. McElroy, Warren Co.
Dr. Miller, Warren County.
Dr. Van Meter, Warren County.
Dr. Waggoner, Warren County.
Dr. L. C. Porter, Warren County.
Drs. Combs and Atchison, Warren County.
Dr. Thomas, Warren County.
Dr. Lackey, Warren County.
Dr. Malloy, Simpson County.
Dr. Foline, Simpson County.
Dr. G. W. Duncan, Simpson Co.
Dr. Edwards, Simpson County.
Dr. James Duncan, Simpson Co.
Dr. W. R. Bryan, Simpson County.
Dr. Milliken, Simpson County.
Dr. Suddeth, Simpson County.
Dr. Simmons, Simpson County.
Dr. Richards, Simpson County.
Dr. Hawthorn, Simpson County.
Dr. B. Letcher, Henderson Co.
Dr. J. H. Letcher, Henderson Co.
Dr. J. J. Diehl, Henderson Co.
Dr. J. A. Hodge, Henderson Co.
Dr. J. O. Collins, Henderson Co.
Dr. W. D. Furman, Henderson Co.
Dr. J. L. Cook, Henderson Co.
Dr. Thompson, Henderson Co.
Dr. J. B. Cook, Henderson Co.
Dr. W. M. Hanna, Henderson Co.
Dr. James Beaty, Henderson Co.
Dr. J. A. Carr, Caldwell County.
Dr. H. T. McNary, Caldwell Co.
Dr. J. A. Maxwell, Caldwell Co.
Dr. L. W. Jones, Caldwell County.
Dr. Charles H. Todd, Daviess Co.
Dr. Haines, Daviess County.
Dr. Stewart, Daviess County.
Dr. W. D. Sturman, Daviess Co.
Dr. B. H. Hobbs, Daviess County.
Dr. O. Newland, Christian County.
Dr. J. D. Woods, Barren County.
Dr. H. McDowell, Harrison Co.
Dr. J. K. McCreary, Shelby Co.
Dr. W. R. Pusey, Meade County.
Dr. N. B. Lewis, Carroll County.
Drs. Davis and Taylor, Webster County.
Dr. L. Prichard, Carter County.
Dr. J. W. Prichett, Hopkins Co.
Dr. W. McNarey, Hopkins County.
Dr. N. L. Taylor, Adair County.
Dr. J. C. Cassidy, Crittenden Co.
Dr. W. S. Graves, Crittenden Co.
Dr. Lindsey, Trigg County.
Dr. Stanrod, Trigg County.
Dr. Slaughter, Hardin County.
Dr. Anderson, Hardin County.
Dr. Pusey, Hardin County.
Dr. A. Warfield, Hardin County.
Dr. Davis, Hardin County.
Dr. Fletcher, Hardin County.
Dr. Berry, Oldham County.
Dr. Douden, Oldham County.
Dr. David Keller, Bourbon County.
Dr. J. F. Hickman, Nelson County.
Dr. N. G. Leake, Nelson County.
Dr. Wilkinson, Nelson County.
Dr. Wise, Nelson County.
Dr. A. Smith, Nelson County.
Drs. Chandler and Bass, Taylor County.
Dr. W. T. Chandler, Taylor Co.
Dr. Hodgen, Taylor County.
Dr. Schively, Taylor County.
Dr. J. S. Warren, Garrard County
Dr. S. L. S. Smith, Garrard Co.
Dr. W. Berry, Garrard County.
Dr. F. C. Wilson, Garrard County
Dr. L. S. McMurtry, Garrard Co.
Dr. Reid, Garrard County.

Dr. P. B. McGoodwins, Caldwell County.
Dr. J. A. King, Caldwell County.
Dr. Lewis Rogers, Jefferson Co.
Dr. S. L. Manly, Jefferson County.
Dr. T. Anderson, Jefferson County.
Dr. Atchison, Jefferson County.
Dr. S. A. Foss, Jefferson County.
Dr. F. Paschel, Jefferson County.
Dr. John M. Duke, Mason County.
Dr. Adamson, Mason County.
Dr. Schackelford, Mason County.
Dr. Pickett, Mason County.
Dr. J. W. Williamson, Union Co.
Dr. W. A. Jones, Union County.
Dr. W. W. Henderson, Kenton Co.
Dr. A. Kullman, Kenton County.
Dr. J. T. Wise, Kenton County.
Dr. J. F. Christian, Kenton Co.
Dr. J. M. Riffe, Kenton County.
Dr. J. J. Temple, Kenton County.
Dr. F. H. Noonan, Kenton Co.
Dr. J. B. Stevens, Kenton Co.
Dr. D. H. Jessup, Kenton Co.
Dr. C. F. Thomas, Kenton County.
Dr. J. H. Blane, Kenton County.
Dr. E. H. Luckett, Daviess Co.
Dr. S. P. Craig, Lincoln County.
Dr. W. H. Spillman, Mercer Co.
Dr. J. D. Jackson, Boyle County.
Dr. W. B. Harlan, Boyle County.
Dr. J. M. Meyer, Boyle County.
Dr. W. W. Cleaver, Marion Co.
Dr. W. H. Hopper, Marion County.
Dr. M. Schuck, Marion County.
Dr. J. Shuck, Marion County.
Dr. W. E. Mattingly, Marion Co.
Dr. B. W. Avritt, Marion County.
Dr. Palmer, Marion County.
Dr. Warren, Marion County.
Dr. Blenco, Marion County.
Dr. B. J. Moore, Marion County.
Dr. H. B. Peterson, Marion Co.
Dr. L. D. Knott, Marion County.
Dr. W. R. H. Carr, Marion Co.
Dr. J. B. Evans, Marion County.
Dr. Porter, Marion County.
Dr. D. O. Polin, Washington Co.
Dr. J. R. McGee, Washington Co.
Dr. J. Debo, Washington County.
Dr. B. F. Wood, Washington Co.
Dr. McElroy, Washington County.
Dr. James Fields, Russell County.
Dr. L. M. Lovelace, Ballard Co.

Surgeon William J. Sloan, U. S. A., Medical Director Department of the South.

Acting Assistant-Surgeon R. G. Redd, U. S. A.

Acting Assistant-Surgeon S. L. S. Smith, U. S. A.

Surgeon P. H. Bailhache, U. S. Marine-Hospital Service.

DATES OF INITIAL CASES.

McCracken County .....May 21.
Warren County .....June 3.
Simpson County .....June 5.
Jefferson County .....June 8.
Henderson County .....June 16.
Trigg County .....June 16.
Union County .....June 16.
Carter County .....June 20.
Kenton County .....June 22.
Caldwell County .....June 29.
Ballard County .....June 29.
Mason County .....June 29.
Henry County .....July 6.
Oldham County .....July 8.
Hardin County .....July 8.
Bourbon County .....July 10.
Taylor County .....July 12.
Carroll County .....July 12.
Christian County .....July 12.
Barren County .....July 19.
Daviess County .....July 19.
Hopkins County .....July 20.
Meade County .....July 27.
Webster County .....July 31.
Garrard County .....August 10.
Marion County .....August 11.
Nelson County .....August 20.
Lincoln County .....August 29.
Adair County .....August 29.
Washington County .August 30.
Boyle County .....August 30.
Clinton County .....August 31.
Mercer County .....September 6.
Russell County .....September 9.

NOTE.—The disease prevailed in Fulton, Harrison, and Crittenden counties, but from want of sufficient information these counties are not embraced in the narrative.

McCracken County.

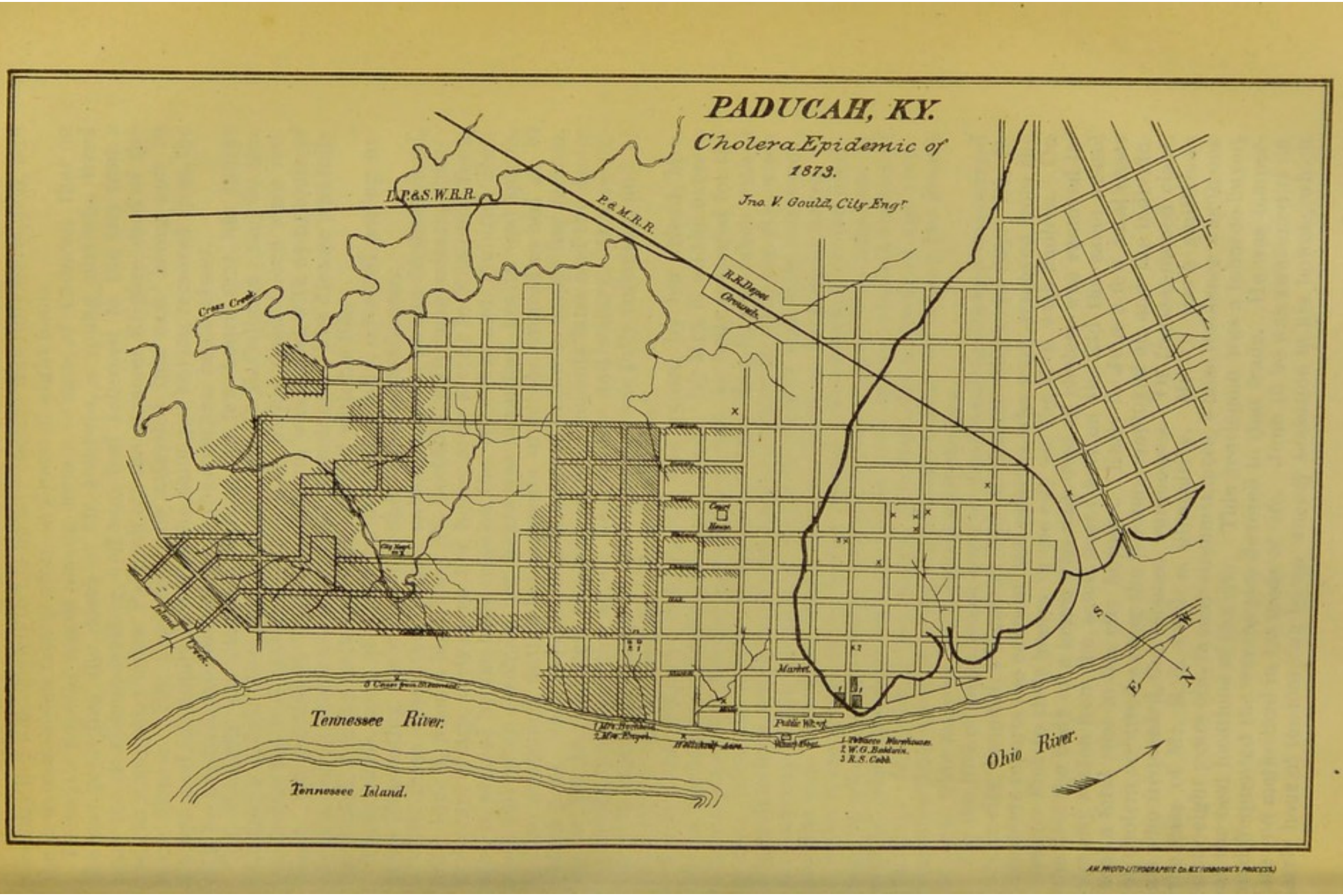
The Kentucky group, in the cholera-epidemic of 1873, opens on the 20th day of May at the city of Paducah, McCracken County, which city is located upon the bank of the Ohio River, at the mouth of the Tennessee, and a few miles below the point at which the Cumberland empties into the Ohio. From its advantage of location, Paducah is a point of importance in the river carrying-trade, all steamers between New Orleans and Cincinnati touching at the wharf-boat on each trip; and being the market of an extensive tobacco-district, the city is much frequented by all classes of individuals financially interested in this staple. The city is the terminus of two railway-lines: the Memphis and Paducah Road, which connects with the Louisville and Memphis, and the Nashville, Chattanooga and Saint Louis Railroads, and the Louisville, Paducah and Southwestern, which connects with the Evansville, Owensborough and Nashville, the Saint Louis and Southeastern, and the Louisville and Nashville Railways. It is seen that Paducah is in constant communication with the South, West, and North.

In 1870 Paducah had a population of 6,866, of whom 4,865 were whites, 2,001 were negroes. The population of McCracken County, at the same time, was 13,988, of whom 10,699 were whites.

The city is built upon a plain of considerable extent, elevated above high-water mark of the rivers. A portion of the city, which is represented upon the accompanying map as within the red-lined boundary, overlies a deep bed of red gravel and is well drained at all seasons; the remainder of the city, or that portion south and east of Broadway, (see map,) is located upon alluvial soil. As is common along the line of western water-courses, the banks of the river are elevated somewhat above the level of the country in their rear, so that the surface-drainage is not directly into the river, but is inland, to be drained off by ravines or creeks, or to be collected into ponds.

On the 18th day of May, 1873, the river-steamer John Kilgore, from New Orleans, La., bound for Cincinnati, Ohio, arrived at Paducah, and remained at the city wharf-boat for over an hour. This steamer had left New Orleans, La., on the 13th instant, at which date cholera was epidemic in the city. Accurate data of this journey cannot be now obtained, from an unwillingness on the part of the officers to impart any information; but it is known that before she reached Memphis, Tenn., one cholera-death occurred; that as she lay at the Paducah wharf-boat two or more persons were extremely ill upon the lower deck, both of whom died before the boat reached Shawneetown, Ill. At Paducah it was positively denied that cholera was on board, and free communication between the city and boat took place. Passengers landed and freight was discharged.

Among the citizens of the city who visited the Kilgore at this date was Mr. William G. Baldwin, a young man twenty-one years of age, unmarried, sober, but a free liver, who as the shipping-clerk of the Limboyd tobacco-warehouse, went on board to arrange for the shipment of tobacco to New Orleans upon the return trip. He remained on board during the entire stay. On the 19th (the next day) he complained of malais; on the 20th of slight diarrhœa. On the 21st the diarrhœa was acute, and Mr. Baldwin imprudently drank a quantity of lager beer, and ate some fruit. At 11 o'clock a. m. the same day he was taken


PADUCAH, KY.
Cholera Epidemic of
1873.
Jno. V. Gould, City Engr
L.P.&S.W.R.R.
P.&M.R.R.
R.R.Depot
Grounds.
Cross Creek
Court House
Market
Public Wh'f
Tennessee River.
Tennessee Island.
Ohio River.
1. Williams Warehouse.
2. W.G. Baldwin.
3. R.S. Cobb.
S
E
N

violently ill; was carried to his home; cholera was fully developed, and the case terminated fatally after an illness of eight hours.

There is a popular report among certain citizens of Paducah that on the day preceding the death of Mr. Baldwin, a young girl who lived near the steamboat-landing, and who had returned to the city from a visit to some point below Paducah on the steamer Kilgore, died of the same disease. The physician who attended this case being now in Europe, and the family to which she belonged having removed from the city, no accurate information as to the case can be obtained.

Mr. Baldwin was attended, during the few hours that his illness assumed a violent form, by his friend, Mr. P. E. Calhoun; and by this gentleman the last services to the body of his dead friend were rendered. On the 23d of May, Mr. Calhoun was seized with symptoms of cholera, and at once secured medical attendance. The disease was fully developed, and the patient barely escaped with his life.

Three cases, none of which terminated fatally, occurred among negroes frequenting the wharf-boat and tobacco-warehouses.

With these cases the disease subsided, as far as can be discovered, until June 3, when a Mrs. Mary W. Bechtold, a German woman, thirty-five years of age, arrived at her home, after a visit to Memphis, Tenn. Mrs. B. arrived by the noon train on the Memphis and Paducah Railroad, and after reaching her house was in perfect health and spirits, and so continued until a few moments after she retired to bed at 10 o'clock p. m., when experiencing an urgent desire to empty her rectum, she left her bed and went to stool. A few moments later and the desire returned; this time the action was profuse and watery. Others followed in rapid succession; by midnight she was fully collapsed, and at 10 o'clock a. m. the next day (June 4) she died.

During the illness of Mrs. B., she was nursed by her friend, Mrs. Teresa Engle, who resided in the next block. By Mrs. E. all the excreta were emptied, the clothing was removed, and the body prepared for the grave. After the funeral on the 5th of July, Mrs. E. was taken with a slight diarrhœa, which continued for three days, or until the 8th, when the severity of the symptoms increased, cholera was fully developed, and the case terminated fatally after an illness of forty-eight hours.

From these two cases the disease spread. The location of the dwellings in which these deaths occurred is shown upon the map, and it will be seen that they form the initial point in the infected district of the city. It is also an ascertained fact that the majority of the river-steamers that touched at the wharf-boat of this city during the month of June were more or less infected with cholera.

On the 10th of June, a deck-hand of the steamer Quickstep was carried to the city hospital, where he died of cholera the next day. Dr. R. Saunders reports the cases of two negroes who were removed from the steamer Fisk to their homes in the city on the 19th with cholera. On the 21st the body of a negro who had died of cholera was removed by the city sexton from the same boat; and on the 22d the same vessel sent a fatal case to the city hospital. Early in June a few fatal cases of cholera occurred among the laborers employed at, and the individuals who frequented, the tobacco warehouses. Of the last-named class, the case of Mr. R. S. Cobb is illustrative. Mr. C. was a gentleman sixty-eight years old, in easy circumstances, whose residence was in one of the best locations of the city. This gentleman was a tobacco-buyer, and frequented the warehouses devoted to that trade. He was temperate and methodical in his mode of life. June 15 he was awakened at an early hour of the morning by an uneasy sensation in his bowels, which

resulted in two or three rather loose actions. He, however, breakfasted as usual, and after visiting the market paid his morning visit to the warehouses. While at the Planters' tobacco warehouse, (Buckner & Terrell,) the severity of the diarrhœa was increased and he had several large, watery, and exhausting actions. At 12 o'clock m. he was removed to his home; at 3 o'clock p. m. he was perfectly collapsed, and died at 11.30 o'clock a. m. the next day.

The case of Henry Fletcher, an employé of Buckner & Terrell at the Planters' warehouse, is illustrative of the onset of the disease among his class. This man, an active and most respectable negro, forty years of age, was taken with a light diarrhœa June 10, which continued for three days, during which he remained at his work, using the common privy of the warehouse, (Mr. Cobb used the same privy before and after his attack.) June 14, the diarrhœa still continuing, Fletcher took a dose of cathartic pills, and attended the funeral of a child that had died the day before of cholera. While at the grave he was taken with cramps; was carried to his home, where he died at 2 o'clock p. m. the same day. This man had been a religious leader among the negroes, and previous to his attack had visited all who had been taken with the disease.

It will be noted by reference to the accompanying map that but few cases occurred in that portion of the city overlying the bed of red gravel, of which mention has already been made; and it is worthy of note that but one multiple instance occurred within these limits, which is occupied almost entirely by the better classes of the community, whose houses were invariably supplied with cistern-water.

In that portion of the city which is located upon alluvial soil, and which is represented by the deep shadings upon the map, the disease was epidemic and raged with virulence. This portion of the city is inhabited by the middle and lower classes, Germans, Irish, and negroes, whose drinking-water was obtained from wells which could only be supplied by surface-water. Some few residences of individuals of the better classes in this portion of the city, which were supplied with cistern-water and kept in good sanitary condition, were not visited by the disease. On the 25th of June the sale of vegetables was prohibited in the city, and the mortality among the negroes began to decrease; this, however, did not apply to the German population, who, regardless of the prohibition, on each Sunday would visit the country and indulge in vegetable food, besides bringing into the city a supply for the week; and it became a recognized fact that each Monday a larger number of persons from this class were buried than on any other day of the week.

We are informed by the physicians of this city, who remained constantly at their post, that it was by no means an uncommon thing to find negroes upon the streets in all stages of the disease, and that this seemed particularly applicable to those who worked upon the public wharf. No physician died of the disease, but all suffered more or less with the premonitory symptoms. Those who attended the sick and cared for the dead were not exempt from the disease. An illustration of this will be found in the case of Sister Ursula, who nursed devotedly the wife of a drayman named Donovan, until released by the death of the patient, when she was herself attacked with the disease at the religious house of which she was a member, and died June 23, after but a short illness. Her death was followed by numerous cases of acute diarrhœa among the other inmates of this house, which were all, however, arrested in the second stage. Disinfectants were actively used, and every effort was made to improve the sanitary condition of the infected

district; but from the 14th of June to the 29th of July the disease raged maintained undoubtedly by constant cholera arrivals from infected points both on the river and railroads.

The medical men were indefatigable in their battling with the disease. When any one of their number was prostrated, the additional labor was ungrudgingly performed by the well, and to their honor be it said, that this excess of labor was almost entirely gratuitous. While constantly working by day and night, it was among a class of the community who were unable to reward their physician that demanded his expenditure of time and skill, this personal exposure to contagion, but in all instances the necessities of the poor were as promptly considered as were those of the wealthy, and this when the existence of the disease almost entirely destroyed the professional income of these brave, devoted men.

The treatment most relied upon during this demonstration of the disease was calomel, opium, and stimulants. In all instances where the patient was reached in the early stage of the disease it was arrested, and convalescence resulted. Some few instances of recovery from prolonged collapse are reported. Dr. Saunders reports very strongly in favor of the hypodermic use of atropia, and under date of October 26, 1873, states in some forty or fifty cases in which he made such exhibition of this remedy, none of the cases advanced beyond the second stage of the disease. December 4, 1873, Dr. S. writes, in all cases which came under his observation, in the first or second stage of cholera, he exhibited hypodermically, atropia gr. 1-30, morphia gr. 1-6, and repeated in from four to six hours as required.

In McCracken County cholera was developed at but two points outside of the city of Paducah. On the 29th of May, a farmer living at what is known as the Cross-roads, some six miles distant from Paducah, who had been in the city on the previous day, was taken with cholera. The disease was fully developed, but after an illness of ninety-six hours the patient was pronounced convalescent. This case was followed by the occurrence of five distinct cases of cholera, two of which terminated fatally. In this group the connection of the cases with Mr. Morrow, who contracted the disease at Paducah, is absolute.

The demonstration of cholera at Woodville, a village some twelve miles to the southwest of Paducah, is of great interest.

On the 13th day of June, a man named Taylor, who resided three and a half miles from Woodville, went on business to Paducah, and remained one day and two nights at that city. On the 15th he returned to his home and complained somewhat of diarrhœa. In a few hours cholera was fully developed. Early on the 16th he was found by Dr. Marshall, of Woodville, in collapse, and in a few hours died. Disinfectants were freely used, and no other cases occurred in the neighborhood.

On the 28th of June, a Mrs. Benton, who lived two miles north of Woodville, was taken with cholera and died in a few hours. This woman, who was a widow, lived in an isolated position, in an old dilapidated log-house upon the banks of a small creek. The yard around this house was covered with high grasses and weeds. The ground was covered with *débris*. The family used water from a well on the hill-side, some 60 or 80 yards from the creek. This well was curbed with planks which were rotten. It was supposed that this woman could in no way have been exposed to the infection of cholera. Dr. C. G. Royster, of Woodville, who reports the case, did not reach her bedside until the patient was hopelessly collapsed.

June 29, John Rogers, aged thirty years, a son of Mrs. Benton, and who resided with his mother, was attacked with cholera, and died after

an illness of but six hours. Rogers was a single man, of no fixed employment, worked whenever he could obtain work, and it was found that during the previous week he had visited several trading-boats at a point on the river some five miles from his home. For two days previous to his attack Rogers had suffered from diarrhœa, and on the day before his mother was attacked had many painless dejections on the ground in the vicinity of the house.

After Mrs. Benton was taken sick on the 28th, her married daughter, Mrs. Sink, who lived nine miles distant, was sent for and arrived at her mother's house two or more hours before Mrs. Benton died. Mrs. Sink was accompanied by her husband and young child. These people remained at this house until after the funeral of Rogers, when, as they were about to return to their home, the young child was taken with a profuse watery diarrhœa. Dr. Royster administered a full dose of calomel, and directed absolute rest. The next day (June 30) the child's condition being much improved, preparations for departure were again made, when Mrs. Sink was suddenly taken with an urgent desire to go to stool, and had a large watery dejection, which prostrated her so severely that she was carried into the house. Laudanum, calomel, and brandy were administered, and the surface of her body was covered with sinapisms. While Mrs. Sink was being treated, her husband was attacked in an almost identical manner, and the same line of treatment was adopted. In both cases absolute rest was enjoined upon the patients. July 2, Mr. and Mrs. Sink, with their child, all being convalescent, started for their home, accompanied by Phil. and Tom Rogers, and Ida Benton, the young brothers and half-sister of Mrs. Sink. The family arrived at home safely, but during the succeeding night the disease was again developed in the person of Mr. Sink, and soon after daylight he was violently ill. Failing to secure medical attendance, a runner was dispatched to Woodville. At 8 o'clock a. m. (on the 3d) Phil. Rogers was attacked with cholera; at 11 o'clock a. m., Mrs. Sink was taken with the same disease; and when Drs. Royster and Marshall arrived from Woodville, at 3 o'clock p. m., Mr. Sink was dead; Phil. Rogers was in *articulo mortis;* Mrs. Sink was hopelessly collapsed; and she died at 9 o'clock p. m. the same day.

About 6 o'clock the same evening Tom Rogers had a large, watery, and exhausting dejection. He was placed at once in bed, and laudanum, calomel, and quinine were administered. During the same night Ida Benton was attacked in the same manner, and the same treatment was had. Both cases recovered, although the convalescence in both was tedious and slow. No other cases occurred. A sister-in-law of Mrs. Sink was assiduous in her attention to the sick in this demonstration. She remained alone in the house during the night of July 3 with the two sick children and the dead, but did not at any time exhibit any symptoms of the disease.

Warren County.

Bowling Green, the county seat of Warren County, is a well-located inland city, situated nearly in the center of the county, upon the line of the Louisville and Nashville Railroad, and one mile from the head of navigation of the Barren River. Railway communication with Louisville, Memphis, and Nashville is almost hourly. Twice each week a steamboat arrives from Evansville, Ind.

The data of the epidemic of cholera at Bowling Green is unsatisfactory, from the fact that none of the physicians had preserved records of

their cases. The burial permits of the county clerk, however, furnish reliable information as to fatal cases.

June 3, the first case of cholera occurred in the person of a white man, forty-three years of age, who left Gallatin, Tenn., at the time cholera was epidemic at that point, on a business visit to the Horse Cave Station, some few miles north of Bowling Green. He was taken ill on his arrival at Horse Cave, and took the next train, endeavoring to reach his home.

By the time the train arrived at Bowling Green the disease was fully developed. He was carried to a hotel, where, after a lingering illness, he died. The excreta of this case were disinfected and buried. No other case, as far as can be learned, is to be traced to any connection with it.

June 13, the second case occurred in the person of a negro woman, fifty-five years old, who had the day before washed the clothing of a man who died of cholera on a steamboat during its trip from Evansville, Ind. The case terminated fatally in thirty-six hours. From this case the disease spread and became epidemic; but was confined almost exclusively to that portion of the city which is located on low ground between the railroad and the river, while the inhabitants of the main portion of the city escaped almost entirely. The drinking-water of the infected portion of the city was obtained almost universally from wells; while that of the districts which escaped the epidemic was supplied from the Barren river by the reservoir system. We have recovered the facts of 86 cases of cholera which occurred at Bowling Green between June 13 and August 10; of these cases 65 terminated fatally.

The disease was carried from Bowling Green to a point in the country some ten miles to the southeast of the town by a refugee negro man, and at the house at which he found employment six fatal cases occurred.

Woodburn, a small village of Warren County, located upon the line of the railroad, about half way between the city of Bowling Green and the town of Franklin, suffered most severely from the epidemic, over one hundred cases having occurred, a large number of whom died. We are unable to obtain any satisfactory information as to this demonstration. Although the village is in such close communication with two large towns where the disease was introduced, and became virulently epidemic, Drs. Lackey and Williams failed to detect the introduction of the disease into Woodburn, and are rather inclined to ascribe its occurrence to malarial influences. They report one case of recovery after the administration of half an ounce of quinine; another recovery in which two-thirds of an ounce of quinine was used. In both cases, however, opium and calomel were administered.

Simpson County.

Franklin, the county-seat of Simpson County, is situated on the line of the Louisville and Nashville Railroad, six and a half miles from the State line. The town has a population of 1,240 inhabitants, 569 of whom are blacks. (Census of 1870.)

One mile east of the town flows the west fork of Drake's Creek. The town is situated on rather an elevated position; is well drained by two ravines which pass through the town, one to the east and the other to the west of the court-house, which building forms the center of the town. These drains come together north of the town and empty into the creek.

The inhabitants of this town have constant communication with all

points on the railroad, and a number of the section-hands of this road, working on the section between Franklin and Millersburgh, Tenn., reside in the town. During the month of May the town was in good sanitary condition: much *débris* had been removed and destroyed. No cases of serious illness occurred in the town until the 5th of June, when Ann Hayes, a negro woman, forty years of age, who had been on a visit to Gallatin, Tenn., was taken with cholera at her home the day of her return, but recovered after a serious illness. The house in which she was sick was one of a cluster of cabins occupied by negroes on the north-east outskirts of the town, and although all the local conditions seemed favorable for the spread of the disease, no other cases occurred. Disinfectants were freely employed.

June 10 a white man, thirty-eight years of age, who had returned from a visit to Gallatin, Tenn., was attacked with cholera, but recovered.

June 12 a white man fifty-one years of age, also from Gallatin, Tenn., was taken with cholera, and died after an illness of ten days. The physician who attended this case was attacked with the disease June 13, and recovered after a serious illness. A little daughter of this physician was attacked, June 14, with the same disease, and died in nine hours. In the excitement and dismay caused by this last case, the precautions which had been adopted in the earlier cases were neglected. The excreta were not disinfected, but were thrown upon a heap of *débris* against the rear fence of the back-yard.

Four days elapsed without the development of new cases, when a white man, forty years of age, who lived near the point at which the excreta of the little girl had been deposited, was taken with the disease and died. From the 19th to the 28th of June, six fatal cases occurred.

From the 28th of June to the 1st of July the disease was in abeyance, but on the last-named date seven cholera deaths occurred, and in the next fifteen days fifty deaths are reported as resulting from this disease. On July 20 a fatal case occurred, and cases of the same character are reported on the 28th of July and 4th of August. During the course of the epidemic, seven of the physicians of the town were seriously ill of the disease, one of whom died. One case of cholera occurred at the county jail in the person of the wife of the jailer, who died after a few hours' illness. The prisoners were at once removed from the building, and no cases occurred among them.

From Franklin the disease was carried into the county. A Mr. Vance left the town July 1, and went to a farm six miles distant; after his arrival he was attacked with cholera, and died after an illness of forty-eight hours. July 8 the mother-in-law of Vance, who resided in the same house, was attacked with the disease and died, and within a few days a young child of the same family, and a visitor at the house, were attacked and died. A Mrs. Pearson, after nursing many cholera-cases in the town, went to the farm of her son-in-law, four miles from town, in a rather isolated position. Mrs. P. was not sick, or suffering in any way, except from the physical fatigue induced by her Christian efforts in caring for the sick. The family of the house to which she went had not been exposed to the infection; no member of the family had been in the infected district, and no one but Mrs. P. had come from that district; yet, two days after her arrival, the son-in-law was taken with cholera and died. All the other members of the family suffered more or less with diarrhœa.

A number of recoveries are reported.

JEFFERSON COUNTY.

The first case of cholera which is recorded as having occurred in Jefferson County, in 1873, was in the city of Louisville, on the 8th day of June, when a white man twenty-nine years of age was admitted to the city hospital with cholera. He had arrived in the city at 5 o'clock a. m. the same day from Evansville, Ind. At 5.30 a. m. he was taken with purging and vomiting, which increased so rapidly in severity that he was obliged to lie down on the sidewalk. From this position he was removed by the police and taken to the hospital. Cholera was fully developed, and he died of the disease at 4.37 p. m. of the same day.

June 10, a gentleman, forty years of age, living on Walnut street, between Seventh and Eighth streets, was taken with cholera following a diarrhœa of a few days' duration. The second stage was fully developed when the disease was arrested.

June 12, a conductor on the Louisville and Nashville Railroad, who had been taken ill at Nashville, Tenn., arrived at his home on Eleventh street, near Broadway, still suffering with the acute diarrhœa. Cholera was violently developed, and the case terminated fatally after twenty-four hours' illness.

From June 12 to August 16, inclusive, twenty-one cases, all of which terminated fatally, are reported in the city. In the majority of these cases the explosion of the disease was in the persons of individuals who had come into the city from infected districts.

On the 17th and 18th of August, two deaths from cholera are reported at Lacona, a small town of Jefferson County, some ten miles distant from Louisville. It is not known in what way these individuals came in contact with the infection, other than that they were in the habit of visiting the Louisville market once a week. The district in which these cases occurred was decidedly malarial, but the cases of disease from that cause had that summer been unusually infrequent. No cases followed among those who nursed these cases and performed domestic offices for them.

September 4, at Louisville, a young female, fourteen years of age, died of cholera after nine hours' illness, and the same day and in the same family a white child four weeks old was taken with the same disease, and died after forty-eight hours. The history of this family is of great interest, and the report is transcribed in detail.

HISTORY OF CHOLERA IN THE BAUER FAMILY.

BY TURNER ANDERSON, M. D., *Louisville, Ky.*

Residence of family on the south side of Green street, between Fourteenth and Fifteenth, frame cottage, low and damp; kitchen floor several inches below the surrounding ground; no provision for drainage. Privy, wash-house, and coal-shed under one roof, and all in dirty condition. Family consisting of the mother, two single daughters, two married daughters, one son-in-law, and two grandchildren.

July 30, at 11 p. m., was called to see Mrs. G., one of the married daughters. Found her vomiting, purging, and cramping. The attack had been sudden, and without any known cause. Morphia was exhibited hypodermically, and quinine, gr. v., ordered to be given every second hour. This was followed by the prompt relief of all symptoms of the attack, and in forty-eight hours she was out of bed. Two weeks previously this lady had been delivered of a male child. On the 22d of August Mrs. G. went to Bowling Green, Ky., to visit her husband, who

was engaged in business at that town. August 25, two days after her arrival in Bowling Green, Mrs. G. was taken with cholera, and died after twenty-four hours' illness. August 28 the body of Mrs. G. was brought in a wooden coffin to Louisville, and taken to her mother's house. Prior to burial the coffin was opened and the remains of Mrs. G. were viewed by her family.

September 2, a child of the late Mrs. G., two years of age, was taken with diarrhœa and vomiting. It was treated with albuminous drinks, soda, morphia, and mint-water, and recovered.

September 4, a single daughter of Mrs. B., fourteen years of age, was taken with cholera at 5 o'clock a. m. At 7 o'clock a. m., when called to the case, found the patient collapsed, and she died at 1.30 o'clock p. m. The same day the infant of Mrs. G., four weeks old, was taken with cholera, and died after forty-eight hours' illness.

September 6, Mrs. A., the second married daughter of Mrs. B., was taken with cholera after a slight diarrhœa, and died within twenty-four hours. The day of her attack this lady had been removed from her mother's house to the second story of a building on Market street, between Tenth and Eleventh streets. Mrs. A. was seven months pregnant.

The night upon which Mrs. A. died the remaining daughter, seventeen years of age, was taken with acute symptoms of the disease, but it was arrested by the hypodermic use of morphia.

After the occurrence of the case which followed the arrival of the remains of Mrs G., all the members of the Bauer family who survived were placed upon quinine in decided doses, with the exception of Mrs. A., who declined to do so on account of her pregnancy; and although all suffered from diarrhœa, in none did vomiting and cramping occur.

LOUISVILLE, KY., *October*, 1873.

September 8, a medical man of Marion County, Ky., who had visited Louisville to attend a sick member of his family, was violently attacked with cholera, and died at St. Joseph's Infirmary, after twenty-four hours' illness.

During the night of September 3 and 4, this gentleman had been in attendance upon Dr. Mat. Logan, of Washington County, and had been hurriedly called to Louisville to see his father, who supposed himself attacked with cholera.

HENDERSON COUNTY.

Henderson, the county seat of Henderson County, is situated on the south bank of the Ohio river, two hundred and twelve miles below the city of Louisville, Ky., and twelve below Evansville, Ind. In 1870 this city had a population of 4,171 individuals, of whom 1,489 were negroes.

Henderson is a thriving river-town, and is the tobacco market of the greater portion of the Green river country. The city has daily communication with all points upon the Ohio River by several lines of river packets, and with Saint Louis, Mo., and Nashville, Tenn., by the Saint Louis and Southeastern Railway. This road south of Henderson connects with the Louisville, Paducah and Southwestern, the Louisville, Nashville and Great Southern, and the Nashville, Chattanooga and Saint Louis Railroads.

The city is built upon an alluvial bed, overlying a strata of clay which is several feet in thickness, when sand and gravel is reached. In the eastern portion of the city, at a depth of 8 feet, a blue mud is reached,

which emits a most offensive odor. The peculiarities of the natural levees which have been already noted as existing along all western water-courses of North America are here observed, and as no system of artificial drainage or sewerage has been attempted, ponds and pools of stagnant water are to be found within the town limits. During the wet months the streets and roads are almost impassable, and the cellars of houses in the southern portions of the town fill with water.

Water is obtained from wells and cisterns alone, although the most admirable natural facilities exist for the establishment of a water-supply upon the reservoir plan. Privies are upon the surface of the ground. The sanitary condition of the town was bad prior to the cholera outbreak. No board of health had been in existence for several years, but when cholera arrived in 1873 a hasty organization was established. Property-holders were required to police their premises; ponds and pools of stagnant water were drained off and filled with fresh earth. Crude disinfectants were actively used.

During the afternoon of May 20, 1873, Mrs. Deacon, a lady fifty-seven years of age, who had spent the morning working in her vegetable and flower garden, after a hearty dinner of early vegetables and pastry, which she ate without the aid of her artificial teeth, was attacked with severe abdominal pain attended with nausea, vomiting, and diarrhœa. The attack was sudden and without any premonition other than a sensation of discomfort from the amount of food taken into the stomach. In the absence of her regular medical attendant, Dr. W. M. Hanna was called to treat the case. Dr. Hanna found the patient prostrated, restless, and anxious, with a cold skin and small, feeble pulse. The matter vomited contained undigested food; the dejections were the fecal contents of the intestines. Morphia sulphas, gr. ½, was administered hypodermically, and relieved the severity of the symptoms. At 6 o'clock p. m. Dr. Thompson, who was the family physician, saw the case. There had been no return of the vomiting or purging. Quinine, gr. x, calomel, vj, were made into two powders, and it was directed that during the night both should be given.

May 21. The patient had rested well during the night, but was found feeble, with a weak pulse and cold surface, and constantly disposed to doze. She was given capsicum, gr. i, carbonate of ammonia, gr. v, quinine, gr. v, and a dose of the same character was ordered to be taken every two hours. She remained quiet during the day, with no change in her symptoms until between 7 and 8 o'clock p. m., when she had an action from her bowels, which is described by Dr. Thompson, and Dr. J. A. Hodge, who was in consultation, as soap-suds in character, and at least half a gallon in quantity. After this dejection the patient sank rapidly, and died in collapse at 2 o'clock a. m. the next day.

After death it was learned that, during the first night, a powder of morphia which Dr. Hanna had left with a member of the family, to be given in case of a return of the vomiting and purging, prior to Dr. Thompson's taking charge of the case, had been given without any necessity being apparent, and without the knowledge of the medical attendants. It was also learned that during the 21st instant at least a pint of whisky had been administered; this also without professional authority.

Considerable excitement was produced by this death in the town. It was pronounced by many to have been a case of cholera, but no cases of even a suspicious character occurred until after a lapse of twenty-one days, when a case of cholera by direct importation is reported.

At a conversational meeting of the Henderson Medical Club on the

16th of July, 1874, which the writer had the honor to attend, this case was fully discussed. The fact that all the characteristic symptoms of cholera were absent was demonstrated by the medical attendants, and the gentlemen present (all the practitioners of the city) with but one exception, united in discarding the case from cholera consideration.

On the 10th of June, 1873, a horse-trainer named McGavit, a negro, about twenty years of age, arrived at Henderson with some horses. He had come directly from Nashville, Tenn., and went at once to the Henderson County fair-grounds. He was troubled with diarrhœa before he arrived at Henderson, and within a few hours after he reached the fair-grounds became seriously ill. Dr. J. D. Collins was called to the case, but on arrival found the patient fully collapsed. Morphia and atropia were exhibited hypodermically, and camphor was given internally. Frictions and dry heat were ordered to the surface of the body. During the evening he partially reacted, but relapsed during the night, and died early on the 12th instant. This man was nursed by Mr. Craft, the superintendent of the race-horses, and by the stable-boys. He was visited by a number of negroes living in Henderson. Mr. Craft was not attacked, and the stable-boys escaped with but a single exception. One man had diarrhœa, vomiting, and cramps, but was relieved by rest and some "cholera-medicine." It cannot be determined who the town negroes were who visited this case.

Dr. J. H. Letcher reports a case of acute diarrhœa, attended with great prostration, in the person of an elderly man named Fields, who was employed about the depot of the Henderson and Nashville Railroad. This man was promptly treated, and recovered after an illness of a few days.

June 21, a Mrs. Haslett, who had arrived on the 19th instant from Nashville, Tenn., at which city she resided, and where, prior to her departure, some members of her family and many of her near neighbors had died of cholera, was taken seriously ill. The disease was diagnosed by Dr. Ben. Letcher to be cholera. This woman had been attacked with diarrhœa previous to her leaving Nashville, but had not informed her friends, fearing that they might prevent her journey. During June 20 this diarrhœa was profuse, exhausting but painless, and when the patient was first visited by Dr. Letcher, violent vomiting and cramping had occurred. This case presented all the recognized symptoms of pronounced cholera; partially reacted, but relapsed, and died June 24. She had been sick, and died at a second-class boarding-house frequented by railroad-hands.

June 23, Dr. J. D. Collins reports a negro man named Smith as having been attacked with cholera. He was in collapse when first seen, but under the hypodermic use of morphia and atropia reacted, and on the twelfth day of his illness was pronounced convalescent. It is not known where this negro became infected, but it is probable that he worked whenever he could obtain employment at the railroad-yard.

On the same day a young man named Watson was taken with cholera some three miles out of town, at a saw-mill where he worked. The disease was fully developed, and he died after an illness of twenty-four hours. This man had been a frequent visitor in Henderson, where he frequented a drinking-house quite near the railroad-depot.

June 24, a man named Kennedy is reported as suffering from an acute diarrhœa, attended with great exhaustion. The diarrhœa was controlled and in a few days he was convalescent. This man was a "brakeman on a through freight-train" between Henderson and Nashville. His

train remained in Nashville one and a half days after each trip, and about twelve hours in Henderson.

June 25, a man named Beasley, who was a fireman on the "yard-engine," was taken with painless and exhausting diarrhœa, which was early treated, and he recovered. This man boarded at the house in which Mrs. Haslett was sick and at which she died.

The same day the negro woman employed as cook at this boarding-house, and who had assisted in washing the body of Mrs. Haslett after death, was taken with diarrhœa, which demanded active treatment, and she recovered.

June 26, two cases of recoveries are reported.

June 27, a man named Simmons was taken with cholera, at a boarding-house on Water street to which he had removed from the house in which Mrs. Haslett died. Simmons had diarrhœa some two or three days previous to this attack. The symptoms of the second stage were developed. Treated with morphia hypodermically, and recovered. The same day a young man named Keogh was taken ill in an adjoining house; had rice-water discharges, and cramped for two hours. He was treated in a similar manner, and recovered.

Amanda Letcher, a negro washwoman living in a cluster of cabins occupied by negroes in the southwestern portion of the city, was taken with the disease, and died after an illness of twenty-four hours.

June 29, a man named Robert Miller was taken with cholera, and died at the boarding-house on Water street at which Simmons was sick.

A man named John Harker was taken with the same disease at a low tavern on Water street close by the infected house. He lingered for forty-eight hours, when he died. The same day three cases are reported that recovered.

June 30, a traveler named Winston arrived from Memphis, Tenn. At the time of his arrival he suffered from diarrhœa; vomiting attended with cramps soon came on. He was treated with morphia and atropia hypodermically, and recovered.

July 1, eight cases of cholera, with four deaths, are reported. The epidemic was fully established.

A focus of infection was established in the southwest portion of the town, where in a block eight fatal cases occurred, and two others died after removal to the temporary hospital. The first case in this group occurred in the person of a negro child, five years of age, whose mother was a washerwoman. The child was attacked with vomiting and purging during the night of July 4, and died early on the following morning. No care was taken of the dejections. During the night of July 5, the mother was attacked and died at 3 o'clock a. m. the next day. After the funeral of the woman, her remaining children, four in number, were taken to an isolated building which had been arranged for a cholera-hospital, but at the time had contained no patients. Here all four children were taken with cholera, and two of them died. After the removal the hut in which they had lived was pulled down, when it was found that the drainage of the ground around the cabin had been into a depression below the floor, and that a cess-pool had been established. Into this filthy hole the dejecta of the child had been thrown. In the block in which the Towles family had lived four other houses had been infected; in them five deaths occurred.

During the epidemic one hundred and sixteen cases of cholera occurred in the town of Henderson, thirty-five of which were fatal. Of

these cases sixty-three were males, fifty-three were females; seventy-three were whites, forty-three were blacks.

We are especially indebted to Dr. John L. Cook for aid in collecting the information herewith presented.

Trigg County.

The epidemic of 1873, as it affected Trigg County, was confined to the towns of Cadiz and Rock Castle, and to the establishment known as Trigg's Furnace.

Cadiz, the county town, is located upon the banks of Little river, nine miles from its confluence with the Cumberland. It has a population of about twelve hundred individuals, and is up to the average of towns of its size in the state.

Rock Castle is a village located upon the banks of the Cumberland river.

The information received from this county is of an unsatisfactory nature. The first case of cholera in the county occurred June 16, in the person of a black female living at the town of Cadiz, who died after an illness of a few hours. No other case occurred until the 25th, when a negro man died of the same disease, and on the 30th two other fatal cases occurred, also in the persons of negroes.

On the 1st of July the disease became epidemic at Rock Castle. The first cases here were in the persons of negroes; but on the 3d a white female was attacked, and from that date until the subsidence of the disease on the 22d, but two negroes were attacked, twenty-four cases having occurred, twenty-two of whom were whites, eight of whom died.

It is asserted by Dr. L. Lindsay, to whom we are indebted for the facts in our possession, that the early cases occurred in the persons of individuals who had not been away from home for a long time, and who had had no communication with boats upon the Cumberland river. It is inferred that the disease had a local malarial origin, from the fact that the first case occurred in a cabin the cellar of which was partly filled with stagnant water.

At Trigg Furnace the parties first attacked were wood-choppers, who had, so far as is known, no communication with persons from infected districts.

After the death of the lady who was taken with cholera at Rock Castle on the 3d, her body was taken for burial to Cadiz. At the funeral the husband was taken sick, and was carried to the house of Dr. T. B. Jefferson, where he died of cholera. On the second day after this man's death, Dr. Jefferson took the disease and died, and on the third day the negro man who had nursed the first case at Dr. Jefferson's house also died.

Union County.

The epidemic of cholera of 1873 in Union County is possessed of much interest, although the absolute contact of the initial case at the town of Caseyville cannot at this time be traced.

Caseyville is a small town of about three thousand inhabitants, located upon the banks of the Ohio river. It is a point which is constantly touched at by all steamboats upon the river.

The amount of information which we have received as to the outbreak at this town is exceedingly limited. The physician in whose care the majority of the cases occurred states his opinion that "the epidemic

was caused by a special miasm traveling through the air," and has declined to impart further information.

From a most reliable source, however, we learn that, prior to the outbreak at Caseyville, a steamboat, on board of which there were a number of cholera cases, touched at the wharf-boat and discharged both passengers and freight. That the first recognized case of cholera occurred in the person of a Mr. Reinfrane, whose business called him frequently to Paducah, and that he had returned home immediately prior to his attack from some point upon the river.

Dr. J. W. Williamson reports favorably upon the use of atropia, hypodermically exhibited, in the treatment of cholera.

From Dr. William A. Jones, residing at Hazelwood, a village of Union County, some seven miles south of Caseyville, a most valuable contribution to the history of the epidemic has been received:

After cholera had become epidemic at Caseyville, Mr. Harrison Berry, a resident of that town, came into the country to escape its influence. For some two or three days he complained of a diarrhœa, which on the 13th of July became profuse, violent, and exhausting. Absolute rest was enjoined upon the patient. Under careful treatment he reacted, and in three days was convalescent.

July 14, Mr. Luther Gilchrist, who resides some eight miles from Caseyville, which town he was obliged constantly to visit, was attacked with cholera. The attack was not very severe. His system responded to the medicines exhibited, and in a few days he was well.

July 16, the mother of this case, a lady sixty-seven years of age, who during the two preceding days had nursed her son, was attacked, and died after an illness of nearly twenty hours.

July 17, a negro woman seventy years of age, who resided with the Gilchrist family, was taken with cholera, and died within twenty-four hours.

July 19, two other members of this family were taken with the same disease, but both recovered.

A man named Smith, who resided at Caseyville, left the town after the disease became epidemic, and went to the house of his friend, Mr. Samuel Bradburn, who lived some eight or nine miles in the country. When he arrived Smith complained of diarrhœa. The next day the diarrhœa continued, and he vomited considerably, but by absolute rest the disease yielded, and he supposed himself to be convalescent. There had been no cholera in this neighborhood prior to the arrival of Smith.

On the 24th of July, Smith left the house of Bradburn and went to the home of his sister, Mrs. Hopkins, a widow lady who lived some four miles distant from his first stopping-place. The same day he was taken violently ill with cholera, and died in a few hours.

Early on the morning of July 25, as Mrs. Bradburn was cooking breakfast for her family, she was suddenly taken with diarrhœa; one profuse dejection was followed by violent vomiting and cramps, and in fifteen or twenty minutes from the action of her bowels, she was fully collapsed, and died in a few hours.

The same day two of Bradburn's children were taken with the same disease; one died, the other made a tedious recovery. All the other members of this family suffered more or less severely from diarrhœa.

July 26, Mrs. Hopkins, at whose house Smith had died, and her negro servant woman, were attacked with cholera. The attack of the servant was as malignant as that of Mrs. Bradburn, and in three hours from the inception of the disease she was *in articulo mortis*.

Mr. William Wallace, who is a relative of the Bradburns, and who resided some six miles from the infected locality, assisted at the funeral of Mrs. Bradburn. Wallace placed the remains in the coffin, drove the wagon to the grave, and getting into the grave, adjusted the coffin. Wallace then returned to his house, which was in a neighborhood up to that time perfectly free from the disease. A few hours after he arrived Wallace was attacked with cholera, but recovered. A young child of a brother of Wallace, who lived in the same house, died of cholera during the convalescence of the first case, and all the other members of the family had diarrhœa.

Mr. Phillip Snow, who was also a relative of the Bradburn family, and who lived at Boxville, some six or seven miles distant, came to Bradburn's house to attend the funeral and assist in nursing the sick. He remained several days, and then started for his home. When he arrived at Boardley, a village some four miles distant from the infected house, he was taken with cholera, and died at the house of Dr. Bradburn. One week after his death Mrs. Bradburn was taken with cholera. She recovered from the disease, but never regained her strength, and died of a low form of fever a few weeks later.

A daughter of Dr. B. M. Long, who lived with her father at Casey's Mines, was, at the time when cholera was prevailing in Caseyville, giving music-lessons in the town. She called at Mr. Kerney's, whose son was ill with cholera. A few days subsequently, while at home, she was taken with the same disease, and died within thirty-six hours from its inception. Disinfectants were actively used in this case.

Mr. John Calloway, a brother-in-law of Dr. Long, who lived in Crittenden County, a few miles distant, was next taken with the disease, and soon afterward one of his children. Mr. Calloway recovered; the child died.

A Mr. Miller, who visited the last case during his illness, was next taken with cholera. He recovered, but six or seven fatal cases occurred at Long's Mines, where Mr. Miller lived, being the manager.

The treatment adopted by Dr. Jones was opium and acetate of lead given cautiously; sinapisms and heat to the surface of the body; iced milk and soup given as constantly as called for.

Carter County.

CHOLERA EPIDEMIC OF 1873 IN CARTER COUNTY.

By Dr. P. H. Bailhache,
Surgeon United States Marine-Hospital Service.

(Received through the Supervising Surgeon Marine-Hospital Service.)

Carter is a county in the northeastern portion of the State of Kentucky, bordering upon Virginia, from which State it is separated by the Big Sandy River, a navigable stream. Grayson, the county-town, has a population of about fifteen hundred inhabitants. This town is located upon the Little Sandy River, in a hilly region which abounds in coal and iron ore.

On the 19th or 20th of June a number of railroad employés, who were working on a railroad cut some four miles south of the town of Grayson, were suddenly taken sick with vomiting and purging. Seven of these men died in three or four days, and as it was supposed that they had been poisoned; all left the work and the neighborhood.

June 23, Mike Vincent, a laborer, at that time hauling for the rail-

road, and living one mile below the place where the negroes who had died were housed, was taken with a similar disease, but recovered.

June 24, James Bryson, who lived about two miles from Vincent, was taken with the same disease, and died.

The negroes who were first attacked had their cabins along the banks of the Little Sandy Creek. Vincent lived one mile below these cabins, and Bryson two miles below upon the same stream. The negroes, Vincent and Bryson (no one else lived between them) all drank of the water from this stream. In other words, the washings from the negro camp flowed past Vincent and Bryson, who both used the water. The section hands of the railroad were constantly going and coming to and from the Ohio river boats.

From Bryson's house the disease was carried by his father up the valley to the Iron Hill Furnace, where he died of the disease. At this furnace the explosion of the disease occurred. The employés were "poor white trash" and negroes, who were huddled together in ill-ventilated, filthy shanties, drinking stagnant and unhealthy water.

Only two or three cases of the disease occurred in the town of Grayson, and these cases were easily traceable to communication with the epidemic at the furnace.

Thirty-two cases are reported, with twenty deaths.

Dr. L. Prichard reports that he depended upon the early treatment by hypodermic injections of morphia.

Kenton County.

The city of Covington is located on the south bank of the Ohio river, at the mouth of the Licking river, by which stream it is separated from the city of Newport.

Covington is directly opposite the city of Cincinnati, and from the facilities of intercourse, which consist of a suspension-bridge (crossed by a street-railroad) and a steam-ferry, many persons doing business in Cincinnati reside at Covington. So intimate is this connection that any epidemic affecting the public health of one city would have direct influence upon the other. The northern terminus of the Kentucky Central Railroad is at Covington.

The first case recorded at Covington was in the person of a white female thirty years of age, whose husband was employed in Cincinnati. She was taken with cholera June 22, and died after a few hours' illness.

It has been found impossible to trace the lines of infection in the Covington cases. The majority, however, were employed at or were in constant contact with persons who worked at the city of Cincinnati.

Although the disease was confined almost exclusively to the lower classes, still several cases occurred among those individuals possessed of all the comforts of life.

Dr. Knollmann reports an interesting group of cases that occurred in a block of tenement-houses in the western part of the city. These cases were seven in number; two cases occurred in two houses, three cases in another. These cases were all connected with the initial case of the series that occurred July 20. Six of these cases died.

The last case of this series, a Mrs. Klewes, before she was taken with cholera washed the clothing of Schmidt, the second case of the series. Schmidt died ten days before Mrs. Klewes. His clothing had been shut up in the room in which he died until the morning of July 31, when they were brought to be washed. After performing this work the woman sickened and died within ten hours.

Several cases are reported of the wife being attacked after nursing the husband sick with the cholera, and *vice versa*.

A total of seventy-five cases are reported, with twenty-five deaths. Of these cases, thirty-nine were males, thirty-six were females; sixty-nine were whites, six were blacks; fifty were married, twenty-five were single.

The ages range from six months to seventy-five years.

CALDWELL COUNTY.

Princeton, the county-seat of Caldwell County, is located on the Louisville, Paducah and Southwestern Railroad, one hundred and eighty-three miles southwest of Louisville, and forty-four miles northeast of Paducah. This town is also in direct communication with Nashville, Tenn., one hundred and twenty-six miles southeast, by means of the Saint Louis and Southeastern Railway, which crosses the Paducah road at Nortonsville Junction, which point is thirty-one miles east of Princeton.

The town is built upon undulating ground, gradually ascending from the northwest until it reaches an elevation that forms a ridge which nearly encircles the town. North and east the country is broken and hilly, while to the south and west is a beautiful fertile plain through which flows a branch that is formed by the water of a large spring (so called, but in reality a brook flowing from a cave which has been explored for over two miles) which runs from beneath a ledge of shelving rock on the southern edge of the town, and passes on to the Cumberland River, a distance of twelve miles. From the foot of the ridge, north of the town, is a ravine which, passing across the eastern side of the town, affords drainage for many acres. This ravine has washed considerably; gullies have been formed, and after heavy rains the water is collected in many places, forming pools that have some influence upon the health of the individuals living in the vicinity.

In the month of July, 1873, Princeton was in an excellent sanitary condition, with the single exception that the privies of the town were without vaults, and were therefore influenced by surface-washings. No other local causes were found to account for the presence of any epidemic disease. Dr. James A. Carr, a distinguished physician of the county, writes: "There were no local causes in or around the town calculated to produce cholera that are not found every year, and therefore not capable of promoting it."

On the 29th day of June a Mr. Kruse arrived at Princeton from the infected city of Paducah. At the time of arrival he was complaining of malaise, and proceeded to the room of his friend, Dr. J. A. Maxwell, when a painless diarrhœa, attended with great exhaustion, was developed. Mr. Kruse remained for some hours with Dr. Maxwell, when he was removed to a hotel, and by careful nursing and the judicious use of opiates and mercurials, the severity of the attack was successfully combatted, and after an illness of about a week the patient was convalescent.

The next day Dr. Maxwell, who had been in constant attendance upon his friend, was similarly attacked, but recovered after an illness and tedious convalescence of some two weeks' duration.

No other cases of the disease were recognized in the town, from the occurrence of the two noted, until July 19; but the fact is established that during the period alluded to, viz, from June 29 to July 19, a number of persons from Paducah and other points infected with cholera

had visited the town. The body of a railroad employé, who had died of cholera at a point west of Princeton, had been brought to that town for burial, and no restriction was placed upon negroes (who are notorious wanderers) from coming into the town from any point upon the line of the railway. Prior to July 19 cholera had become epidemic in fourteen counties of Kentucky, from any of which the infection of cholera could have been carried into Caldwell County, (counties of Hickman, Ballard, McCracken, Crittenden, Union, Henderson, Daviess, Trigg, Christian, Simpson, Warren, Hardin, Meade, and Jefferson.)

July 19.—Mildred Wyle, a homeless, friendless negro woman, who had been abandoned on account of her worthlessness by her husband, was taken with cholera in the town of Princeton, and died of the disease within twenty-four hours. This woman had been away from the town for some time, and had returned only a few days before she was taken sick. It is a matter of impossibility to determine at this date where she had been; but it is known that she returned from some point on the railway west of Princeton, and it is highly probable that after she had been discharged by a family who had employed her as a domestic, and who lived about twenty miles from Paducah, that she had visited that city before returning to Princeton.

July 21.—A negro woman employed as the cook at one of the hotels was taken sick with cholera, and died on the succeeding day.

July 25.—Two cases occurred, one of which proved fatal.

July 26.—A fatal case is reported.

July 27.—Two cases occurred; both recovered.

July 29.—Three cases with one death, and July 30 four cases with two deaths are reported, and the epidemic may be considered as established. From the 30th of July to the 22d of August sixty-eight cases of cholera, with twenty-two deaths, are reported; a total of seventy-eight cases, with twenty-nine deaths. Of these cases forty-five were males, thirty-three were females; thirty-six were whites, forty-two were negroes. Of the fatal cases, nine occurred among the whites, twenty among the blacks. Of the total cases, seven occurred among children from one to ten years of age, five of whom died. In the demonstration, the last fatal case occurred August 15. The maximum of intensity was reached August 10, upon which day eight cases, with four deaths, are reported.

The disease was distributed over the entire village, but the district in which the infection was intense was found to be along the line of the ravine north of the town. In one family, eight cases of the disease occurred, with four deaths. In two families three cases occurred, with one death. In one family two fatal cases are recorded, and in seven families two cases occurred, and in three instances the attack was fatal. In a few instances the disease was carried from the town into the surrounding country.

On July 31, a Mr. William Perryman, who was at Princeton attending court, was attacked with cholera, and was conveyed by his friends to his home in Hopkins County, where he died of the disease, August 2. On August 4, Dr. Shackelford, who attended this case after it reached Hopkins County, died of the disease. On the 31st of July, Mr. Hugh Craig, who resided in a most desirable location, some five miles southwest of Princeton, where for the three preceding days he had been on duty as a juryman, was taken with cholera, and died after an illness of ten hours.

August 4, Mr. Robert Craig, who had been in constant attendance upon his uncle, Mr. Hugh Craig, was taken with cholera, but recovered.

August 3, Mr. T. J. Morse, residing eight miles north of Princeton,

where he had also been attending court on the preceding days, was attacked with cholera, and died after an illness of twenty hours. No other case occurred in his neighborhood.

August 10, a young lady who resided some six miles east of Princeton was, while on a visit to the town, so severely attacked with the disease that she was unable to return to her home. Her illness, which terminated fatally, lasted for forty-eight hours. The mother of this young woman came at once to Princeton to care for her daughter, and after the funeral returned at once to her home. The same day, August 12, the mother sickened and died of the same disease within ten hours. In this family several cases, which recovered, occurred.

Ballard County.

During the summer of 1873, a party of laborers engaged in the extension of the Mississippi Central Railroad from Jackson, Tenn., to Cairo, Ill., moved into camp at the foot of a bluff some three miles back of the Mississippi River, nearly opposite to the city of Cairo, Ill. Near their camp was a spring of water that flowed from the foot of a bluff the summit of which had for years been used as a graveyard. The men of this party, twenty in number, had been recently paid off and had been indulging in whisky. They cleaned out the spring on Saturday, the 29th day of June, drank freely of the water during Sunday, and on Monday, July 1, cholera, most malignant in its character, broke out among them, and during the next five days sixteen of the twenty men were dead.

Some of the men reached Cairo and died at that city; others died upon the road-side. One case, a young man employed as a teamster, came to Cairo on July 1 with diarrhœa. He went into a drug-store to obtain some medicine, fell fainting from exhaustion upon the floor, and was carried to a house about one hundred yards distant and placed in bed. The characteristic rice-water discharges at once set in, with vomiting and cramps. He sank rapidly, and died after a collapse of about ten hours.

A young Irish girl, seventeen years of age, who had been employed at the boarding shanty of the same gang of laborers, was admitted to hospital at Cairo on the 3d day of July with a diarrhœa, which soon took on the rice-water character, with vomiting and cramps. In twenty-four hours she was collapsed, in which state she remained for thirty-six hours, when she died.

It has been found impossible to obtain full lists of this demonstration. The four survivors of the party are not to be found, and nothing was known of them other than that they had come from some point in Tennessee. The line of extension of this road was through Union City, Tenn., at which point a formidable epidemic occurred.

For the facts of this demonstration we are indebted to Dr. H. Wardner, of Cairo.

Dr. L. M. Lovelace, of Milburn, Ballard County, reports that four or five cases of cholera occurred at that town, but that all yielded to treatment.

Mason County.

So much of the epidemic of cholera in 1873 as affected the county of Mason, was confined to the city of Maysville, located upon the south bank of the Ohio river, sixty miles above Cincinnati. Maysville is a city of some importance, being the entrepôt for the greater portion of Northeastern Kentucky, having a considerable tobacco-trade, and being the most extensive hemp-market in the United States. The manufactur-

ing interests are large and growing. According to the census of 1870, Maysville has a population of 4,705 individuals, of whom 681 are negroes.

The city is built upon an elevated, well-drained position, at the foot of an extensive range of hills, by which it is nearly encircled. It has daily communication with Cincinnati, Ohio, Parkersburgh, and Wheeling, W. Va., and all intermediate points, by river-steamers, and with Lexington, Ky., sixty miles to the southwest, by the Maysville and Lexington Railway. The hills or bluffs in rear of the city are composed, according to Owen's geological survey, entirely of limestone, clay, and marlite.

At Maysville, in 1849, cholera remained in force from the month of April until October; and there seemed to be just grounds for apprehending a serious epidemic in 1873, but the city escaped almost entirely.

From June 29 to July 25, but fourteen cases occurred, seven of whom were in one family of negroes.

June 29, a young man just returned from Cincinnati was attacked with cholera, but recovered.

June 30, a lady, resident of the city, was taken with cholera, but recovered.

July 3, Dr. Shackelford reports the first of a most interesting group of cases, in the person of a negro woman, who died after an illness of about fifty-two hours.

July 5, her daughter, aged twenty years, was taken with cholera, and died after ten hours' illness. The same night a young child of the last case was taken ill and died. The next day (July 6) after the funeral of those who had died the previous day, the cabin was abandoned. In a few hours thereafter the husband of the second case and her two sisters were taken with cholera. These cases were treated at the city hospital; the man and one of the women died.

July 7, a negress, who had been in attendance upon the first two cases, was taken with cholera, and died the next day.

This family of negroes had resided in a small cabin on a hillside. The ground around was extremely filthy, and the drainage and surface-washings of this filthy yard were into the well from which they obtained water, and also under the cabin.

From July 25 to August 18, no new cases of cholera are reported in the city. At the last date a white female, in destitute circumstances, was brought into the city from some point upon the river. She died of cholera after an illness of three days.

August 25, a negro man was brought to Maysville from a town twenty-five miles above on the river. He was attacked with cholera before his arrival. The disease, however, did not advance beyond the second stage.

August 27, a negro man, named Purcell, was brought to Maysville by boat, and although collapsed from cholera, *was placed in a spring-wagon and carried to Millersburgh, Bourbon County, where he died two days after his arrival.*

These three instances of the importation of cholera produced no epidemic at Maysville. For the notes of the last-mentioned cases we are indebted to Dr. M. F. Adamson.

The exemption of Maysville from a fatal epidemic of cholera in 1873, is, in the opinion of Dr. Jno. M. Duke, a distinguished physician of that city, who has witnessed the effects of each epidemic since 1832, due to the almost universal substitution of cistern for well water.

HENRY COUNTY.

The information as to the epidemic in Henry County that we have been able to collect, is contained in a letter from Dr. James K. McCreary, of Shelby County, which we present in detail :-

"BAILEY'S STORE, KY., *August* 29, 1874.

"DEAR SIR: Having been called out of my locality to see the cholera-cases, I am not sufficiently acquainted with all the facts of every case to enable me to fill out the blank forms you send. Therefore I send a narrative, hoping that it may be of some service to you.

"The first case of cholera occurred on the 6th day of July in a locality known as Hardin's Bottom, on the Kentucky river about twenty-five miles below Frankfort. The subject was a young man (married) who had eaten various fruits and vegetables through the day, the attack occurring at night; he died before daylight, having been treated with a cholera-mixture. His residence was situated on high ground with healthy surroundings.

"The second case was a middle-aged lady of family living within a mile of the above. She had been eating freely of various fruits and vegetables, and was laboring under excitement over a family trouble at the time of her attack. She was taken on the evening of the 10th and died on the 12th from uræmia.

"The third case was a young married lady, living in Lecompte's Bottom, six miles up the river from Hardin's Bottom. The attack was at night. Patient had eaten a great many cucumbers for dinner, and had fished in the hot sun during the afternoon. I treated this case successfully with hypodermic injections of morphia, with calomel, bismuth, whisky and capsicum internally, and with dry heat to the surface of the body.

"The fourth case occurred at the mouth of Sand Ripple, which is midway between the above-named places. The subject was the wife of the first case. She had moved to her father's after the death of her husband. I saw her when in collapse, and prescribed a mixture of chloroform, spirits of camphor and tincture of capsicum, with dry heat to the surface. Under this she soon reacted, but died in a few days from uræmia.

"On the morning of the 13th I was asked to see an old lady who lived in Hardin's Bottom in sight of the first case. I found her collapsed, from which she soon rallied under the mixture and dry heat, but died from the opium that she got in a cholera-mixture of unknown formula that she had taken before I arrived. At this point I found myself in the midst of a prevailing epidemic which was causing the wildest excitement among the people. So great was the excitement that parents left their children, and children their parents, to seek safety in other localities. Those who remained had resigned themselves to die.

"To check the epidemic was the problem that presented itself. To do this I interdicted the use of fruits and vegetables. Placed in the hands of every one pills of lead and opium, with instructions to stop a diarrhœa at its onset. In forty-eight hours I had treated eight well-marked cases of cholera, with a loss of two. I remained here one week; there were but few cases and no deaths after the first two days. During this week two fatal cases occurred at the mouth of Sand Ripple. There was nothing in the entire district that I could regard as an obvious cause for the epidemic. It is true that there was a slough with some stagnant water close by, but there was no case of malaria in the whole

country. In fact there was no sickness of any kind, except a few cases of summer-complaint among infants.

"After the excitement had subsided and everybody felt hopeful that there would be no more cholera, an imprudent practitioner told the people at the mouth of Sand Ripple that there was no danger to be feared from the use of fruits and vegetables. This caused a family to resume their use, by making an unreasonable meal of roasted corn for their dinner, and to eat freely of musk-melons in the afternoon. That night two cases of cholera occurred in the family, both of which proved fatal in a few hours. That night the remainder of the family started to leave the place. Two children sickened, and one died on the road-side before daylight; the other lived for two or three days. A young man of the family, who went to the burying-ground with the bodies of the two children, was taken ill during the interment and lived but a few hours. There were other cases in this family who recovered.

"When we come to look after the causes of cholera we must consider as a predisposing cause an imperceptible effluvium relative in nature to the different causes of the exanthemata, each of these being a specific in the production of its own malady. There is no doubt of this poison being generated in India, reaching us through the air, as its circulating medium, producing a cholera atmosphere. With this as a prime cause, aided by our local causes, we have the true causes of the disease. If cholera be contagious, it does obey the laws of contagious diseases; if malarial, it is unlike all other diseases of the class and does not yield to the same remedies.

"In opium or its alkaloid we have an agent, when properly administered, that is capable of arresting the disease. If administered by the mouth, during the repeated acts of vomiting, we never know how much of the remedy is retained, and when to repeat the dose. After the disease is arrested, opium is injurious, for it suppresses the secretions. Calomel and diuretics are required, with diet and moderate stimulation.

"JAMES K. McCREARY, M. D.

"Dr. ELY McCLELLAN,
Assistant Surgeon U. S. A."

We have endeavored, but unsuccessfully, to obtain additional evidence as to this demonstration of the disease, the questions suggested by the narrative remaining unanswered. It is, however, worthy of consideration that, at about the same dates cholera was epidemic upon the line of the Louisville, Cincinnati and Lexington Railroad; that the town of La Grange was attacked, and that, the construction-train of the same railroad company becoming infected, the negro employés were discharged, and that they scattered through the adjoining counties. To discover if any of these people reached Hardin's or Lecompt's bottoms, or at the mouth of Sand Ripple, caused our inquiries, which remain unanswered.

OLDHAM COUNTY.

La Grange, Oldham County, is located on the line of the Louisville, Cincinnati and Lexington Railroad, twenty-seven miles from the city of Louisville. The town is built upon a ridge and is drained by four ravines. At the foot of this ridge, and along the line of those ravines, the lower classes of the community reside. In this portion of the town the privies are upon the surface of the ground, and are cleaned by surface-washings alone. Well-water is almost exclusively used, and many

of these wells are so situated, that after each rain-fall they are contaminated from the surface-washings. This is especially true in regard to the well from which the family, in which the disease was first developed, obtained their drinking-water.

The gentlemen who observed this demonstration of the disease, although they decline any positive expression of opinion, incline to the theory of the malarial origin of the disease, from the fact "that the room in which the family, among whom the disease first occurred, slept, was over a dirty cellar, in which were several inches of stagnant water, and that the well from which the drinking-water was obtained was situated on low ground, and into it the filth of the yard had washed." They are kind enough to write further: "During the months of June and July a succession of violent rain-storms alternated with an intensely hot sun; the ravines were repeatedly filled to overflowing, and washings from the high lands were spread upon the low grounds, which were covered with luxuriant vegetation." It was along these ravines that the epidemic was particularly virulent.

Prior to the outbreak at La Grange, cholera had been developed in nine counties of Kentucky, and had appeared in the cities of Louisville, Covington, and Newport. The town, being upon a main line of railroad, was in daily communication with infected districts, and the rain-storms which have been noted were severe enough to have washed "*cholera-stuff*" from even the line of the railroad to the low grounds where the disease was developed.

From July 8 to August 4, thirty-nine cases of cholera are reported in this county. Of these cases, eighteen terminated fatally. In three families two individuals were attacked; in two other families three occurred; in one four, and in the other five cases. A few individuals living in the county became infected in the town.

Hardin County.

Elizabethtown, the county town of Hardin County, is located upon the line of the Louisville and Nashville, and the Elizabethtown and Paducah Railroads. This town is therefore in almost hourly communication with the cities of Nashville, Memphis, Paducah, and Louisville, as well as all intermediate towns.

The site of the town is well drained by a small creek which flows in a southwestern direction between the town and the line of the Nashville Railroad. On the banks of this creek, and heading from Main street toward the northeast, is a small street known as Race alley. The ground over which this alley passes slopes to the creek, and is lined upon each side of the pass-way by negro cabins. During the month of June, 1873, the roadway of this alley was filled several inches above the level of the surrounding grounds, and the drainage thus obstructed flooded the ground under the cabins on the western side of the alley with the washings from the higher ground upon which the main portion of the town is built.

The ground around these cabins was filthy in the extreme, being covered with *débris* of all kinds in the various stages of animal and vegetable decomposition; and although the first case of cholera did not occur among the inhabitants of this row of cabins, yet, the disease once developed in this locality, its virulence was exhibited.

A careful examination into the surroundings of this demonstration of cholera determined the following significant fact: On the 4th of July, 1873, a negro celebration was held at Elizabethtown, which gathering

was attended by a large number of negroes living at towns upon the line of the railroad. A large number came from Bowling Green, at that time a point infected with cholera. These negroes arrived early on the 4th and remained over the 5th, returning to their respective homes on the 6th instant.

On the 8th day of July a case of cholera occurred in the person of an aged negro man, who, although not living on Race alley, was in constant communication with the families who did. This case terminated fatally in twelve hours.

The second case occurred on Race alley, July 10, and died after an illness of ten hours. From that date until September 2 the disease was epidemic. Forty-one cases occurred, twenty-two of whom died. The disease was almost entirely confined to Race alley; one or two cases occurred in the town late in the epidemic.

In a family living upon the banks of the creek, in the northeastern borders of the town, five individuals were taken with cholera, one of whom died. On the creek southwest of the town, in another family, three persons were attacked, all of whom died.

Dr. McMurtry stated that on the 26th of August a farming community, some six miles southeast of the town, were infected by a refugee from the town. Four cases of cholera occurred in rapid succession, all of which terminated fatally.

Dr. Anderson reports a case in which the infection was carried by a young man to the house of a friend in the country, where a fatal case of cholera occurred.

On the night of August 14 cholera was developed in a group of cabins occupied by laborers employed on the extension of the Elizabethtown and Paducah Railroad, at a point called Round Hollow, about three miles from the town of West Point.

These cabins were built upon the banks of a small branch which empties into back-water from the Ohio river. They were miserably filthy, and were occupied by Irish and negroes, who lived indiscriminately in them, in utter defiance of all hygienic laws. The ground around these cabins was covered with filth of all kinds, which drained into the creek, upon the banks of which were built stables, pig-pens, &c. From this creek, which at this season of the year was almost dry, water for all domestic purposes was obtained.

From the 14th to the 28th of August, the epidemic of cholera was in force among the inhabitants of this settlement. Thirty-four cases of cholera are reported to have occurred, of which twenty-two died. Attempts at disinfection and orders as to the proper disposition of the dejections were negatived by the indifference of these people. After the disease was developed many left the settlement and were taken with cholera in the surrounding country. In each of these instances the disease was stamped out.

One man on his way to Indianapolis, Ind., reached the town of West Point, when he was stricken down with the disease. Through the influence of Dr. Davis, he was received into a house and every precaution was taken to prevent the spread of the disease. At this house he was treated and nursed until he recovered, and no member of the family was attacked.

Dr. Fletcher reports that none of the families who lived on the creek when the disease occurred, and who used water from wells remote from the creek, were affected. That at a railroad settlement one and a half miles, on the same creek above Round Hollow, where spring water was exclusively used, no cholera occurred.

Dr. H. R. Pusey, of Garnettsville, who attended many of the cases at Round Hollow, states that all the persons living in the locality were affected with the premonitory symptoms, which in the incipient stages were relieved by the free use of calomel and opium. Dr. Pusey saw no case recover that had advanced to the stage of collapse.

The exact facts as to the importation of cholera to Round Hollow cannot now be obtained; but as railroad employés are essentially a migratory people, it is more than probable that it was carried from Elizabethtown.

Bourbon County.

Millersburgh is a small town of Bourbon County, about twelve miles east of Paris, the county-town, and forty-eight miles east of Frankfort, the capital of the State. The town is the center of a rich farming community, and is one of the principal towns of the county.

We present herewith a paper which has been prepared by our valued friend Dr. David Keller, of Paris, one of the most prominent and accomplished medical gentlemen of the State. The article of Dr. Keller is most elaborate, and we present it in detail (although we are constrained to dissent from much that is therein expressed) as it represents not only his own individual views, but those of a large body of gentlemen residing in the valley of the Mississippi.

THE CHOLERA EPIDEMIC OF 1873 AT MILLERSBURGH, KY.

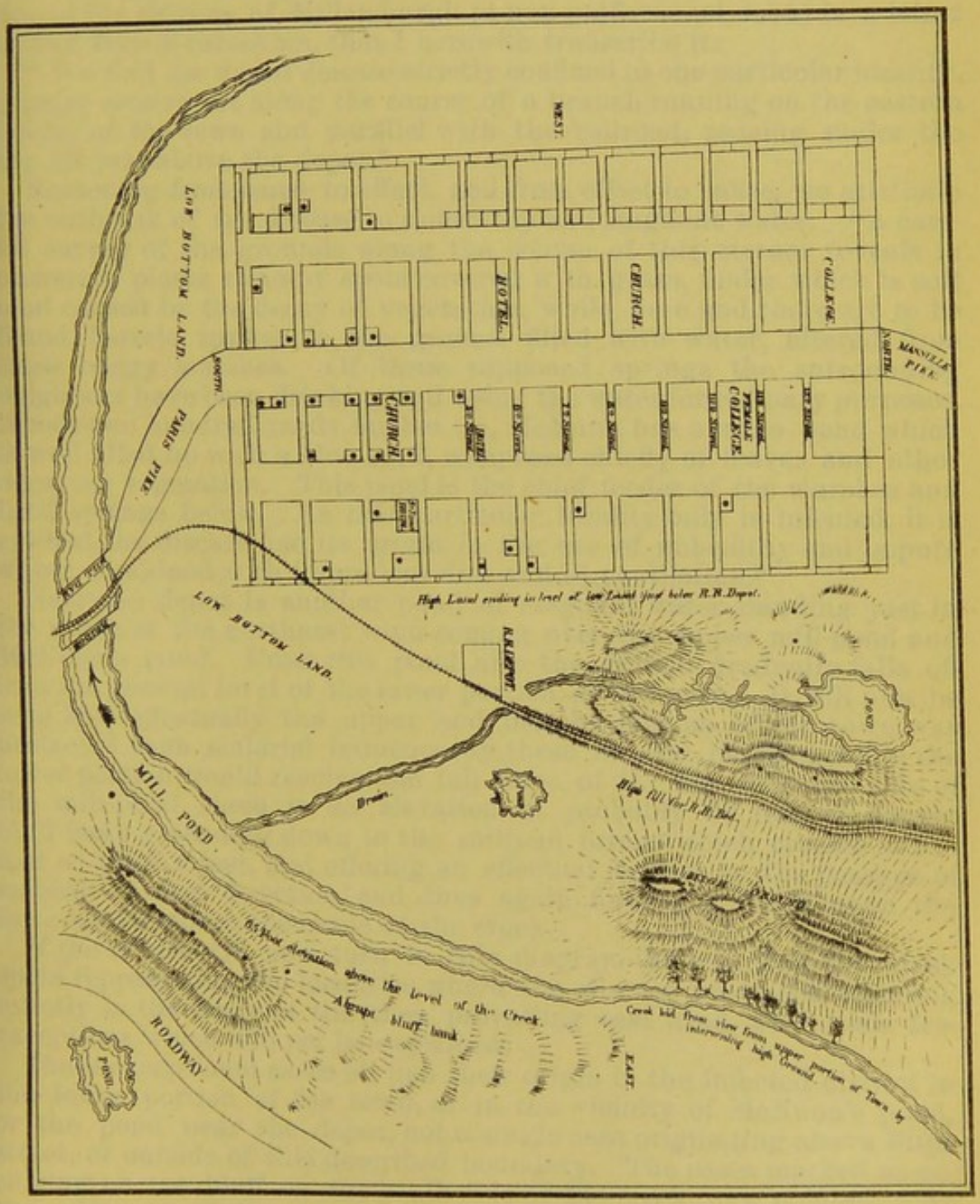
By David Keller, M. D.

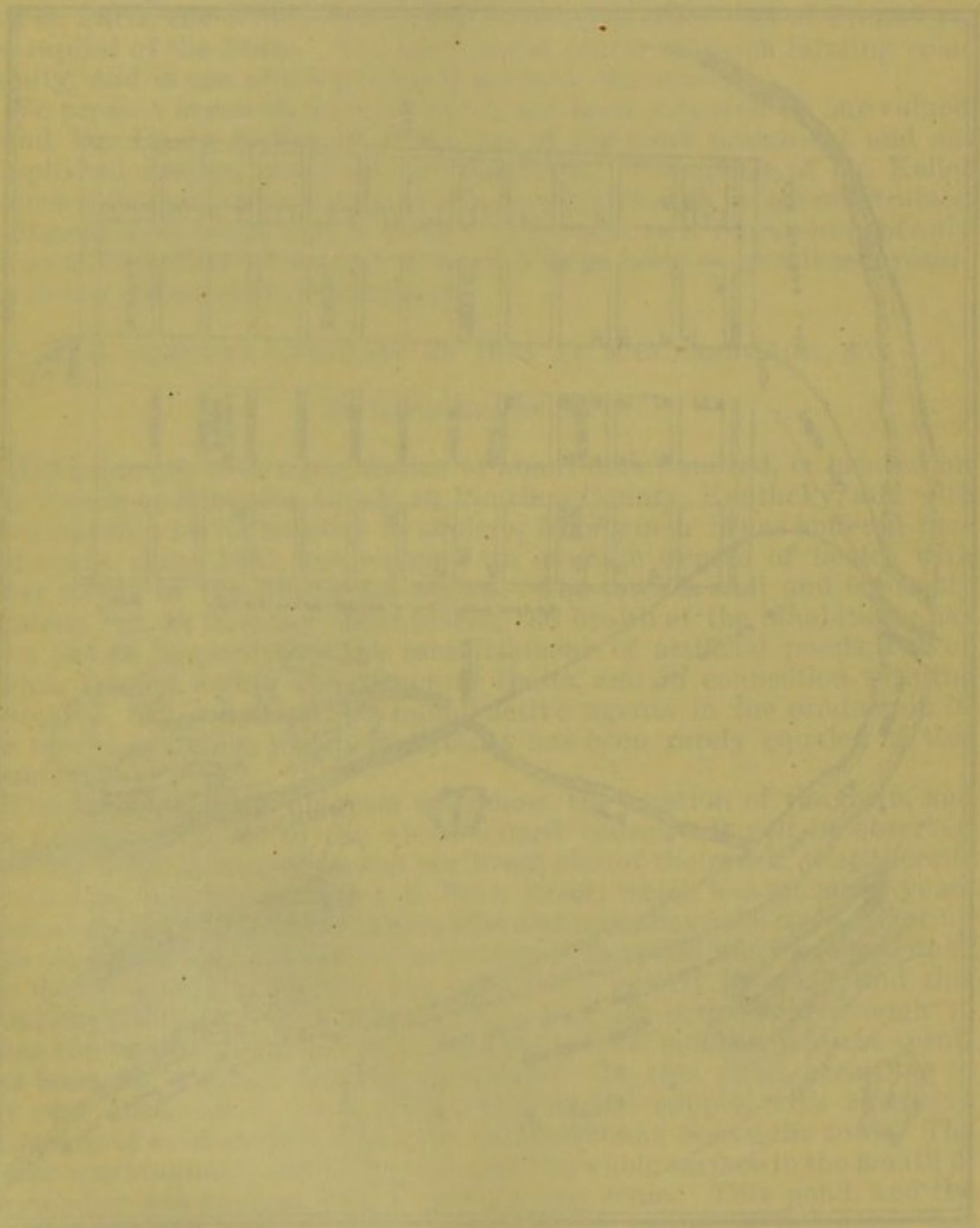
Millersburgh, with a population of about nine hundred, is located on the waters of Hinkston Creek, in Bourbon County, Kentucky, and with the exception of its liability to cholera, from which it has suffered time and again since 1833, has enjoyed an average degree of health with other towns in the blue-grass region. The town is well and favorably located; but, as in many other places, the health of the inhabitants has been put in jeopardy by the establishment of artificial ponds, two of which, located within the corporate limits, and in connection with the mill-pond, will, we think, be found active agents in the production of the recent epidemic, which for fatality has been rarely equaled in this country.

The accompanying diagram will show the location of the town, and the relation it bears to the above-named causes. It will be observed that the town is located on the northeast side of the creek, that there is a mill-dam very near the foot of Back street, which has for many years backed up the water for a considerable distance above the town. During this time the accumulation in the bottom of the pond has increased until the depth of the creek-bed has been very greatly lessened, and this summer, although not a very dry one, has not given rain enough to raise the waters of any of our creeks for several months, and the result has been an unusual low stage of water. In this pond, according to my own observation, there was a diminished supply, with extensive exposure of mud surface along the northern bank above the town. The water was stagnant, and so impure that the whole surface in the month of September was covered with a green mossy scum. This pond, and the creek below the town, embrace the town on two sides, beginning east and running southwest, and finally leaving the town on its southwestern border, having traversed about one mile in getting around the town limits. The extreme eastern view of the pond is cut off from the upper

CHOLERA MAP OF MILLERSBURG, KENTUCKY

Epidemic of 1873, by David Keller M.D. of Paris, Ky.





and healthy portion of the town by a high range of land, which gradually declines as the town is approached by the creek. Next will be seen what is known as McNunn's pond, located at the extreme northeast border of the town limits, and stands at the head of a deep hollow on high ground, and is protected to a great extent from leakage by a heavy fill made across its southern border. The western border of this hollow is next to Back street, and is probably 50 feet above the drain-level, and runs parallel with Back street nearly to the depot of the Maysville Railroad, where it gradually falls off, like the ground on the opposite side of the railroad, to the level of the low lands in the circle of the creek. The character of this pond and its surroundings are so well described by one of the citizens of Millersburgh (a non-professional man) in a letter to the True Kentuckian, that I herewith transcribe it:

"We find the dread disease strictly confined to one particular locality, a negro settlement along the course of a branch running on the eastern border of the town and parallel with the railroad, passing under the big fill just above the depot."

Reasoning from cause to effect, and from effect to cause, we attribute the outbreak of the disease to unhealthy and stagnant water. "A careful survey of the grounds along the course of this stream reveals in numerous places swampy spots covered with grass, under which is soft mud caused by the decay of vegetation, while here and there are to be found barrels sunken in the ground filled with water, filtered from these boggy marshes. Of these supposed springs the surrounding neighbors have been drinking and using the water for culinary purposes. About two hundred yards farther up, McNunn has a large pond which is well filled up with a blue mud, composed chiefly of leaves and other decaying vegetation. This pond is the chief feeder of the marshes and little springs below. As this particular locality only is infected, it is evident the disease had its origin in the use of unhealthy and impure water, combined with imprudent diet and ill ventilation."

Near the depot is another pond of stagnant water standing just in the range of the northeast wind coming over the upper mill-pond and McNunn's pond. From this pond also the ground gradually falls off into the general level of the lower portion of the town. It will now be seen how effectually the upper and healthy portion of the town was protected from malarial influence by these natural barriers, while the lower portion would receive the full force of it. On the south side of the mill-pond there is an elevation of probably 60 feet of abrupt bluff bank extending down to the railroad bridge which crosses at the foot of Back street, and offering an effectual barrier to the passage of malaria in that direction, and thus again forcing it down upon the infected district in the circle of the creek.

If the reader will now turn to this diagram he will find the black spots representing the localities where the disease prevailed, standing exactly in the range of the then prevailing east wind, with some few exceptions which will yet be explained.

These exceptional cases all had their origin in the infected district in the lower portion of the town, or in the vicinity of McNunn's pond, or the pond near the depot, not a single case originating above Fifth street, or outside of this described boundary. The cases marked as occurring on the bluff on the south side of the creek, now pointed to by the opponents of the malarial theory as an argument against the same, on the ground that malaria would not rise to that height; but in answer it is stated that, on inquiry made by the writer, it was ascertained certainly that all of these had been visiting the sick in the infected district, with

one exception, and that the case of the woman who lived in the house marked ⊙ and very near the bridge, and at the gorge or break in the bluff, and it is by no means certain that this case had not been in the infected district. The strong probability is she had, as her death occurred almost simultaneously with that of others near McNunn's pond, and when the lower portion of the town had not been attacked. There are but few public buildings in Millersburgh. The two colleges, male and female, are located in the upper part of the town, and were not in session during the prevalence of the disease. There are three hotels, one located on the corner of Main and Fifth streets, another on south side of Fifth and Third, the Saint James, an Irish boarding-house at the foot of Back street, near the bridge, and here the disease was terrific. Those who did not die left the place, and the house stands closed to this time. On the 10th of July a case of cholera, and the first one, occurred in the immediate vicinity of McNunn's pond, (see map;) this case terminated fatally in six hours. On the 11th five cases occurred in the same vicinity, and in from twelve to thirty-six hours all died. On the 12th other cases died. One of these was the woman mentioned as dying near the bridge. These cases were all negroes; three adult females, one adult male, and four children, the first case being a child two years old. With the occurrence of these deaths the disease subsided, and made its appearance on the night of the 28th August, and in four days, with the population thinned out by death and flight of nearly all who could get away, there was, on Monday, September 1, twenty-one burials out of a population numbering less than two hundred, of which about twenty-six were whites. The announcement of this terrible mortality gave rise to the most exaggerated reports, which were taken up and added to until it was stated in one newspaper that there was scarcely a human left in the place. The intensity of the disease continued until September 11, when it moderated, and from that time no new cases occurred; and at this time there was a decided moderation in the intense heat, and to this cause, and the want of material in the infected district, may be attributed the departure of this most unwelcome visitor.

The number of deaths foots up seventy-six from the first to the closing of the second visitation, confined almost exclusively to the Irish and negroes, who, as a general rule, set at defiance all sanitary rules and regulations. With a few exceptions, the houses are single story, badly ventilated, and with surroundings anything but inviting to the passer-by. From all the facts connected with the cholera in Millersburgh, from the appearance of the first case to that of the last, the condition of the town and its surroundings, I think it is clearly shown that the disease was indigenous to the place, of malarial origin, and to the manor born; that it was not imported, the first case occurring in a child living on the ground and had not been from home, and there is not, and cannot be found, the slightest evidence to show that any case had been brought to Millersburgh from abroad; that the subsequent cases occurred under exactly the same circumstances with the first, and it is, therefore, reasonable to conclude they all originated from the same cause. That it is not contagious, infectious, or portable, and cannot be propagated by these means, we think the following cases will clearly demonstrate, to wit: Daniel Marks, a colored man, resident of Paris, nine miles distant from Millersburgh, visited the latter place on Sunday, August 31, to see some sick relatives or friends; spent the day and probably Sunday night in the infected district, returned to Paris, had cholera, and died on Tuesday morning, surrounded by his family and friends, and no effort made to prevent the spread of the disease, if there was any such tendency, and there was

no case of cholera resulting from contact with this patient. This case was not isolated, for a negro woman, Harriet Wheeler, came up from Millersburgh about the same time, and died in the same or adjoining house with Marks, and on visiting the house the next day in company with Dr. L. D. Barnes, we found on inquiry that all of the dejections had been thrown out near the front door. Dr. Barnes directed that fresh dirt should be thrown over the ground where this had been done, but whether this was done or not the writer does not know. The city council also ordered the burning of the bed-clothing, &c. There was no new case in this neighborhood.

Henry Buckner, a colored man, came to Paris from Cynthiana, and died in a suburban negro village, in bad sanitary condition, surrounded by a large number of negroes, in very hot weather, and no sort of precautionary measures taken whatever, and there was no spreading of cholera from this case.

Miss O'Connor came to Paris from Millersburgh, and died in another part of the city from all of the above cases; was visited by a number of persons, and there was no new case arising from contact with her. I have heard that orders were given by her physician to have all of the dejections covered up in the ground. Whether this precaution was observed the writer cannot say.

Mr. Robert Miller visited Millersburgh frequently during the epidemic, was attacked with cholera, and died at home several miles in the country, surrounded by his family and friends, and no new case occurred in that neighborhood. So with Mr. Owen, who left Millersburgh and died at Millwood, thirty miles distant, and no new case occurred where he died.

The history of the cholera in Lexington, Ky., in 1833, is strongly confirmatory of the malarial origin of the disease. The first cases which occurred in that city were in the immediate vicinity of a low, wet piece of ground, of about one acre, which had for years been the receptacle of all the offal of the neighborhood; sixty-six deaths in this immediate vicinity, with a population not dense, and of the whole number of deaths, 489, which occurred in the months of June and July, within four of two-thirds of the whole number occurred in the low, wet situations. As the season advanced cholera subsided, and was succeeded by fever and dysentery, diseases known and admitted by all to be of malarial origin. (Trans. Journal, vol. 1, page 194.) If we are asked to explain how it is that cholera, if a disease of malarial origin, is not uniformly produced with the return of hot weather in malarial regions, we answer that we cannot tell, and, in return, ask why is it that we observe in these same places remittents one year, intermittents another, and again dysentery, and some seasons all occurring in company? When this is explained we may probably answer the first; until then we will have to be satisfied with the facts as they exist. It is true there is some peculiarity in the condition of the sick which leads them to have intermittent or remittent fever rather than dysentery, or cholera rather than either, and that peculiar condition must have a cause; but there is no less difficulty in explaining why a few persons have cholera in the midst of their neighbors, or even their own family, who are suffering under fever or dysentery, than why many should not suffer under the same circumstances. Let the objector explain the peculiarity in the one case, and we will explain it in the other. But whatever that explanation may be, it never can do away the fact that cholera arises in the very same circumstance in which fever and dysentery arise.

The Vienna conference of July, 1874, declared unanimously that chol-

era was spontaneously produced in India; but that in all other countries where it breaks out it has always been produced from without. So far as the latter part of this declaration is concerned, it is very difficult to conceive how the conference arrived at this conclusion, unless we concede that they are omniscient. There were no possible means in their possession by which they could have arrived at this conclusion, with facts for its basis, and therefore the declaration is pretentious. With reference to the transmissibility of cholera by man, this conference declared unanimously that the disease is transmissible by man coming from an infected medium, but man is not considered the specific cause, apart from the influence of locality. The influence of locality is therefore necessary to the production of cholera, and cannot be excluded from the list of producing causes.

Estragulas, in his account of the cholera as it occurred in South America, is decided in the expression of opinion that it had its origin in Paraguay; for, says he, "it was not until 1866 that the cholera became known to the countries of La Plata, and prior to the appearance of the epidemic in Paraguay, not a single vessel from infected ports had arrived either at Montevideo or Buenos Ayres, and not a single case occurred at either city before it had been imported from Paraguay."

Further he says, "If we are to accept the decompositions of vegetable matter in India's indigenous flora as one of the causes of cholera, we have to admit that analogous decompositions could be alike in their results, for the flora of the Himalaya and the Cashmere Valley are of analogous type to that of Paraguay, and the results of decomposition must be also similar." But it has never been shown what there is specific in the soil of India which gives rise to cholera, and it can scarcely be admitted that, independently of other causes, the source of cholera is a peculiar unique condition of soil there, for its analogue is to be found in other parts of the world. "Now, in cholera the combination of causes we conceive are soil-changes, vegetable and animal decomposition, atmospheric influences, over-crowding, filthiness, &c. Why, then, should not the same combination of causes give rise to cholera in other parts of the world where they exist?"

In Paraguay before these causes were present there was no cholera; when these causes appeared cholera appeared, and when these causes ceased there was a total disappearance of the disease. He says, "The troops coming from Brazil did not bring cholera to Paraguay, for there was none in any Brazilian port or city at the time." The Paraguayan army, when the disease first appeared, was secluded from the rest of the world and completely blockaded by land and water."

Sydenham, in his account of the cholera in London in 1669, gives a very accurate description of the disease, as witnessed at the present day. He says, "It comes almost as constantly at the close of summer and toward the beginning of autumn, as swallows in the beginning of spring and cuckoos toward midsummer." There is no intimation that the disease was imported into London.

Dr. Cooke, in his "Remarks on Cholera," as it occurred in Lexington, Ky., in 1833, gives a full and explicit account of the epidemic as it occurred in that city, and attributes its origin to malaria, and points out the locality where the first case originated, and there is nothing whatever said about the disease being brought from abroad.

The communication at this time between Lexington and Versailles, only twelve miles apart, was uninterrupted, and yet there was no cholera in the latter place during 1833, while in 1834 it was severely scourged, and Lexington was exempt. What becomes of the transmissibility of

cholera in this instance, which "is known not to travel faster than man travels," when the people of these two places were constantly in communication, and not a case in existence in the two places at the same time and in the same year?

In 1833 the cholera broke out on the plantation of the writer's father in North Alabama, where there had been no cholera in the county up to that time. There were a large number of whites and blacks on the plantation, and yet only about one-third of the number were attacked, the first case dying in twelve hours; the balance recovered. No sort of precautionary measures were adopted, and the intercourse between the sick and the well was uninterrupted.

With a strong desire to arrive at the truth, and having closely observed, through three different epidemics of cholera, the circumstances and surroundings under which it occurs, he has in no instance seen anything whatever which led him to believe it was contagious, or that it could be transmitted from one point to another by personal intercourse; but, on the contrary, believes it to be as free from all infection as remittent or intermittent fevers. The experience of others has led them to far different conclusions, but after all, the adoption of that plan of treatment best calculated for the relief of our patients is the first and most important point to be arrived at. In the language of a distinguished medical man, in a recent letter to the writer, "we can afford to shake hands over our differences of opinion as to the cause of cholera, if we can agree on its treatment."

With reference to treatment, it is not pretended that anything new or original will be offered in this paper. The writer's views as to pathology and treatment have in a great measure been derived from the oral and written teachings of Prof. John E. Cooke, strengthened and confirmed by his own observation and experience, running through quite a number of years, during which time he has seen cholera in all of its phases.

Cholera is to be cured by producing and keeping up a free secretion from the liver and its discharge from the bowels. The best remedy with which to effect this object is calomel. In cholera it is particularly important, because from its small bulk, weight, and freedom from taste, it is more easily taken and retained than any other medicine, because other cathartics tend more or less to produce liquid discharges, and they are already profusely so; and because from the rapid course of the disease, the best remedy ought to be relied upon as far as is safe. In all violent epidemics peculiar to hot weather, the first cases occurring, as a general rule, will be found typical of all subsequent cases in so far as the quantity of medicine to produce a given effect is concerned. If in a cholera-epidemic two drachms of calomel are required to allay vomiting and produce free biliary secretion in the first few cases, the presumption is that this quantity will be required in all subsequent cases to produce the same effect, and should be given without hesitation. If a larger quantity is required in the first cases, so will it be in all subsequent ones, and no hesitation should be had in giving the dose sufficient to produce the desired effect, for upon this depends the recovery of the patient. In this connection the writer desires to record his opinion as to calomel: That of all the so-called potent and dangerous medicines, he looks upon this as the most useful, harmless, and at the same time most abused and misrepresented of all others; that the bugbear, salivation, with which the ignorant are every day frightened, need not occur in one case out of thousands, with proper care in its administration and subsequent management.

Cholera is a disease of congestion of all the internal organs, attended in the great majority of cases with complete suspension of the secretion of bile, and as the restoration of this secretion is all-important, the administration of opium in any shape or form cannot, in the opinion of the writer, fail to be detrimental in its action, from the fact that it increases the difficulty which we should be anxious to remove, to wit, the locked-up secretion of the liver. Given generally with the view of checking watery purging, its failure is signal, from the fact that it does not remove the condition of things on which this purging depends, and the writer knows no other remedy that will, aside from calomel as the chief reliance.

The experience of the resident physicians of Millersburgh in the epidemic of 1873, in reference to the use of opium, morphia, subcutaneous injection of atropia, &c., was anything but satisfactory.

Dr. J. R. Best informed the writer that, so far as he had observed the action of these remedies, they were failures. Dr. John D. E. Jarnett, another resident practitioner of Millersburgh, testifies to the same facts. These two gentlemen were unremitting in their attentions upon the sick from the first to the closing of the epidemic. Dr. Smith, another of the resident physicians, was actively engaged, until prostrated by disease, from which he did not recover until the close of the epidemic. These physicians, like the faithful sentinels of an army, remained on duty at the peril of their own lives, thus again illustrating the self-sacrificing character of the medical profession in the hour of danger.

In confirmation of the correctness of the above views of treatment, the writer herewith records the following cases which occurred in Millersburgh, and in which this treatment was adopted:

Case 1.—My first visit was on Monday, September 1, to see a child of Dr. D. E. Jarnett, who was supposed by her father to have cholera. She had been actively treated, and when I saw her she was measurably relieved. The remedy relied on in this case was calomel in decided doses.

Case 2.—The second case visited in company with Dr. D. was a negro woman by the name of Wheeler, aged twenty-two years, (the mother of one child,) and at this time five months advanced in pregnancy. She had been sick for two days, and under charge of Dr. D. E. Jarnett. Her features were shrunken, extremities cool, pulse feeble, very hoarse, and not able to speak above a whisper. The vomiting and purging had been arrested, but her condition was a very critical one. No additional medicine was given at this time, (12 o'clock.) She was badly provided for, and without any of the necessary appliances or comforts of a sick-room. Visited her six hours afterward; the vomiting and purging had returned, and her case was considered much worse. Two drachms of calomel rubbed up with a small quantity of charcoal were given, which promptly arrested the vomiting and purging, and after the lapse of about twelve hours she had several free bilious actions, and her general condition improved, but on the next night, in the absence of Dr. D., who was then sick, she was induced to take some cholera-nostrum; after which labor-pains came on, ending in miscarriage attended with considerable hemorrhage, resulting in her death on Friday, six days from the beginning of the attack. But for the occurrence of the miscarriage she might possibly have recovered.

Case 3.—A child of this woman, a boy aged two years, was sick at the time of our first visit with cholera fully developed, vomiting and purging, with involuntary discharges; his features were shrunken and extremities cool. He took half-drachm doses of calomel and charcoal, and made a rapid recovery.

Case 4.—A child of Caroline Wood was visited at 2 o'clock Monday night; had been sick several hours; was collapsed, and in a dying condition. Death at 3 a. m. No medicine given.

Cases 5, 6, *and* 7.—America Parker, mulatto, aged about twenty-two years, and mother of several children, living on the bluff south side of the creek. She had active rice-water discharges; she took two drachms of calomel and charcoal, and was promptly relieved. The mother of this woman was then dying in the same room from cholera, after an illness of only a few hours; also, one of America's children, aged about five years. A second child just attacked was subjected to same treatment with that of the mother, and made a rapid recovery. The first-mentioned child took medicine, but was in a state of collapse and no hopes were entertained of its recovery.

Case 8.—A young mulatto woman, Matilda Robinson, aged twenty-two, and mother of several children, was visited early Tuesday morning. This was a violent and fully-developed case of cholera, incessant vomiting and purging attended with cramps. Two drachms of calomel and charcoal were given, and part of which being thrown up, the dose was repeated immediately, and by great effort was retained, the patient being held down in bed by two assistants, and the face freely washed with cold water. In a few minutes the vomiting and watery purging ceased, and was followed in twelve hours by free bilious evacuations, and she rapidly recovered. A strong and robust negro man died in this house same day, after an illness of a few hours. The treatment in his case was calomel and opium, two grains each, at short intervals.

Cases 9, 10, 11, *and* 12.—Lucy Armstrong, aged about forty, and her three children, living in an adjoining house, all had active cholera discharges; at this time were subjected to the calomel treatment, and were promptly relieved. There had been a number of deaths in this and the adjoining houses. One of the physicians present when these cases were prescribed for was asked his opinion of their condition. He replied, "They are just such cases as have been dying in six hours."

Cases 13, 14, 15, *and* 16.—We next visited four patients of Dr. D. E. Jarnett, who were convalescent, all of them showing strong marks of the recent struggle through which they had passed; these were all middle-aged negro men, and had been subjected to the calomel treatment. Their names were George Brown, Horace Wood, Tom Lawson, and Henry Lawson.

Case 17.—George Conway, a colored man, aged about forty years, had been sick for twelve hours. This case was visited on Thursday evening at 5 o'clock, in company of Dr. L. D. Barnes, of Paris; the case was an extreme one, extremities cold up to the body, features shrunken and pinched up, surface bathed in a cold, thin perspiration, eyes sunken, and pulse very feeble at the wrist. The discharges were involuntary, and almost constant. He took two drachms of calomel, and directions left to allow him as much powdered ice as he desired, being very thirsty. This patient was left with the impression on the minds of us both that he would be dead in a few hours. Returning to Millersburgh Saturday morning to see some other patients, the writer called at the house of Conway and found him entirely relieved of all symptoms of cholera, and upon inquiry found there had been no action of the bowels since taking the calomel. He was ordered to take a dose of castor oil, and no other trouble was experienced. He was not salivated, and made a rapid recovery.

Cases 18 *and* 19.—Two daughters of George Conway, aged respectively fourteen and seventeen years, were treated in the same way, and

were soon well. These cases were not violent, but were having free rice-water discharges. Several deaths had occurred in this and the adjoining family.

Cases 20 *and* 21.—Two children of Milly Armstrong were treated; the first, aged four years, died; the second, aged two years, recovered.

The writer saw several other cases in company with other physicians, to whom large doses of calomel were given, and they recovered; whether other medicines were subsequently given or not he does not know.

Some slight inaccuracies may have occurred in this report, and if so they have been unavoidable, but do not affect the general result. Accuracy has been aimed at; but it is impossible, in the alarm and confusion incident to a violent cholera epidemic, to keep a record of every case exactly as it occurs.

In a letter from Dr. J. R. Best, he says: "In the late epidemic of cholera there were more than twenty recoveries from cholera, and an indefinite number from cholerine." The writer is indebted to Dr. Best, who has kindly furnished him with a list of deaths occurring during the visitation.

To make Millersburgh as healthy as any other town in the blue-grass region, it is only necessary to wipe out these malarial spots and the work is done.

PARIS, KY., *December*, 1874.

It is but just that the converse of this history should be given. In, however, attempting this, and in stating facts which are invariably overlooked or set aside by the opponents of the theory of the infectiousness of cholera, who advocate the malarial origin of each demonstration of the disease, we disclaim any spirit of criticism of the able paper which we have presented. Dr. Keller has most ably presented and defended his views upon the subject of the epidemic. We simply present a few facts that have come to our knowledge, being convinced that they form the chain that connects the epidemic of cholera at Millersburgh with the disease that was at the time traversing railroad lines and the navigable waters of the Mississippi Valley.

The first recognized case of cholera in the epidemic of 1873 at Millersburgh occurred on the 10th day of July, in the person of a negro child two years of age, who died after an illness of six hours.

On the 11th of July five cases of cholera occurred, all of whom died after from twelve to thirty-six hours' illness.

On the 12th of July two cases of cholera occurred, and both died; one in twelve, the other in twenty-four hours.

These eight cases constituted the first epidemic at Millersburgh in 1873. These cases all occurred in the persons of negroes; of whom five were males, three were females. They all, with but one exception, lived in the immediate vicinity of the first case. The exception, a female, died of the disease at her home, some distance outside of the infected district, *but she had been visiting the cholera sick.*

The locality at which these cases occurred was close to the line of the Maysville Railroad, in fact almost under the line of the railroad embankment, and in a cluster of cabins occupied by negroes, many of whom were employed by the railroad company.

It can be conclusively shown that on or about the 6th day of July, 1873, a railroad employé named Pat. Daily, while at work at the railroad cut just above town, was taken suddenly sick with diarrhœa and vomiting. He was carried by his friends to the town; on the road he stopped in front of the cabin of Horace Woods to get a drink of water, and was

then carried to "the old hotel" in town. He recovered in about a week; his disease having been pronounced cholera-morbus. Daily was recently from the city of Maysville.

July 9.—The wife of Horace Woods, at whose house Daily had stopped for water, was taken with diarrhœa, vomiting, and cramping. As the discharges were of pure rice-water, attended with suppression of urine, shriveled skin, and as on the 10th the patient was collapsed, the disease was pronounced by Dr. Smith, her medical attendant, to be cholera; but as she recovered, the case was recorded as *cholera-morbus*.

July 10.—In the same house with the Woods family, the young child of George Baylor was attacked with cholera, and died, as before stated; and within forty-eight hours two other cholera deaths occurred in the same house.

With the cases of July 12 the disease expired, and no more was known of it until August 22, when it suddenly re-appeared with redoubled virulence.

There had been no meteorological changes between July 12 and August 22 to account for the cessation and redevelopment of the malarial influences; but the facts go to show that there was no more of the disease until after the arrival of two railroad employés from Maysville, named Henry Carrington and Harvy McIlvain, who both died of cholera at "the old hotel." These men were sick when they arrived, and after their cases had become pronounced, the disease spread from the building in which they took refuge to the lower portions of the town.

It will also be remembered that on August 28 the negro Purcel arrived at Millersburgh from Maysville, when in collapse from cholera, but that he did not die until the third day after his arrival.

Had the initial case of the first epidemic occurred at a point at which there could have been no possible connection with the cholera infection; had the initial cases of the second epidemic not followed a positive importation of the disease, the malarial theory would have been unassailable. But the location of all the first cases was such as to directly subject them to infected persons, and the importation of the second epidemic cannot be doubted.

That malarial influences were present at Millersburgh during the summer of 1873 is not doubted, but cholera did not occur until the disease was brought into the town. The malarial influences of 1874 were positive and defined throughout the Southwest, but no epidemic cholera occurred, although its spontaneous development had been prophesied by some theorists.

It is advanced that in the history of a cholera demonstration the first death amounts absolutely to nothing; the fact of importance is the first case of profuse, painless diarrhœa. It has been shown that the initial case may not terminate until after others have succumbed to the disease; and that the porter of the specific poison does not always himself exhibit symptoms of the disease.

For valuable aid in obtaining the facts herein set forth, we are indebted to Surgeon P. H. Bailhache, United States Marine Hospital-service, stationed at Louisville, Ky.

Taylor County.

The history of the epidemic of cholera in Taylor County is most interesting, from the fact that in this county, undoubtedly, is to be found the first link in the chain of infection which spread to most of the counties of Central Kentucky.

Early in the month of July a negro man applied for work in one of the construction-parties of the Ohio and Cumberland Railroad. At a later date it was ascertained that he had come from Western Tennessee, where he had been working on the Memphis and Paducah Railroad. The man obtained work on the tunnel-section at Muldrough's Hill, and was given quarters in a group of cabins occupied by other negro workmen and their families. Not many days after his arrival he was taken with an acute diarrhœa, from which he was confined to his bed for some eight days. This attack was attended with great prostration and general constitutional disturbance.

The dejecta from this case were thrown out on the ground in rear of the cabin, which was built upon a hill-side. Immediately in front and below this cabin was a spring, from which the neighborhood obtained drinking-water. On the 14th, 15th, and 16th days of July there was considerable rain-fall, and by surface washings the spring was nearly filled with *débris*. On the 17th of July two violent and fatal cases of cholera occurred in the cabins adjoining the one in which the diarrhœa-patient was residing. Both of these cases died within ten hours. One was in the person of a negro woman, who was eight months pregnant. Labor came on during the second stage of the disease, and the patient was delivered of a dead child while fully collapsed.

These cases were treated by Mr. W. T. Chandler, of Campbellsville, a student of medicine, and who has since graduated with distinguished honors.

From these cases the disease was carried along the line of the railroad-works to Campbellsville, the county town, and to Lebanon, Marion County.

Thirteen cases of cholera are reported as following the cases already enumerated, eleven of which terminated fatally. Dr. Hodgen, of Campbellsville, a reliable observer, reports the occurrence in the same vicinity of eighteen cases of acute diarrhœa which demanded active treatment.

The town of Campbellsville escaped the epidemic almost entirely; and this point is of exceeding interest, as demonstrating the efficiency of disinfectants in protecting a community which is exposed to the infection of cholera. Six instances were either cases of cholera brought into the town, or the disease was developed after the arrival of the individual from an infected point.

The Campbellsville cases are as follows:

I. July 20, a negro man, who had contracted the disease on the line of the railroad, died of cholera.

II. August 10, a white man, who had contracted the disease on the line of the railroad, died of cholera.

III. August 21, a negro man, a refugee from the infected town of Lancaster, Garrard County, died of cholera.

IV. September 2, a white boy from Lebanon, was taken with cholera, but recovered.

V. September 2, a gentleman from the infected town of Columbia, Adair County, died at the Campbellsville hotel of cholera.

VI. September 8, a gentleman from the infected town of Lebanon, Marion County, was attacked with cholera and died.

Each of these cases were isolated as far as it was practicable. The excreta of each case were disinfected and buried, and every additional precaution was adopted. Among the residents of the town no cases of cholera occurred, although during July and August cases of acute diarrhœa were frequent. The inhabitants of this town had declined to attend the Marion County fair.

Dr. S. Y. Chandler, of Campbellsville, reports strongly in favor of the dilute-sulphuric-acid treatment in cholera cases, maintaining the value which has been ascribed by others to the use of the dilute acid.

CARROLL COUNTY.

During the epidemic of 1873, the only cases of cholera that are found to have occurred in Carroll County are found upon the construction-train of the Louisville, Cincinnati and Lexington Railroad, at the village of Worthville, a point nearly midway between the cities of Louisville, Ky., and Cincinnati, Ohio.

Dr. N. B. Lewis, to whom we are indebted for the facts of this demonstration, informs us that the hands upon this construction-train were negroes, picked up at Louisville, Frankfort, Covington, and La Grange. The cars in which the hands lived were in the most miserable sanitary condition. During June and July, there had been frequent cases of diarrhœa and cholera morbus among them. Frequently sick negroes had been left at their homes, of whom no further information can be obtained.

On the 12th day of July, a negro named Norman was taken with cholera upon this train at Worthville, and died within twelve hours. On the 13th, Mrs. Conner, who was employed as cook for the hands, a white woman, was taken sick; her attack was violent, but she recovered. The hands upon the train dispersed to their homes. Dr. Lewis has been informed that of these men five cases died after they reached their homes. It is suggested that through the workmen employed upon this construction-train the infection of the town of La Grange, Oldham County, was accomplished, as the homes of some of these men were at that town.

CHRISTIAN COUNTY.

Hopkinsville, the county town of Christian County, was invaded in the month of July by cholera; from what cause the development of the disease occurred the reports which have reached us fail to determine.

The town is located upon the line of the Saint Louis and South Eastern Railroad, and the inhabitants are in daily communication with Saint Louis, Mo., Evansville, Ind., Henderson, Ky., by south-bound trains, and with Nashville, Tenn., by all north-bound trains. Close connection is moreover made with the Louisville, Paducah and South-western Railroad.

During the month of June, strenuous efforts were made by the authorities to place the town in the highest possible sanitary condition. *Débris* of all kinds was removed from public and private property. Disinfectants were freely used wherever required.

July 12, Mrs. T., aged forty-eight years, was taken with cholera, and died in ninety-six hours.

July 18, a negro woman, fifty-four years of age, was attacked, but recovered.

August 4, Mrs. H., thirty-two years old, died in thirty-six hours.

August 7, John, a negro, twenty-eight years old, was attacked, and died after an illness of twelve hours.

August 8, Jim, a negro, thirty years old, died after a few hours' illness.

The cases were isolated, with the exception of the negroes. All had been guilty of imprudence in diet.

BARREN COUNTY.

We are able to present the following letters descriptive of the cholera-epidemic of 1873 in Barren County.

"GLASGOW, KY., *November* 30, 1874.

"MY DEAR SIR: * * * * * * *

"My report is confined strictly to cases exhibiting all the characteristics of genuine cholera. The tendency to cholera in the district in which the cholera was confined was exceedingly marked, cholerine prevailing quite extensively. Cholera appeared a mile north of our town on the most elevated lands in this very broken and well-drained locality. It occurred, so far as a critical investigation demonstrated, with no intercourse between the subjects of its ravages and any infected district. The disease had been prevailing epidemically at Gallatin, Tenn., and Franklin, Ky., and in a sporadic form at Bowling Green for perhaps two or three weeks, when suddenly, without premonition, it irrupted near Glasgow in a most alarming and fatal form. Six or seven negroes died in as many days, and all in a small negro settlement on an elevated and well-drained ground. No local causes could be developed for its appearance. It next appeared a mile northeast in a country largely overflowed by a creek running a number of miles, and poisoned by malaria, and was principally confined to that locality during its prevalence.

"The locality of its invasion wars against the malarial theory; its subsequent settling argues in its favor, and the non-communication of its first subjects with any infected district militates forcibly against the contagious theory.

"My own impression, derived from close personal observation, induces the belief that it was materially influenced by malarial poison in its later movements. Cholera-specifics I found not only wholly inefficacious, but perniciously hurtful. The remedy which I relied upon, and which did not disappoint me in the stages preceding collapse, was as follows:

℞. Hydrg. submur.,
Camph. pulv., ā ā gr. xxx.
Opii pulv., gr. iv.
Acet. plumbi, gr. xx.
M. Ft. chart. no. xv.

Sig., one to be given every hour until the discharges change in character.

"The number of cholera-cases in this neighborhood I do not know, nor can they be accurately determined, as the physician who attended the majority has since died.

"The number of cases was probably not over thirty-five, with eleven deaths

"Very respectfully,

"JNO. D. WOODS, M. D.

"ELY MCCLELLAN, M. D."

The earliest case is reported on the 19th of July; this case lingered until the 22d, when it died.

On July 22, Dr. E. R. Williams, of Glasgow, was attacked, and died on the 23d.

Glasgow is the terminus of the Glasgow branch of the Louisville and Nashville Railroad, and the town is in communication with the main line by two daily trains. It is about thirty miles distant from Bowling Green, and we have been informed that negroes who fled from the last-named town during the epidemic, took refuge among their friends at or near Glasgow.

DAVIESS COUNTY.

THE CHOLERA-EPIDEMIC OF 1873 AT OWENSBOROUGH, KY.

BY E. H. LUCKETT, M. D.

Owensborough is a thriving town of about four thousand inhabitants, located upon the south bank of the Ohio river, one hundred and fifty-five miles below the city of Louisville. This town is a large tobacco-market, and is the shipping-point of a number of counties. The town has railroad connection with the Louisville, Paducah and Southwestern Railroad.

The history of the cholera-epidemic of 1873 at this city is embraced in the following cases:

Case I.—Was an importation from Nashville, Tenn., at which place cholera existed at the time of the departure of Brown, colored, aged forty-five years, married. Brown was sick with diarrhœa when he started for this place, which was on the 19th of July, arriving the next day. He was visited by Dr. Harris on the 21st, and died on the 25th. When seen he was vomiting, purging rice-water, and in collapse.

Case II.—Henry Hayden, colored; married; aged about forty years; taken sick in Louisville, Ky., July 30; arrived here next day. Hayden was a deck-hand on a steamboat plying between Louisville, Ky., Evansville, Ind., and Henderson, Ky., at all of which places cholera existed at the time.

Case III.—Miss O'Donald, twelve years old, was taken sick September 5 with vomiting, purging, and cramping; was ordered calomel, opium and capsicum. Dismissed cured on September 13.

Case IV.—Rachael Lee, colored; aged thirty-five years; attacked August 11. Was seen by Dr. Stewart on the same day at 3 o'clock p. m. Dr. S. says: "We found her vomiting, cramping, and passing large rice-water discharges. In collapse when seen. Ordered mixture of chloroform, tincture of opium, pulverized camphor, tincture of ginger, and Hoffman's anodyne. A dose to be taken every hour. She died on the night of the 12th, at midnight. Rachael Lee lived opposite case No. 1, and was frequently in Brown's house during and after his illness. She was the mother of three children. After her death the children were removed five squares distant to a higher location.

Case V.—Emma Lee, aged twelve years, oldest daughter of Rachael Lee, was taken sick August 24 with the same symptoms as her mother. Treated in the same way. Died August 25, thirty hours after date of attack.

Case VI.—Joe. Crabtree, colored; married; aged twenty-six years; moved Emma Lee and the other children of Rachael Lee to his house, where Emma died. He was taken sick on the 24th of August, the date of Emma Lee's sickness. The symptoms were the same, but less aggravated. Treatment the same. Recovered. (One of the remaining children of Rachael Lee was moved back to Second street, one square above the residence of Brown, where it sickened and died with diarrhœa, after a short illness.)

Case VII.—Mrs. Nichols, white; married; aged thirty years; attacked August 15 with vomiting, purging, and cramping. Died the same day. Delivered eight days previous.

Case VIII.—Samuel Nichols, white; aged thirty-five years; husband of case No. 7; convalescing from remittent fever; attacked August 19 with cholera-symptoms. Died same day. Mr. N. was a mail-carrier

between this place and the city of Henderson, where cholera was prevailing at the time.

Case IX.—Tom Nichols, son of cases Nos. 7 and 8, white, aged fourteen years; attacked with cholera August 19. Recovered.

Case X.—Miss Reinberger, German, aged ten years; taken sick with cholera-symptoms August 20. Recovered. She occupied a portion of the house in which the Nicholses resided.

Case XI.—Tom Reinberger, German, aged eight years; sickened with vomiting, purging, and cramping on the 21st of August. Recovered. Lived in a part of the Nichols house.

Case XII.—Frank Winter, German, married. Visited by Dr. Stewart, on August 30, at night. Had had a diarrhœa for two or three days. When seen by Dr. Stewart he was vomiting, purging, cramping, and in a cold sweat. Was ordered three twenty-grain doses of calomel and chloroform-mixture. Recovered.

Case XIII.—Frank Hahn, German, aged thirty years; dissipated; attacked at midnight, September 1, with cholera. Treatment same as previous case. Died at midnight, September 2.

Case XIV.—Mrs. Winter, wife of Frank Winter, German, aged twenty-six years; sickened September 6 with same symptoms as cases Nos. 12 and 13. Pregnant; aborted on the 9th; recovered. These last three cases were near neighbors of the Nicholses and Reinbergers, and visited them during their sickness.

Case XV.—Mrs. Rarrick, white, aged about thirty-two years, married, mother of several children; attacked with cholera September 2, and died on the night of the 3d. She lived opposite the Winters, and visited that family during their sickness.

Case XVI.—Mrs. Buckley, mother of several children, was taken sick with cholera on the 5th of September. In collapse six or eight hours after commencement of the attack. Treatment: Sulphate of morphia and subnitrate of bismuth, beef-tea, and chicken-broth. Recovered.

Case XVII.—Nannie Buckley, daughter of Mrs. Buckley, (case 16;) attacked with choleraic diarrhœa on the 8th of September. Recovered.

Cases XVIII, XIX, and XX.—E. C. Berry, Mrs. Berry, his wife, and Henry Berry, their son, aged respectively fifty, thirty-eight, and ten years, were relatives of Mrs. Buckley, (case 16,) and waited upon her in her sickness—the son driving the wagon for his mother—were all three attacked with choleraic diarrhœa on the 12th and 13th of September. Treatment, calomel and opium; recovered. This family resided about one mile from town. They had three other children who did not visit Mrs. Buckley, neither of whom were sick.

Case XXI.—Mrs. Green, German, aged fifty years, waited upon Mrs. Rarrick; was taken September 5, and died the same day.

There can be no doubt upon the mind of any unprofessional person that the cholera was introduced into this city from three different sources, two of the points being sources for the spread of the disease. In following the history of the disease, starting from Brown, lately of Nashville, we have, first, the disease developed in Rachael Lee, who lived across the street, and was in daily communication with the family; next, in her daughter, who sickened and died of cholera, notwithstanding her removal to a higher and healthier locality, and one entirely out of the cholera-district, who, in turn, communicated the poison to Jo. Crabtree, to whose house she was removed after the death of her mother. It is probable, also, that a sister of Emma Lee, aged two years, died with the disease, as in about a week after Emma's death the sister was taken with a purging, and died in two or three days.

There was no spread of the disease from Hayden's house, (case No. 2,) unless a child of his, who died suddenly three or four days after he died, had the disease. Of this I have no proof, being unable to get a history of the case, the family moving off.

The third point of introduction of the poison was by Nichols, the mail-carrier. He was making tri-weekly trips between this city and Henderson where cholera was prevalent; but there is no evidence that he had been in contact with the disease, nor was there any investigation from this point. During his last trip from Henderson to this place he was taken sick with a remittent form of fever, from which he was cured in three or four days. Two or three days after his recovery his wife was taken sick with cholera, and died in a short time. She was quite feeble at that time, being in a puerperal condition. The second day after her death Nichols takes the disease, and dies the same day; his son then sickens, and the two Reinbergers, who occupy part of the house, are attacked, the last three recovering. Frank Winter, who lived in the vicinity, and visited the Reinbergers, was next stricken with the disease, to be followed by Hahn, who lived with him; and then Winter's wife was attacked. The next case was Mrs. Rarrick, who lived opposite the Winters, and waited upon Mrs. Winter. Mrs. Rarrick was nursed by Mrs. Green, who, in two or three days after Mrs. Rarrick's death, sickened and died with the disease; and then Mrs. Buckley, who made Mrs. Rarrick's shroud in the room occupied by Mrs. Rarrick during her sickness, was attacked with the disease, but happily recovered. Her daughter, brother, sister-in-law, and nephew, who were constant in their attentions to her, were all taken sick with a diarrhœa which lasted several days.

The facts herein presented do not absolutely prove the portability of cholera, but they strongly corroborate much that has been proved, as I think; and the only question that can throw a suspicion of doubt upon the subject, is as to how the Nichols family contracted the disease. I have no scruples in believing that Nichols was the means of its conveyance to his house, and that it was either his having another disease at the time he was subjected to the poison, or because of an unfavorable condition in his system to its implantation at that time that he owed his escape. But mark how readily the poison acted as soon as his nervous system received a shock, as it did by the death of his wife.

It may be asked, what was the sanitary condition of these localities where cholera prevailed? In the Nichols locality bad, very bad; in the other localities not worse than other portions of the city. Nor was the sanitary condition of the Nichols locality as bad as a portion of the city where typhoid fever was then prevailing.

Hopkins County.

This county escaped almost entirely the epidemic which raged with such severity in the towns of the adjoining counties.

Dr. J. W. Prichett, of Madisonville, under date of August 12, 1874, states that no case of the disease occurred in that town during 1873. Madisonville is located upon the line of the Evansville, Henderson and Nashville Railroad, and as cholera was epidemic at the terminal points of this road, the escape of this community is remarkable. Dr. P. reports that a number of aggravated cases of cholera morbus occurred, "but in all the characteristic features of cholera were wanting," and none terminated fatally.

One case, that of A. R. Bradley, occurred July 20. Mr. B. was taken

sick at Nashville, and at once returned home; the diarrhœa was exhausting, cramps were developed, but the case yielded to treatment. Disinfectants were freely used.

Meade County.

Dr. H. R. Pusey, of Garnetsville, Meade County, reports that five cases of cholera occurred within the limits of the county, but in that portion that is adjacent to the infected-district in Hardin.

On the 27th of July B. A. Jones, who resided close to the line of the railroad, and who had been for several days at Elizabethtown, was taken with cholera, but recovered.

July 28, a Mrs. Torance, who lives on the turnpike road from Elizabethtown to the Salt River, was taken with cholera, and died after a short illness. The country at this time was infested with tramps from Elizabethtown, and some of these wanderers had been at Torance's house.

July 29, a Mr. L. C. Danley, who lived three miles west of Round Hollow, was taken with cholera at his home, and died after a short illness. This man was a colporteur, and had recently been within the lines of infection in Hardin County.

Two other cases are reported, both of whom recovered.

Webster County.

The only demonstration of cholera in 1873 that can be found in Webster County was at the village of Providence.

On the 31st of July a Mr. Perryman, while attending court at Princeton, Caldwell County, was taken with a profuse and exhausting diarrhœa. As cholera was at this time epidemic at Princeton, Mr. Perryman left as soon as possible for his home. He, however, was able to reach the house of a Mr. Dixon, near Providence, where he died on the 2d of August from cholera. Upon the day that Perryman died, his physician, Dr. John Shackelford, was taken with cholera, and died on the 4th of the month.

These cases were followed by the illness of Mrs. Dixon and her son, both of whom recovered. A few days later a lady who had visited Mrs. Dixon was attacked with cholera, but recovered.

Garrard County.

The epidemic of cholera in this county was confined almost exclusively to the town of Lancaster, and to refugees from that town, after the development of the disease.

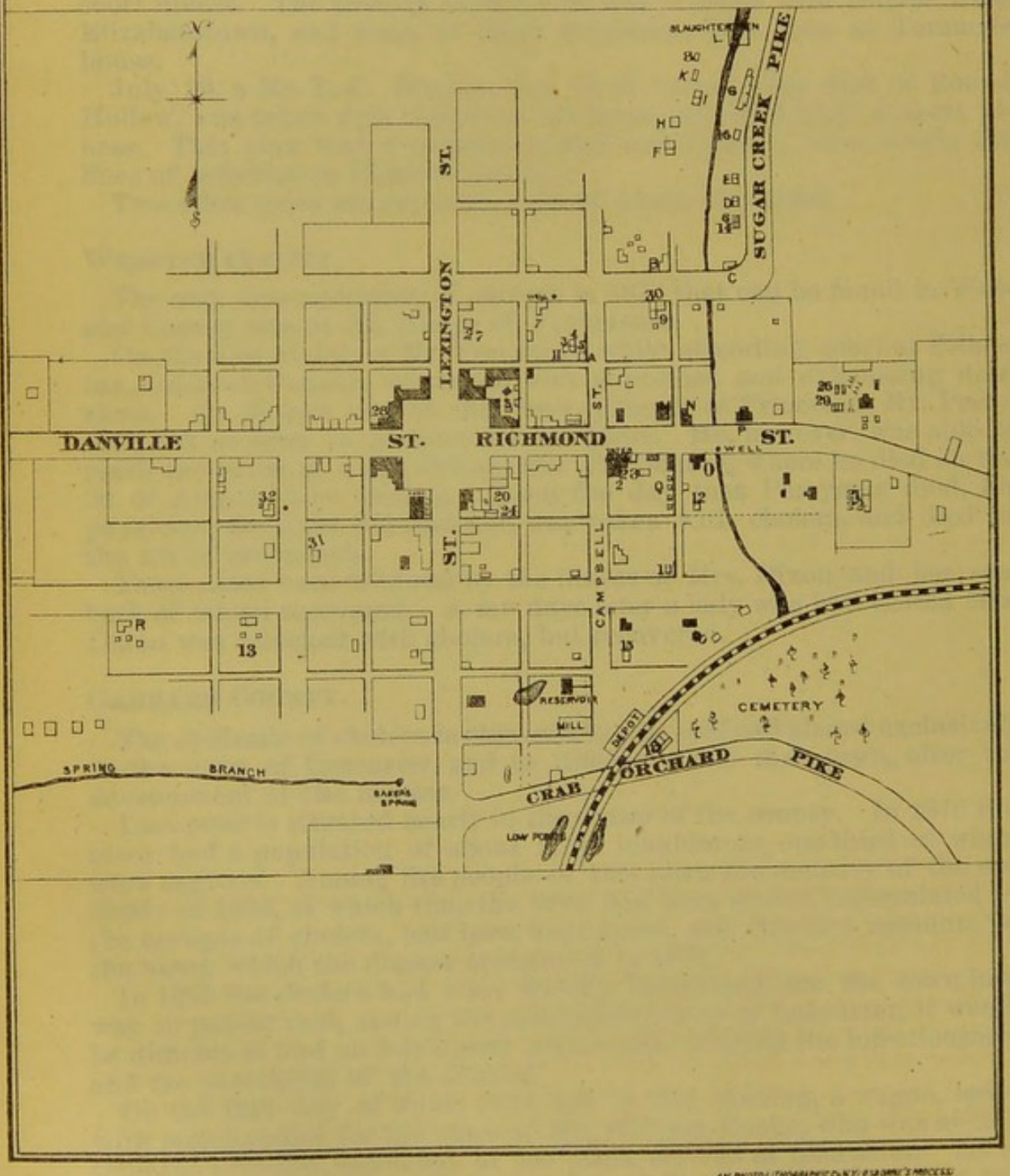
Lancaster is situated nearly in the center of the county. In 1870 this town had a population of about 1,200 inhabitants, one-third of whom were negroes. Among the people of this town the memory of the epidemic of 1833, at which time the town had been almost depopulated by the ravages of cholera, had been kept green, and this fact accounts for the terror which the disease occasioned in 1873.

In 1833 the cholera had been directly introduced into the town in a way so patent that, among the older inhabitants of Lancaster, it would be difficult to find an intelligent person who doubted the infectiousness and the portability of the disease.

On the 18th day of June, 1833, late in the evening, a wagon, laden with merchandise for the store of Mr. William Cooke, who was at that time the principal merchant of the place, arrived at Lancaster. These goods had been purchased at the city of Philadelphia, Pa.; they had

MAP OF LANCASTER, KY.

SHOWING THE LOCATION OF EACH CASE OF CHOLERA 1873.



been transported to Wheeling, Va.; from thence by steamboat on the Ohio to Maysville, Ky.; from thence to Lexington, Ky. At the last-named town they were loaded on the wagon from which they were delivered to Mr. Cooke. The wagon was unloaded the evening of its arrival at Lancaster; the goods were unpacked and placed upon the shelves in Mr. Cooke's store, and before noon the next day Mr. Cooke, the wagoner, and two or three men who had handled these goods, were dead from cholera.

Prior to these cases there had been no sickness in the town, but from them the disease spread, became epidemic, and from the 19th of June to the 8th of July one hundred and sixteen deaths occurred. Of these, fifty-eight occurred in the persons of whites; of them, thirty-two were males, twenty-one were females, and five were young children. Two fatal cases occurred in the persons of medical men, and duplicate cases occurred in many families.

Forty years later the same disease visited this town, concealed in the person of a sick stranger. This man, as will be shown hereafter, came directly from an infected district in the State of Tennessee. He was taken with cholera after his arrival at Lancaster; he lingered for twelve days and died; but before he died, cases of the same disease occurred among persons who came in contact with him; from them the infection spread to others, and eighteen fatal cases occurred.

The town of Lancaster is built upon undulating ground, some 600 feet above the level of the Ohio river. The business portion of the town is high and well drained. On the eastern side of the town, Richmond street descends abruptly into a valley through which a small stream flows in a northeastern direction. This stream is fed by some small springs which issue from the foot of a hill occupied by a cemetery, and affords drainage for the main portion of the town. Its banks are marshy and overgrown by wild grasses and weeds. Beyond this stream the Richmond road ascends a considerable hill, upon the summit of which is located the barracks of the United States troops. The space between the barracks and the town is occupied by private residences. Upon the east side of the drain, and upon the low ground in which it empties, after crossing the Sugar Creek road, a number of cabins are occupied by negro families. Upon the banks of the drain, outside the limits of the town, was a filthy slaughter-house, the effluvia from which at the time pervaded the entire town.

In the month of August, 1873, the sanitary condition of this town was very bad. No attention had been paid to its police. Filth of all kinds was scattered around the negro-cabins, and human excrement was entirely upon the surface of the ground. The water-supply of this town is obtained, in the main, from wells. Those wells in public use are so situated that after each rain-fall they inevitably receive a large amount of surface-washings. One of these wells, that of Richmond street, to which frequent reference will be made, is directly on the line of the eastern drain. Above this well, on the slope of the hill, at the foot of which the well was dug, are stables, cow-sheds, pig-pens, and privies; and it is notorious that after each rain-fall the water of this well has been found to be tainted. When the fact is taken into consideration that throughout the Southwest the stables and their adjoining premises are invariably used by the males as privies, it is clear that the fluid contents of this well must have been contaminated by a certain amount of fecal matter.

On the 10th day of August a man named Bewley, who had traveled from Russellville, Tenn., which town, at the date of his departure, was

infected with cholera, arrived at Lancaster and lodged at the house of a friend who resides on Richmond street, upon the hill-side, and immediately above the well and the eastern drain. We are informed by Dr. C. D. Riggs, of Russellville, Tenn., that prior to Bewley's departure from that town cholera had become epidemic, and that Bewley himself had been the subject of a "suspicious diarrhœa" before he started for Kentucky. Bewley was ill when he arrived, and stated to his friends that he had been sick several times on the trip, which he had made on horseback. He was so ill that he was obliged to at once go to bed. Vomiting, purging, and cramps were soon developed; the man became collapsed, remained in that stage for several hours, reacted, passed into a typhoid condition and lingered until the twelfth day of his illness, when he died. The excreta of this case were not disinfected, but were thrown out upon the ground in rear of the out-houses.

This case was not recognized as cholera by the attending physicians, although one gentleman expressed himself as being suspicious, but having no knowledge of the epidemic from which the patient had escaped, and not having informed himself of the gradual northward advance of the disease, concluded that the case was not one of cholera.

On the 14th day of August a negro man named Jenkins died in his cabin, nearly at the head of the eastern drain, of unmistakable cholera. This man had, up to the day on which he died, waited upon Bewley. By Jenkins all vessels containing the dejections and vomit had been emptied. This man obtained his drinking-water from the well on Richmond street. The excreta of this case were not disinfected, and they were thrown into the drain.

August 15, the father-in-law of Bewley, a Mr. Turner, who resided ten miles northeast of the town, was taken with cholera and died after an illness of eight hours. This man had come to Lancaster to visit Bewley. He remained with him one day and slept in the sick-room one night; the next morning he started for home and was taken sick on the road.

August 16, a negro woman named Bailey, who lived upon the same street as Bewley, and one short block distant, in a miserably dirty cabin, was taken sick and died after an illness of twenty-two hours. The excreta of this case were added to the general mass of filth around the cabin. No disinfectants were used.

August 19, four fatal cases occurred in cabins and rooms immediately adjoining the room in which the woman Bailey had died. The disease in no case continued longer than ten hours. The same day a lady who lived in the vicinity of the slaughter-house abandoned her home and with her family fled to the house of friends upon the bank of the Kentucky River, some ten miles distant from the town. Upon the road she was attacked with the disease, and died within a few hours after reaching a place of safety.

August 20, three new cases were reported and all terminated fatally. One, Fanny Bailey, was the daughter of the woman of that name who died on the 16th. Fanny had continued to occupy the room in which her mother had died. The second case of that day, Sam. Salter, a negro, lived with his wife and sister in a cabin upon the banks of the eastern drain and close to the cemetery. The excreta were thrown into the privy which was used by the two women. The third case was in the person of a negro woman who had fled to Camp Nelson, on the Kentucky River, twenty miles from the infected district.

It has been positively ascertained that until this date all who had been attacked with cholera had not only lived in the vicinity of the

house at which Bewley was ill, but that they had obtained their drinking-water from the Richmond-street well.

On the evening of this day the writer, in obedience to orders, arrived at Lancaster, to inspect the garrison so far as its sanitary condition was concerned, and to make any necessary arrangements to secure to the troops full and competent medical attention.

The town was found to be almost entirely deserted. All who could do so had left, save a few brave men and devoted women, who remained to fight the disease, comfort the sick, subsist the destitute, and put away the dead. It is well to note that the authorities of this little town expended over $3,000 in charity during the epidemic. This amount of money was not contributed by foreign charity, but was in and of the inhabitants of Lancaster alone.

Up to this date, August 20, disinfectants, outside of the barrack-grounds *had not been used.* An effort was made to institute a thorough system. As far as was practicable, the ground already infected was treated with a solution of the sulphate of iron, and each householder was required to supply himself with disinfectants for use on his premises.

August 21, five fatal cases are reported, and on this day the first person living out of the infected district was attacked. This was in the person of a negro named West, who had been employed by the town authorities as a cholera-nurse. A second case was husband of one of the women who died on the 19th. This man had continued to occupy the room in which his wife had died. The third and fourth cases occurred in the wife and sister of Sam. Salter, who died on the 20th. These women had, after the death of the husband, separated. The wife had gone to her father's house, on the southwest side of town. The sister had gone to Stanford, Lincoln County, where she was taken with cholera, but was carried back to Lancaster. These women both died after a few hours' illness. The last case occurred in the person of Mrs. Temple, who had left her home, which was upon the same street as the house at which Bewley had been ill, and died in the country of cholera.

August 22, a white man, forty-five years of age, of intemperate habits, who had been constantly drunk for the past week, was seized with cholera, and died in ten hours. A negro man named Ned. Cecil, who lived in the house next to that at which Edna Salter had died, and who had used the privy in which the cholera-dejections of the women had been thrown, was taken with cholera while on the public square. He was carried into an unfinished building and carefully attended, but died after an illness of twenty hours. The excreta of this case *were* disinfected. The same day a young carpenter, named Spoonamore, who had been employed at work upon the new building of the national bank, died of cholera at his home near Stanford, Lincoln County. On the evening of this day Bewley, the initial case of the epidemic, died.

August 23, a fatal case occurred at the United States barracks. This case occurred in a married soldier, who lived with his wife in a room in the rear of an officer's quarters.

August 24, two fatal cases occurred. The first in the wife of the soldier who died on the preceding day.

The contact of these persons with the infection was for a time obscure. The room they occupied was scrupulously clean. The location was high and well drained. Neither of the individuals had been in the town during the prevalence of the disease. They had not used the water of the Richmond-street well, as has been charged in a history of this demonstration published in October, 1873. It has, however, been determined by an investigation instituted by Acting Assistant Surgeon Smith,

United States Army, the medical officer of the command, that the clothing of this couple had been washed by a negro woman who lived in the infected quarter of the town, and that this lot of clothing was received back but a short time before the attack. On this day a lady who had nursed Bewley in his illness died of cholera in the country.

August 25, a young man named Singleton was attacked with cholera at the residence of his brother-in-law, who lived some four miles from Lancaster, upon the Sugar Creek. Singleton had a diarrhœa for some days before his attack, during which time he used the common privy of the family. In this case the disease was well marked. Dr. Berry, who reports the case, states that there was complete suppression of the urine for forty-eight hours. The system, however, responded to the treatment, and the case recovered. During this illness a brother and sister had a mild attack, which yielded to treatment and rest. The house occupied by this family, in the town of Lancaster, was upon Richmond street, and the family obtained their supply of water from the public well to which reference has so frequently been made. The family consisted of Singleton, his wife, and four children.

August 26, Moses Doty, the father of Alice Salter, and at whose house she died, was attacked, and died after an illness of eight hours. During the evening of the same day the sister of Singleton, Mrs. Finley, was attacked, and died in eighteen hours. This lady had used the privy in which the diarrhœal discharges of young Singleton were deposited, but when the disease under which he was suffering became pronounced, Mrs. Finley and her husband left the house for another about one mile distant, where she sickened and died.

August 27, a negro man sixty-eight years of age, named French Smith, died of cholera after an illness of sixty hours.

August 28, a negro child thirty months old, the son of a man employed by the authorities as a nurse for the cholera sick, died of cholera after an illness of six hours.

August 29, two soldiers, named Rathjon and Hasbrouck, were taken with cholera and died, the first in sixteen, the last in twelve hours. One of these men had nursed and assisted in preparing for burial the remains of the private, Rushbrook, and his wife, who died on the 23d and 24th instant.

The second of these cases, Private Hasbrouck, had not been in direct contact with the cholera sick, but he was the "bunkee" of Private Rathjon; that is, these men occupied the same tent and bed. They were both dissipated, reckless men, and it is supposed that they had both visited negro cabins in the infected district of the town.

Mr. and Mrs. Stephens, who lived in the infected district, occupying a portion of the house that was abandoned by the family of Collier on the 19th instant, were both taken with cholera in the country. The wife died, the husband recovered. The same day a male negro died after an illness of sixteen hours.

September 1, Ellen Lusk, the grandmother of the child who died August 28, was taken ill and died. This old woman had nursed her grandchild during its illness, but after its death had returned to her own home.

September 2, Charity Dunn, a negro woman, who had been confined to her house with rheumatism for two months, was taken with diarrhœa. At first bilious in its character, in a few hours she was in fully-developed cholera, and died in about twenty-four hours. A fatal case of the disease had occurred at a house within a few yards of the one in which this woman was sick.

At Paint Lick, some nine miles distant from Lancaster, a negress named Lucy Reid, the mother of a large family, was taken with diarrhœa at 5 o'clock a. m. At 2 o'clock p. m., when she was visited by Dr. L. S. McMurtry, of Danville, who reports the case, she was in collapse, and died at 8 o'clock p. m. This woman had been in no cholera-district, but had remained at her home during the entire summer. She had committed no imprudence in diet. Her cabin was clean and comfortable, but its ventilation at night was very bad. A careful inquiry instituted by Dr. McMurtry into the history of this case developed the fact that a young boy was then living in the family who had some days previously come from the infected district of Lancaster after his parents had died of the disease. The only possible connection that this family could have had was through the person of this boy; after the death of the mother, two children sickened and died, but the boy who was the porter of the disease remained well. The same day a man named Robert Perrin, who lived in a distant portion of the Paint Lick township, was taken sick, and died after an illness of thirty-six hours.

September 3, Ann Mason, who lived quite near to the house at which Alice Salter had died, was taken with cholera, and died after twenty-four hours. The same day William Arnold, who is the undertaker of the town, and who lived quite near to the houses at which Alice Salter, Anderson West, and Ann Mason had died, was taken ill, but was convalescent in four or five days.

September 4, Private W. Graff was taken sick at the camp, some miles out of the town, to which the troops had been removed, but recovered after a short illness.

September 5, a negro woman named Burdett, the mother of the child who died August 28, and the daughter of Ellen Lusk, who died on the 1st instant, was taken sick. She recovered, as did also a man named Alexander Harris, who sickened the same day.

From the last date no new cases occurred. Those sick rapidly convalesced, and the inhabitants of the town who had fled from their homes to escape the disease, returned. Individuals living in the country began again to visit the town; business was resumed; but on September 21 the community was alarmed by the occurrence of another case.

An old lady named Guthrie had come from her home in the country to visit the Tate family, at whose house Bewley had been sick of cholera, and where he had died. The day after her arrival (September 20) she was taken ill, cholera was rapidly developed, and she died after an illness of thirty-six hours.

This case closed the demonstration of the disease; but it is a singular fact that initial and terminal cases of the epidemic occurred and died in the same house, the same room, and on the same bed.

The cholera sick at Lancaster were treated by Drs. Pettus, Jackman, and Hill, of the town; Drs. J. L. Warren and S. L. S. Smith, who were on duty with the troops; and by Drs. William Berry and F. C. Wilson, of the city of Louisville. Dr. Warren abandoned a lucrative practice at the Crab Orchard Springs, Drs. Smith, Berry, and Wilson their professional engagements at Louisville, to render professional aid to the inhabitants of this stricken town.

Marion County.

Lebanon, the county town of Marion County, is located upon the Knoxville branch of the Louisville and Nashville Railroad, situated nearly in the center of the county; it is not only the market-town of the

farming community, but is the base of supplies and shipping-point of several small towns and hamlets. The railroad passes through the center of the town, from east to west, upon low ground, following the course of a small stream, which, heading in a spring to the northeast, forms within the corporation limits two ponds for the use of the railroad company and a large flouring-mill. From these ponds the stream to which the name of Jordan has been given flows through the town in a southwest direction. The course of this stream is protected by stone walls, and the crossings of the several streets are securely covered. This stream is the receptacle of filth of all kinds. Flowing in rear of the buildings on the north side of the main street, the privy of every establishment facing upon the street is built over it.

Upon the southeast of the town is a small stream, the head of Hardin's Creek, fed by impure springs and the drainage from high ground. These two streams form the natural drainage of the town. The water-supply of the town is obtained from wells, which are all more or less influenced by surface-washings. Some few dwellings are supplied with cisterns. The public water-supply consists of two wells, one of which, in front of the court-house, supplies the inhabitants of the center of the town; the other, upon lower ground, is used by negroes and the lower classes almost exclusively. Both of these wells were in miserable condition, and through their defective walls surface-drainage gained access to each well.

The street through which passes the railroad is lined with dwellings, some few of which are comfortable, but the largest number are huts occupied by negroes. At the head of this street is located the flour-mill.

During the months of June and July the earnest solicitations of the physicians of Lebanon, who had formed themselves into a sanitary association, secured one cleaning and disinfection of Jordan and the removal of much *débris* of all kinds from public and private dwellings. An offensive effluvia from the lower rooms of the flour-mill attracting attention thereto, it was found that the flooring of the basement story was raised a few inches from the ground, which space was nearly filled with decomposing vegetable matter, and that from one corner, and under the foundation wall, a spring of very considerable volume issued. This water was drained off into the Jordan. The *débris* was disinfected and removed.

On the 19th of July, a negro man, thirty years of age, working upon the line of the Ohio and Cumberland Railroad, some six miles from Lebanon, was suddenly taken ill. His case presented all the symptoms of cholera, and he died after a few hours' illness, perfectly collapsed. He had been guilty of great imprudence in his diet, and the case was at first rated as one of cholera morbus. The case of July 17, upon the railroad in Taylor County, having come to the knowledge of his physician, some pains were taken to ascertain if any contact had occurred between the two cases; when it was discovered that on the day previous to his attack he had been on a visit to the cabin in which the negro was sick, and that the communication was constant between the two sections and the town of Lebanon. This case was followed by many of acute diarrhœa among the other employés of the road, but in none did it advance to a stage of danger.

On the 11th day of August, a negro woman, fifty-five years of age, living in the western district of Lebanon, between the line of the Louisville Railroad and the Jordan, was taken ill. She presented all the symptoms of cholera, and died collapsed after ten hours' illness.

It was ascertained that some days previous to her attack this woman had left her home in Lebanon to attend her son, who was sick on the line of the railroad in Taylor County, where it will be remembered the disease was in existence. When the man was convalescent his mother removed him to her home at Lebanon, and where she was attacked with the same disease the following day. The excreta of this case were not disinfected, but were thrown upon the ground in rear of the hut. From the 11th to the 18th of August several cases are known to have occurred among the lower classes of the negroes, having symptoms more or less well marked. No record of these cases can now be obtained, from the fact that the physician in whose care they occurred died himself of the disease at a later date. These cases occurred in the vicinity of the case of the 11th instant. In none of them were disinfectants used.

August 18, a white man, fifty years of age, residing on the railroad opposite to the house in which the case of the 11th instant had died, was taken with cholera, and remained perfectly collapsed for nearly twenty-four hours, when he reacted, and made a tedious recovery. No disinfectants were used, and the excreta were thrown upon the ground in rear of the house.

August 19, a young lady, eighteen years of age, living in the same vicinity, was attacked with a similar disease, from which she made a slow recovery.

It is of importance to note that the preceding cases were rated at the time as cholera morbus; each had been the subject of some imprudence, to which the violence of the symptoms were attributed, and it was only after a subsequent study of each case that its true status was determined.

Upon the same day (August 19) a white man, thirty-five years of age, living in a high, well-drained portion of the town, was attacked with cholera. The symptoms were terribly violent; no relief could be obtained from the most active measures, and he died in ten hours from the inception of the disease. In this case the excreta were carefully disinfected, the clothing was washed in a strong solution of carbolic acid, and the mattress on which he died was burned. This death occurred upon ground which was high and well drained; the place of business of the man was equally well located; he had not been away from the town for months, and was thought not to have come in contact with the cases which had already occurred. It was, however, subsequently determined that he habitually passed a portion of each night with a female who lived in a house in the immediate neighborhood of those in which the disease had already occurred.

August 25, a negro man, living in a small house built over Jordan, died of the same disease. This man had passed several days preceding his illness among the railroad hands at the section of the Cumberland and Ohio Railroad. In this case the excreta were not disinfected, but were emptied into the bed of Jordan, in which at the time no water was flowing.

On the same day a white man having charge of the town cemetery died after a few hours' illness, with symptoms almost identical with those presented by the preceding cases. In this case, however, the attack followed an immoderate use of iced water when overheated by great exertion.

On the 26th of August the Marion County Fair was commenced upon the grounds near the town of Lebanon, and many visitors attended from Marion and the adjoining counties. So great had been the popular prejudice against announcing the fact that any cholera deaths had occurred

in the town of Lebanon, that during the week preceding the opening of this fair a handbill was prepared, stating that cholera had not occurred at Lebanon, which circular was apparently signed by a number of the physicians resident in the town, among others the writer, who at the time the circular was issued was on duty at the town of Lancaster, some fifty miles distant, and who in no way authorized the use of his name. This handbill was extensively circulated in the counties adjoining Marion.

The water-supply of the Marion County fair-grounds being limited, a contract had been made to carry water from the town to supply the deficiency. A well was selected in the western portion of the town, on low ground, and within 40 feet of Jordan, and in the immediate vicinity of the houses in which the cases of cholera had already occurred. The individuals having this matter in charge selected this well because it was easy of access, and because they supposed the water to be pure, and to be far better than they could obtain from any other locality. No suspicion of blame could be attached to them for this selection, for, even if they had recognized the fact that several cases of cholera had occurred in its immediate vicinity, they had been taught the theory of non-contagion by the laborious newspaper articles of individuals who were held as oracles.

The well was old, having been dug in 1854, on what was formerly a drain leading from an elevation upon which is a grave-yard. It had been sunk through a shaly kind of mud-stone, and the first water that entered the well came in about 8 feet from the surface, and from the direction of Jordan.

On the evening of August 27 a violent rain-storm deluged the country, the banks of Jordan were overflowed, and the well was filled flush. So great an amount of water fell that the surface of the ground was completely washed, and nothing but a direct interposition of Providence could have prevented the surface-washings from contaminating the water contained in the well.

During August 28 and 29 the attendance upon the fair was large. The water from this well was served as upon the former days. No case of violent illness had occurred in the town since the 25th. A fatal security seemed to possess all, but on the night of August 29, and the early hours of the 30th, the blow was struck. It might be said, simultaneously thirteen cases of cholera occurred, and within ten hours twelve had terminated fatally; one case lingered for nine days and then died. All of the individuals who were thus attacked had been in constant attendance upon the fair; the cases were not confined in any one locality, but were scattered over the entire town. At almost the same hour at which the Lebanon outbreak occurred four cases occurred at the town of Saint Mary, in the same county, and five miles distant from Lebanon, and one case occurred at Raywick, also of Marion County, and nine miles distant. These cases all terminated fatally; all had attended the fair.

During August 30 cholera was epidemic in all portions of Marion County. Wherever individuals who had attended the fair and drank the water resided, there cholera was developed, no matter how isolated or how healthy the location. From August 30 to September 14, cholera was epidemic in Marion County, and isolated cases of the disease occurred until October 1, when it disappeared.

The disease was not confined to the lower classes of the community, but was confined to those who indulged in the water at the fair-grounds, and to those who came in contact with the sick. In many instances but one member of a family attended the fair; that individual having been

taken with cholera after his return home, communicated the disease to other members of the family, and one or more cases occurred.

Active disinfection of the excreta was employed in the majority of the cases; and it is noticeable that wherever this method of precaution was instituted no second case occurred. The same remark may be made of a few isolated instances in which no disinfectants were used, but many other cases can be noted in which the neglect of such precautionary method was followed by the occurrence of several cases of the disease.

A company of United States Infantry occupied the barracks in the town of Lebanon during the entire epidemic. In the management of these men extraordinary precautions were adopted. They were kept constantly employed, their food was carefully inspected, and the water of the well from which alone they were allowed to drink, was constantly tested as to its purity. A constant vigilance was employed to discover the disease in its incipient stage. Whenever a man was observed, by a non-commissioned officer detailed for the purpose, to visit the company-sink more than once, he was at once reported to the hospital, where the next dejection was received in a commode and carefully inspected. The least tendency to diarrhœa was treated. The commanding officer seconded fully the medical officer of the post, all of whose sanitary recommendations were rigidly enforced. No case of the disease occurred in the garrison, although during the epidemic cases of acute diarrhœa were of frequent occurrence, but all yielded to treatment. The child of a married soldier who resided with his family outside the garrison-limits, and who was not subjected to the same sanitary regulations, died September 8 of cholera. This death occurred late in the day. On the 9th the father, Private William Moore, while arranging for the funeral, drank largely of whisky, in each drink of which he placed a quantity of quinine, of which he had purchased an ounce, under the impression that it could prevent his taking the disease. At 11 o'clock p. m. of the same day this man was found in his bed collapsed, and he died before morning.

In the town of Lebanon, during the epidemic, in but one instance did more than one case occur in a private house; in that instance a mother and her young daughter both died of the disease. At the Guthrie House, the railroad-hotel, five cases occurred, three of which terminated fatally. The other hotel, distant about one hundred and fifty yards, was free from the disease. No cases occurred in any of the county institutions of charity or correction.

The majority of the physicians adopted the calomel and opium treatment, combined with camphor or aromatics. The opium was used with care. No favorable results were obtained by atropia. In all instances (after the first blow of the disease upon the community) in which the patient was subjected to active treatment and perfect rest in the first stage of the disease, it was found to be perfectly amenable to treatment.

On the 3d of September a case of some interest occurred in the person of a negro man about forty years of age, who was found by Dr. Cleaver and the writer, lying on the floor of a deserted cabin fully collapsed. There was absolutely nothing in the room; the man had no home, and was deserted by his kind. A bed was procured, upon which he was made comfortable; a large dose of calomel was administered, and as it was found utterly impossible to obtain a nurse he was provided with a light, some calomel-powders, and a large bucket of iced water, and a cup. He was vomiting occasionally, having involuntary discharges, was pulseless and voiceless; his body was icy cold, and bathed in profuse perspiration. Other cases demanding attendance,

the man was of necessity left to himself; at midnight Dr. Avritt visited him, replenished his ice, but left him without being able to discover any favorable change in his condition. At daylight he was again visited, and was found to have reacted; his recovery was gradual. During the night, which was passed absolutely alone, with the exception of the midnight visit of Dr. Avritt, he had drank every drop of water from the bucket.

NELSON COUNTY.

The history of the epidemic of cholera, as it affected Nelson County, is of value as demonstrating the portability of the disease.

The first cholera-case which occurred in this county was in the person of a young man who resided upon a farm some six miles northwest of the town of New Haven. This man was taken with cholera upon the 20th of August, the day after he had returned from the town of Lebanon. While at Lebanon he had visited the house of a friend who had died in that town of cholera, and had assisted in preparing his body for the grave.

In this instance the disease lasted but nine hours from its inception, and when Dr. N. G. Leake, who had been summoned when the symptoms became violent, arrived at the house the patient was dead.

The dejections had not been disinfected, but had been thrown out upon the grass around the house. Dr. Leake attempted the disinfection of the premises, but was unsuccessful, for the next day, August 21, the mother and brother of the first case, who resided in the same house, were both taken with cholera, and within fifteen hours both were dead.

August 23, a married lady, the sister of the first case, and her husband, who had both been in constant attendance upon the sick in this house, were attacked with the same disease, and both recovered after a lingering illness.

August 25, the grandmother of preceding cases, a lady sixty years of age, who also resided at the same house, died of cholera after an illness of eighteen hours.

August 26, an aunt of the same family, who also lived at the same house, was taken with cholera but recovered.

The residence of this group of cases was not in a malarial district.

September 2, a white man, twenty-six years old, was attacked by cholera at his home, near New Haven, and died after an illness of sixty hours. The day before his attack he had visited the house of a near relative in Marion County. At this house several cases of cholera had occurred, and at the time of his visit two of the family were ill of the disease. He did not enter the house, but sat upon a back porch, upon which the dinner was that day served.

The head of this house being fully convinced of the non-communicability of cholera, had declined to make use of disinfectants, and all the excreta of the patients had been thrown upon a heap of *débris* within a few feet of the porch.

These cases were followed by the occurrence of twelve others in the town of New Haven. In each case the infection was traced either to the Marion County fair, or to the two localities, the infection of which has been noted.

BOSTON.

The second demonstration in Nelson County was at the town of Boston, ten miles west of New Haven, and upon the line of the Knoxville branch railroad.

At this town on second of September, a negress, who had just arrived from the town of Lebanon, was taken with cholera, but recovered after a severe illness.

This case was followed by six others in the same house, all of whom died, the last occurring September 8.

September 9, three deaths occurred in the persons of individuals who had left the infected house after the outbreak of the disease. This house was located upon low, wet ground, and its sanitary condition was most miserable.

BARDSTOWN.

The third demonstration was at the county-town. Bardstown is situated in the northern portion of the county, and is an inland town of much importance. It is the terminus of the Bardstown branch of the Louisville and Nashville Railroad. The town is in constant communication with adjoining counties.

It has been impossible to obtain full information as to this demonstration of the disease. We are informed by Dr. Alfred Smith that the first case which occurred in that vicinity was in the latter part of August, in the person of a young man who had been on a business-trip to the town of Lebanon; that several persons had died of the disease, when he was called to see a man who had been in attendance upon these cases, and found him, within five hours from the inception of the disease, profoundly collapsed, and he shortly died. Disinfectants were freely used, and no other cases occurred.

Within a few days of this case, Dr. Smith was called to a man sick at the Ellis House, in the town, with cholera. This man had just come from Lebanon. He died after a short illness.

This case was followed by two others, who had come from Lebanon, and by several among the inhabitants of Bardstown and its vicinity. Dr. Smith attributes to the use of dilute sulphuric acid the most favorable results which were obtained.

At Bardstown, as at many other points, a diversity of opinion existed among the medical men as to the genuineness of the disease. That the views of all may be represented, we append the following letter:

"BARDSTOWN, KY., *December* 4, 1874.

"DEAR SIR: I am sorry that I am not able to give you any available information that may aid you in making up your report, and this is the reason I did not reply immediately after your first letter came to hand.

"During the months of July, August, September, and October, 1873, there was a great deal of sickness, nearly all showing a malarial type, from the mildest to the most severe grade. Those of the last usually died in from six to eighteen hours, if not seen immediately by a physician, and given large doses of quinine. They were attacked usually with coolness of the surface and great enervation of the nervous system, paleness, and after a time a haggard and worn-out expression of the face, nausea, vomiting, great thirst, and diarrhœa that varied in its character. If reaction was not soon produced, death was the result.

"As I kept no notes of the cases that I treated, I will give you from memory an account of some cases that occurred at the residence of a family one and a half miles from the town on the 4th day of October.

"Upon the north side of this house there was an old cellar that was partially filled with *débris* of all kinds, the sweepings of house and yard. At the date specified this cellar was nearly full of rubbish, upon which

the family were in the habit of throwing all wash-water. From it a most offensive odor was emitted.

"I was first called to see the lady of the house and her little girl, some eight years old. The mother had simple bilious fever, the daughter the same, complicated with dysentery. On the next day I found three others of this family sick, a negro servant-girl with the fever, and two young girls twelve and fourteen years of age. One of the last noted had been taken in the early part of the previous night with diarrhœa and vomiting, but as she and her sister had eaten freely of green tomato-catsup it was thought she was not much sick, and no attention was given her until I arrived at the house. The first case (of the young girls) died in six hours; the other, who was similarly affected, recovered.

"Both had cold surfaces, pale, haggard expression of the countenance, great thirst, nausea, vomiting and purging. After a time the dejections became serous, without odor, and producing scarcely any discoloration of the bed-linen. The same treatment was adopted in both cases. Quinine in large doses, diffusible stimulants, and calomel. Mustard was applied to the extremities, abdomen, and along the spine, and dry heat. These two cases were more marked than any I had, and at the time I did not regard them as cholera, but as pernicious fever, described by Wood and others.

"Respectfully,

"JAMES MUIR, M. D."

"Dr. ELY MCCLELLAN,
Assistant Surgeon U. S. A."

Dr. J. F. Hickman reports a series of fifteen cases, but two of whom died. The first of these cases occurred July 10. Seven of these cases occurred in one family, with no deaths. No history of the cases accompanies the list, and we are unable, therefore, to include them in the narrative.

The last case reported by Dr. Hickman was on the 30th of August, and in the person of a white man who had that day returned to his home from the Marion County fair.

LINCOLN COUNTY.

The epidemic of cholera in Lincoln County, so far as reports can be obtained, was confined exclusively to the immediate vicinity of the county-town. To Dr. S. P. Craig, of Stanford, who was constantly in attendance upon the cholera-sick, we are indebted for the notes upon which the history of this local demonstration of the disease is based.

Cholera, of a malignant type, made its appearance in Stanford on the morning of the 29th of August. About five days previous to the appearance of the disease in the town a young man named Spoonamore died of cholera at his home, about two miles east of the town. Two or three days previous to his death Spoonamore left Lancaster, where he had been engaged at some carpentering-work during the epidemic at that point, and passed through Stanford on his way home, where a day or two later he was taken sick.

During the prevalence of the disease at Lancaster, where it continued until after it had become epidemic at Stanford, a large a number negroes, who were refugees from the first-named town, are known to have stopped at Maxville, that portion of the town of Stanford where cholera first made its appearance, but as far as can be determined none of these refugees had the disease or any symptoms of it. This point, however,

is involved in much uncertainty, for negroes being notorious wanderers, many of these refugees made but a few hours' rest at Maxville, and then went on to other points. One of the number is known to have died of cholera at Campbellsville, Taylor County, a distance of nearly sixty miles southwest.

The town of Stanford is situated in a little valley, through which passes Saint Asiphs Branch, a small stream of very pure water, having its origin from the celebrated Buffalo Springs, about one mile from the town. It has always been considered a remarkably healthy town. It has always been free from miasmatic diseases. Epidemics of any kind rarely visit it. The portion of the town where cholera first appeared is known as Maxville. It lies northwest of the depot of the Knoxville branch of the Louisville and Nashville Railroad; is the most elevated portion of the town, and is inhabited almost exclusively by negroes. The sanitary condition of the town at the time of the cholera-appearance was very bad. The authorities had used considerable efforts at sanitary reform; had succeeded somewhat in the main portions of the village, but Maxville, like all negro settlements, remained filthy.

In the rear of the houses where the disease first broke out was a sink some fifty yards in diameter. On the northern edge of this sink, and about thirty yards from the houses, was the privy of the neighborhood. On the western edge were two small springs of muddy, impure water that empty into the sink about 20 or 30 feet from the privy, which, being used by a large number of persons, was filled to overflowing with *putrid excrementitious matter.*

The odor from this privy and sink, in the latter of which there was mingled organic matter of all kinds, pervaded the entire neighborhood. This privy was used by the Lancaster refugees, and beyond doubt became the "hot-bed of pestilence."

On the first day of the epidemic (August 29) five cases of cholera occurred at Maxville, in houses close to the sink already described. These cases were all in the persons of negroes. (four of whom were males, and one a child five years of age,) and all were dead within thirteen hours.

August 30, in the same group of cabins, four other cases occurred. The disease was still confined to the negroes, and was equally divided as to sex; one case was in the person of a boy seven years old. In twelve hours all the cases had terminated fatally. On this day the town authorities took possession of a church used by the negroes, and in the building organized a cholera-hospital, which was placed under the charge of Dr. Craig.

From August 31 to September 14, eleven cases of cholera occurred at Stanford, six of which were fatal.

The disease for some days was confined to Maxville, and to those of the inhabitants who had fled from their homes after the first fatal cases. After the epidemic had been some five or six days in existence, the town was dotted with cases. Four occurred near the center of the town, and in the portion occupied by the whites, but only one of the four cases was in the person of a white. Of these four cases two occurred in one house; the others were in separate houses, but all three were close together. The person first attacked in this group of cases, a negro girl, died. About the same time cholera appeared in the western suburbs of the town; three cases occurred, all of whom died.

From the 14th to the 28th day of September no new cases occurred in the town of Stanford; but on the last-named date a gentleman and his wife, living quite near Maxville, were both taken sick with cholera.

The case of the lady terminated fatally within twenty hours. The husband recovered slowly. This family had abandoned their home on the first day of the epidemic, and had remained in a healthy location until a period of ten days had elapsed from the last reported case. During the absence of this family their house had remained *closed and unoccupied*. Upon their return to the town they returned at once to this house, and no other precautions were adopted than that of bringing the drinking-water of the family from a well in a portion of the town that had not been infected. In each of these final cases the characters of the disease were exhibited. Malaise, painless diarrhœa, which was neglected for two days, in both instances ushered in the attack.

During this epidemic disinfectants were freely used. Sulphate of iron and chloride of lime were added to the contents of the privy and sink at Maxville. Whenever any excretra were thrown upon the ground or into a privy by the attendants, the spot was at once disinfected. As far as possible all excreta were received in vessels containing chloride of lime; after use, a fresh supply of the chloride was added and the mass buried.

The line of treatment adopted was the hypodermic use of morphia in the first stage of the disease, and of atropia in the others; calomel and camphor by the mouth; dry heat; sinapisms; hot baths; ice *ad libitum*.

Dr. Craig reports favorably on the use of atropia in the treatment of cholera. The history of one case is given in full as indicative of the results obtained in several cases. (See page 6, case 2.)

ADAIR COUNTY.

In Adair County the epidemic of cholera was confined to the town of Columbia, to one locality of that town, and to a few cases who, having visited the infected locality, returned to their homes in the surrounding country.

Columbia has a population of about six hundred inhabitants. Very few negroes reside within the corporation limits. The town is built upon a hill-side, and is by nature most admirably drained. The arrangement of the town is upon a square, in the center of which stands the court-house, and from the square streets are laid off to the north, south, east, and west.

Opposite the court-house, and at the corner of the street leading north, is a hotel known as the Winfrey House. Upon the side street, and opposite to the hotel, is a large barn, which is used as a livery and sale stable, under the charge of the proprietor of the hotel. In the rear of this stable is a large covered privy, which was used not only by visitors but by nearly all the male inhabitants of the town.

Columbia has always been considered a healthy town. The epidemics of the past were cholera in 1833 and 1835, from which disease the town suffered severely; dysentery in the fall of 1849, from which disease over sixty persons died; congestive intermittent fever in 1862, from which disease a large number of persons died; but from that time until 1873 no disease could be classed as epidemic.

In the month of August, 1873, the sanitary condition of the town was bad. The ground around the dwellings, as well as the streets, was covered with *débris* of all kinds. The privies, with the exception of that in rear of the Winfrey House stables, were built on the surface. Stables, pig-pens, chicken-houses were unclean, and around them human excrement was mixed with other *débris*. The rear premises of the Winfrey House

were even in worse condition than is ordinarily observed at country hotels. The rear of the lot upon which the stable stands is lower than the surrounding lots which had been built upon. The privy was over a pit dug into the ground, but this pit was full to overflowing with excrement and the washings of the yard after each rain-fall being into it, the ground in all directions was saturated with the fluid contents of this pit. The rear windows of a row of brick buildings that face upon the public square open into this stable-yard.

An effort was made early in August by the physicians of the town to improve the sanitary condition. In some instances they succeeded in inducing property-holders to clean their premises, and an effort was directed toward at least the stable of the Winfrey House; this effort was opposed by the proprietor as an unwarrantable interference with his property.

On the 29th day of August a negro boy, fourteen years of age, who had been, as a hostler, at the Marion County fair, returned to Columbia and went to work at the stables of the Winfrey House. He had a diarrhœa when he arrived, and during the evening made frequent use of the stable-privy.

At an early hour the next day (August 30) a negro man who was in charge of these stables was suddenly taken with cholera. He was carried into a basement-room of the hotel, where he died after an illness of forty-eight hours. About 8 o'clock a. m. the same day, the boy whose arrival from Lebanon has been noted, was found in a mule-shed adjoining the stable in collapse. He was carried into the stable preparatory to being placed in a bed, but died in a few moments. Later in the same day, a young lady twenty years of age, the eldest daughter of Mr. Winfrey, was taken ill, and died after an illness of ten hours; and a white man, who resided some fifteen miles from the town, upon Carey's Creek, but who had been in the town on the previous day, and who was known to have used the stable-privy, was attacked at his home with the same disease, and died after six hours' illness. This outbreak of the disease occurred at a time when the town of Columbia was full of non-residents. The circuit court was in session, and a large number of strangers were registered at the hotel, where were also congregated a number of regular boarders.

August 31, the proprietor of the hotel was attacked, and died within twelve hours, and during the early hours of the same day five members of the Winfrey family and six boarders at the hotel were taken ill, a total of twelve cases in one house, all being attacked within a few hours of each other, and within eighteen hours eight deaths had occurred.

During this day all who were able to do so left the house; among others, a Mr. Vaughn removed his wife to Cane Valley, a small village some eight miles east of Columbia, when Mr. V. returned to the Winfrey House to render aid to the sick. At about 3 o'clock p. m. Mrs. Vaughn was taken with cholera, and her husband was recalled from the town.

September 1, four persons who had boarded at the hotel were taken sick, and within sixteen hours all had died. Of this group of cases Dr. Henry Owens, the rear windows of whose office opened into the stable-yard, and who had been assiduous in his attention to the sick, was, after he was himself attacked, carried to his home in the country, where he died. Another gentleman, Col. Robert Miller, who had the day before left the hotel and had gone to the Griffin Springs, some six miles distant, was attacked, and died after an illness of sixteen hours. A

negro man who had nursed the negro who was the first case reported on the 30th, died after an illness of fifteen hours.

On the same day Mr. Vaughn, who had left the town on the previous night to nurse his wife, sick with cholera at Cane Valley, was taken with the same disease. The lady recovered, but Mr. V. died after a tedious illness. A white man, fifty years of age, who had used the infected privy on the 30th of August, died at his home, on Green River, after an illness of fourteen hours; and a young girl living on Casey's Creek, whose father died of cholera on the 30th, was taken ill and died after ten hours' illness.

September 2, a white boy who had frequented the hotel and stables was attacked, but recovered. Two white men, father and son, who had nursed the sick at the hotel, and had made the coffins for some of the dead, were taken ill. The father, aged seventy years, died; the son recovered. A farmer who lived some four miles north of the town, but who had been in the hotel-stables the previous day, was taken ill at his home and died in twenty-four hours. A gentleman who had left Columbia on Sunday, August 31, died of cholera at the hotel at Campbellsville, Taylor County.

During the three following days no new cases occurred.

September 6, a young daughter of Mrs. Winfrey was attacked and recovered.

September 8, four cases occurred in persons who had been exposed to the infection at the hotel. The attack was mild in each instance, and all recovered.

September 10, an aged man and his wife, residing in a secluded position some two miles from the town, were both taken with cholera. The husband recovered; the wife died. It is not known how they were subjected to the infection.

September 20, a man aged seventy-five years was taken with cholera, and died after a few hours' illness, and on the 23d his wife died of the same disease.

After the disease had become epidemic, a general police of the town was made. The Winfrey House was closed. The stable was abandoned after the privy had been disinfected and filled with fresh earth.

It is the opinion of the two physicians who remained in Columbia during the epidemic that in the majority of the cases the excreta were not disinfected, but that they were cast upon the ground around the houses. A young man who nursed Mr. Winfrey during his illness informed the writer that the dejections of this case were emptied from the window of the room in which the man was sick into a dirty lane which separated the kitchen from the hotel.

By Dr. U. L. Taylor, of Columbia, to whom we are under obligations for important aid in the collection of the facts of this demonstration, we are informed that the treatment consisted of calomel, opium, astringents, and stimulants. Dr. Taylor is of the opinion that to the use of calomel the only beneficial results that were obtained should be attributed.

On the 27th of October, 1873, the writer visited the Winfrey House, and asked permission to inspect the rooms in which the cholera cases had occurred. We found that no effort had been made at cleaning beyond a washing of the bed-clothing and brooming of the floors. The mattresses and other beds remained unchanged, and the stains of the dejections were visible. Under the upper portion of the bed upon which Winfrey had died a number of soiled rags were found, in all probability just as they were tucked beneath the mattress during its last occupancy.

The importance of prompt and immediate cleansing of these rooms, the removal of all soiled articles of property, and a general police of the grounds was most earnestly impressed upon the person in charge of the property, with the only result of eliciting an expression of displeasure at such interference—a closing demonstration of the same foolish obstinacy that had subjected the town to a fearful epidemic.

WASHINGTON COUNTY.

Springfield, the county-town of Washington County, nine miles north of Lebanon, with which town its inhabitants are in daily communication, escaped almost entirely. A full record of every case in which the disease became pronounced has been obtained; and it will be seen that in every instance the connection is positive between the subject of the disease and either the Marion County fair or the town of Lebanon. That the county escaped an epidemic is undoubtedly due to the active course of disinfection to which each case was subjected.

August 30, the negro driver of the carriage of Mr. E. D. Davison, residing near Springfield, returned from the Marion County fair with an active diarrhœa. He was removed to his house on the outskirts of the town, where, at 9 a. m. the next day, he was found fully collapsed, and died in a few hours. The same day a negro man is reported as being attacked with cholera at Mackville, a small village near the Boyle County line. This man had been attacked with the disease after his return from the Marion County fair, and recovered after a tedious illness.

September 1, a young white man, twenty years of age, died of cholera at his home, a few miles from Springfield. This case also is referred to the Marion County fair.

September 2, three negroes (two males and one female) living in the Pleasant Run district were taken with cholera, and all died within thirty-six hours. Each of these individuals had been at Lebanon within two days of their attack. On the same day two cases (a white man and his wife) occurred at the village of Texas, in the northeastern portion of the county. The two last mentioned had attended the fair.

September 3, Dr. Mat. Logan, a physician of much prominence in his county, who had been actively employed in attendance upon the cases of cholera in Marion as well as Washington Counties, was taken with active diarrhœa. Dr. Logan, being a breeder of blooded cattle, had, with his family, been in constant attendance upon the Marion County fair, where he had exhibited stock. The diarrhœa continued until an early hour of the 4th, when cholera was fully developed, and he died after twenty-four hours' illness. The same day a negro death near Springfield, and a white recovery at Texas, are reported. The last was a member of the same family in which it has been recorded that two cases had occurred.

September 7, Mrs. R., the daughter of Dr. Logan, who resided with and had nursed her father in his illness, was attacked with cholera and died in seventy-two hours. With the other members of the family, this lady had attended the Marion County fair.

The same day a negro man was found in a field near Springfield, where he had lain during the preceding night exposed to a rain-storm. He had started to walk home from Lebanon, on the road was taken with cholera, and sought shelter in a stable. From this he was driven by the inhuman owner. When found he was fully collapsed, and soon died.

A fatal case is reported at Mackville, in the person of a white man who had been in attendance upon the cases which occurred at that point.

September 9, Mr. R., the son-in-law of Dr. Logan, was attacked with cholera and barely escaped with his life after a tedious illness. This case was followed by that of Mrs. Logan and the young child of Mr. R., both of whom recovered.

On September 11 and 13 recoveries are reported.

The treatment which was most generally adopted was that of calomel, opium, and camphor; morphia hypodermically; stimulants. In some cases atropia was exhibited, but without beneficial results. Hot saline injections seemed to be productive of good in some cases.

Boyle County.

Boyle County, joining Garrard upon the east and Marion upon the west, was exposed to two distinct lines of cholera infection; the disease becoming epidemic in Garrard on the 14th and in Marion on the 30th of August. So far as can be ascertained, no cases of the disease were imported from Garrard, while all the cases which were developed in Boyle can be distinctly traced to the Marion County fair.

When it was ascertained that cholera had become epidemic at Lancaster, the authorites of Danville, the county town of Boyle, adopted extraordinary precautions. The town was thoroughly policed, after which a rigid house-to-house system of inspection was adopted, the town having been divided into districts and to each district one member of the town trustees and one member of the Boyle County Medical Society were assigned as inspectors.

The negro inhabitants were compelled to keep their houses and grounds in good sanitary condition. Everything that was detrimental to the public health was removed, ponds were drained, *débris* buried or burned.

During the month of June preceding, the embodied circular had been issued by the Boyle County Medical Society:

CHOLERA.

FOR THE PUBLIC.

The Boyle County Medical Society having been requested by the board of trustees, in view of the threatened outbreak of an epidemic of cholera, to recommend to the public such measures as are deemed most efficient in preventing and controlling the spread of this disease, most earnestly suggest the following for the careful consideration of every one:

At once begin a most thorough and painstaking process of sanitary cleansing in your houses, your premises, and persons. Be sure that you attain to the utmost cleanliness possible in everything, and never relax your vigilance and care in this matter. See that in your yards no garbage from the kitchen is allowed to accumulate. To prevent this, bury it in your gardens two or three feet under the surface, or obtain the privilege of manuring the country farms with it. The object to be attained, it should be borne in mind, is to prevent drainage from such accumulations into springs and wells from which drinking-water may be used, and disposing of it in the way mentioned endangers nobody. Precautions of a similar character should be taken with privies. Whether you have a pit or not under them, you should see to it that there is no danger of surface-drainage in the one case, or its escape through the wall of intervening earth in the other, into wells or springs where the water is used for drinking purposes. Well-cemented cisterns are free from such dangers, if kept carefully closed at the top. The gar-

bage of kitchens and the contents of privies cannot be kept, however, at too great a distance even from cisterns; for in many apparently of the most unaccountable and therefore unsuspected ways, all sources of drinking-water are continually becoming contaminated from such sources.

These precautions become many hundred fold more important in dealing with the discharges from the bowels of persons actually attacked with cholera. These discharges undoubtedly contain the poison which has frequently been the cause of propagating the disease by getting into water used for drinking purposes. The contents of the privy may be disinfected by pouring daily into every privy-seat a pint of copperas-water, made by dissolving in a gallon of boiling water about one and one-half pounds of copperas; but this should not forego the necessary careful supervision of the drainage from it. The same may be said of the disinfection of any mass of filth.

Allow no accumulations of stagnant water about your premises, and see that all your cellars are always clean and dry.

At all times, but especially while sleeping, every apartment should be most thoroughly ventilated.

Avoid all excess in eating and drinking, and in your whole course of life. Plainly-cooked meats and vegetables, and sound, ripe fruit may be allowed for food; but all use of the frying-pan as a cooking-utensil should be abandoned. If you cannot roast or broil meats properly, stew or boil them. Any kind of food sodden with the fat or grease of the frying operation is at all times a powerful predisposing cause of diarrhœa, dysentery, and cholera morbus. New or unmatured potatoes, and unripe fruits, should be studiously avoided. Exposure to sudden changes of temperature should be shunned, and if accidentally exposed to a rain, change the wet garments as soon as possible.

If attacked by cholera lie down in bed at once, and with warm wrappings, warm bricks, and hot bottles, sustain any loss in the temperature of the body. Pass the evacuations in a bed-pan, and don't rise from a horizontal position for any purpose whatever. If there is a tendency to vomit, apply a mustard poultice over the stomach. Have a qualified physician in attendance as soon as possible, and swallow no medicines prescribed by any one else—especially avoid patent medicines and quack nostrums. Avoid at all times a panicky state of feeling about cholera, and this is best accomplished by keeping the mind and body well employed; but be careful to engage in no exhausting physical or mental labors, especially avoiding excessive exposure to the direct action of the sun during the extreme heats of the summer. Co-operate to the full extent of your time and ability with the board of trustees and the medical men of the place, all of whom have volunteered their services for the town as a sanitary police, and who are ready now to do everything in their power for the common good, in purifying the streets, and in making suggestions for individuals and their premises; and also assist them in carrying into efficient and prompt execution any health ordinance they may deem proper at any time to enact.

To conclude, your attention is called to the following significant statements from the American Public Health Association, deservedly the highest authority in sanitary matters in this country:

"To combat and arrest the progress and prevent the epidemic prevalence of this scourge of sanitary negligence, it is necessary that the inhabitants of every city and town should promptly resort to the most effectual purification, and the best known means of disinfection, and that this sanitary cleansing and preparation should as far as possible be undertaken before any cases of cholera occur; and that in the presence

of this disease these sanitary duties should be enforced in every household and throughout the entire district.

* * * * * * *

"From being the most feared and destructive pestilence, cholera now may be controlled and extinguished more quickly and completely than any other epidemic disease."

Perhaps this last statement is a little too strong, yet we think we can scarcely urge with too much force the most rigid sanitary precautions.

R. W. DUNLAP, M. D., *President.*

G. T. ERWIN, M. D., *Secretary.*

The trustees of the town of Danville cordially recommend the above paper from the Boyle County Medical Association, and would further advise that so long as there is an apprehension of an outbreak of this fearful epidemic in our midst, the people dispense with all large gatherings within the town or country; especially should they dispense with picnics, barbecues, and other gatherings where extensive dinners are prepared.

Done at a meeting of the board of trustees held this 27th June, 1873.

G. E. WISEMAN, *Chairman.*

Attest:

WM. GOODLOE, *Clerk.*

This circular had the desired effect. It tended to remove, when the inevitable contact with the disease occurred, the dread which had been engendered by assertions of individuals in the public press, "that cholera was a disease of local origin, malarial in its source, against which disinfectants are unavailing, and that the individual stricken with the disease was beyond the aid of human skill."

During the existence of the epidemic in the town of Lancaster, Garrard County, but little communication took place between that town and Danville. It has been shown that in Lancaster the disease was located in the portion of the town that was occupied by the lower class of negroes, and that the whites who were attacked were those who came directly in contact with the infection in or from that district. The better class of the inhabitants who abandoned the town after the occurrence of the disease, took refuge at the many watering-places of the State. Some took refuge at isolated positions on the Kentucky River, others on farms in the county. The negroes scattered through the county, and in large numbers migrated to Lincoln County, where it has been shown that they inaugurated the epidemic. Few, if any, went into Boyle County, or into the city of Danville.

The people of Boyle, misled by the circular already referred to, as stating that no cholera had occurred at Lebanon that season, attended the Marion County fair, from the close of which the occurrence of the disease, as in the other "central counties," dates.

August 30, Mr. B., a farmer in comfortable circumstances, residing some six miles from Danville, was attacked with the disease, and, after an illness of ninety-six hours, recovered. This gentleman having stock to exhibit, was anxious to visit Lebanon, but having some misgivings as to the safety of so doing, consulted his physician, to whom he submitted the "Lebanon circular." The doctor informed him, "From the names signed to this, the reports we have heard must be false." The next time the doctor and his patient met, the latter was in the second stage of cholera.

August 31, a case occurred near North Fork Station, on the line of the Knoxville branch of the Louisville and Nashville Railroad.

September 1, a young lady, who had with other members of her family left her home in Marion County, on account of the disease, was attacked with cholera and made a slow recovery, and the same day three other cases occurred near North Fork Station.

September 2, the father and brother of the case first recorded on the previous day were attacked; both recovered; and one recovery is reported at North Fork Station.

September 3, a gentleman from Marion County was attacked at Oakland, five miles from Danville, and, after a severe illness, recovered.

In each of these cases the symptoms of the second stage of cholera were fully developed; all received prompt medical treatment; none were collapsed.

September 4, a young man seventeen years of age, a resident of Lebanon, but at this date entered as a student at Center College, Danville, was attacked with cholera while in his class-room. The attack was severe, but did not advance beyond the "blue stage," when reaction was established. In this case the urine was suppressed for forty hours.

September 5, a negro man was attacked with cholera at the house of a friend a few miles from Parksville, and died after an illness of eight hours. This man had been the servant of Colonel Miller, one of the victims of the Winfrey House, Columbia, epidemic. He had nursed his master through his illness, had prepared his body for the grave, and after the funeral had started on foot for the house of his friends in Boyle County. The distance he had walked was over sixty miles. The day after his arrival he was attacked by the same disease.

From the 3d to the 9th of September, five cholera-cases, with one death, are reported as occurring near North Fork.

Each of the cases recorded, with the single exception of the negro who died on the 5th instant, had attended the Marion County fair. Each case had premonitory diarrhœa from one to two days before the development of the disease. The line of treatment reported was morphia, hypodermically; calomel and quinine, exhibited internally; sinapisms and dry heat. Dr. J. D. Jackson reports favorably of the combination of dilute sulphuric acid and morphia. Dr. J. M. Myer enveloped his patients in blankets wrung out of scalding water. Dr. W. B. Harlan used successfully the dilute acid treatment.

In every case the excreta were disinfected and buried, and every effort made to isolate the case.

The only instance in which the attendants of cholera-sick in this county became infected with the disease, occurred in the person of Dr. W. O. Roberts, who reports the cases that occurred near North Fork Station. Dr. Roberts recovered, although he was the subject of a severe attack.

Clinton County.

The history of the epidemic as it occurred in the county of Clinton is of great value, although the epidemic was confined to but two points in the county, and but a small number of individuals were subjected to the disease. At one point it is demonstrated that cholera may at times be introduced with impunity into a healthy community; and by the other the dangers which may arise from such an importation, even at a point upon a mountain well drained and free from all malarial influences.

A Mr. Frank Bryson, who was the proprietor of a store upon Wolf River, about eighteen miles from Burksville, Ky., returned to his home from a trip to Nashville, where he had been purchasing goods. A few days after his return (early in the month of June) he was attacked with cholera and died after a few hours' illness. Although he was surrounded by his family and friends during his illness, no other case of the disease occurred. Every effort has been made to obtain an official report of this case, but unsuccessfully.

On the morning of Sunday, August 31, Maj. A. M. Adair, commonwealth attorney of the sixth judicial district of Kentucky, who had been attending the circuit court at Columbia, Adair County, when cholera was developed in that town, started on horseback for Albany, Clinton County, in company with Judge T. T. Alexander, for the purpose of opening court at the last-named place.

During the previous night both Judge Alexander and Major Adair had remained in the room of a friend who was sick of cholera at the Winfrey Hotel. At this house both of these gentlemen had lived during the two preceding weeks, and they were present when the cholera-blow struck this locality. On the night preceding the journey they had taken turns in nursing their sick friend, one sleeping at a time, and they remained as long as permitted by their official duties.

When a few miles from Columbia, Major Adair was taken with nausea, attended with more or less uncomfortable feelings of the abdomen. These symptoms became more and more severe until 5 o'clock p. m., when a violent vomiting came on, attended with symptoms of diarrhœa. The party had ridden some fifteen miles since the first symptoms, being desirous to reach the house of a friend, but Major Adair was now obliged to dismount and yield to the desire to go to stool, when a violent purging began. A pallet was made of the saddle-blankets, and upon this Major Adair was placed. Within thirty minutes two teaspoonfuls of laudanum and several teaspoonfuls of the extract of ginger were given to him. After some little time, being somewhat relieved, he managed to mount his horse with the assistance of Judge Alexander, but was unable to move. Dismounted and laid down again, when the vomiting came on again attended with involuntary discharges from the bowels.

The case becoming desperate, a place of shelter was obtained at the house of a Mr. Kelly living near by, and to this house Major Adair was carried and placed in bed. The doses of laudanum and ginger were repeated, and a horseman was dispatched to Albany, eight miles distant, for a physician, who was unable to reach the bedside until midnight. Morphia was exhibited hypodermically and free doses of tinct. opii given internally. The patient retained consciousness until 3 o'clock a. m., when he went into a collapse. No reliable information of the case can now be obtained, until Friday, September 5, when Dr. Waggoner, of Bowling Green, a near relative, reached the house and took charge of the case. Dr. Waggoner's notes read as follows: "Respiration 12, stertorous; skin moist; pupils very much contracted; pulse 60, oppressed; miliary eruptions on various parts of the body; profound stupor; when partially aroused (could be only partially aroused) would pick at nose and scratch himself; hiccough; urine suppressed since Sunday night, five days and four nights. Was informed by his brother, Colonel Adair, who had reached the sick-room on the 3d instant, that the patient was taking sulphate of quinine, gr. x, every ten hours, with a teaspoonful each of fluid extract of buchu, tincture valerian, and spts ætheris nit. every 'now and then.'"

The patient was at once placed upon the following line of treatment:

℞. Quiniæ sulph., gr. iss.
Camphor. gum, gr. j.
Bismuth subnit., gr. iij.
Potass. nitras, gr. ij.
Ipecac pulv., gr. j.
M. Ft. chart. no. j.
To be repeated every hour for five hours.

At 5 o'clock p. m. congestion relieved; hiccough less frequent; and the following was exhibited:

℞. Quiniæ sulphas, gr. ij.
Bismuthi subnitras, gr. iij.
Potass. nitras, gr. iij.
Ipecac. pulv., gr. j.
M. Ft. chart. no. j.

To be repeated every two hours, while at each alternate hour the following was administered:

℞. Tinctura belladonnæ, gtt. xx.
Ext. buchu fluidum, ℥j.
M. For a dose.

At 6 o'clock p. m. a hypodermic injection of fluid extract of buchu was exhibited.

At 7 o'clock p. m. bowels acted well; passed about eighteen ounces of urine; hiccough diminishing; a little brandy given cautiously.

At 2 o'clock a. m. pulse 75, respirations 14, temperature normal; bowels and kidneys acting. The quinine powders continued, and every alternate hour the following was given:

℞. Tinct. belladonnæ, gtt. x.
Tinct. valerianæ, ℥i.
Fluid ext. buchu, ℥i.
M. At a dose.

Brandy at intervals of an hour or two. Calomel, gr. iij, were added to the last powder.

At 7 o'clock a. m., bowels and kidneys acted; pupils dilated, respiration 16; temperature normal; hiccough ceased.

The treatment, with the exception of diuretics, was continued. During this course of treatment flaggelations and occasional cold douches were applied. The patient can be roused to semi-consciousness.

Quinine, brandy, and occasional small doses of belladonna were exhibited through the day, with a gradual improvement.

At 7 o'clock a. m. on the 7th, respiration and temperature normal; bowels and kidneys acted twice during the night. Strychnine, sulph., gr. $\frac{1}{32}$, was given every three hours during the day.

At 12 o'clock m. of the same day passed blood in stool; pulse 116; feverish; complains of pains in lower bowels; had frequent bloody discharges; pulse became weak and thready. Refuses injections of starch-water and tannin; was placed upon catechu, camphor, and acetate of lead. At 2 o'clock p. m. of the 8th the discharges were arrested. At this time his pulse was very weak and irregular; prostration complete. Was given the following every two hours:

℞. Ipecac. pulv., gr. i.
Bismuthi subnit.,
Rhatany ext., āā., gr. v.
M. At a dose.

There was a continued improvement during the day. Became rational on the 9th instant, and convalesced to complete recovery. We can only add the comment, "The forbearance of nature is more than wonderful."

The house at which Major Adair was sick is situated on one of the spurs of the Cumberland Mountains, twenty-six miles southeast of Columbia, which was the nearest point infected with cholera. The position of this house was so isolated that the owner first learned that cholera was in the country by the arrival of Major Adair sick with the disease. No malaria could be found to produce the disease, but the dejections of Major Adair were not treated with disinfectants, but were thrown out into the privy and upon the ground, with the following results:

September 8, Mr. Kelly, the owner of the house, was taken with cholera. The disease was fully developed, was collapsed for eight hours, when he reacted. Was treated by Dr. Waggoner by hypodermic injections of morphia, and cups over the epigastrium. Hot fomentations to abdomen and legs. Later hypodermic injections of quinine. The case did well until the 12th instant, when the disease was redeveloped, and the case terminated fatally after a few hours' illness.

September 10, a son of Mr. Kelly, eighteen years of age, was attacked with cholera, but reacted and safely recovered.

September 12, a young daughter of Mr. Kelly was attacked with the same disease, and died at about the same hour as her father.

It is stated by persons living in the vicinity that a negro man who had waited upon Major Adair during his illness, died at the same time as Mr. Kelly and his daughter.

As far as can be ascertained no other cases occurred in the county.

Russell County.

The inhabitants of Jamestown, the county-seat of Russell County, had been in constant communication with those of Columbia during the epidemic at the last-named town. The mail-carrier from Columbia, who remained every other night at Jamestown, had suffered severely from diarrhœa, and a young man from Lebanon, who had left that town after the cholera had become epidemic, was taken with the disease, near Jamestown, and made a tedious recovery.

September 9, Mrs. James Fields, a lady sixty-two years of age, residing in Jamestown, was attacked with cholera, and died after a few hours' illness. In rapid succession, a gentleman who resided in the adjoining house, a negro woman who had nursed Mrs. Fields, a gentleman who was a constant visitor of the Fields family, Mr. Fields, and a negro child, ten months of age, the last living on the same premises, were attacked with cholera, and all died. Subsequently five other persons, members of the Fields family, or immediate neighbors, were attacked with the disease, but recovered.

October 1, a Mr. Long, who resided on Wolf's Creek, after a visit to Jamestown, was taken with cholera and died.

October 3, Miss Long, who had assiduously nursed her brother, died of the same disease.

The well from which all the persons who were attacked with cholera, with the exception of Miss Long, had obtained drinking-water, was found to be contaminated by drainage from a dirty cellar, which was half full of water, and beneath the house at which the mail-rider from Columbia had slept during the period of his diarrhœal sickness. The use of this well was prohibited, and the disease disappeared.

Mercer County.

At Harrodsburgh, Mercer County, five cases of cholera are reported by Dr. C. H. Spilman. The individuals affected were all negroes; two

males, and three females. All were adults. But one fatal case occurred, that on September 9.

Dr. Spilman states that it is impossible to trace any connection between these people and the infection; but when the roving character of the negro is taken into consideration, and the fact that they are utterly unreliable in their statements as to where they have been, and what they have been doing, after their nocturnal excursions, it is not safe to assert that these cases *could not* have come in contact with the cholera infection.

CHAPTER XII

OHIO GROUP.

OHIO CONTRIBUTORS.

Dr. J. J. Quinn, health officer, Cincinnati.
Dr. William Clendenin, late health officer, Cincinnati.
Dr. C. L. Armstrong, Hamilton Co.
Dr. J. W. Underhill, Hamilton Co.
Dr. W. Carson, Hamilton County.
Dr. N. Leaman, Hamilton County.
Dr. B. Mosemeir, Hamilton County.
Dr. J. T. Whittaker, Hamilton Co.
Dr. F. Stick, Hamilton County.
Dr. J. P. Walker, Hamilton Co.
Dr. H. Luddington, Hamilton Co.
Dr. C. H. Foertmeyer, Hamilton Co.
Dr. W. T. Brown, Hamilton Co.
Dr. W. B. Kellar, Hamilton Co.
Dr. C. S. Muscraft, Hamilton Co.
Dr. T. Little, Hamilton County.
Dr. La Luerner, Hamilton Co.
Dr. C. D. Fishburn, Hamilton Co.
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Dr. F. Richards, Hamilton County.
Dr. T. G. Herron, Hamilton Co.
Dr. G. Bruhl, Hamilton County.
Dr. A. Rosenfelt, Hamilton County.
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Dr. G. Saal, Hamilton County.
Dr. S. Nickles, Hamilton County.
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Dr. John Davis, Hamilton County.
Dr. G. K. Taylor, Hamilton Co.
Dr. F. Brunning, Hamilton Co.
Dr. J. C. Cleveland, Hamilton Co.
Dr. O. E. Davis, Hamilton County.
Dr. M. L. Amick, Hamilton Co.
Dr. J. L. Cilly, Hamilton County.
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Dr. S. M. Carr, Hamilton County.
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Dr. E. M. Epstein, Hamilton Co.
Dr. J. R. King, Hamilton County.
Dr. J. A. Murphy, Hamilton Co.
Dr. L. A. Shepard, Hamilton Co.
Dr. T. A. Colter, Hamilton County.
Dr. W. W. Dawson, Hamilton Co.
Dr. J. A. Lair, Hamilton County.
Dr. A. Freeman, Hamilton Co.
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Dr. T. C. Minor, Hamilton County.
Dr. T. A. Colter, Hamilton County.
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Dr. J. K. Flowers, Franklin County.
Dr. John Willoughby, Franklin Co.
Dr. W. H. Drury, Franklin County.
Dr. N. C. Reed, Franklin County.
Dr. J. W. Hamilton, Franklin Co.
Dr. R. Werth, Franklin County.
Dr. J. H. Coulter, Franklin County.
Dr. J. M. Dunham, Franklin Co.
Dr. G. S. Stein, Franklin County.
Dr. Norman, Franklin County.
Dr. C. F. Emrich, Franklin Co.
Dr. Otto Frankenburg, Franklin County.
Dr. R. M. Denig, Franklin County.
Dr. E. B. Fullerton, Franklin Co.
Dr. G. M. White, Franklin County.
Dr. D. R. Kinsell, Franklin Co.
Dr. J. Sadler, Franklin County.
Dr. Z. F. Guerin, Franklin County.
Dr. J. C. Schueller, Franklin Co.
Dr. Butler, Franklin County.
Dr. C. E. Denig, Franklin County.
Dr. J. Lowry, Franklin County.
Dr. John McCarrell, Columbiana County.
Dr. H. W. Kitchen, Cuyahoga Co.

Assistant Surgeon John M. Dickson, U. S. A.

DATES OF INITIAL CASES.

Hamilton County.....May 27.	Franklin County .....July 4.
Montgomery County.....June 3.	Scioto County .....July 20.
Clarke County .....July 3.	Fairfield County .....July 31

Hamilton County.

In the performance of the duties assigned to us, the task of presenting a history of the cholera epidemic of 1873, as it affected the city of Cincinnati, is attended with greater embarrassment than any other of the series, from the fact that there arose at Cincinnati, early in the epidemic, a most acrimonious debate as to the introduction of the disease into that city, (*vide* files of the Clinic, 1873,) and it is almost a matter of impossibility to prevent even a statement of facts without entering to a certain extent into the merits of this debate. The discussion assumed the following form:

Upon one hand it was stated that the disease had reached Cincinnati through a direct line of connection from the cholera infection, which was at the time in existence in the city of New Orleans, the Southwestern States, and upon the waters of the Mississippi.

Upon the other hand, this proposition was indignantly repudiated, and it was claimed that the disease originated spontaneously in Cincinnati, and without any connection with previously existing cases in other localities.

Upon one side it was stated that the epidemic at Cincinnati presented the same characteristics of the disease which have always been noted in previous epidemics; and that it once having reached the city, the infectious properties of the disease were manifested.

Upon the other side this was utterly denied, and it was asserted that the so-called "multiple cases" were but seldom seen; that in no instance did more than two or three individuals contract the disease at the same locality, and that in the vast majority of cases no direct connection with any infection could be traced.

With an earnest desire to avoid the charge of partisanship in this matter, although with no hesitancy to present fully the facts which have come to our possession, or to express freely the views which we may have formed thereon, we present as the history of the cholera epidemic of 1873 at the city of Cincinnati three distinct papers:

I. By J. J. Quinn, M. D., health officer.

II. By William Clendenin, M. D., late health officer.

III. By C. L. Armstrong, M. D., of Cincinnati.

To which we add the notes of a few facts which have come to our knowledge, not embraced in the papers announced.

During the frequent visits of inspection which we made to the city of Cincinnati, we were most courteously received by the Health Officer, who spared neither time nor pains in placing before us the views which he held upon the subject of the cholera epidemic, and while we are obliged to differ from these views, we desire to extend every courtesy to this most efficient officer.

It has been found to be impracticable to reproduce the elaborate report of Dr. Quinn *in extenso*, but we have preserved all facts, and the portions which have been omitted will be found to be, I. Measurements of distances; II. The remarks on "Were any of these cases true cholera?" III. Summary of deaths from acute diarrhœal diseases; IV. References to map accompanying report; V. Statistical tables; VI. Remarks on the origin and cause of the general epidemic; VII. General remarks; VIII. Conclusions.

SPECIAL REPORT.

A.—CHOLERA IN CINCINNATI IN 1873.

By J. J. Quinn, M. D., *Health-Officer.*

SANITARY CONDITION OF THE CITY.

From the severe winter and backward spring of 1873, and from other, perhaps unavoidable, circumstances, the approach of the warm season found the city of Cincinnati, as far as the streets and alleys were concerned, in what was spoken of by citizens, and at least one medical journal, as an unfavorable sanitary condition. Changes were being made, but not completed, in several departments of the municipal government, and the annual spring house-to-house examination of dwellings was delayed. This, however, had not lessened the usual efficient action of the late health-officer, and private nuisances were promptly abated whenever discovered, but without the employment of any additional sanitary force or other extraordinary means.

The advent of warm weather brought with it the energy of a change in the street-cleaning department. The work of removing public nuisances, and thoroughly cleansing the streets, alleys, and gutters, had been commenced before the change, and was vigorously prosecuted afterward, not only by the ordinary means, but with the aid of fire-plugs and steam fire-engines. In the mean time, special attention was given by the sanitary force to the discovery and abatement of private sources of danger to the public health; and the 14th of June, the day upon which the first fatal case of cholera is reported to have occurred, found Cincinnati, it is believed, in as favorable sanitary condition as most of the large cities of the country. Nuisances there were in the city, which it had been found impracticable to remove; they were, however, for the most part, remote from dwelling-houses, and their pernicious effect on the public health has not been very clearly demonstrated, though there can be little doubt they had an injurious influence.

MORTALITY OF THE CITY PRECEDING THE EPIDEMIC.

Cholera had made its appearance in New Orleans in the previous February, and had been prevailing in different parts of the Southern States; and, although it was not entirely unexpected in Cincinnati, no unusual amount of sickness, nor the prevalence of a particular type of disease, gave premonition of its approach. Besides its natural and ordinary growth, the population of the city had been increased by the extension of the corporate limits on February 1 over territory containing about 1,350, by the annexation on March 18 of an additional ward containing about 5,000, and by the accession on June 9 of territory containing about 1,150 inhabitants. Notwithstanding this, there seems to have been little difference between the mortality immediately preceding the appearance of cholera and that of the corresponding period of previous years; not so much even as often occurred in the respective mortalities of particular periods of other years. Without the aid of any epidemic influence, great difference in the percentage of mortality is often found in the corresponding periods of different years. The following shows the mortality for the month of May:

	1871.	1872.	1873.
Deaths	319	407	404
Still-born	21	31	29
Total	340	438	433

It is proper to state that a severe small-pox epidemic, which had prevailed during the winter, still lingered in May, 1872. Making allowance for the deaths from that disease, and for the natural and unusual increase, by annexation, of the population in 1873, the ratio of increase in deaths was about the same as in previous years.

During the first three days of June the mortality in these years were, in—

	1871.	1872.	1873.
Deaths	33	47	36
Still-born	3	5	3
Total	36	52	39

There were also in this period for 1872 ten deaths from small-pox. Deducting, however, the deaths from small-pox which occurred in each of the three years, the mortality from all other causes was 32 in 1871, 37 in 1872, and 35 in 1873.

These statistics show the mortality immediately preceding the beginning of my administration as health-officer, June 4, to have been about the same as in previous years, making allowance for increase of population, prevalence of small-pox, and other ordinary circumstances. A comparison of the first ten days of my term of office, or until the appearance of cholera on the 14th of June, with the corresponding days of the two preceding years, reveals a greater difference in the mortality, but not against the present year. The mortality was, from June 4 to June 13, inclusive:

	1871.	1872.	1873.
Deaths	135	108	117
Still-born	6	9	10
Total	141	117	127

From these facts it must be evident that no unusual number of fatal cases of disease gave warning of the advent of cholera. There being no record of non-fatal cases of sickness kept in the city, except of those treated in public institutions and those which occurred among the out-door poor, it is impossible to make a comparison of the whole amount of sickness prevailing in this period of 1873 with that of previous years; but, from all the data that can be obtained, it would appear that the general health of the city was at least as good as in former years.

What was true of fatal cases of disease in general was equally true of each particular cause of death. The prevalence of no particular form of disease foreshadowed the coming of cholera.

FIRST INFECTED STEAMBOAT FROM A CHOLERA-DISTRICT.

Although constant communication by river and railroad had been kept up, from the first appearance of cholera in the South, between infected districts and Cincinnati, the first reported death from the disease took place, as already stated, on the 14th of June. It is proper to go back of that date, and inquire whether the disease had been imported or developed in the city previous to that time.

The steamboat John Kilgour left New Orleans, where cholera was prevailing, on May 13, and landed at this city May 23, having had three

deaths from cholera on board during the trip. From this it has been claimed that the cholera of 1873, in Cincinnati, dates with the 23d of May. I will therefore confine my present inquiries to the period following that date, although my investigations of the subject have extended beyond that time, with, however, the same result.

Cholera made its appearance on the John Kilgour upon the second day after she left New Orleans. The first victim was Mr. John Schenck, a prominent citizen of this county, who died about forty miles above Vicksburgh; the second was a deck-passenger, who died about fifty miles above Cairo, on the Ohio River, and was buried soon after death; the third, who was also a deck-passenger, died twenty-five to thirty miles below Evansville, Ind., and was buried at Rome, one hundred miles below Louisville. The steamer was well washed and scrubbed several times afterward; the state-rooms were thrown and kept open for full and free ventilation, and the whole boat was thoroughly disinfected, different agents having been obtained at Evansville for that purpose.

No person had any symptom of cholera on the voyage except those who died. All the deck-passengers left the boat at Louisville. The captain was acquainted and subsequently met and conversed with many of the cabin-passengers; he knew all the officers and crew; and neither he nor the other officers have heard of a single person on board having had any symptom of cholera after the trip.

The remains of Mr. Schenck were placed in an air-tight casket at Greenville, Tenn., about ninety miles from the place of death, and forwarded from Memphis by rail, in charge of Adams Express, to Cincinnati. From Cincinnati they were taken to the late residence of the deceased, about nine miles from the city, thence to the cemetery, one and a half miles distant, without being removed from the hearse, and deposited in their final resting-place before the performing of the religious ceremonies, which took place in the adjoining church, after the interment. The casket was never opened after it had been hermetically sealed at Greenville, one thousand miles from Cincinnati. Mr. Schenck left a widow and ten children. None of the family has since had cholera or anything resembling it; neither has any one of over one hundred persons who attended the funeral; nor has there been a death from cholera nearer than Carthage, a village some three or four miles distant, across the country, and on a direct road from the city, in a different direction. No case occurred outside of the city on the road to the residence of the deceased, over which the funeral cortege passed; and no case occurring in the city since can be traced to the John Kilgour, to anybody on board, or to anything connected with the vessel.

If this boat brought the disease to Cincinnati, we might expect to find some of the first cases developed in the city among its passengers, officers, or crew; among some of the friends or acquaintances visited by them, or among persons having some intercourse with the boat. Or, if the disease had been at first overlooked as genuine cholera, we might expect the first fatal cases, pronounced diarrhœal affections, in some manner connected with the boat, or with some article carried by her from an infected district. What was the fact?

CHOLERA MORBUS.

The first death reported from any diarrhœal cause, after the arrival of the John Kilgour, took place at No. 1327 East Front street, on the 26th of May. This was a case of diarrhœa, in a child four months old,

and will be referred to again. The second occurred in the Cincinnati Hospital, on May the 27th. The case was reported in the certificate of death, by the attending physician, as cholera morbus; duration of the illness, six days. The attack, therefore, commenced two days before the Kilgour arrived at the wharf.

The patient was a stranger in the city, a farmer from the extreme eastern part of Kentucky, where no cholera had then or has since prevailed; nor did his course to Cincinnati lay through any cholera-infected locality. It is not unusual for persons from the country, especially in the early part of the warm season, when the use of new vegetables has just been commenced, to experience, from change of diet, water, or other cause, more or less disturbance of the bowels. Soon after his arrival this visitor was seized with diarrhœa, and taken, May 22, to the Cincinnati Hospital. When admitted, he was, the record says, "bleeding some at the nose. On the 23d, he had light-colored stools; on the 24th, his stools were dark colored; on the 25th, they were tinged green; on the 26th, there was little diarrhœa; on the 27th he was seized with convulsions, in which he died. The duration of his illness was recorded as six days, his residence in the city at one week. His death, as already remarked, was returned to the health-office, with the certificate of the physician, as cholera morbus; and certainly the epistaxis and convulsions would not point it out as a case of genuine Asiatic cholera.

The next case reported as cholera morbus, which proved fatal, occurred in the practice of Dr. George E. Walton, died May 12, also in convulsions, and had, besides, sanguineous discharges from the bowels. The patient was a child, twenty months old, living with its parents, at No. 237 Longworth street, in a high and healthy neighborhood. The parents had not been near any person or thing associated with cholera. This child's illness lasted only twenty hours.

Some physicians might hesitate to pronounce a diagnosis of first cholera cases, on account of the doubt and incredulity that might be entertained by members of the medical profession, until the presence of the disease was well established and generally acknowledged. It would be difficult, however, to show that these two, which were the only cases reported as cholera morbus until June 16, should have been diagnosed true Asiatic cholera. And if they should be so pronounced, it would not be very evident that they were either imported or contracted from an imported case.

CHOLERA INFANTUM.

The first death from cholera infantum, after the 23d of May, occurred May 30, after three days' illness. The patient was a child two months old, living on York street, a distance of 6,650 feet, or more than one and one-fourth miles, in a direct line, from the nearest railroad-depot, and 9,800 feet, or nearly two miles, from any steamboat-landing. On the same day, at No. 510 West Fifth street, a distance of 6,950 feet, one and one third miles from the first case, five squares from the nearest southern railroad-depot, and 6,200 feet, or more than a mile, from the wharf at which the John Kilgour landed, the second death from this disease took place. The patient was a child seven months old, and died after four days' sickness. The third death occurred June 4, at No. 21 Park street, four squares from the last case, 5,000 feet, or nearly one mile, from the steamboat-landing, and one square from the Ohio and Mississippi Railroad depot. The child was two days old, and two days sick. On the same day, after an illness of five days, the fourth fatal case took place at No. 117 Betts street, 2,500 feet, or nearly half a mile, from the near-

est death mentioned above, 6,000 feet from the Ohio and Mississippi depot, and 8,000 from the public landing. The patient was two months old. The fifth death from cholera infantum took place at the Burnet House, on June 6; the child was six months old, one day sick, and only one day in the city from the South.

This was the first patient attacked with any diarrhœal disease, who had come from a suspected district. No case of cholera, or of any from diarrhœal disease, occurred subsequently nearer the Burnet House than two and one-half squares. That case was one of cholera, and died at the Henrie House, nearly a month later; and no connection could be established between it and the Burnet House case of cholera infantum.

The sixth fatal case of cholera infantum occurred more than four miles from the river; death took place June 7; age of the child, seven months. On June 8, the seventh case, aged ten months, died on Liberty street, after three days' illness. The nearest previous death to this, from diarrhœal causes, was about ten squares distant. At No. 337 Walnut street, and on June 11, the eighth case died; age, one year; duration of illness, two days; several squares distant from the last-mentioned case, and 8,500 feet from the river. The ninth case of cholera infantum, or the last which terminated fatally, between the 23d of May and 14th of June, died June 13; age, eleven months; duration of attack, three days; residence, No. 79 Dayton street.

With the exception of the patient at the Burnet House, these children were all natives of the city. The parents of one had no acquaintance or communication with those of any of the others, and their homes were, for the most part, at widely-separated points. The two nearest cases to each other were the first and last, and they were about two squares apart.

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ACUTE DIARRHŒA.

It would be difficult to discover anything in the reports of these cases showing they were not what they were represented to be. Nor would it be easier to find any characteristic symptom of cholera in the following reported cases of diarrhœa during this period. The first fatal case of diarrhœa, referred to above, occurred on East Front street, 9,000 feet in a direct line (15,000 feet, or nearly three miles, by the line of travel on either road or river) from the public landing, and 6,800 feet in a direct course from the nearest railroad-depot, or 11,600 feet by the line of street. The patient was a child four months old; duration of attack, twenty-four hours; date of death, May 26. The second fatal case was also a child four months old, who died May 31, after ten days' sickness, at 180 West Third street; distant, directly west, from the first case 11,500 feet, or more than two miles, and more than four miles by the line of travel. The third occurred on Mount Adams, at a point (midway between these two cases) 3,500 feet from and 340 feet above the level of the Ohio River. This child was nine months old, and three weeks sick. The fourth case was three months old, twenty-four hours sick, and died June 10, on Vine street, above Liberty, formerly the northern boundary of the corporation, and still north of the densely-populated portion of the city. This case occurred 9,000 feet, or more than one and a half miles, from the river.

Three fatal cases of chronic diarrhœa were reported during this time, only one of which was an adult. The first was a female, twenty-one years of age, who had suffered under the disease four months; another

was a child who had diarrhœa from birth; the third was a child nine months old, the last third of whose life was a prey to the disease. None of these cases were located near any of those mentioned above. It may be added that, as in the cases of cholera infantum, none of the families in which death took place from diarrhœa had any acquaintance or intercourse with the others.

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LATER CASES OF DIARRHŒAL DISEASES.

There were probably cases of cholera occurring at a later period, which, from the absence of some well-marked symptom or symptoms, were set down to kindred diseases. These occurrences, however, took place after, not before, the acknowledged appearance of the epidemic. It so happened that the first fatal cases of true cholera fell into the hands of physicians who recognized the disease and gave it, in their certificates of death, its true name. From these cases the manner in which the epidemic entered the city cannot be traced. Had it been possible to have obtained a history of all the cases, those that recovered as well as those that died, the introduction of the disease might possibly have been traced through their history. But even if this could have been done, it would be difficult to trace the first fatal case to any imported cause; and the mode of propagation afterward would still have remained a mystery. No two cases occurred in the same block or had any connection with each other, with the exception of a single instance, in which father and child died in the same house upon the same day, until sixteen deaths from cholera were reported in widely-separated parts of the city.

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No cholera-epidemic influence is necessary to explain the difference in the number of deaths from these causes, in the corresponding periods of these different years. The deaths from them were less in 1873 than in 1871, and the havoc made by small-pox among children in 1872, diminishing the material for the ordinary summer-complaints of infants, would account for the difference in that and the present year, even without taking into consideration the difference in population, although two of the cases actually occurred in the newly-annexed territory. Neither in their variety, in the number of cases, ages of the patients, or violence of the attacks, were the diarrhœal diseases for three weeks preceding the appearance of cholera materially different from other years. What is here said of specific diseases may also be said of diseases in general.

The total mortality from May 23 to June 13, inclusive, excluding still-born, was in 1871, 288; 1872, 264; 1873, 261.

FIRST CASES OF CHOLERA.

These facts show pretty clearly that Cincinnati was not only free from any unusual severity in ordinary diarrhœal affections, but was in the enjoyment of its usual health when the first case of cholera was reported. The certificate of death gave the name of Philatine Gundlock; age, forty-five years; widow; residence, 57 Oliver street; residence in the city, twenty years; previous residence, Germany; duration of last illness, twenty hours. Being desirous of tracing the introduction of cholera into the city, I addressed a note to Dr. N. Leaman, who attended the case, requesting answers to certain questions, and stating as a reason

for the request that, as this was the first case reported, it was desirable to obtain as full a history as possible of the origin of cholera in the city, its mode of introduction, &c.

Similar inquiries were made in the investigation of subsequent cases. The following were the questions:

"What were her habits of life?

"What kind of labor or work was she in the habit of performing?

"Had she been recently out of the city; and, if so, when, and to what place?

"Had any person from other localities been visiting her? If so, was the visitor from a locality where the cholera was or had been prevailing?

"Had she recently visited or nursed any sick person having symptoms of cholera or cholera morbus; or attended the funeral of any one dying with symptoms of diarrhœa?

"Was her dwelling clean, and what was its situation in relation to light and ventilation?

"Were there any filthy gutters, stagnant pools, or other nuisances in her neighborhood at or before the time of her attack?

"What were the sanitary surroundings of her residence?

"Had she, prior to her illness, made any alteration in or departed from her accustomed diet or drink?

"Did you discover any exciting cause; and, if so, what?"

[We are obliged from want of space to omit the details of the fourteen cases which have been reported somewhat in detail by Dr. Quinn; they are, however, sufficiently noted for all practical purposes in the following remarks.—McC.]

These cases occurred during the first six days of the epidemic, and are mentioned somewhat in detail because they were the first fatal cases reported. None of the parties, except the father and child at 160 Hamilton road, had any association with the others; neither had been out of the city for three months or more; neither had any communication with the steamboat, or with a railroad-depot; and neither, as far as can be ascertained, had been in contact with persons from cholera-infected districts or cholera-patients. The local or proximate cause in the first case was, in the opinion of the attending physician, the large meal of batter-cakes and green vegetables. In the second case, the patient himself attributed his sickness to ice-cream and radishes, eaten on successive days. The circumstances surrounding the patient, with his irregularity of habits, might be sufficient, if the remote cause were present, to account for the development of the disease in the third case. Whether the fourth patient had been imprudent in his diet could not be learned, and whether sewer-gases, from the catch-basin in front of her own residence, had any connection with her attack, may be a matter of speculation. The fifth patient occupied dark, badly-ventilated rooms in unclean premises, and had used green vegetables for food. The sixth had also eaten green vegetables, which, at that time, were considered by most persons, from their own experience alone, very unwholesome. The seventh had not only eaten unripe vegetables, but also uncooked meat. The eighth had been overheated, and taken an unusual quantity of cold beer. The premises where the ninth death occurred were in bad sanitary condition, and the patient was in feeble health at the time of the attack. The tenth patient had indulged in the excessive use of liquor. Little could be learned, at the time of death, of the eleventh and twelfth cases, and as the widow with the surviving child soon afterward returned to Germany, nothing could be learned since. It is known, however, that the father had suffered from diarrhœa for

two weeks before the cholera-symptoms set in, and that these had followed the use of sour wine. The habits of the thirteenth patient, who lived in a boarding-house with bad sanitary surroundings, could not be ascertained. An overcrowded tenement-house was the home of the last case mentioned. It is not known upon what diet the child had fed.

These cases, with the exception of the eleventh and twelfth, took place in different and distant parts of the city. They were spread 10,800 feet, or more than two miles, from west to east, and 15,800 feet, or nearly three miles, from south to north. The location of the first case was 8,750 feet, or more than one and a half miles, from the public landing, and 7,400 feet, or more than one and a quarter miles, from the nearest southern railroad-depot, and not on any line of travel from either of these points to any business part of the city. The second case was 3,600 feet from the river, 5,000 feet from the nearest southern railroad-depot, and 4,800 feet, or nine-tenths of a mile, from the first case. A railroad, which makes connection with Louisville, passes the location of the third case, but the cars are not stopped to exchange passengers or freight nearer than 4,200 feet from the place. Its distance from the public landing was 9,150 feet; from the second case, 8,350 feet, or more than one and a half miles; and from the first, 7,000 feet, or about one and a third miles. The fourth death took place at a point near the base of the triangle formed by lines connecting the localities of the first three cases, at the distance of 4,350 feet from the first, 3,950 from the second, and 6,735 from the third case. The patient's own residence was within the triangle, nine squares north of this. Its distance from the first case was six blocks, from the second about 4,000 feet, and from the third over 6,000 feet. From the fifth case to the fourth, which was the nearest reported up to that time, the distance was 4,400 feet. The sixth case was 2,600 feet, the seventh about 900 feet, the eighth 3,000 feet, and the ninth 2,100 feet from the next nearest cases, respectively. From the tenth to the fourth, which was the nearest previous case, the distance was 550 feet. From the eleventh and twelfth to the nearest fatal case that had occurred the distance was 2,400 feet. The thirteenth patient was seized with the disease at the distance of nine squares from the nearest previously fatal case of cholera; and the fourteenth, two squares from the nearest death from the same cause.

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It may be remarked that, with comparatively few exceptions, no relation could be traced between cases; and that when an apparent connection existed, it might, in most instances, be fairly attributed to a common proximate cause.

It is also proper to state that in no instance did a death from cholera occur at a greater elevation above low-water mark in the Ohio River than 175 feet, and few fatal cases occurred at a higher altitude than 115 feet. Low-water mark in the Ohio River, at Cincinnati, is 430½ feet above tide-water in the Gulf.

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The total deaths reported from cholera were 207, distributed as follows:

In hospitals, previous histories of patients and places where attacked not known	22
In different parts of the city, residences not found	8
In hotels	1
In private residences	34
In tenement and boarding houses	142
Total	207

Few of the patients who died in hospitals could be traced to their homes. Some were non-residents, taken from steamboats; some had no fixed or permanent homes; and others were boarders in different parts of the city, little of whose histories could be learned. It was ascertained, however, that three of them had been in previous ill-health, two others had been imprudent in the use of intoxicating liquors, and one imprudent in diet. In addition to these, two labored under great mental excitement and dread of the disease, before their attack. It was also known that all were members of different families.

Cases were reported on sparsely-built streets, in houses not numbered, and some were returned with the wrong name of the patient, or the wrong number of residence. There were eight of these, the sanitary condition of whose homes and whose habits of life and history of attacks could not be learned. No two of them, however, belonged to the same family. There were also seven other cases, whose residence, though examined and included in the following table, cannot be indicated upon the map, in consequence of its partial boundaries.

A youth, fourteen years of age, died in one of our large hotels. He had been attending school in the city, though his home was in another part of the State, and no exciting cause could be discovered to account for the attack. The hotel was clean, excellent in its appointments, and well kept. No other death from cholera was reported in this or any other hotel in the city.

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It was difficult to obtain from surviving relatives an acknowledgment of imprudence in diet, drink, or habits of life. But when reliable histories of the patients could be obtained, a probable exciting cause could generally be discovered, either in the habits of the patient, the overcrowded condition of the dwelling, or the sanitary aspect of the premises or surroundings. The term "exciting cause" is used in the sense in which soil, moisture, heat, and light excite vegetation. On the theory that cholera-germs were present, they seemed no more capable of development without extraneous aid than seeds of grain upon a barren rock. There was no panic in the city, and few cases could be attributed to fear, a frequent proximate cause in the cholera-epidemics of 1849 and 1866.

Of one hundred and seventy-six patients whose residences were known, thirty-two were members of thirty-one families, occupying an entire dwelling each; two were visiting relatives in a private family occupying one house; and one hundred and forty-two lived in tenement or boarding houses.

DEATHS IN PRIVATE RESIDENCES.

Thirty-four deaths took place in thirty-two private residences. Thirty of the private families had one death each; one had two deaths; and in the other took place the death of the two visiting relatives.

MULTIPLE CASES IN PRIVATE RESIDENCES.

The last two were the first multiple cases in private residences, and were the one hundred and thirty-seventh and one hundred and forty-second fatal cases that occurred in the city. One of the patients was a lady from Newport, Ky., who had merely visited her sister for the purpose of spending the day. She had just recovered from an attack of cholera at her own home, and was laboring under diarrhœa in the fore-

noon of the day of her visit. She ate, however, a hearty dinner of plain food, was seized with vomiting two hours later, and died next day, July 9, the duration of the attack being twenty hours. Her son was unexpectedly summoned to her bedside, labored under great excitement, and became very much exhausted from attendance upon his mother. His death took place July 10, after twenty-six hours' illness. The sanitary condition of the premises and surroundings was good. The house was upon the same block on which case No. 2 occurred, and distant from it about half a square. Some might attribute these cases to the latter fact; others would probably regard at least the first of the two as an imported case from Newport.

The other multiple cases in a private residence are 175 and 177, those numbers indicating the order of their occurrence. Both patients were children, aged, respectively, four and seven years. The first died August 2 after six, and the second August 3 after eight, hours' illness. Nothing which might be considered as the proximate cause of the disease could at first be discovered. The family lived comfortably, in a clean and healthy part of the city; great prudence had been exercised in directing and regulating the habits and diet of its members; the house itself was well arranged for ventilation, and in excellent sanitary condition. A closer examination of the premises showed an unusual construction of the soil-closet, or privy. The vault was situated in a wood-shed and arched or covered over. At a distance from the shed, toward the center of the yard, was the privy-house, fitted up with hoppers in water-closet style, but without any traps, water, or water-pipe connections. The hoppers were connected, by a downward soil-pipe, with the closed vault in the wood-shed. The inclination of this pipe was not sufficient to carry downward, toward the vault, semi-fluid material. Here were a vault and privy-connections, unintentionally arranged for the confinement of noxious gases, and for their escape in the most concentrated form, whenever pressure and agitation from drenching the soil-pipes were brought to bear. This took place every day, as the pipe was that often flushed with water. This out-house was used by the children, and around it were their accustomed haunts.

An occupant of the adjoining building, whose windows overlooked the out-house, was also attacked with cholera about the same time with these children, but recovered.

The thirty private houses, in each of which one death took place, contained one hundred and thirty-four rooms, and were occupied by one hundred and forty-one persons. The two houses in which multiple cases occurred contained ten rooms, and were occupied by nine persons. In twenty-eight, the sanitary condition was good; in the other four it was more or less unfavorable.

DEATHS IN TENEMENT AND BOARDING HOUSES.

One hundred and forty-two persons died of cholera in one hundred and thirty-one families, who lived in one hundred and thirty-one different tenement or boarding houses. The houses contained, in all, seven hundred and thirty-four families, numbering two thousand nine hundred and eighteen members. One hundred and twenty-two of the patients were members of the same number of families, and lived in houses in each of which only one fatal case occurred. These one hundred and twenty-two families numbered four hundred and thirty-eight persons, and occupied two hundred and sixteen rooms. The houses were also

occupied by six hundred and fifty-eight other families, consisting of two thousand two hundred and ninety-two persons. Forty-nine of these houses had favorable surroundings; of seventy-three, the vaults were full or foul, the premises unclean, or the surroundings bad.

MULTIPLE CASES IN TENEMENTS.

Twenty of the one hundred and forty-two patients who died in tenement or boarding houses were members of nine families, seven families having two, and two families having three deaths each. These families consisted of forty-four persons, lived in nine different houses, and occupied eighteen rooms. The same houses were occupied by forty-four other families, consisting of one hundred and eighty-five members, making fifty-three families of two hundred and thirty-nine persons in nine houses. Five of these houses had clean premises and surroundings; the premises or surroundings of the other four were in bad sanitary condition.

In speaking of the sanitary condition of premises, it is not deemed necessary to refer to that arising from overcrowded buildings, further than to state the number of members in the families, with the rooms occupied, and number of other occupants of the buildings. The character of the tenement and boarding houses, in which deaths from cholera occurred, was as follows: fifty-one two-story, sixty three-story, and four four-story, brick; and fourteen one, and two two-story, frame. For the most part the yards were small, and in many instances so inclosed by walls and houses as to preclude the free circulation of air.

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All these patients except two were either natives or residents of the city for some time previous to their attack. None of the families in which the deaths took place had lived in their respective residences less than one year; and none, except that in which cases Nos. 137 and 142 occurred, had any intercourse with persons from infected districts.

The history of Nos. 11 and 12, as far as could be learned; Nos. 137 and 142, and Nos. 175 and 177, has already been given.

Nos. 17, 26, and 27 lived in the upper and rear part of a three-story brick, on the second level of the city, in the midst of a densely-inhabited neighborhood, and surrounded by large tenement-houses. The family had resided in the same place for eighteen months. The father was a baker, and worked at some distance from his home; the mother had just been delivered of twins, and the usual care could not be given to the children. The first child attacked with the disease was seized upon the street, while at play, with vomiting, and discharged from the stomach a large quantity of cherries. To quiet one of the other children, she was taken to a neighboring saloon and fed upon pretzels and beer. Four families, of seventeen persons, occupied the house; the rooms were clean and well ventilated; but the vault beneath the windows of the apartments occupied by the patients was full and foul.

Nos. 20 and 29 were children, aged, respectively, twelve and eight years. They occupied with their parents two rooms on the upper floor of a three-story brick tenement-house. The house was occupied by five families of thirteen persons. The premises were clean, and nothing definite could be learned of the diet of the children.

Nos. 30, 31, and 32 lived about one square from Nos. 17, 26, and 27. The family, consisting of the father, mother, and two children, occupied two rooms on the ground-floor, in a two-story double frame building. The building contained four families, and was separated by a joint yard,

about 16 feet wide and 30 feet long, from a three-story brick tenement-house, containing eight families of twenty-seven persons. A large privy, common to the inmates of both tenements, occupied the center of the yard. The western part of the yard was occupied by outside stairs, leading to the second story of the frame; porches along the brick building covered the eastern side; and the hydrant, which must have been running most of the time, to supply so many persons, kept the front, where it was located, continually damp. This yard was so obstructed, on three sides, that no current of air could pass through it. Little sunlight could enter it at any time, and none for the greater part of the forenoon or afternoon.

The father was a musician, and was engaged with a band, on June 22, playing in a religious procession. The day was extremely hot, and the children, according to the statement of the mother, became very much excited and overheated in following the procession. On his return in the evening, the father found them prostrated with the disease. They lived until the next day, when he was also attacked; his case terminated fatally on the day following. He had been exposed to a hot sun during a long walk on the 22d, and became very much agitated to find his children so ill on his return.

Three families, of eleven persons, occupied the house in which Nos. 59 and 60 occurred. The house was a two-story brick, the privy-vault to which was in foul condition, though the surface of its contents was 8 feet from the ground.

The seventy-eighth and eighty-ninth cases were mother and child. The family consisted of the parents and two children, and occupied two front rooms in the third story of a brick tenement-house. Seven other families, of twenty-nine persons, lived in the same building. The vault was full and foul. The neighborhood was clean, and, to the front and sides, occupied with similar tenements. From the rear extended northward one of the hills which surround the city, and which was sparsely built upon. Another death from cholera took place on the adjoining street almost immediately in the rear of these families. That patient had been sick eight days, and died two days previous to case No. 78.

Cases Nos. 81 and 85 were twins and died upon the same day, after the same duration of illness. The family consisted of nine members, and occupied two rooms in the rear of the second story. The house was a two-story double frame, situated in the eastern part of the city, in front of a high hill, and one square north of the Ohio River. Between it and the river were no residences or buildings to obstruct the breeze from the water; on the side-hill, to the rear, were also few houses. The building contained twenty-eight rooms, which were occupied by thirteen families, of seventy-three persons. Upon the premises were two vaults, both of which were in a very filthy condition.

The building in which cases Nos. 115 and 116 occurred was a three-story brick, well ventilated, and clean. The entire premises, street, and immediate surroundings were in good sanitary condition. The patients were brothers—healthy, robust young men. On the 4th of July they attended a large picnic, given to German societies on a visit from other cities, and at which beer and wine were the most prominent refreshments. Both day and evening, at the picnic and afterward, were spent by these young men socially and convivially. They were seized before the next morning with cholera, and died, one after twelve, the other after eight hours' illness.

No satisfactory history could be obtained of Nos. 202 and 205. The

family consisted of eight persons and lived in a three-story brick house, occupied by two other families, of thirteen members. The house, street, and neighborhood were clean, and, with the exception of being situated near the low, marshy bottom of Mill Creek, in good sanitary condition.

NON-FATAL CASES.

In the above I have only included fatal cases of cholera, but in their examination every actual, apparent, or probable connection with non-fatal cases has been duly considered. Non-fatal cases are not included for the very satisfactory reason that full returns of the number which occurred could not be obtained, and for the additional reason that the histories of many of the reported cases of recovery were incomplete or altogether absent. Any attempt at a full and complete history of them would therefore be defective. As I have aimed at definiteness and accuracy, and not at what might merely be plausible or possible, I have preferred not to essay at this time a report which would necessarily have for its foundation only partial returns of numbers and incomplete histories of attacks. At another time such history may be given of non-fatal cases as would be warranted by the reports already received and which may yet be obtained.

ORDINARY DIARRHŒAL DISEASES.

Although there was no unusual number of deaths from diarrhœal diseases before the appearance of cholera, the mortality reported afterward from cholera morbus, cholera infantum, and acute diarrhœa, was largely in excess of that from the same causes in previous years. Whether this excess was due to the confounding of these diseases with true cholera on account of the absence of some prominent symptom, or whether there were two or more epidemics running parallel with each other, may be determined by each medical reader for himself.

Most of the fatal cases reported as cholera morbus, cholera infantum, and acute diarrhœa, were wanting in one or more of the characteristic symptoms of Asiatic cholera. In only two of the cases has it been established that rice-water discharges were present. There is reason to believe that they were present in one other case. None of the others, as far as can be ascertained, had rice-water evacuations, husky voice, or corrugated fingers. In only a few was there suppression of urine, and when cramps existed they were described as of a much less violent character than those usually accompanying Asiatic cholera. It is well known, however, that cholera can exist, and even prove fatal, without the presence of rice-water stools, and it may be that the absence of this, or other prominent symptoms, led to errors in diagnosis.

There would not, therefore, seem to be any impropriety in regarding the excess, at least, of fatal cases of what was reported as the ordinary diarrhœal diseases of summer as due to the same influence that produced the undoubted cases of cholera. For this reason I give the deaths reported from cholera morbus, cholera infantum, and acute diarrhœa, on each day, from June 14 to October 18, together with the total mortality from these causes during the year, and during the years 1870, 1871, and 1872.

* * * * * * *

CHARACTER OF THE DISEASE.

The late cholera has been supposed by some not to have been of the genuine Asiatic type. Some have regarded it as Asiatic cholera, but not as generally characterized by all the prominent symptoms of the

disease, as in former epidemics. If all the cases which were reported under the names of cholera morbus, cholera infantum, and acute diarrhœa are to be regarded as typical cases of the cholera of 1873, there would seem to be grounds for the belief that in Cincinnati, at least, some of the hitherto-prominent symptoms of Asiatic cholera were absent. Whether such was the case in Nashville and elsewhere, where the epidemic was more devastating in its course, is best known to the medical profession of those places.

The cases that fell under my own observation, those that recovered as well as those that died, were as well marked as any encountered by me in former epidemics of the disease. It is possible for an exotic disease to be transplanted, or become naturalized, and yet retain all the characteristic symptoms and virulence of the original type; it may also undergo some change or modification in its character.

It might be a matter of interest, but can be of little practical importance, to determine whether the late scourge was an indigenous disease, merely resembling in symptoms and violence the cholera of the Ganges, since it was governed by the same laws in its mode of propagation, demanded the same treatment, and was attended with the same results as the Asiatic cholera of previous epidemics.

GENERAL SUMMARY.

Cholera was in New Orleans as early as February 9, 1873.

It has been pretty conclusively proven by the health authorities of New Orleans that the epidemic of 1873 was not imported into that city by vessel from any European or transatlantic port.

From New Orleans the disease traveled as far north as Little Rock, on the Arkansas; Davenport, on the Mississippi; Yankton, on the Missouri; and Pittsburgh, on the Ohio Rivers; following, apparently, the larger water-courses, and up the tributaries of the Ohio into the interior of Tennessee and Kentucky. It also visited interior towns situated upon small streams of water, and made its appearance in Chicago and Cleveland, upon the southern borders of our large lakes.

In its travels northward it frequently avoided one commercial point to settle in another and more distant one, although steamboats from infected districts had landed at, or passed by, the avoided towns, and although communication by other modes of travel was uninterrupted. At later periods it broke out at some of the points which had been thus passed. It was in Louisville eight days before it broke out in Evansville. It passed Owensborough, Ky., two months before it broke out at that place. It made its appearance in Burlington, Iowa, on the same day as in Saint Louis, passing by Hannibal, where it did not appear until nineteen days afterward. It was in Chicago nearly two months before it was in Cleveland, and one month before it was reported in Saint Louis.

The first infected steamboat or vessel on which deaths from cholera had occurred, arriving in Cincinnati from New Orleans during the prevalence of the epidemic in the South, brought no case of disease to the city, neither could any subsequent case be traced to it; nor did the same boat leave the disease at Evansville, where it landed for disinfectants; at Louisville, where it discharged all its deck-passengers, among whom two deaths had previously occurred; or at other places where it stopped to discharge passengers or disload freight.

Although constant and daily communication was kept up from the first appearance of cholera in New Orleans between Cincinnati and

cities on the Mississippi and Ohio Rivers where the disease was prevailing, the first fatal case in Cincinnati occurred on June 14, only two days after the disease broke out in Evansville, three hundred and fifty miles below.

On its appearance in Cincinnati the streets and alleys were clean and the city generally in a fair sanitary condition. Neither the amount of disease nor the prevalence of any particular type gave premonition of its approach.

No connection can be established between the first fatal cases of cholera and any steamboat landing, railroad depot, imported cholera patient, or person from a locality where the disease had been prevailing. This was also true of the first fatal cases of what were reported as cholera morbus, cholera infantum, and acute diarrhœa, with the single exception of one case of cholera infantum at the Burnet House, to which no subsequent case of intestinal disease could be traced.

Had any non-fatal cases occurred in the city before the 14th of June, it might have been possible to trace some connection between them and an infected district, and also between them and some subsequent cases which proved fatal. The most careful investigation, however, has failed to discover the existence of anything like an attack of cholera from which the patient recovered before the 14th of June. The first death from cholera reported was the first case of the disease, fatal or non-fatal, as far as can be ascertained, that actually occurred in the city. But even if there had been recoveries from cholera in the city before that time, it would not be possible to trace any connection between them and the first fatal case that was reported, or between that case and a cholera-infected district. The patient lived a life of almost entire seclusion, off from any direct line of travel to or from any steamboat landing or railroad depot, and had no intercourse whatever with persons who had been affected with any form of diarrhœal trouble.

Full histories of the first fatal cases were obtained at the time, or soon after their attacks; and the fact was well established that the parties were unacquainted with each other; resided in different parts of the city; had not visited abroad; received no visitors from places where cholera had been prevailing; and associated with no persons who had diarrhœal symptoms of any kind. Inquiries into the histories of the subsequent cases revealed, for the most part, a similar state of facts.

The first cases of cholera fell under the treatment of physicians who recognized their true character, and returned them, in the certificates of death, under their proper name. None of the earlier cases were improperly diagnosed or falsely reported. In some of the later cases, however, there may have been errors in diagnosis, arising from the absence of some prominent symptom, and these may have been returned under the name of cholera morbus or other disease. There was a large excess of deaths reported from the ordinary diarrhœal affections over the number occurring in other years, which might probably be attributed to cholera, or at least to the cholera influence.

It was difficult to obtain from the surviving relatives any acknowledgment of imprudence in diet, drink, or habits of life; but when such could be obtained an exciting cause could generally be discovered in inattention to diet, in the overcrowded condition of the dwelling, in the sanitary surroundings of the patient, or in a violation of some of the laws of hygiene. On the theory that cholera germs were present, the specific poison did not seem sufficient to develop the disease without the aid of some extraneous agency. Few, if any, persons who were known

to observe regular habits of life, prudence in eating and drinking, and who lived in clean and comfortable homes, fell victims to the disease.

Except in cases taken from steamboats, after the presence of the epidemic was established, the multiple cases Nos. 137 and 142, and one person from Pittsburgh, on a boat-race excursion, who spent most of his time in saloons near the river, no stranger in the city died of the disease. Gardeners and farmers brought their produce to market, country merchants purchased their supply of goods, and citizens visited abroad on business and pleasure; yet none of them were known to contract the disease, or convey it in their persons, or on their clothing, to other places.

In its travelings from Cincinnati, as in its journeyings toward it, the cholera seems to have followed the direction of the large and small water-courses. A case was reported to have occurred at Wheeling about June 9, although its prevalence there was not authoritatively announced until July 22. It was at Dayton, on the Miami River, July 1, and at Columbus, on the Scioto, July 5. It did not require from two to three weeks to travel to those cities by railroad lines. The first case in Hamilton, on the Miami River, and also on the line of railroad between Cincinnati and Dayton, occurred July 30. Carthage, the nearest suburban village visited by it, is on the waters of Mill Creek, and the patients there attacked had not been visitors to the city.

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B.—THE INTRODUCTION OF EPIDEMIC CHOLERA INTO THE CITY OF CINCINNATI, OHIO, IN 1873.

By William Clendenin, M. D., *late Health-Officer.*

During the summer of 1873 there were two hundred and seven deaths from cholera reported by the board of health as having occurred in the city of Cincinnati; the first death from that disease, according to the same report, occurring on the 15th day of June.

At this date, (June 15,) and preceding the time of its recognized existence in the city, the mortality had been about the same as in preceding years, and, according to the health-report, "no unusual number of fatal cases of disease gave warning of the advent of cholera." The same authority further declares that "the prevalence of no particular form of disease foreshadowed the coming of cholera."

We have, therefore, the best authority for stating that there was not the least indication of the existence of any *so-called* epidemic influence or atmospheric condition to which this outbreak of cholera in Cincinnati could have been attributed. This is a fact of the greatest significance, and one which corroborates the general history of the disease.

How, then, did the cholera originate in Cincinnati in 1873, and what was the mode of its introduction?

There are but two hypotheses upon which its presence could be explained, viz: It must either have had a spontaneous origin in certain local conditions at the time existing, or it must have been imported in some manner from some place where it was prevailing.

This is a question of the very highest importance to the public generally, as it has a distinct and weighty bearing upon the business interests of the city, as well as upon the health of the inhabitants; for if cholera has once been generated here, if those conditions under which cholera originates in Hindostan exist in Cincinnati, then is this terrible

malady liable to break out in our midst at any time. Then, the system of quarantine is not only useless, in so far as it affords protection against the introduction of cholera from abroad, but it is an embarrassment to commerce, to the merchant, and the traveling public, that should be removed at once. According to the decisions of the International Sanitary Conference on the origin, endemicity, &c., of Asiatic cholera "this disease is never spontaneously developed, and it has never been observed as an endemic, but it has always come from abroad."

We may learn something definite of the origin and mode of introduction of the cholera into this city in 1873 by studying the course of former epidemics and their mode of introduction. Cholera made its first appearance in the United States in the year 1832. It developed first on this continent at Quebec and Montreal, at which points the first vessel that ever came to this country with cholera on board landed passengers. From the places designated the disease radiated along the lines of travel in all directions. It passed along the Champlain and Erie Canals on canal-boats, and on the lakes in steamboats. It was carried from Buffalo to the Upper Mississippi by the troops of General Scott's command, and thence to Saint Louis by the steamboat Columbus, and from Saint Louis to Cincinnati on the steamboats William Parsons and the Sylph. The first cases in Cincinnati occurred on the 9th of October, the victims having been passengers from Saint Louis on the boats named. The epidemic had made its appearance in Cleveland, Ohio, three months earlier, or on the 10th day of July, as it appears from the following official bulletin from the Cleveland Board of Health:

"BOARD OF HEALTH,
"*Cleveland, July* 10, 1832—9 *o'clock a. m.*

"The board of health have the unpleasant duty to report that the steamboat Henry Clay arrived last evening in our piers from Detroit with three of her men sick, and, as the board of health have no doubt, with the cholera. She had been up with soldiers, among whom the disease broke out, and of whom eleven or twelve died, (of cholera,) with two of the boat's crew, &c.

"J. MILLS,
"E. W. COWLEY,
"And five other members of the board of health."

The epidemic of 1849 reached Cincinnati by way of New Orleans The facts are briefly these: The first two cases of cholera occurred in New Orleans December 12, 1848. The patients were a man and a woman, who were taken to the Charity Hospital, in the last stage of the disease, from the ship Swanton, which had just arrived from Havre. The Swanton's passengers were German immigrants. Seventeen persons died of the disease during the passage. The day following, that is, on the 13th of October, numerous cases appeared in the houses near the shipping. The disease was carried up the Mississippi River, and appeared at Memphis the 22d day of December. The steamboat Peytona arrived at Louisville December 28th from New Orleans, with a passenger-list of four hundred, and there were fifty deaths from cholera on the way.

The first cases of this epidemic occurred in this city on the 27th day of December, or, to state the facts more correctly, the first cases occurred at the wharf on steamboats just arrived from New Orleans, and were taken to the Cincinnati Hospital for treatment, immediately after which a few cases occurred among the inmates of the hospital. During the

next three weeks a few cases appeared in the vicinity of the public landing, among persons connected with river pursuits. In the hospital reports of interments for the week ending April 25, nine cases of cholera are reported, all of whom were boatmen and others taken to the hospital from the wharf.

Prof. George Mendenhall, in a report of this epidemic made to the American Medical Association, states that "the amount of sickness (in Cincinnati) during the months of March, April, and May was very small, and the proportion of bowel affections not in greater amount than usual. Notwithstanding this, we occasionally had a case of cholera occurring, but they were very few, and confined to the lowest class of our foreign population, until about the 1st of June." The number of deaths reported from cholera from the 1st of May to the 30th of August, 1849, was 4,114.

The cholera was carried to Chicago (in 1849) from Saint Louis by a party of emigrants directly from New Orleans, on a canal-boat passing through the Illinois and Michigan Canal.

The facts relating to the epidemic of 1866 may be briefly stated: The steamship Virginia left Liverpool on the 4th of April, 1866, with a large number of German immigrants, and landed at the lower quarantine, New York, on the 17th. During her passage cholera broke out among the steerage-passengers, thirty-eight of whom died; and Dr. Burdett, who, after making the usual medical examination, (at the quarantine,) found twenty-eight of the passengers in the steerage lying sick with the cholera. The disease was communicated to the troops on Governor's Island, in New York Harbor, among whom it broke out on the 3d day of July. A detachment of recruits from Governor's Island were sent to Newport Barracks, where they arrived on the 10th of July. The first death from cholera that occurred in Cincinnati was a German lady, who, the day of the arrival of the troops from New York, had visited Newport, and crossed the river on the ferry-boat with them. Late in the night, July 10, she was attacked with diarrhœa, vomiting, and cramps. The next day she became collapsed, with profuse rice-water evacuations from the bowels, suppression of urine, &c., and died sixteen hours after the first symptoms appeared.

A part of the same detachment of recruits which carried the disease to Cincinnati were forwarded to Louisville, Ky., where they arrived between the 16th and 19th of July. The first case of cholera in Louisville occurred on the 29th day of July, and was one of these recruits from Governor's Island. The disease was carried thence to Bowling Green, Ky., and during the last of August and first of September recruits arrived at Nashville, Tenn., from Newport Barracks, Kentucky. The first three cases there occurred among these recruits; and, finally, the first case at Memphis, Tenn., was a recruit who had arrived the day before from Nashville.

Recruits from New York Harbor arrived at New Orleans on the 8th and 16th of July, on the steamer Herman Livingston. During her pasage two of the recruits died of cholera, and two cases were sent to hospital at Jackson Barracks as soon as the command disembarked. From Jackson Barracks the disease was carried into New Orleans, and thence by boats along the Mississippi River to Cincinnati and Saint Louis. Early in the month of August several steamboats arrived at the port of Cincinnati from New Orleans with cholera cases on board, and it was about this date that cholera became epidemic in Cincinnati.

The history of each of the three epidemics thus briefly traced shows that cholera reached Cincinnati by a different route each time of its

appearance. The facts presented also show most conclusively that in each epidemic the disease was *carried* to Cincinnati by human beings.

The appearance of the cholera in Cincinnati does not appear to have been foreshadowed by the prevalence of any particular form of disease in either of the three epidemics, except perhaps by the small-pox, which might have been regarded as a forerunner of the epidemic of 1849; but there was not at any time any unusual tendency to disease of the bowels; consequently neither of these epidemics could have been of atmospheric or meteorological origin, nor in any sense dependent upon local conditions.

The first cases of the cholera epidemic of 1873 occurred in New Orleans during the months of February. The mortality-reports published in that city weekly, by authority of the board of health, showed a number of deaths from this cause during the months of February and March. The same authority admitted the presence of cholera there in April, and in the mortality-list for the week ending May 11, 1873, there were eleven deaths registered as having occurred from the same cause.

On the 15th or 16th of April the first case of cholera occurred in Memphis, but it did not become epidemic there until some weeks later.

The steamboat John Kilgour left New Orleans on the 13th day of May, 1873, at which date cholera was quite prevalent in that city. The Kilgour had a considerable number of deck or steerage passengers on board, most of whom were flat-boatmen, from different places along the Mississippi and Ohio Rivers, who had been down with produce, and were returning home. The cholera broke out on the Kilgour the next day after she left the port. The first victim was Mr. John Schenck, who resided about nine miles from Cincinnati. Mr. Schenck died near Vicksburgh. His body was sent home from Memphis by railroad, in an air-tight casket. Mr. Schenck's baggage was brought to Cincinnati by the Kilgour, and there delivered to his friends. The body was buried without the casket having been opened or taken into the house. Three of the Kilgour's deck-passengers died of cholera during this trip; one was buried near Shawneetown, one near Rome, and one near Evansville. Two of her passengers went ashore at Memphis, and one at Paducah, with choleraic diarrhœa. When this boat arrived at Mount Vernon, she was unable to land at the wharf-boat on account of the low stage of the river, and she effected a landing a short distance above the wharf, where one of her deck-passengers went on shore sick, as was believed, with symptoms of cholera, and entered the house of a Mr. Russell, situated near the place of landing. The next day Mrs. Russell was attacked with cholera and died. A number of her relatives, residing in the county a short distance from Mount Vernon, who visited her while sick and attended her funeral, subsequently took the disease, and among whom a number of deaths ensued at their respective residences.

From these cases the disease was carried back again into the town of Mount Vernon, and thus originated the fearful epidemic which swept over that place.

The John Kilgour landed at Cincinnati on the 22d day of May, as reported by the records of the Chamber of Commerce, with a number of cabin and *steerage* passengers from New Orleans direct.

As already stated, the board of health report that the first death from cholera in Cincinnati was on the 15th day of July, *but the records of the Cincinnati hospital show that there was a death from cholera in that hospital on the 27th day of May.* The patient was a farmer from Kentucky, and was taken from the steamboat-landing to the hospital on the 22d day of May. Prof. John Davis, a member of the medical staff of the

hospital, who has had large experience in both the epidemics of 1849 and 1866, treated this case, and pronounced it to be true Asiatic cholera. The subjoined history of the case is taken from the records of the hospital:

"ABRAM RORER was admitted into the hospital on May 22, 1873; farmer; Kentucky; states that he was taken sick yesterday with diarrhœa, cramps in legs, and vomiting. Stools very thin and frequent. Man of good size, well-developed, and well nourished. Lies partially comatose; seems very drowsy when aroused, and has no energy to answer questions; surface of body cool; pulse 114, scarcely perceptible at the wrist; has been bleeding some at the nose. Temperature 97½° Fahrenheit. Ordered beef-essence, with ammonia carb. gr. xx, injected into the rectum every two hours. Patient vomits everything except the brandy, of which he had taken ℥ss. every two hours since he came in the house.

"May 23. Had two characteristic rice-water discharges last night. Temperature gradually decreased during the night from 97½° F. at 7 o'clock p. m. of the 22d until 4 o'clock a. m. of to-day until it reached 96° F. By 9 o'clock a. m. the heat was normal, and remained so all day. Pulse 126, barely perceptible. Ordered brandy ℥vj, tinct. catechu, ℥ij, of which ℥ss to be given every two hours.

"May 24. Stopped the above, and ordered the following:

℞. Piperin,
Tannin,
M. Gentian, āā gr. j.
To be given every hour.

"Pulse 105; still weak, but stronger than yesterday; has vomited again to-day. Stools dark-colored and deposit thicker, not so frequent; hands still cold; lies perfectly listless. The temperature remained normal up to the middle of the afternoon, when it again began to drop. The following was then given:

℞. Hydrg. sub. mur., grs. x.
Piperin, gr. xx.
Tannin, gr. xx.
M. Ft. chart., No. x.
One to be given every hour.

"This was given until used up; then the same was repeated without the hydrg. sub. mur.

"May 25. In *statu quo*. Stools somewhat green. Patient very much reduced.

"May 26. Patient much worse; pulseless; limbs cold; checks sunken; not much diarrhœa. Continued the treatment.

"May 27. Died in convulsions; cholera."

Copied from the male medical record of the Cincinnati Hospital, vol 19, page 208, September 7, 1874.

W. R. AMICK,
Resident Physician.

This case was under the charge of Dr. John Davis, with James L. Neave, resident physician.

W. R. AMICK.

On the 26th day of May a child died on East Front street, of acute diarrhœa, after an illness of twenty-four hours. The parents of this child resided at a considerable distance from the steamboat-landing, *but*

quite close to the point where steamboats tie up when not making regular trips.

On the 6th of June a child six months old died of cholera infantum at the Burnet House, three squares from the public (steamboat) landing. This child was sick only twenty-four hours, and had been in the city only one day, *from the South.*

June 12. A child, aged twenty months, died of cholera morbus; duration of the sickness twenty hours.

Besides the John Kilgore the following-named steamboats arrived at Cincinnati from New Orleans upon the days named: Charles Bodman, May 24; H. S. Turner, June 6; C. B. Church, June 14, and the Nicholas Longworth, on the 23d of June. Each of these boats had cases of cholera or choleraic diarrhœa on board during their passage.

Several of the line of boats running between Cincinnati and Memphis had cholera on board during their trips made the last of May and the first days of June.

The Pat. Rodgers, the Arlington, the Mary Houston, and other boats had cholera on board during their trips up the river. The James D. Parker lost several deck-passengers and two or three of her crew by cholera during her trip from Memphis to Cincinnati. One of her crew who died was buried below Louisville. The family of this man resided at Newport, and his clothing was brought up on the boat. A lady friend, seeing the boat at the landing, went on board to make inquiries concerning the deceased and his effects; the latter were shown to her. This lady went from the boat to visit a sister living in Cincinnati. At the time she was in perfect health, but during the afternoon of the same day she was suddenly attacked with cholera, and died the next day, after an illness of twenty hours. A son of this lady came to Cincinnati in the evening to take his mother home, but finding her seriously ill remained with her all night. Within four hours after the mother's death this son was similarly attacked, and died of cholera after an illness of thirty-six hours. Two other persons, friends of the family, who came to nurse them, were attacked with cholera, but recovered.

The clerk of the Parker is reported to have said that all on board had symptoms of cholera during the trip except the captain and himself.

The bed-linen used upon the Memphis and Cincinnati boats is usually washed by laundresses on shore, but nothing definite or satisfactory can be ascertained beyond this mere fact. The Nashville and Saint Louis boats generally have their washing done on board, though it is sometimes done on shore. These facts are certainly possessed of the most important bearing upon the history of the introduction of the disease, and from them the diffusion of cholera over the city of Cincinnati may be accounted for.

The third, fifth, and seventh cases reported by the health-officer occurred near the river. The second case treated at the Cincinnati Hospital was a washerwoman, and the third case was taken to the hospital from No. 152 West Front street, near the steamboat-landing.

The fourth case reported by the health-officer was a colored washerwoman, who died at No. 130 L'Hommedieu alley. She had lived for several years in Kentucky, a short distance from this city, but at the time of her death had been a resident of Cincinnati for three months. This woman made frequent visits across the river to her old home; the last one of which was three or four days before her death. In crossing the Ohio River, by either the bridge or the ferries, she would have to go in the immediate vicinity of the steamboat-landing.

The first case reported to the health-officer was a German woman, a widow, whose occupation was that of caning chairs. Nothing can be learned of the history of this case, beyond the fact "that she went to the lower (toward the river) part of the city to buy her cane." This patient resided on the south side of Oliver street, more than a mile from the river. Subsequently three other persons died of cholera on the north side of Liberty street, (which is the next adjacent street,) within one square of the first decedent's place of residence. Nine other persons died within the immediate vicinity of the house in which the second case reported to the health-office had died.

Several instances might be given in which the disease was carried from infected houses in the city to towns in the vicinity of Cincinnati, but the facts already presented afford sufficiently-conclusive evidence that the cholera was *carried* from New Orleans to Cincinnati by human beings.

The portability of small-pox is recognized by all physicians, and yet it is often much more difficult to trace the course of that disease and the connection between cases than may be found in following the course of either of the epidemics of cholera that have visited the United States. The fact that all the other persons occupying the same house do not take cholera from one of the family who may have died of it is no more inexplicable than that only one of a family of six or nine persons take small-pox, measles, or scarlet fever.

The facts above adduced are incontrovertible, and every unprejudiced mind will admit that they prove fully and certainly—

I. That at the time cholera broke out in Cincinnati, in 1873, there was no unusual tendency to disease of the bowels.

II. That there were no atmospheric or meteorological conditions present which were not common to the locality.

III. That the sanitary condition of the city was fully as good as it had been at any time previous.

IV. That the first cases of cholera occurred in Cincinnati after the arrival of the steamboat John Kilgore from New Orleans, where cholera was prevailing at the time that boat left that port.

V. That the appearance of cholera at Mount Vernon, and other places on the Ohio River, below Cincinnati, occurred after the Kilgore had landed at those points.

VI. That the first case of the epidemic at Cincinnati occurred at the steamboat-landing.

VII. That other cases occurred in the immediate vicinity of the first and second cases reported by the health-officer.

VIII. That in each of the epidemics, viz, that of 1832, 1849, 1866, as well as 1873, the disease was carried into Cincinnati, along different routes of travel, by human beings, who had previously been exposed to the disease, or in some way directly exposed to its influence.

C.—THE HISTORY OF A GROUP OF CHOLERA CASES WHICH OCCURRED AT CINCINNATI, OHIO, DURING THE EPIDEMIC OF 1873.

By C. L. Armstrong, M. D.

CASES.

June 19.—Mrs. Hopper, 66 years of age, residence No. 211 Cutler street.
June 20.—Minnie Pettitt, 6 years of age, residence No. 211 Cutler street.
June 29.—Michael Smith, 47 years of age, residence No. 70 Rittenhouse street.
June 30.—A. H. Smith, 7 years of age, residence No. 70 Rittenhouse street.
June 30.—Mrs. Dorris, 35 years of age, residence No. 70 Rittenhouse street.
July 1.—Mrs. McCarty, 42 years of age, residence No. 70 Rittenhouse street.
July 3.—Henry Hoge, sr., 58 years of age, residence No. 72 Rittenhouse street.
July 3.—Emma Kiser, 17 years of age, residence No. 40 Rittenhouse street.
July 5.—Herman Hoge, 20 years of age, residence No. 72 Rittenhouse street.
July 5.—Henry Hoge, jr., 23 years of age, residence No. 72 Rittenhouse street.
July 5.—Christina Hoge, 16 years of age, residence No. 72 Rittenhouse street.
July 5.—Christina Hoge, 60 years of age, residence No. 72 Rittenhouse street.
July 5.—Minnie Luelf, 1 year of age, residence No. 72 Rittenhouse street.
July 6.—Mrs. George Hoge, 23 years of age, residence No. 258 Baymiller street.
July 11.—Louisa Westing, 27 years of age, residence No. 258 Baymiller street.
July 12.—Mrs. Niederhelman, 70 years of age, residence No. 258 Baymiller street.
July 12.—Mrs. Niederhelman, 30 years of age, residence No. 408 Baymiller street.
July 12.—Herman Niederhelman, 7 years of age, residence No. 408 Baymiller street.
July 14.—William Bromer, 22 years of age, residence No. 74 Rittenhouse street.
July 14.—Frank Bromer, 18 years of age, residence No. 74 Rittenhouse street.
July 16.—Mrs. Sunderman, 26 years of age, residence No. 70 Rittenhouse street.
July 16.—George Hoge, 28 years of age, residence No. 258 Baymiller street.

Remarks.

The first case in this group, Mrs. Hopper, was a professional nurse. She had been constantly employed prior to her attack, but with what class of diseases cannot now be definitely determined. The symptoms

were severe, strongly marked, and after a collapse of thirty-six hours' duration she died. The duration of this illness was about sixty-two hours. The sanitary condition of the premises was not good. The house was old. The dejections were not disinfected, but were thrown into a privy in rear of house. The day before this lady died, her granddaughter, Minnie Pettitt, who lived in the same house, was taken with choleraic diarrhœa, and was seriously ill for a number of days.

June 29.—Michael Smith, the second case, was taken sick with cholera, and, after being collapsed for some hours, reacted, and recovered after a tedious convalescence. This man was a cooper by trade; he lived at No. 70 Rittenhouse street, but his shop was on the corner of Clark and Kossuth streets, and about thirty yards from the privy in which the excreta of the first cholera case had been thrown.

June 30.—The young son of Smith was taken ill with cholera, and died after an illness of fifteen hours. This child had been constantly in his father's room. The same day a female, who occupied a room in Smith's house, and upon the same floor, was taken with the same disease. She recovered after a slow convalescence, during which she suffered a threatening relapse.

July 1.—The fourth case occurred in the same house, in the person of a female occupying a rear room. This case also recovered.

July 3.—Henry Hoge, sr., who lived in the adjoining house to that occupied by the preceding cases, was taken with cholera, but recovered. The same day a young woman who lived at No. 40 of the same street, and in the same block of houses, died of cholera, after a few hours' illness. This female had visited frequently the sick-room of the Smith boy during his illness, and had frequented the house during the days that other persons had the disease.

July 5.—Four cases of cholera occurred at No. 72 Rittenhouse street, two of which proved fatal after an illness of from seven to nine hours; these are cases Nos. 115 and 116 of the health-officer's report. The same day, in a small tenement in the rear of this house, an infant was taken with the same disease.

July 6.—Mrs. George Hoge, the daughter-in-law of the family at No. 72 Rittenhouse street, who had been constantly with her sick relations, was taken with the same disease at her home at No. 258 Baymiller street. The recovery of this case was much delayed.

July 11.—A young lady, who had been betrothed to Henry Hoge, jr., and who had assisted in nursing the Hoge family, was taken with cholera at the house of George Hoge.

July 12.—The mother of Mrs. George Hoge, who lived with her daughter, took cholera; and the same day her daughter-in-law, who resided at No. 408 Baymiller street, and her young son, were also sick with the same disease.

July 14.—Two young men living at No. 74 Rittenhouse street were taken with cholera.

July 16, a lady residing at No. 70 Rittenhouse street had cholera, and the same day George Hoge, who had been constantly with the sick of his own and his father's family, had the disease.

In this series of cases none were fatal after the cases of July 5. The cases of recovery were fully marked, but all were placed under treatment at the inception of the disease.

The above record is presented as an unusually clear demonstration of the portability of the disease; all the cases, twenty-two in number, forming a chain of infection from the initial case.

CINCINNATI, OHIO, *December* 28, 1874.

The history of the epidemic of cholera at Cincinnati might well be left as demonstrated by the three articles which we have presented. The subject would be so submitted, were it not that a few facts, throwing some light upon the epidemic, have not therein been noted. We present them briefly:

I. Prior to the outbreak of the disease at Cincinnati, the epidemic had been established at the following-named points: at Memphis, Tenn., April 15; near Cairo, Ill., May 2; Nashville, Tenn., May 11; Saint Louis, Mo., May 11; Paducah, Ky., May 21; and Mount Vernon, Ind., May 29. With one and all these points Cincinnati is in constant communication by steamboats and railroad.

II. In a careful examination of the records of the health-officer, as presented in his special report, there is nothing to show that any effort was made to trace the disease prior to the date of his first fatal case. The statement in paragraph quoted "non-fatal cases," can scarcely be received as satisfactory, since the inception of the epidemic was certainly the proper time for the investigation, and not a later period, when the tracing of the epidemic had been in a measure obliterated by time.

The remarks upon pages 103 and 104 of the health-officer's report, relating to "non-fatal cases," are swept away by those upon page 129, where it is stated "the first death from cholera reported was the first case of the disease, fatal or non-fatal, as far as can be ascertained, that actually occurred in the city."

We have obtained from the health-office and the physicians of Cincinnati a record of five hundred and three cases of cholera. Of these cases two hundred and eighty-eight were recoveries. Every effort was made to obtain perfect lists of the cases which occurred, with, however, but partial success, as but a small proportion of the communications addressed to the medical men of the city elicited a reply; but, inaccurate as they are, they still have conveyed significant information. In the lists of cases thus obtained, Dr. B. Mosemeier reports, upon June 4, a cholera-case that recovered; Dr. J. W. Underhill reports, upon June 10, a cholera-case that recovered; Dr. N. Leaman reports, upon June 10, a cholera-case that recovered; Dr. B. Mosemeier reports, upon June 13, a cholera-case that recovered.

It will be remembered that it has already been recorded that Prof. John Davis stated that the man who died at the Cincinnati Hospital on the 27th of May was a case of epidemic cholera.

We solicit for the gentlemen we have named the same honorable treatment that Dr. Quinn so eloquently demands, upon page 71 of his report, for those gentlemen who reported cases of cholera morbus early in the epidemic.

III. During the epidemic numerous instances occurred demonstrating the infectiousness of the disease. In the city three medical men fell victims. One of these was a resident physician at the Good Samaritan Hospital. In this last case it has been contended that the disease was caused by imprudence in diet; but the doctor was not attacked until after cholera-cases had been brought into the hospital, and until after his contact with them.

Another resident physician at the same hospital was attacked on the 12th of June with a painless diarrhœa. He took passage upon the steamer Andes for Wheeling, W. Va., where he arrived on the 17th, and originated two house-epidemics of cholera: one at his home, a few miles from the city of Wheeling; the other at the house of a blacksmith upon the road, where he had stopped to rest.

At the Cincinnati Hospital one nurse took the disease after many

cholera-cases had been treated, but recovered, although subjected to a serious illness. At the Good Samaritan Hospital a Sister of Mercy died of cholera. This sister had not been in robust health for some time, and had been sent to the Mother-House to recuperate; she returned the day that Dr. Quick was attacked, was in his room and that of another cholera-subject, and in a few hours was herself attacked. We have been informed that other cases originated at this hospital, but have been unable to obtain the particulars.

At the Cincinnati Hospital the excreta of the cholera-patients were thrown into the drains that empty into the public sewers. But these drains are constantly flushed with water, and in them disinfectants are habitually used. An inspection of the laundry of this most admirably-conducted hospital will demonstrate that in the act of washing, as there conducted, a most efficient disinfection of cholera-soiled clothing would be secured.

We are unable to state whether disinfectants were used at the Good Samaritan Hospital or not, being unable to obtain any particulars.

We are informed that a very active system of disinfection was instituted throughout the city, by order of the board of health; that privies were treated with sulphate of iron; that houses at which cholera occurred were disinfected with carbolic acid; that orders were issued for the placing of cholera-soiled clothing in strong solutions of sulphate of zinc; that in two instances, at least, the clothing of cholera-patients was burned; that chloride of lime was freely used in yards, and all damp, dirty places.

By many medical gentlemen of the city we were informed that in all cases that occurred under their care the excreta were most carefully disinfected, and that every precaution was adopted to prevent the diffusion of the disease.

Saint Bernard.

Within the limits of Hamilton County cholera was epidemic at the villages of Saint Bernard and Carthage.

A careful series of investigations show that these two points were infected from entirely different sources, and that the demonstration at each point is worthy of careful study. In noting the occurrence of cholera at Carthage, the report of the health-officer of Cincinnati for 1873, (page 72,) concludes, "and the persons there attacked had not been visitors to the city," (Cincinnati.) Our investigations show that in both instances (Saint Bernard and Carthage) the initial cases *had been* visitors at Cincinnati.

The town of Saint Bernard, six miles north of Cincinnati and four miles south of Carthage, upon the old post-road, was originally a religious settlement, but is now a secluded village of Mill Creek township. This village, one mile east of the railways, has, with the exception of the canal, no direct communication with the city of Cincinnati or the town of Carthage, except by private conveyance.

On the 27th of June, 1873, a man named Robert Picket, who had that day buried his wife, who had died of cholera at Cincinnati, arrived with his family of four children at Saint Bernard. A few hours after his arrival Picket was attacked with cholera, and almost at the same hour three of his children were taken with the same disease. One of the children, a female infant, three months old, died after an illness of twelve hours. One child, three years old, died on the fourth, and the

remaining child, eighteen months old, died on the fifth day of the sickness. July 6, Picket was pronounced to be convalescent.

July 4, a man named Schmidt, who had frequently visited Picket, was taken with cholera and died.

During the illness of the Picket family a Mrs. Norman was constant in her attention to them, and on July 5 this good woman was taken with the same disease and died after an illness of twenty-four hours. This case was followed (July 6) by the attack of a woman named Schulte and two young children, who lived in the same house as Mrs. Norman. Within eighteen hours all three cases terminated fatally.

The Norman family were nursed by a Mr. and Mrs. Luxterman, who remained with them until the termination of the cases, when they returned home. In this family a lady seventy-nine years old, and three children, died of the disease.

A Mrs. Kouniman, who had attended the sick in both the Norman and Luxterman families, was taken with the disease, but recovered. In this family two young children died.

A dairyman named Kizer, living two miles from Saint Bernard, frequently visited the houses at which the disease had occurred. His family remained constantly at home, and only came in contact with the infection through the person of the father. Kizer escaped the disease; but his four children, two males and two females, died of cholera. Three other cases of the disease occurred at Saint Bernard, one of which proved fatal; all of whom resided in close proximity to the infected houses.

Carthage.

Carthage is a small village upon the line of the Cincinnati, Hamilton and Dayton, and the Dayton Short-Line Railways, ten miles north of Cincinnati. The Miami Canal passes along the entire eastern extent of the town. On the southern outskirts is located Longview Insane Asylum. One mile north of town is the Cincinnati Infirmary, a county hospital, and at about the same distance eastward is the Hamilton County Infirmary.

Communication with the city of Cincinnati is constant; many trains each day pass over each railway; boats are constantly passing on the canal, and frequent wagon and carriage journeys are made between the county institutions and the city. North of the town are large beds of sand and gravel, and from these beds the city of Cincinnati obtains her supplies of these materials. This work alone furnishes employment to a large number of laborers, the majority of whom are Germans or Hollanders.

Until the 15th of July, 1873, no cases of cholera had occurred in the town of Carthage, but on that date a child two years of age, named Tent Have, was taken with the disease, and died after an illness of fourteen hours. Every member of the family to whom this child belonged, with but two exceptions, were taken with the disease and died—the father, mother, sister, and five children. These deaths occurred between the 15th and the 23d of July.

From a brother of Tent Have, now living at Carthage, and from a number of papers belonging to the deceased family, access to which we obtained through the kindness of Dr. W. H. Bunker, now the superintendent of Longview Asylum, we are able to trace this family from Holland to Carthage, Ohio. The party, consisting of Tent Have, his wife, five children, and the sister of the wife, with two young men, one of

whom was betrothed to the sister, arrived at New York on the steamship City of Limerick from Liverpool, on the 5th day of July, 1873, as shown by the certificate of the commissioners of emigration of the State of New York, which has been obtained through the kindness of Dr. John C. Peters.

"EMIGRANT-LANDING DEPOT, AND OFFICES OF
THE COMMISSIONERS OF EMIGRATION
OF THE STATE OF NEW YORK,
"*Castle Garden, New York, September* 11, 1874.

"This is to certify that it appears from the manifest or list of passengers of the steamship City of Limerick, William Jamieson, master, arrived at the port of New York from Liverpool on the fifth day of July, one thousand eight hundred and seventy-three, which manifest is now on file at this office, that Thenhar, Hendk, J. G., Johan, Berdina, Therm, Jno., Gerrad, and Maria Have, aged 36, 37, 8, 6, 5, 3, 1, 22, and 28 years, natives of Holland, arrived as passengers per said vessel, on the said voyage to this port, according to the report of the master aforesaid.

[SEAL.] "H. J. JACKSON,
"*Assistant Secretary.*"

On the 31st of May, 1873, this party left Tubbergen, Holland, as shown by the passports signed by the burgemeester, now in our possession. Belonging to a Catholic aid society, this family were shipped from Rotterdam to Liverpool, thence to the United States.

July 6, the Tent Have party left New York for Carthage, via Baltimore, Md., and the Baltimore and Ohio Railway. On the 9th or 10th of July they arrived at Cincinnati, but, as we are informed by the survivors of the party, too late to proceed at once to their destination, and they remained in the city over night, sleeping at a station-house. By an early train the next day they proceeded to Carthage, and were cared for by a brother, who, for some time, had resided in the village.

The men, with the characteristic industry of their race, at once found employment at the gravel-pits. The women and children rested, awaiting the arrival of their effects. July 13, the boxes and bales of household property having arrived, the family took possession of a house; their effects, which consisted chiefly of bedding and woolen clothing, were unpacked and hung up in and around the house to dry, after the long voyage; and it is asserted by the survivors that this had not been unpacked since leaving home.

On the 15th of July a male child three years old was attacked with cholera. This occurred ten days after landing in New York City, five days after their arrival at Carthage, and within forty-eight hours after the unpacking of the chests and the exposure of their contents to the sun and air. The same day, the father, who had been called from his work by the illness of his child, and was directed by Dr. Bunker to cut down and remove some rank weeds growing around the house, was taken with the same disease, and died within eight hours; and at almost the same hour that the father was taken sick a second child, five years of age, was attacked and lived only twenty hours.

The next day (July 16) the mother sickened, and died in twelve hours. The next day (July 17) a third child, seven years old, died after fifteen hours. A lapse of one day, and a fourth child, eight years old, died after twenty-four hours' illness. July 22 the fifth child, four years old, died after an illness of twenty-four hours, and the next day the young

woman died also. The two young men suffered severely with diarrhœa, but in neither did the disease advance to the second stage.

Under the direction and personal supervision of Dr. Bunker, the excreta of these cases were disinfected with sulphate of iron and buried, and all the soiled articles of clothing that could be discovered were burned. The most active system of disinfection was instituted in the village, and but one case occurred outside the house occupied by the Tent Have family.

July 23, the day of the last Tent Have death, a young woman, married, and pregnant with her first child, and who lived in a comfortable house about one hundred yards in the rear of the infected house, was taken with diarrhœa; on the 25th, cholera was fully developed, and she died after forty-eight hours' illness, having aborted a four months' fœtus some twenty hours before death.

It was subsequently ascertained that this lady, although forbidden by her husband to go near the infected house, had prepared articles of diet for the sick, which she each day carried to the fence in the rear of the house to which the cholera was confined. Surely, such charity covereth a multitude of sins.

No other cases occurred in the town of Carthage, but on the 21st of July, the day upon which it will be remembered the last child of the Tent Have family was ill of cholera, the disease suddenly appeared at the Longview Asylum, in the negro department, and in the person of a female who was employed as the cook. The case was isolated; the excreta were disinfected with sulphate of iron. The patient lingered until the 23d, when she died. No other case occurred until July 26, when a white patient was attacked, and the same day four other cases occurred. July 27 two more cases occurred. These eight cases all terminated fatally. July 28 a case occurred, which recovered. July 29 a fatal case is reported, with three cases who recovered.

It has been asserted that in no way could a connection be established between the cases at the asylum and those in the town; that no communication existed between the asylum and the infected house; therefore the origin in the asylum must be considered as a distinct demonstration of the disease.

Through the indefatigable energy of Dr. William Clendenin, of Cincinnati, this point has been cleared up, and it is positively shown that the infection was carried into the negro department of the asylum.

The negro department of Longview Asylum is in a large house situated at some distance from the main buildings of the asylum. It is a large brick building upon the western extremity of the asylum grounds. In front of this building pass the canal and the Dayton Short-line Railroad, and in the rear a street to and from the village.

The insane inmates of this house were isolated from contact personally with the cholera-sick, but no such restrictions were adopted by the attendants, who were allowed all their usual liberty, and, actuated by humanity, the physician in charge of the negro division of the asylum had visited in consultation with Dr. Bunker the cholera-sick.

The introduction of the disease into the asylum, however, is not to be left to any conjecture; for it is asserted that Joseph Marshall, the supervisor of attendants in the negro division, frequently went from curiosity into the house where the Hollanders were ill of cholera, and that from this house he time and again returned to the asylum. A morbid curiosity seemed to possess this man; he could not resist the impulse, and as often as he could frame an excuse for leaving the asylum he visited the infected house.

This man, Marshall, who is a negro, passed a portion of each day in the asylum-kitchen, and in the company of Delila Pointer, the first of the asylum-cases. Marshall was at the Tent Have house when the last of the family died and as they were all dead he could see no reason for his not appropriating a curiously-braided coat, which had belonged to the dead Tent Have. The negro love for finery overcame any scruples he may have had; the coat was concealed, and carried to the asylum, when, as it was found to be wet, it was hung up on the back porch to dry; while in this position it attracted the attention of a patient named Howard Preston, who, putting on the coat, wore it for a day, and slept in it one night, when it was again taken possession of by Marshall. The next day Preston and four other inmates of the asylum were taken with cholera, when Marshall, properly connecting the outbreak of the disease with the stolen coat, destroyed it at the kitchen-fire. These facts were obtained by voluntary confession to Dr. Clendenin.

At Longview thirteen cases of cholera occurred, nine of which terminated fatally. Of these cases nine were females, four were males; six females and three males died. Of the total number of cases six were whites, seven were negroes. Five whites and four negroes died.

The occurrence of white cases at the negro division is accounted for from the fact that some time prior to the outbreak of cholera, owing to the crowded condition of the wards in the main buildings, a number of demented whites had been placed in the negro division, where they were mixed with the other inmates.

The main buildings of the asylum were isolated from the infection, the attendants rigidly respecting the orders issued by the superintendent. The medical gentlemen, who, as in duty bound, met the call of Dr. Bunker for professional advice, adopted every precaution to avoid the introduction of the disease into the asylum, and successfully, for no cases occurred in the main buildings, where these gentlemen reside.

At Lockland, some two miles north of Carthage, a single case occurred in the person of a lady who had visited the house of the last case at Carthage. This case was, however, but mild; the diarrhœa and the tendency to advance beyond the first stage of the disease continued for some days, but by absolute rest and the cautious use of opium the disease was arrested.

Montgomery County.

Dayton is a city of some 30,000 inhabitants, located on the east bank of the Great Miami River, at the mouth of Mad River, and upon the line of the Miami Canal. The city is fifty-two miles northeast of Cincinnati. The city is a railroad-center of considerable importance.

On the 2d of June, 1873, a man named McManus, who was a commercial traveler, arrived at Dayton, and put up at the Merchants' Hotel. At the time of his arrival he was suffering with diarrhœa, and placed himself under the charge of Dr. W. J. Conklin, to whom he related the following history:

"That he had come to Dayton directly from Memphis, Tenn., at which city cholera was epidemic. That a gentleman who traveled with him had died at Memphis of cholera the day he left that city. That before leaving Memphis he had been attacked with a diarrhœa, which had given him no uneasiness until his arrival at Dayton."

On June 3, Dr. Conklin reports this case as having large and involuntary rice-water discharges, and as being pulseless and cold. Was treated with morphia, and gradually recovered. The excreta of this

case and the vault into which they were thrown were disinfected. No other case occurred in the hotel.

It is not known that any other cases of cholera occurred at Dayton until June 29, when a man named Cameron was attacked with cholera, and died after an illness of thirty hours. Cameron was a hard-working, industrious man, but given to occasional hard-drinking. His business took him into all parts of the city, and although no connection can be learned between him and any other cases of disease, he had worked for some days on the new jail-building, which is in the same block as the Merchants' Hotel. No cases occurred in the house in which Cameron died, or its immediate vicinity.

July 3, William Wright, a cartman employed in the city street-cleaning, was taken with cholera, and died after an illness of eighteen hours. No cases occurred in his immediate vicinity.

July 14, a fatal case of cholera morbus is reported.

July 19, Martin D. Ward, the driver of a car upon the city-railway, was taken with cholera, and died after an illness of seven hours.

In the house at which Ward died resided his family, eight in number, seven of whom were attacked with the same disease, but all recovered.

July 22, a female named Young, who had assisted in nursing Martin D. Ward until his case was pronounced to be cholera, was taken with the disease, and died after an illness of twelve hours.

July 23, John B. Young, living in the same house as the preceding case, was taken with cholera, and died after an illness of three days.

July 24, Mary Miller, who had been in the house of Ward, (the case of the 19th,) was taken with the disease, and died after an illness of three days.

July 26, another female member of the Young family died after an illness of twelve hours; and on July 29 a married sister of the same family, who did not reside in the same house, but who had been with her father and sisters, died at her home, of cholera, after an illness of two days.

It will be noted that but at two houses in the city of Dayton did cholera become epidemic in 1873. But one group of cases is found, the initial case of which was Martin D. Ward. In his own family, seven cases of choleraic diarrhœa occurred; Margaret Young, who was in attendance upon Ward, carried the disease to her own family; two other deaths occurring by Mary Miller, who had also visited the Ward house during the early stage of the disease; another house was infected, but no other cases occurred. By Mrs. Hackett the disease was carried to a fourth house, but no other person was infected. The houses of the Ward and Young families are upon the same street, (King,) distant one short square. The house of Mary Miller is on Baxter street, over half a mile from King street, while that of Mrs. Hackett was over two miles distant from King street.

It has been shown that in one instance (case of McManus) cholera was imported into the city of Dayton; but it will be impossible to establish any connection from known data between his case and that of Cameron, twenty-seven days later. Nor can any connection be learned between Cameron and Wright, or between these two men and Ward. But Dayton being a railroad-center, at which not less than eight great lines of railway cross, at which trains of all descriptions are almost hourly arriving, the importation of the infection is more plausible than any theory of local development which may be advanced.

That this city escaped an epidemic of the disease is due to the ener-

getic action of the health-officer, who promptly adopted all measures in his power to confine the disease to the points where it became located, and there to stamp it out. And the solution of the problem as to why this process of disinfection did not prevent entirely the spread of the disease is found in the fact that the early cases of the disease were in the hands of irregular practitioners, who did not recognize at an early date the gravity of the cases in their hands.

CLARKE COUNTY.

Springfield, the county-town of Clarke County, is located at the confluence of Lagonda Creek with Mad River, and upon the line of the old National road, forty-three miles west of the city of Columbus. Springfield has a population of about thirteen thousand inhabitants, and is a town of extensive manufacturing interests.

On the 3d day of July, 1873, the first case of cholera at this city occurred in the person of a man named Patrick Horan, a day-laborer upon the railroad, and who lived upon East Columbia street, a very low locality, that receives the drainage of about one-fourth of the city that is built upon high ground.

Horan was attended by Dr. E. M. Buckingham, who thus describes the case: "Found the patient collapsed. Had been taken the evening before with diarrhœa, attended with cramps. Rice-water discharges and total suppression of urine rapidly followed. He was dead at 11 o'clock a. m. The patient occupied the first story of a frame house, which was elevated perhaps one foot above the ground. The house was comparatively well-ordered for a common day-laborer, but was in a filthy neighborhood. The man had been living in the house for more than a year, and had been at work the day before his death."

The same day (July 3) Dr. Buckingham was called to see one William Parkes, who lived immediately across the street from the house in which Horan had died. Parkes's case presented all the characteristics of cholera, and at 2 o'clock p. m. he was dead.

The next eight or ten cases that occurred were in the immediate vicinity of these two cases. At no time did the disease spread over the city, but remained confined to a few blocks and streets in the immediate vicinity of the houses in which Hogan and Parkes had died.

A total of twenty-three cases are reported; of these cases eight were fatal. This, however, does not embrace a full list of the cases that occurred, as some of the medical men of Springfield declined to render any assistance to the work of collecting the history of the epidemic.

To Drs. A. and C. W. Dunlap we are indebted for much courteous aid and assistance.

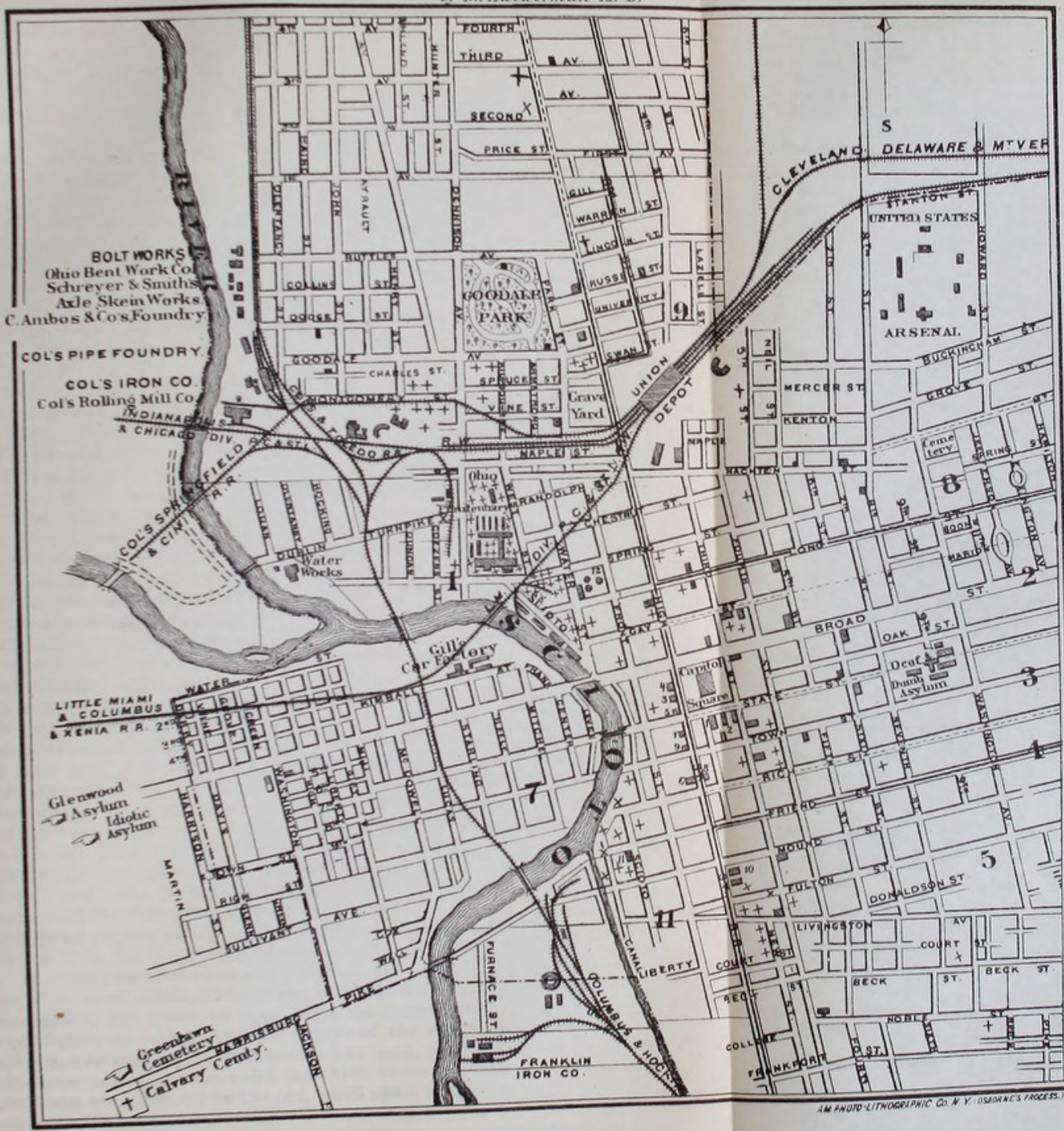
FRANKLIN COUNTY.

CHOLERA-EPIDEMIC OF 1873 AT COLUMBUS, OHIO.

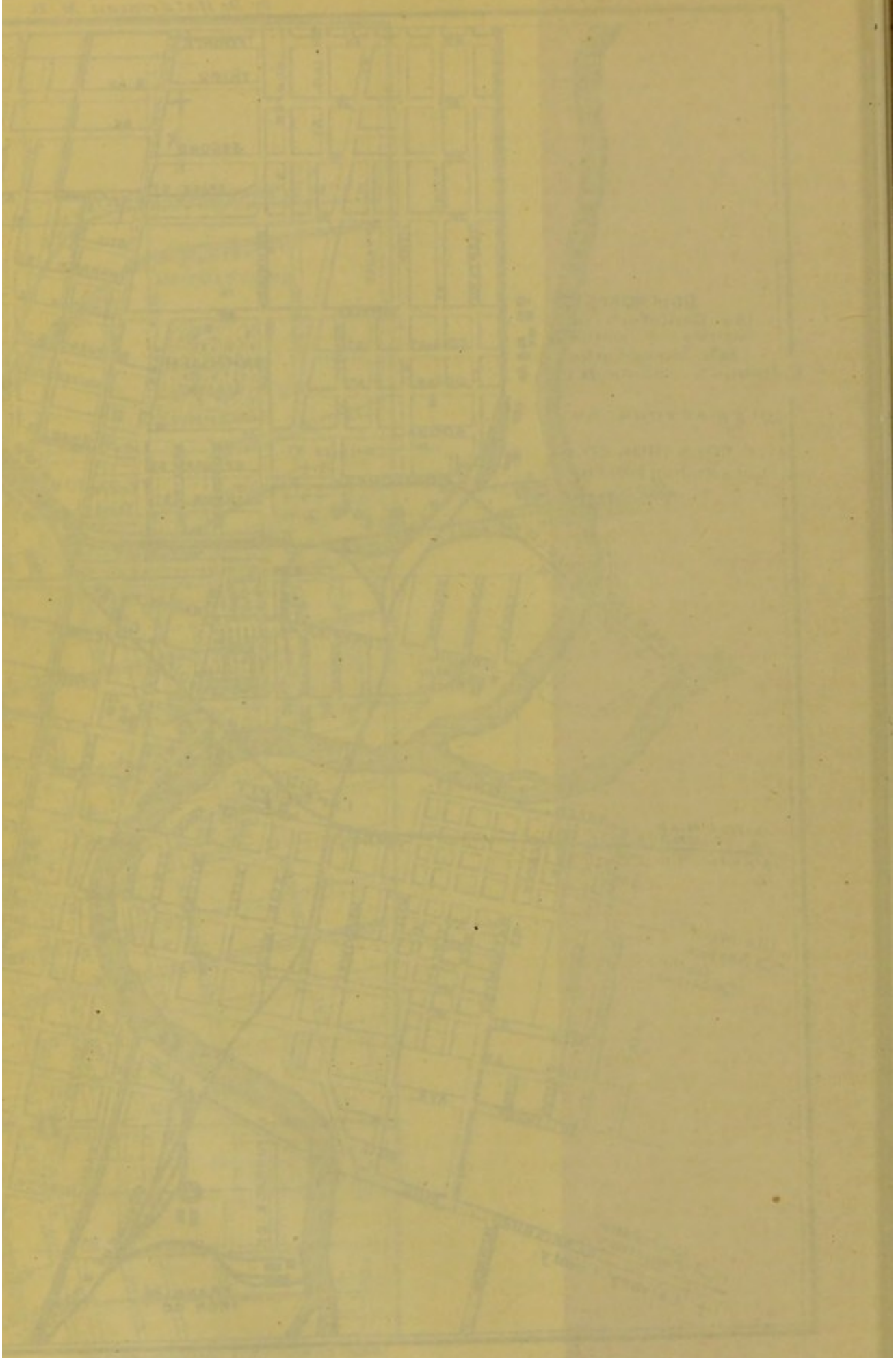
BY D. HALDERMAN, M. D., *Physician to the State Penitentiary.*

The city of Columbus, Ohio, 8,000 feet above the level of the ocean, and with a population of about forty-five thousand, is situated mostly on the east side of the Scioto River; the main part of it upon a bluff, rising abruptly from the water's edge to an altitude, upon an average, of about 65 feet, and extends thence, in the form of a plateau, southeast to Alum Creek, a tributary of the Scioto, distant, at this point, two and one-half miles. Toward the northwest this table-land sinks gradually

MAP OF CHOLERA EPIDEMIC OF 1873 AT COLUMBUS OHIO.
by Dr. Halderman M. D.



A.M. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)



into a somewhat irregular flat, which, as it nears the river above the bluff, in turn again drops into low bottom-lands, subject formerly to successive inundations, but guarded now by levees. The premises of the Ohio penitentiary are also situated here.

The river at this point makes a series of curves not much unlike the letter "S," with corresponding bottom-lands in each, subject once as the above to overflows, and now in like manner protected by levees; while, from a convexity looking east, rises the bluff above-named. Directly across from this latter, on the west side of the stream, spreads out one of those bottoms, relieved only by a sort of table-like eminence, upon which is situated the old town of Franklinton, founded prior to the settlement of Columbus; while beyond it, this bottom again makes a wide sweep, sinking as it recedes to a lower level, till terminated by a second elevation, the site of some of the public institutions of the State. Between Franklinton and the levee is Middletown, which places jointly have a population of about eighteen hundred.

East of the river, again below the city, between the former and the canal, is yet a third bottom, over part of which recent portions of the city extend.

Marshy places in these regions are now in process of being filled in by the rapid growth of the city, the manufacturing interest of which, viz, rolling-mills, founderies, machine and car shops, extends principally in this direction, with a population mostly of the laboring-classes. From this filling in, however, the construction of railroads, the levees, &c., and the want of due attention to drainage, numerous cess-pools for the refuse and offal of these parts are left.

The Scioto, moreover, at this point corresponding to the length of the city, is back-water from the dam, as feeder to the canal from this place, and is about one hundred yards wide, stagnant, and of some depth, sufficient for canal-boats, which it freights. Along its shore open the numerous sewers from the city, and with rare exceptions above water, some flowing quite a distance down the declivities, which, together with the filth abounding here, set free a very Pandora's box of noisome exhalations infesting these parts.

As to the system of sewerage, it needs to be but further observed that in its construction reference seemed solely to have been had to drainage alone, without regard to sanitary purposes. With few exceptions it consists of so many subterraneous channels—laboratories, so to speak—for the conversion of the *débris* of the city into noxious gases, to be again disseminated by every wind or breeze; and as these are usually from the west, with the general course of the sewers counter thereto, it follows that the city, placed to the leeward of their outlets, with corresponding inlets free to the circulation of air through them, must suffer from whatever evil may come from this direction, as is evident from facts in connection with the late epidemic to be given below.

The water-supply of the city, by means of the Holly system of water-works, is from the Olentaugy River, a tributary of the Scioto, emptying into the latter just above the city; though for drinking and culinary purposes it is used mostly from wells, from which it is naturally of wholesome quality, but liable to contamination from sinks and privy-vaults, the contiguity of which, and the nature of the soil, but too often excite suspicion, particularly as the custom has been, when filled, to tap these vaults into adjacent reservoirs, in which their contents are buried, or to sink new ones and fill in the old, until some back yards are well-nigh subsoiled with them.

The city, moreover, being without a sanitarium, no measures upon the

approach of the disease were taken against it; nor upon its advent were the municipal authorities awakened to the necessity of prophylactics and sanitary improvements, contrasting in this respect greatly with the prison authorities, who spared no pains in taking every precaution advised by the physician in charge.

So much for its topography, and such the condition of the place when the cholera, on the night of the 4th of July, first made its appearance; not in the penitentiary, however, as is currently alleged, but near by its wall, in one of those low places, and within a few steps of the drops (given below) into the sewers at this place.

The patient, a large, corpulent woman, aged forty years, up to the time of the fatal malady, presided at the bar of the saloon, which, upon the occasion of the day just ended, held high carnival, extending well into the night; when her illness set in by copious vomiting and purging, with cramps, the dejections being of the rice-water kind, followed by collapse, attended with the icy tongue, chilled breath, and pulseless wrist, as reported by Dr. R. M. Denig, of this city, whose professional standing guarantees the genuineness of the case.

The second case, that of a female taken seventeen hours later, in a squalid tenement-house a square away from the first, was reported by the attending physician the same as the above. Both died in twelve hours.

No doubt, then, as to the nature of the malady and of its development in the city outside the prison. Yet no precautions were taken; the dejections, without disinfection, were disposed of in the usual way, and the occupancy of the houses, without renovation, continued; and in the first case, being Irish Catholics, a wake was kept, attended by a degree of festivity, as is their wont.

But the disease paused now until the 10th of the month, when it simultaneously appeared in the prison and with renewed vigor at the place of its first occurrence.

Meantime heavy rains fell, followed by extreme heat; and intestinal fluxes set in which became general and obstinate in character. The disease now, both in the city and prison, progressed, and in the former was confined mostly to the course of the river and the line of the sewers known as the infected district, and which extended also over that part of the city spoken of as the flats, which, being without sewers and dependent solely upon surface-drainage, is, in consequence, marked by the refuse, animal and vegetable, of these parts in process of decay, and the cess-pools from causes above given, and about which a *nidus* of ten deaths from cholera was had.

Concerning the *locum primum* of the disease, it needs be further observed that, from the inclination in this direction of surrounding slopes, it forms a sort of basin for the surface-drainage of many squares. Over it, by means of quite a steep fill and a bridge, passes the railroad, and beneath the latter the street; and where also, within a radius of only fourteen yards, five drops open into the great sewers at this point. No stench-traps guard these openings, and the place is hemmed in by a slaughter-house, the prison-wall, lumber and coal yards. Out of half a dozen families, its sole occupants, eleven persons fell victims to the disease; which, with some that recovered, and the circumstance that few, if any, escaped more or less diarrhœa, lends the suspicion that these sewers and their surroundings, together with the dampness inseparable from the place, had to do with these results. Besides, as bearing upon the introduction of the disease, the house in which the initial case occurred, contiguous to and overlooked by the railroad, must, it is fair to

presume, be constantly within the sphere of influence of whatever contagion passing trains may leave.

The whole number of deaths in the city from cholera, not including those in the Ohio penitentiary, was sixty-nine. Twenty-one of these have already been accounted for, and the rest, with few exceptions, were disposed over the region just named, grouped two or more in tenement-houses, a few on canal-boats, &c., and those beyond these limits were also associated generally with insalubrious surroundings of some kind, as in the city prison, the interior of which, through its sinks, in direct communication with sewers beneath; two inmates were simultaneously taken and transferred to the county infirmary, where they died. The rest of the prisoners were at once liberated, and the place being renovated and disinfected, its occupancy was resumed without further molestation. Some were traced to a prior connection with the disease; several persons that visited the first case took it, one of whom, residing in a remote part of the city, recovered, but was followed in a few days by the death of his child, and so others might be cited.

Thus far reference to the mortality only has been had, as an exponent of the prevalence of the disease, and of the kind of places it sought; the recoveries to the number of forty-eight cases as reported by physicians, it may be remarked, seemed less observant of the circumstances of place and the conditions in life, than were the deaths.

As to negative results, from the course of the malady, it may be observed that in Franklinton and Middletown, on the west side of the river, to the windward of the latter, the city proper and its sewers, in a population of about eighteen hundred, not a single case occurred. Nothing is peculiar about these places, save that Middletown is on a lower level than any other part within the corporate limits, and that neither it nor Franklinton is provided with sewers; otherwise their sanitary condition compares about with that of the rest of the city. Also the extension of the city *below* the *dam* between the river and the canal, entirely escaped. The sewers here open into the latter, and the former is a free flowing stream.

Nor less notable the impunity with which some of the public institutions escaped. The county infirmary, to which the cases referred to in the city prison, with one other, were taken, is situated on the opposite confines of the city from which the disease prevailed. The building itself, antiquated and about to be condemned, is anything but salubrious; but with a strict regard for hygiene and the free use during the epidemic of disinfectants, viz, carbolic acid and sulphate of iron, with which latter its sinks, sewers, &c., were kept constantly saturated, the disease was confined to the cases brought in from the city; cared for, however, in the pest-house, isolated from the rest of the institution, and all of whom died. But it is worthy of note that, near by, the only cholera-deaths, two in number, that occurred in this part of the city succeeded these cases. So also Saint Francis Hospital, containing over one hundred beds, mostly occupied, received from without several fatal cases, and likewise escaped. And the county jail, with about thirty inmates, at the time wholly escaped. Its sanitary condition is all that can be desired; during the cholera, vegetables were discarded from its dietary.

CHOLERA IN THE OHIO PENITENTIARY.

This institution in its construction and surroundings is unfortunate. Situated on the east bank of the Scioto River, only about 16 feet above its level, it is exposed to the opening of the sewers in this vicinity as well

as to the stagnant condition of the stream and the filth along its shore. The sewer, especially, into which the excrement of over a thousand men is daily deposited, its inlet and outlet only about one hundred and forty-five yards apart, and alike free to the circulation of air through them, is peculiarly adapted to the generation and dissemination of *materies morbi*.

The building itself, consisting of stone, is arranged in the form of one edifice within another, the inner one containing the cells. Each cell, upon an average, is 7 feet long by 3 feet 4 inches wide, and 6 feet 9 inches high, making but 157½ cubic feet to the cell, closed in on all sides by solid masonry, except its entrance, which is closed by an iron grating. These cells, numbering in the male department ten hundred and fifty, are built in this solid stone structure within the main edifice, reaching to the ceiling of the latter, and surrounded by corridors for each tier of cells; the only space left between it and the outer building being a passage-way 11 feet wide. From this is obvious the defect in the ventilation; without an outlet from the cells, save their entrance closed by the grating (leaving in the aggregate an available air-space of but 18 inches square;) this again, for want of due ventilation between the cell-edifice and the exterior building, leaves no practicable means of ventilation within them, to say nothing of their diminutive size. Add to this the dampness inseparable from the solid stone structure, together with the exhalations and excretions from so large a body of men crowded for twelve hours in so small a space, and the nature of the situation, manifest particularly in hot, sultry weather, is comprehended. Each cell is provided with a night-bucket of sheet-iron, zincked, with a tightly-fitting lid, emptied every morning by men detailed for that purpose into the sewer aforesaid and thoroughly disinfected.

The female apartment, separate from the rest, is constructed on a wholly different plan; is well ventilated, and looks out upon the city. Its inmates, numbering twenty-five, all escaped the disease. So the asylum for the insane and incorrigible is a separate edifice; its cells, constructed upon a modern plan, are light and airy; but the building, cooped in among other buildings, has not the best ventilation. Out of fifteen inmates, one had cholera.

The hospital, in a different wing of the building from that of the cells, on the second floor, is spacious, but had not the best ventilation. In it the patients, with the necessary corps of nurses and attendants, are in common, and the latter, during reliefs, also lodge here; and where, moreover, the rations for patients and attendants are prepared and served.

For drinking and culinary purposes the water used, from a single well, is pure and of excellent quality.

As already observed, not until the 10th of July, well-nigh a week after its appearance in the city, was cholera announced in the prison. The intestinal fluxes aforesaid were attributed largely to a 4th of July repast, in which many of the convicts evidently too freely indulged; though the same did not follow a similar occasion this year.

On the above date one case only was had, which, after a series of reverses, relapse, &c., in a few weeks entirely recovered. Skipping a day, the second case, that of a frail body, occurred on the 12th of the month, and died in fourteen hours. Until the 20th of the month the malady daily exacted its victims, as shown by their chronologic order, with history and results tabulated below. Thus it is seen that, within a period of thirty-one days, twenty-seven cases, with twenty-one deaths, were had, a rate of mortality sadly at variance with that currently reported, but which may be accounted for by the malign character of the disease,

and by the wretched cachexy of some of these unfortunate beings, engendered by a life of vice and dissipation, and by protracted exposure to the damp, foul air of the cells, until the *vis conservatrix naturæ* is well-nigh spent.

It is further shown that the diarrhœa was had in twenty-three cases, but it does not follow that in the rest it was absent, since its existence in the majority was ascertained by inquiry post mortem, through officers and guards, and the recoveries all had it. As to the time of the attack, it will be observed that eight of the cases came on between midnight and 6 a. m., ten between this time and 12 m., four between this hour and 6 p. m., five between this latter, again, and midnight; further, that they came together in batches of as many as seven in a day and five in a forenoon.

It was striking to note, also, the influence of heat and moisture. A heavy rain with a day's hot sun preceded each installment, while the former, without or prior to the latter, as invariably checked it. It is difficult to regard this as a mere coincidence; so striking was it that it began to be a harbinger of evil, seen in the looks of every one. This choleraphobia rose to a morbid condition with some of the prisoners; but, contrary to the popular notion, no harm seemed to come of it—the timid were not the ones taken.

That with the majority the disease approached unawares, is evident from the fact that they were apparently in their usual state of health up to the last moment; some ate heartily the meal before—in one case but twenty or thirty minutes; others were taken while on duty, or asleep in their cells; two aver they were awakened by it; in one of whom an effort to pass flatus was attended by a profuse watery dejection.

The insidious diarrhœa that preceded was little apt to awaken suspicion; for notwithstanding the repeated cautions to report for medicine at the earliest intimation of illness, but nine of the cases, just one-third, did so. But that they were not wholly without admonition is evident from the circumstance that *tinnitus aurium*, *muscæ volitantes*, vertigo, &c., were common, and, though little regarded at the time, subsequently became vividly fixed in the minds of the survivors as signs of the impending malady.

Nor was it less severe in its onset than subtile in its approach; facts go to show that men stricken down at their posts, rendered helpless in a few moments, had to be carried into the hospital; that some fell by the way, and others came in faint.

The course of the disease is well known, and its malignancy here attested to by its results. With some it seemed mortal from the start, paralyzing sensibility and rendering indifference to life. One poor wretch, reduced by a period of solitary confinement, brought in faint and pulseless, expired without apparently a pang or struggle, and without an evacuation until post mortem, when, upon removing the body, the characteristic fluid escaped. Others, wasting from every pore, tormented by cramps, thirst, &c., and a dread sense of impending dissolution, resisted to the last the deadly collapse—a sharp rebuke to those given to doubt the Asiatic feature of the disease, or that other than a severe form of cholera morbus prevaled. And the examples of post-mortem caloric and muscular contractility, characteristic of violent deaths, further evinced the nature of the malady. In some instances, no sooner were the bodies carried to the dead-room than the bearers returned in breathless haste, declaring them still alive, and were with difficulty reconciled by an explanation of the harrowing sight.

CASES CONTRACTED IN THE HOSPITAL.

Whether casual, or resultant from the mingling and contact with the disease in the hospital, two of its inmates, a patient and an attendant, took it. The first, a feeble and imbecile old man, died, and a *post mortem* examination (superintended by the writer) was made of the body; the second was taken in twenty-four hours thereafter, but recovered. Others present at the examination escaped with diarrhœa, which the nurses and attendants all had, together with more or less gastric disorders. An officer, Captain C., of the night watch, not included in the table, who, during the cholera, spent most of the time superintending the sick, took the disease, and after a protracted illness, recovered.

MANAGEMENT OF THE DISEASE.

The convicts, averaging at the time nine hundred and thirty-five, of which number 10 per cent. were blacks, were, when not on duty or at meals, confined to the cells, as is the custom, except in the forenoon on Sunday, when religious services are held in the chapel; but during the cholera epidemic, to avoid in the afternoon of the same day the close air of the cells, they were distributed through the yard and shops with entertainment suited to the occasion.

All were required to take a full bath once a week.

Few changes were made in the dietary. Corn-bread, part of the regular prison-ration, was discontinued, and wheat-bread alone used; more fresh beef and less cured meat, with warm drink, either of tea or coffee, for dinner, except when soup was had. No potatoes were used; rice and a scant supply of hominy were continued; also butter and cheese; and tomatoes used to flavor the soup. In hospital, potatoes, corn-starch, mutton, milk, tomatoes, animal broths, &c., were had in addition to the above, to be used as prescribed.

Upon the approach of the disease, the premises, always well policed, were renovated throughout and disinfected without stint. The articles used were the chloride of lime, bromo-chloralum, carbolic acid, and sulphate of iron; the first of which in the hospital was soon abandoned, for the more eligible combination of the two latter, as directed by Dr. Parkes, and without which the buckets and bed-pans were never left, unless for a few moments, to inspect the character of the stools. The defect in the sewer referred to, into which the night-buckets were emptied, was in part overcome by the free use of disinfectants and by keeping its inlet, when not in use, closely covered—commenced the 18th of July, with the effect, as the table shows, of directly abating the disease, and by the 11th of August completely "stamping" it out in the prison, while it continued increasing in the city, where it remained until the 17th of September, which, together with the circumstance of its inception and subsequent ravages about the drops into the sewers spoken of, corroborates the suspicion that the latter had to do with fostering the malady.

In the use of medicine, those generally approved were adhered to. Cases that reported before vomiting set in were given, at once, morphine, gr. ¼ alone, or with calomel and bicarb. soda each gr. x.; and, if retained, followed directly by plumbi-acetas, gr. iii to gr. iv, in solution, cleared with acetic acid, but was seldom retained long enough to be appropriated. Under these circumstances, or when vomiting had already commenced, the morphine was administered hypodermically (gr. ⅓ to gr. ½) with the lead solution, as above, the latter to be repeated every half hour or hour

while purging continued. Large sinapisms were kept to the abdomen as long as could well be borne; and as the temperature declined, warmth was applied by means of blankets and fomenters; perspiration kept dried; and for the cramps, friction was used, and, when severe, chloroform by inhalation. To whatever due, in the course of from one to three hours, the evacuations usually abated, and in some ceased; but they, it soon became evident, were not the burden of the malady. Pending collapse, but little it seemed could be done— danger rather of tampering than of doing too little; watch was kept not to carry the opiate too far, and the reckless use of the hypodermic syringe by some cannot be too much deprecated. The apparent need of stimulants and fluids seemed irresistible. Brandy, largely diluted, was given, but with many was distasteful and excited vomiting. Ice-water was taken with avidity, and was allowed freely, as was also ice melted in the mouth, and no harm seemed to come of them. During extreme collapse, when nothing could be appropriated, or anything borne, the following from Aitken, used in the British army, in India, was well received by the stomach, and called for by the sufferers, whom it seemed to exhilarate: R. ol. anis, ol. cajeput, ol. juniper, āā℥ss., ether, ℥ss., liquor acid halleri, ℥ss., tinct. cinnam, ℥ij. M: Dose fifteen drops in water every fifteen minutes.

As a prophylactic rather than to be used in the course of the disease, a hot stimulant mixture was resorted to, consisting of tinct. camphor, min. x., tinct. capsicum, min. xv, whisky, ℥ss. at a dose; to be given in the event of threatenings in the way of cramps, faintness, vertigo, &c. As an opiate, the tincture or morphine was sometimes added; and it is difficult to believe, but in some cases it averted the disease. Other medicines were tried, as lime-water, ipecac, subnitrate of bismuth, sul. ether, spts. ammonia aromat., and tannin with brandy by enema, but were soon abandoned, as were also the calomel and carb. soda, and reliance mainly had upon opiates, the lead, and supportants.

Sul. quinine with aromat. sulph. acid, and opiates with vegetable astringents, were given for the diarrhœas.

Nourishment in the way of animal and farinaceous broths, milk, milk-punch, coffee with milk, &c., were taken as soon as tolerated. Solid food was rejected by some for days.

Sour milk was used by some of the attendants; mentioned, inasmuch as a writer, recently, in the Nashville Medical Journal, intimated it to be an exciting cause of the malady.

The kidneys and bladder required attention; all that survived the collapse except two, had to be catheterized, and from each quite a quantity of urine was taken; but whether it was secreted since or prior to the attack is questioned; its mere presence in the bladder, is not proof of its recent production.

The origin of cholera *de novo*, in Columbus, will scarcely be claimed. Then, whence and how came it? That it commenced at the place, and with the case named, is well attested. The habitation being one of public resort, frequented by classes whose habits and vocations (railroaders, &c.) render them apt bearers of the disease, its introduction by this means, after being heralded for weeks along the line of travel, is what might, with the present views in regard to the propagation of the disease, have been *a priori* expected; to say nothing of its possible origin, as intimated, from the contagion brought by passing trains. The entrance of the disease thence into the prison a week later, through the communication kept up by guards, teamsters, &c., was but a natural result. Besides, the husband of the deceased, up to the time of her illness, was employed as night-watch in some of its shops.

Cholera-epidemic of 1873—*Ohio Penitentiary, Columbus, Franklin County, Ohio.*

Case.	Age.	Date of attack.	Date of death.	Remarks.
1	29	July 10—11 a. m.....	.....	Recovered; able-bodied; diarrhœa one week; medicine; vertigo; muscæ volitantes; diplopia; sense of gastric oppression; collapse; ischuria.
2	51	July 12—3 a. m.....	July 12—5 p. m.....	Invalid for years; greatly emaciated.
3	58	July 13—12 m.....	July 14—1.45 a. m...	Debilitated; frail; life-convict; had served eight years.
4	32	July 14—11 a. m.....	.....	Recovered; able-bodied; noted for obstinacy and pertinacity; had slight diarrhœa; awakened by borborygmus, followed by painless sense of abdomen giving way; tinnitus aurium.
5	28	July 14—11 a. m.....	July 17—7.30 a. m...	Robust, but fidgety; diarrhœa; had served only a few months; syncope; carried to hospital.
6	38	July 16—5 a. m.....	July 16—3.30 p. m...	Able-bodied; no characteristic evacuations until post-mortem; medicine.
7	33	July 16—8 a. m.....	July 16—2 p. m.....	Able-bodied; diarrhœa; tinnitus aurium; vertigo; cramps; vomiting.
8	33	July 16—8.30 a. m...	July 16—6 p. m.....	Able-bodied; diarrhœa; medicine; carried to hospital.
9	22	July 16—8 30 a. m...	July 16—8.45 p. m...	Able-bodied; diarrhœa; gormandizer; supported to hospital.
10	42	July 16—12.45 p. m..	July 16—9.45 p. m...	Somewhat feeble; diarrhœa; gormandizer; medicine.
11	74	July 16—2.30 p. m...	July 16—11 p. m.....	Frail; imbecile; diarrhœa; life-convict.
12	28	July 16—8 p. m.....	July 17—10.40 a. m..	Debilitated; diarrhœa; in dungeon eighteen days for incorrigibility; carried to hospital pulseless.
13	45	July 17—1.30 a. m...	July 18—6.30 p. m...	Able-bodied; diarrhœa; had incontinent, watery dejection.
14	58	July 17—7.30 p. m...	July 18—6.15 a. m...	Able-bodied; diarrhœa; an effort to pass flatus, attended by watery dejection; carried to hospital.
15	22	July 17—2 p. m.....	.....	Recovered; vigorous; quick, nervous; diarrhœa; vertigo; awakened by borborygmus; fell on way to hospital; left with gastric ulcer.
16	34	July 18—2.30 a. m...	July 19—11 a. m.....	Feeble; fidgety; diarrhœa; medicine.
17	44	July 18—4 a. m.....	July 18—10 a. m.....	Able-bodied; diarrhœa; night-bucket contained copious rice-water stools; carried to hospital.
18	59	July 18—1.30 p. m...	July 18—6.30 a. m...	Feeble.
19	20	July 18—10.30 p. m..	July 22—12.50 a. m..	Able-bodied; diarrhœa; medicine; life-convict; Aitken's vomiting of "green-paint-looking matter."
20	28	July 19—12 m.....	July 19—11.15 p. m..	Able-bodied; diarrhœa; came to hospital faint.
21	43	July 19—6 p. m.....	.....	Recovered; lacked in vigor; diarrhœa; medicine one week; muscæ volitantes; vertigo.
22	21	July 24—11 a. m.....	July 25—6.30 p. m...	Insane, but able-bodied.
23	63	July 24—9 p. m.....	July 26—3.15 a. m...	Feeble; diarrhœa; medicine; fainted.
24	37	Aug. 1—4.30 a. m...	Aug. 1—5 p. m.....	Able-bodied; diarrhœa; had cholera in 1852.
25	67	Aug. 6—4 a. m.....	Aug. 8—3.30 a. m...	Frail; imbecile; diarrhœa; life-convict; superannuated; was singularly void of cramps and pain or suffering of any kind.
26	36	Aug. 9—7 a. m.....	.....	Recovered; able-bodied; painless evacuations; no cramps; medicine; commenced by vomiting.
27	27	Aug. 11—12 m.....	.....	Recovered; able-bodied; diarrhœa; hospital-attendant; attended post-mortem examination of a cholera-case the day before.

NOTE 1.—The above cases were all white male convicts.

NOTE 2.—Of the six cases marked "Recovered," No. 1 was under treatment about three weeks; No. 4, one week; No. 15, three weeks; No. 21, one week; No. 26, three days, and No. 27 about the same length of time.

NOTE 3.—The remarks refer to the cases prior to or at the onset of the attack, except the ischuriæ being sequelæ.

NOTE 4.—The immediate cause of death in case No. 5 was uræmia.

NOTE 5.—Case No. 25 had atrophy of encephalon, as revealed by post-mortem examination.

SCIOTO COUNTY.

Portsmouth, the county-town of Scioto County, is located upon the banks of the Ohio River, above the mouth of the Scioto, and at the outlet of the Ohio and Erie Canal, one hundred and fifteen miles above Cincinnati. This town is also the terminus of the Scioto and Hocking Valley Railroad.

On the 20th of July, two men, named Erght and Noel, arrived at Portsmouth upon a river steamboat from the city of Cincinnati. In both the disease was developed before reaching the city; both cases

terminated fatally, that of Erght after five hours' illness, that of Noel after ten hours'. But one other case occurred, that of a little girl seven years of age, who had been at the house at which one of these men had been cared for. This child was taken on July 26, and died after an illness of ten h ours.

FAIRFIELD COUNTY.

CHOLERA AT LANCASTER, FAIRFIELD COUNTY, OHIO, IN 1873.

BY DR. D. N. KINSMAN, *Health-Officer.*

Lancaster is a city of six thousand inhabitants. Along its western and southern borders flows the Hockhocking River, through a marshy soil, on a line inside of the river, close to the city; and, indeed, in its limits for more than a mile and a half is the Hocking Canal.

On the north and west of the city is a large extent of land, which has never been drained; and on the south, although the land is under culture, it is often overflowed, and remains damp and swampy during rainy seasons.

The geological foundation of this section is the Waverly sandstone, overlaid by a limestone drift. The hills surrounding the city rise to a height of 300 feet; the banks of the water-courses are abrupt, and the channels are narrow; as a result this section of the country is subject to very sudden rises of water. On the 4th of July, 1873, one of the most disastrous floods ever known in the valley occurred. All the bottoms were overflowed, and thousands of acres were covered with water from one to six feet in depth, and upon the subsidence of the waters were covered with vegetable and animal substances; this matter under the action of the sun decomposed, and filled the air of town and country with a stench, which in some localities was terrible.

In the center of the town is a hill, upon the top and sides of which probably one-fourth of the population resides. The wells on this hill are from 40 to 80 feet in depth; on the low land around the base of the hill water is reached at a depth of from 12 to 15 feet. The water is strongly impregnated with lime, and wells are the source of all the potable water except in a few families who use filtered rain-water.

The western portion of the town along the canal has been the longest inhabited. The houses are thick, and the soil, from the presence of stables, privies, and out-houses, reeks with filth. The dashing rains of summer wash the hill-side, carrying all its filth to the base of the hill, where it remains on the level of the greater portion of the town. There is no sewerage in the city, except in the northern portion; all the rest has surface drainage. Hogs are allowed to run at large; although they are to a certain extent scavengers, they are harmful in the total. A few days after the flood, diarrhœal diseases begain to prevail, and from the 15th of July until the 1st of September cholera morbus and cholera infantum might almost be said to be epidemic. The type of the disease was severe but not fatal.

Six cases were treated, which had all the characteristics of cholera asphyxia. Four of these occurred in the western part of the town, on the canal bank. Three were in one family, all of whom were seized within twenty-four hours. Another case, living on the same street was sick a few days later. The fifth case was in the person of the yard-master of the Cin-

cinnati and Muskingum Valley Railroad. The sixth was in the person of the wife of a beer-saloon keeper. All these cases had diarrhœa, vomiting, vox cholerica, and collapse. In two cases the urine was suppressed. In one delirium lasted for three days after reaction was established.

It was impossible to trace any contact with persons who had the disease, or those who had come from a distance where the cholera was prevailing. The filthy locality in which the patients lived, the necessary contamination of their drinking-water, heat, and close, illy-ventilated sleeping-rooms, are accepted as sufficient factors for the development of the disease.

CLEVELAND, OHIO.

It having been noted in the Cleveland Plaindealer that during the month of July, 1873, two cases of Asiatic cholera had been reported to the health-office, as having occurred on Mulberry street of that city, a communication was addressed to the health-officer, which was answered by the following letter:

"CITY OF CLEVELAND,
"OFFICE OF THE BOARD OF HEALTH,
"*Cleveland, July* 30, 1874.

"DEAR SIR: Your favor of July 27 at hand. in reply, at the time erferred to our people were fearful that the cholera would reach us, consequently the cases you refer to were hastily reported under the excitement as cholera; but upon mature investigation as to the habits of the patients and progress of the disease, it was decided that none of them died from Asiatic cholera.

"Very respectfully,
"H. W. KITCHEN, M. D.

"DR. ELY MCCLELLAN."

STEUBENVILLE, OHIO.

A dispatch to the Louisville Courier-Journal, June 19, 1873, stated that a man named Stephenson, who arrived at Steubenville from Cincinnati on the 18th of the month, had been taken sick, and had died in a few hours of cholera.

Upon investigation this report was found to be utterly unfounded, and to have been circulated for the sake of notoriety. The man Stephenson did arrive at the time stated from Cincinnati, where he had been on an excessive debauch. After his arrival at Steubenville he was known to have eaten immoderately of cherries, and died of acute cholera morbus. No other cases of the same or of an assimilating disease occurred in the city.

The above facts are determined upon consultation with Dr. Moffatt, who was in 1873 the health-officer of Steubenville, and with Dr. Johnston, a prominent physician of the city.

CHAPTER XIII.

INDIANA GROUP.

INDIANA CONTRIBUTORS.

Dr. H. G. Jones, health-officer, Evansville.
Dr. G. B. Walker, Evansville.
Dr. B. J. Day, Evansville.
Dr. J. W. Kyle, Jennings Co.
Dr. J. A. Scudder, Daviess Co.
Dr. James Lamb, Dearborn Co.
Dr. R. C. Bond, Dearborn County.
Dr. J. W. Culley, Hendricks Co.
Dr. Morrell, Vigo County.
Dr. J. B. Armstrong, Vigo County.
Dr. S. H. Pearse, Posey County.
Dr. J. B. Weever, Posey County.
Dr. E. V. Spencer, Posey County.
Dr. M. S. Blount, Posey County.
Dr. W. F. Collins, Marion Co.
Dr. J. M. Darrach, Marion Co.
Dr. S. Record, Marion County.
Dr. T. Parvin, Marion County.
Dr. E. Reed, Vigo County.
Dr. S. J. Young, Vigo County.
Dr. J. W. Thompson, Vigo Co.

Dr. P. H. Bailhache, Surgeon Marine Hospital service.

INITIAL CASES.

Mount Vernon, Posey County ..... May 27.
Evansville, Vanderburgh County ..... June 5.
Indianapolis, Marion County ..... July 2.
North Vernon, Jennings County ..... July 10.
Terre Haute, Vigo County ..... July 16.
Aurora, Dearborn County ..... July 27.
Lizton, Hendricks County ..... August 1.
Washington, Daviess County ..... August 11.

Posey County.

Mount Vernon, the county town of Posey County, is located upon the banks of the Ohio River, about two hundred miles below Louisville, Ky. The town has a population of about three thousand inhabitants. At this town and in its vicinity the cholera-epidemic of 1873 was characterized by its malignancy. The history of this demonstration is embraced in the following papers:

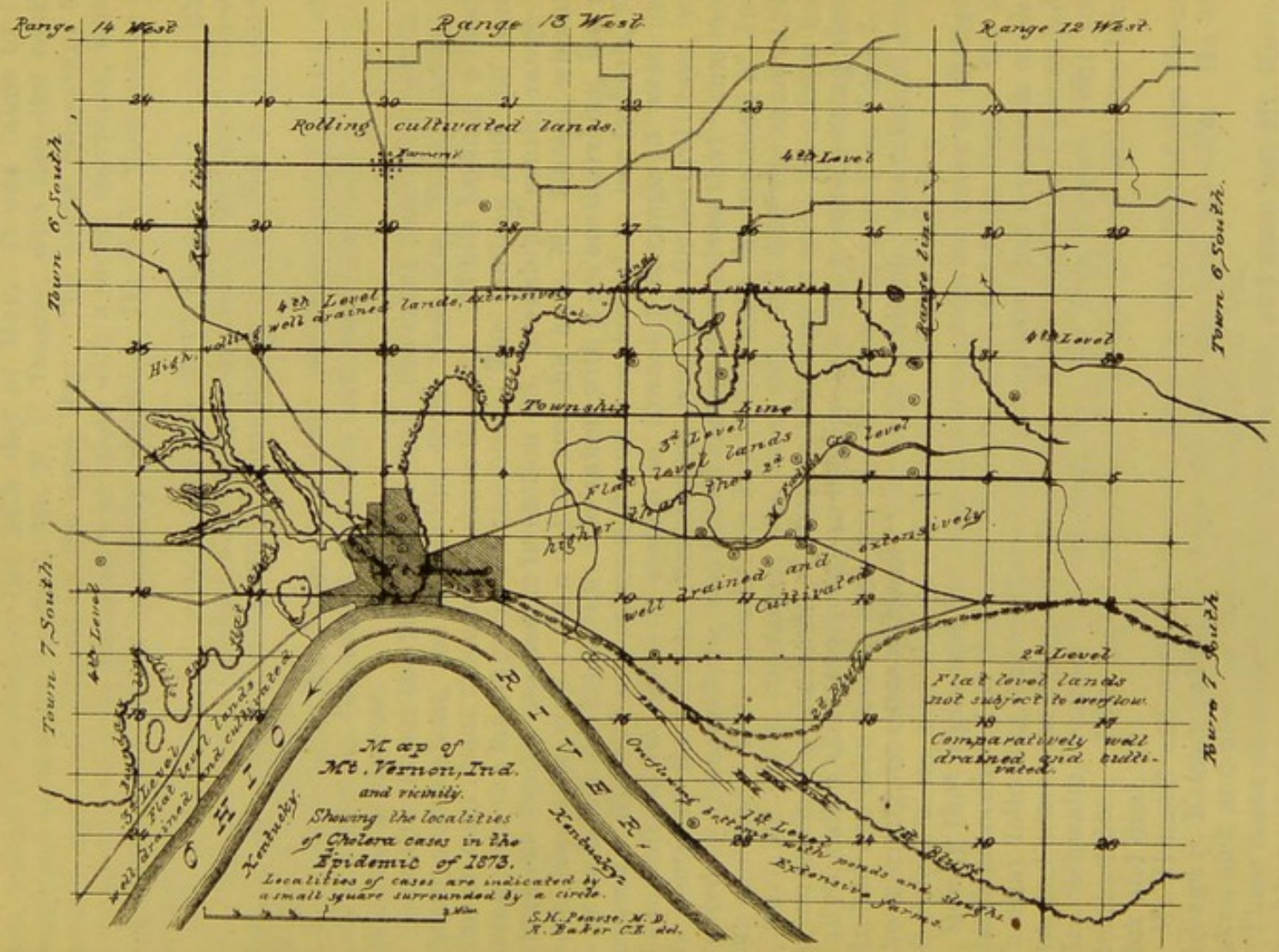
I.—EPIDEMIC OF CHOLERA AT MOUNT VERNON, IND., IN 1873.

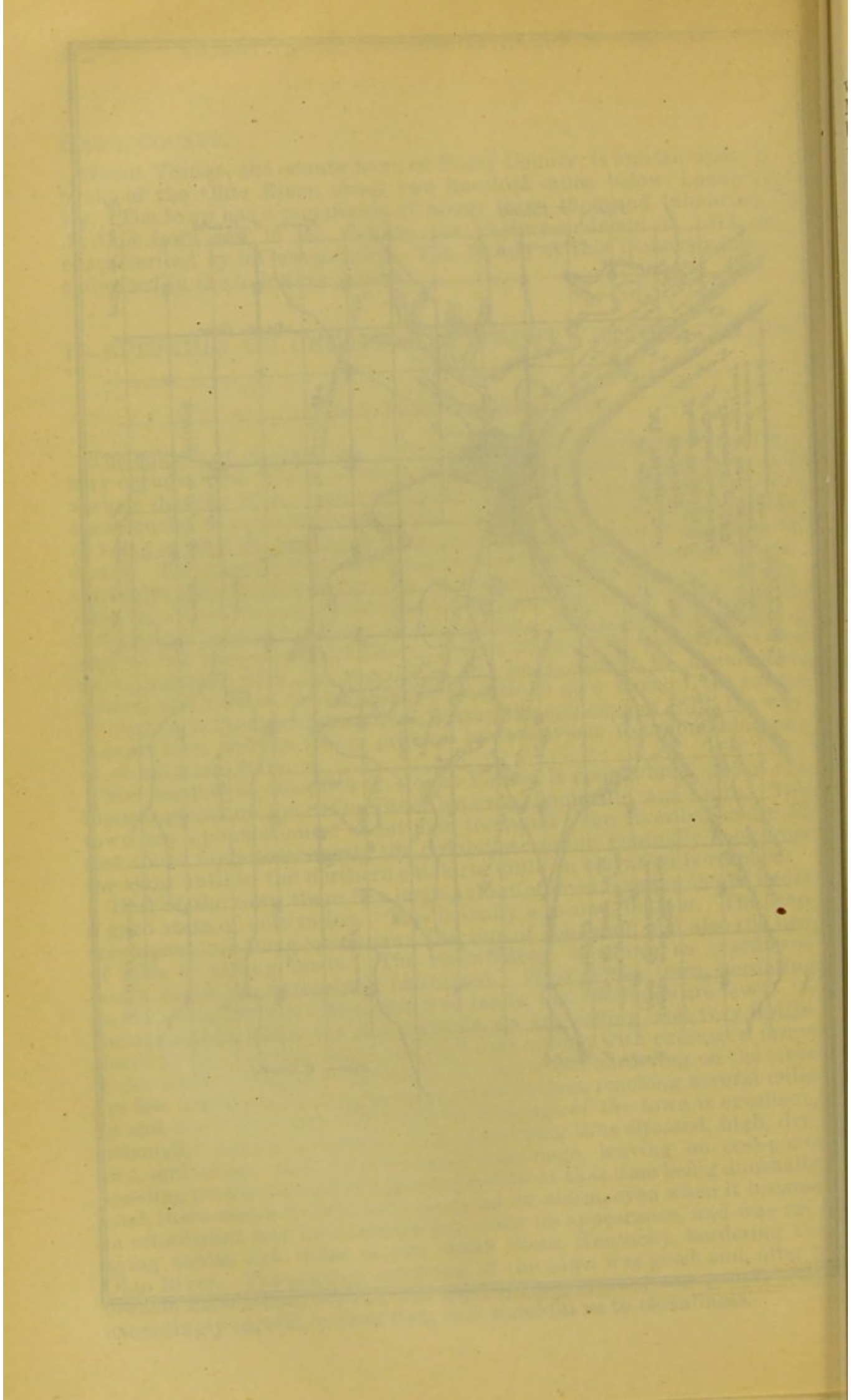
By S. H. Pearse, M. D.

The subject of cholera has at various times within the last half-century occupied the minds of some of the most eminent physicians, and various theories have been advocated, and again abandoned for new ones equally as erroneous as the first. That cholera is a disease capable of being carried from place to place, it seems, there is no longer room to doubt. The excreta from the body of a cholera patient seems to contain some specific poison that can be transported any distance and produce the disease in any given locality, unless everything pertaining to said patient is most thoroughly disinfected. The beds upon which a patient has lain, all the curtains, and everything in and around the room, together with the excreta of the body, should be disinfected. Taking this view of the subject, we propose to give some of the causes of cholera in Mount Vernon, Ind., during the epidemic of 1873, the way it came here, and the course pursued by it previous to its breaking out in an epidemic form.

The location of the town of Mount Vernon is upon a bluff, one of the highest points on the Ohio River between Louisville and Cairo. The town has a population of about four thousand; the river-banks are 12 feet above high-water mark, the ground ascending gradually back from the river until in the northern outskirts quite an elevation is reached.

East of the town there is a large extent of level farming-lands, under a good state of cultivation. This is really a second bottom. The map accompanying this paper shows the line of the bluff, and also the line of hills, or rolling lands. The river-bottom is shown as overflowed lands, which are extensively cultivated. West of the town, bordering on the river, there are no overflowed lands, but the lands are level. A short distance from the river the lands are rolling and very fertile. North of the town the lands are high and rolling, with extensive farms under good cultivation. South of the town and bordering on the river are low lands; this is a large overflowed bottom, reaching several miles up and down the river. The natural drainage of the town is excellent, although it has no sewerage. The town being thus situated, high, dry, airy, and clean, with natural surface-drainage, leaving no cess-pools breeding pestilence, and the general health at that time being unusually good, there seems to have been no cause for alarm, even when it became an established fact that cholera had made its appearance, and was ravaging towns and cities in our sister State, Kentucky, bordering the Ohio River. The sanitary condition of the town was good, and, after it became known that cholera was approaching, most of our people were exceedingly careful in their diet, and watchful as to cleanliness.


Range 14 West
Range 13 West
Range 12 West
Town 6 South
Town 7 South
Rolling cultivated lands
4th Level
Range line
Township line
3d Level
2d Level
Flat level lands not subject to overflow
well drained and cultivated
extensively
Ohio River
Kentucky
Map of
Mt. Vernon, Ind.
and vicinity.
Showing the localities
of Cholera cases in the
Epidemic of 1873.
Localities of cases are indicated by
a small square surrounded by a circle.
S.H. Pearse, M.D.
R. Baker C.E. del.



We had heard of the epidemic now under consideration, prevailing at various points on the Mississippi River, it being the most violent at Memphis, Tenn. One of our citizens fell a victim to it there. His brother and partner went there to bring the body home. His body was placed on board the steamer Pat Rodgers, and brought to Mount Vernon, where it arrived on the 26th day of May. It was taken to the residence of another brother, Mr. F. C. Decker, who had the casket opened, and then buried on the same day. The night following, the brother who went to Memphis was taken with a severe diarrhœa, which was pronounced by the attending physician, Dr. E. V. Spencer, to be cholerine.

Two or three days after this event, Mr. F. C. Decker had three children with the same character of disease, and but a few days elapsed before a child on the same block, immediately in the rear of Decker's, took sick and died.

A few days after the death of the child just mentioned a second, and finally a third, in the same house, took sick and died, each of the same character of disease.

Some time about the 20th day of May (the exact date I am unable to obtain) a steamboat, the Eddyville, from Nashville, Tenn., landed to take on corn about three miles above the city. While loading, a family living near the landing visited the boat. The landing and the house where the family resided is in section 23, township 7 south, range 13 west, (shown on map.) In a day or two the man, Mr. Russel, who had been on board the Eddieville, was taken with a severe diarrhœa, but recovered. His wife was taken sick and was moved to her father's, Mr. Isaac Cully's, who lived in section 36, township 6, range 13 west, near the center of the section. Mrs. Russel was sick for several days, was visited by the neighbors, who talked among themselves that "this looks like cholera." Time passed from day to day until the morning of June 6, when Mr. Cully, the father, was taken sick, and died the same night. A young man by the name of Pickles, who was at work on a farm near Cully's, called there every day to inquire how they were getting along. He had not been feeling well for two or three days, and on June 7, in the morning, he came to Mount Vernon for medicine, was taken ill about 10 o'clock a. m., and died at 7 o'clock p. m. of the same day.

During that night and the next day several severe cases of choleraic diarrhœa occurred at the hotel where he died, but none fatal. On the Tuesday following, the mother of the young man had an attack of cholera, and came near dying, but recovered. Following this a German lady, Mrs. Schwalm, washed the bedding, &c., for Mrs. Pickles. She took sick and died. Mrs. Alsted, who helped to take care of her, was taken sick and died.

Mr. Himmel and wife, who were at Alsted's, both died of the disease. George S. Koonce helped to bury Mr. Himmel and his wife. He was taken sick and died, as did also a daughter of his.

These cases all occurred in rapid succession, and none but Mr. Koonce lived but a few hours after the attack. From this neighborhood the disease was taken across the country some twelve miles, where there were several cases. It occurred in this way: When Mrs. Schwalm died, her husband's father came over, and to make the children more comfortable, he took the feather-bed upon which Mrs. S. died, put it into a wagon, put the children on it, and took them to his house. A few days following this the children, the old man, and his family were all down sick with cholera, and nearly all died. In the city, for some days after the death of Pickles, there were no fatal cases; but during this

period fresh poison was constantly being brought to us from Memphis, Nashville, and other points, in the following manner: Steamboats on our western rivers carry all kinds of freight and a great many passengers. Some of these passengers are in the cabin and some are on deck, and the deck-passengers and the deck-hands have their quarters in the engine-room, where they eat and sleep, and are much of the time lying around on piles of freight, and frequently on the bare deck.

At that time nearly all the boats on the river had more or less cases of cholera on board.

On May 26, the steamboat Pat Rodgers, from Memphis, Tenn., landed at our wharf, having cholera on board. The steamboat Arlington, May 26, landed and discharged a large lot of freight. May 30, the steamboat Mary Houston landed and put off freight; she had cholera on board. On the 26th of May the steamboat R. E. Lee was here, and again stopped at our wharf on the 10th of June. The steamboat Henry Probasco was here on the 6th of June. The steamboat James D. Parker landed here on the 22d of June, all on board sick except the captain and clerk. Then there were the regular packets stopping every day, going down and coming up the river, with cholera-cases on board most of the time. On the 21st of July the steamboat Camelia brought from Nashville, Tenn., a gang of negroes to work at the Grand Chain, (a Government work on the Wabash River.) One of those negroes died at the wharf-boat of cholera on arrival. A few days afterward another of this gang came over from the Grand Chain, was taken sick, and died of the same disease. So, from this, it can be readily seen that the source of the poison was being constantly supplied from abroad. The disease was developed gradually, occasional cases occurring from the 7th of June until about the 1st of July, when it began to assume an epidemic form, of a very malignant type. There were several cases in rapid succession, when after about one week there seemed to be a cessation, and we hoped it had passed by; but we were disappointed.

About the 12th it began to rage in all its fury, very violent and continued, until the people became panic-stricken, and were then willing to act upon the advice of some of the physicians, to scatter, and not remain in the infected district. Had this advice been heeded a month sooner, without doubt it would have saved the lives of very many.

About the 18th of July the disease reached its climax, more cases occurring on that day than on any other; and for some five weeks following it gradually decreased in the number of cases.

From the 20th day of July, the city did not contain more than one-third the inhabitants that were here previously. They left the city in all directions, some going but a few miles into the country, while others went to their friends in other States. One of our citizens, who left here on the 18th, was a dairy-man who had visited all parts of the town twice a day, delivering milk to his customers, from the commencement of the disease. He started with his family for Portsmouth, Ohio, was taken sick while *en route*, and died just after his arrival there.

There were some others who were taken sick after leaving here, but this was the only death.

The disease prevailed to a great extent in the level parts of the town, where the drainage was the poorest, or, at least, where the least effort was made by the families to keep their premises clean and disinfected.

There were a few cases up on the high ground, but they were traceable, and the first parties attacked came with the cholera fully developed. The first case on the extreme high part of the city was a young man by the name of Woody. He had been on the river, came home with diar-

rhœa, which run on for some days, when genuine cholera ensued. He was boarding at his brother's. His brother's family consisted of himself, wife, wife's sister, and four children, one a babe. The young man died after about forty-eight hours' sickness, and was buried the same day that he died.

The persons attending the funeral from this brother's, together with the young man's mother and two sisters, who each lived one mile in the country, on the high ground, were nearly all taken down with cholera.

The next day after young Woody died, a young man, who lived in the country, and who had assisted in taking care of him, went home and lived but a few hours, dying of cholera in a malignant form.

Two days after young Woody's death his brother's wife was taken sick and died, as also two children, the babe living less than three hours.

They were all taken on the morning of July 17, and at noon two were dead, and the wife died about 5 o'clock p. m. On the 18th, the mother and one sister, living as before mentioned, were taken, and in a few days the father and two other sisters were taken down, and all died, making nine deaths in this family, which were directly traceable to the young man having been taken sick there. Besides these, there were three or four other cases that were very bad but recovered.

In the same manner some other cases might be traced from some particular family. But, it seems to me, enough has already been said to prove conclusively that it is communicable from one person to another, or from family to family, as the case may be.

During the prevalence of the disease in this locality, the medical profession were too much occupied to give the subject that close observation which it demanded, as to its contagious or infectious nature. But I believe we are all agreed in this: that it is communicable from one to another, and that very much can be done to check its progress and destroy its peculiar poisonous properties, whatever they may be.

As to the treatment, we have nothing new to advance, as the treatment of cases here was very much the same as advocated by our best writers in previous epidemics.

The whole could be summed up as alterative and stimulating.

The diarrhœa was usually treated by giving pill. hydrg. and pulv. opii, and sometimes ipecacuanha. After an action of the liver had been secured, astringents were used.

II.—EPIDEMIC OF CHOLERA AT MOUNT VERNON, IND., IN 1873.

By E. V. Spencer, M. D.

During the summer and fall of 1872, dysentery prevailed to a considerable extent. Whe had, also, our average amount of sickness of the usual character, but all cases seemed to have a more irritable condition of the stomach and bowels than common, and this condition has continued up to this time, slowly and gradually passing away since the cessation of the cholera. The condition of the air and our physical condition seemed ready for an explosion, and all that was necessary was a spark to ignite it; and this occurred on or about the 20th of May, 1873, by the remains of a person who had died of cholera in Memphis, Tenn., being brought here for interment; also by persons visiting the infected steamers from Nashville and Memphis, Tenn.

There was nothing unusual about the season, except very heavy rains

about the time the disease was introduced among us. The season was rather cooler than common during the entire prevalence of the epidemic. It prevailed in the same localities it had in previous visitations—the second bottom, level, with rich, alluvial soil, with a heavy clay subsoil. The inhabitants almost invariably used well-water, and the wells were nearly full to the surface with a very impure water. When cholera broke out, there seemed no appreciable difference between the epidemic of 1873 and previous visitations of cholera that I have witnessed here, unless in the latter being more general. There were no peculiarities of the latter that did not attach with equal force to the former. When it broke out we were having vernal intermittents, as usual in this locality, occasionally a case of typhoid fever, some erysipelas, diarrhœa, and occasionally a case of mild dysentery. After the introduction of cholera, fevers diminished in numbers, and when it was at its worst, nothing else seemed to prevail; it absorbed up nearly every other complaint, and, as the epidemic abated, the usual diseases returned. The attack was almost invariably preceded by a painless diarrhœa. In some instances obstinate dyspeptic symptoms were manifest. Borborygmi preceded the onslaught of the disease in nearly every case; in fact, every one suffered more or less with uneasiness and rumbling of the bowels. In a majority of the cases the disease made its appearance in the latter part of the night, ushered in by nausea, vomiting, diarrhœa, labored breathing, cramps, pulse increased in frequency and weak, great thirst, mind much disturbed, great anxiety; this, however, soon passed away, and if the disease passed on into collapse, the patient manifested a dogged indifference to life. In some cases no cramps existed, the patient passing on to a speedy death, without the spasm of a muscle. The intellect remained clear to the last, except in some cases where a suppression of urine existed for a considerable time; these cases became comatose. The severe cases were, hoarse talking, as from deep within the chest. The cramps were very painful, making the patient cry out. After the first dejections, which were generally bilious, they became rice-water in appearance; and after the continuance of the disease for a brief period, there was no appreciable difference between the dejections from the stomach and bowels. The urinary secretion seemed suspended, as well as that of the liver. In cholerine the poison fell with less force upon the system. Fever light; furred tongue; painful uneasiness of the bowels, nausea, mucus discharges from bowels, and occasionally bloody, but little or no bile discharged. These were the principal symptoms of the disease, which was quite manageable. I regard the disease as essentially contagious, as can be clearly proven by its spread during its prevalence among us. It seemed also to be propagated by getting into the water, from the dejections of cholera-patients being thrown into privy-vaults, and thus the wells became contaminated. It is generally believed here that few had cholera who drank exclusively cistern-water. The treatment I adopted depended entirely upon the stage of the disease.

First. I insisted on the patient going to bed, and permitted him or her under no circumstances to get up. The horizontal position is essential to a cure. Early in the disease opiates and counter-irritants were the remedies. Mustard cataplasms to epigastrium, abdomen, and over kidneys; one-half grain of morphine put upon the tongue and allowed to dissolve, or $\frac{1}{4}$ to $\frac{1}{3}$ grain hypodermically injected if vomiting existed; or a teaspoonful of a mixture composed of equal parts of tinct. opium, tinct. camphor, and peppermint essence, after each dejection; bits of ice to hold in the mouth. This treatment continued until

the patient was relieved, or passed on into collapse. In some instances I applied Nichol's vesicating fluid to epigastrium to check vomiting; after this was accomplished, if the patient was not in collapse, I gave subnit. bismuth, morphine, act. plumbi, and hyd. cum creta, and continued it with an occasional dose of castor-oil and spirits of turpentine, or rhei pulv. in aromat. sirup of rhei, until the secretions were restored. Great care was required in diet. If the case emerged into collapse, medicine appeared to have but little influence; friction and counter-irritants were used upon the extremities; ice given freely; broths if the stomach would tolerate them; mercurials, and, if necessary, astringents, to prevent running off. Neither opiates nor alcoholic stimulants were prescribed. In my report will be found a Sally Rapier, colored, aged 22. This was the only case of recovery from collapse I saw during the entire epidemic. I know of no satisfactory treatment for this stage of the disease. I may here remark that in every case where it was possible I caused the dejections to be disinfected. I advised all parties to avoid, as far as consistent, encountering or coming in contact with the disease, and when it became epidemic in the city, I advised all who could to leave, and am confident that to this more than any other agency is to be attributed the cessation of the disease. The epidemic commenced the last of May. I labored night and day in it up to July 18. The hardships attendant upon this protracted epidemic had undermined my health, so that I was totally disabled; constant diarrhœa and frequent vomitings, obstinate dyspeptic symptoms, &c., rendered it imperative for me to get out of the contaminated atmosphere to recuperate. I left on the 18th of July; after which there were some ten or twelve cases in the city.

VANDERBERGH COUNTY.

EPIDEMIC CHOLERA OF 1873 AT EVANSVILLE, IND.

BY H. G. JONES, M. D., *Health Officer.*

Evansville, Ind., is situated on the Ohio River, about two hundred miles from its mouth, and contains a population of about thirty-five thousand souls.

The plateau upon which the city is built is elevated several feet above high-water mark. This plateau extends back several miles, when the ground gradually becomes more elevated and rolling. Immediately above, and about three miles below the corporate limits of the city, the land is very low, and is inundated with every considerable rise of the river. These low lands are interspersed with numerous bayous and sloughs, in which stands more or less stagnent water during the hot months of the summer season. The soil is very rich and productive; producing a large crop of vegetation that annually dies and decomposes in these stagnant waters. During the earlier history of these lands intermittent-fever prevailed to some considerable extent during the autumnal months of each year; but recently, since the country has been cleared up and cultivated, (or at least such parts that can be cultivated,) the inhabitants are as free from malarial troubles as any country of equal fertility of soil in the world—notwithstanding but little has been done to drain these sloughs and ponds, which cover nearly as great an area as they did a half century ago.

Three sides of the city of Evansville are bounded by running water. An efficient system of sewerage has been adopted—emptying for the

most part into the Ohio River—that carries off the rain-fall and the surplus water from domestic and manufacturing establishments. A specialty is made of keeping the streets and alleys clean, free from manures, garbage, &c. During the past year, and, indeed, for several years past, the actual mortality of Evansville has been but little over one-half, in proportion to its population, that of the great city of New York.

For the past fifteen years no contagious or epidemic diseases have prevailed in the city, save once or twice a few cases of small-pox or whooping-cough.

Thus were we situated, with a good system of sewerage, our alleys and streets in a good condition, the city clean and the inhabitants healthy, when a New Orleans steamer, the John Kilgore, on her way up the river, left at one of our wharf-boats a deck-hand, in a collapsed state of cholera. It was stated that the man had had diarrhœa and symptoms of cholera for several days before he was left at the wharf-boat, and that several cases had occurred on the steamer on her trip up. Cholera was prevailing at New Orleans at this time. Medical aid was called to the man, and every effort made to save him, but of no avail; he died in a few hours.

In the course of two or three days another deck-hand was left at the wharf by a New Orleans steamer; he was also in a collapsed stage of cholera, and died in a few hours, in despite every effort to save him.

These cases called forth redoubled diligence from the board of health, which was most heartily indorsed by our worthy mayor (Butterfield) and the common-council. Disinfectants were freely used, at their advice and earnest entreaty; every inlet into every sewer was the receptacle of considerable quantities of coal-tar or some disinfectant, the gutters and sewers were flooded day after day, and every sanitary measure adopted that could be devised to prevent the introduction and spread of cholera. The seed, however, was sown, the disease was in our midst; and we battled with it day by day, as best we could, until it was stamped out.

These two imported cases referred to occurred about the 1st of June. Before these no cholera or cholera symptoms had been observed by any of our physicians.

The first case that was reported to occur in the city was on the 5th day of June. This case proved fatal in twenty-four hours. I could not learn whether any communication had occurred between this and the imported case; but he was a drayman, and his business and calling led him to the river and in and about the wharf-boats, where the imported cases had been landed, and where they remained for some time. From this to the 12th of the month several cases were reported, most of whom recovered.

On the 12th, a man in the employ of one of the railroad companies was attacked with cholera. His boarding-house and place of work were a mile or more distant from the river and place where the first cases occurred. However, he was a stranger, only a few days in the city, and his family were not here. The probabilities are that he had been at the river and wharf-boat, or may have been brought in contact with cholera patients, or patients with cholera symptoms, and he not have been conscious of it or cared about it.

The only irregularity that I could hear of was that he had been drinking water, while at work, that had become stagnant by standing for several days in the tank of an idle locomotive tender. This case occurred

on the 12th, and proved fatal in eleven hours from the first attack. No other case occurred in the house where this man died.

June 14, another case occurred, in which the patient was collapsed in two and one-half hours and died in nine hours. No other case occurred in this house.

Up to the 18th several cases occurred in different parts of the city, but all recovered. On the 18th three cases occurred in one house; the one first attacked died in thirteen hours; the other two cases recovered. On the 19th, one case proved fatal; also, on the 20th one died; on the 22d one died and two recovered; on the 23d two died and one recovered; on the 25th one recovered; on the 27th two died; on the 28th one died, and on the 30th three died.

July 1, two cases were reported, both of which recovered; on the 3d one died and one recovered; on the 7th one died; on the 12th one died; on the 15th one died; on the 17th two died; on the 20th three died and two recovered; on the 22d two died; on the 23d two died and one recovered; on the 28th one recovered; on the 30th two recovered.

August 1, one recovered; August 3, one died; August 4, one died and two recovered.

Such is a brief summary of the cases of cholera that occurred in Evansville in 1873. The greatest amount of mortality occurred in July, during which the disease certainly assumed a malignant type. Four deaths occurred, in some cases in from three to six hours. But it must be remembered that it was not until several cases had occurred that the masses could be made to understand the importance of strict sanitary measures being adopted; but as soon as that was acquiesced in and generally attended to the disease disappeared from our midst, notwithstanding it was raging with such fearful virulence in other places, where the proper sanitary measures had not been adopted.

The facts in the case go to show—first, that the first cases were imported; and, secondly, that as soon as proper sanitary measures were adopted and generally employed the disease disappeared.

MARION COUNTY.

CHOLERA EPIDEMIC AT INDIANAPOLIS, IND.

BY P. H. BAILHACHE, M. D., *Surgeon United States Marine Hospital Service.*

Indianapolis, the capital of the State of Indiana, is located upon the west fork of White River, at the crossing of the old National Road. This city has a population of nearly fifty thousand inhabitants, and is one of the most flourishing of the cities of the West.

Indianapolis is a railroad-center of great importance; no less than ten railroad lines crossing or terminating at this point. A constant stream of travel, therefore, flows through the limits of the city.

The first case in the cholera epidemic of 1873, at this point, which can be traced, occurred on the 2d day of July in the person of William A. Hensley. Hensley was a bar-keeper in the restaurant of Mr. Samuel E. Moran, which is located directly across the street from the Union Passenger Railroad Depot; and this restaurant is much frequented by travelers passing through the city. Hensley's disease was at first pronounced to be cholera morbus; but after a careful examination was diagnosed cholera Asiatica by Dr. Sutcliffe, who had charge of the case.

The next day (July 3) Mr. Moran, while sitting upon a chair at his

restaurant, suddenly felt himself to be fainting, and fell upon the floor purging and vomiting.

Both of these men recovered after a hard fight and a most tedious convalescence.

Several cases, similar in every respect, occurred in this vicinity during the next few days; and on the 7th day of July a fatal case occurred within a short distance of the Union depot, that presented all the characteristics of epidemic cholera. This was eighteen days previous to the first case recognized by the board of health. Before these cases occurred at Indianapolis, cholera was epidemic at many places that were in almost hourly communication with that city, and the disease was undoubtedly introduced by some traveler or travelers who ate or drank at Moran's restaurant.

East and south of the Union depot is a flat, that is known as the valley of Pogue's Creek. This creek serves as a drain for the eastern and southern portions of the city. Through this valley the majority of the railroad lines pass, and to this valley the epidemic was almost exclusively confined.

On the 25th of July, the first case occurred that attracted public attention. The subject was the son of a man named Bucksot, who lived on Pogue Creek flat, at a point on Winston street that is subject to overflow from the creek and from washings of the surrounding high ground and streets. The house was a one-story frame, low and damp. The well upon the premises had been bricked up, but was not cemented, and was invariably filled after rains with surface-washings. The family who occupied the premises, previous to the Bucksots, had a crazy daughter, who empted slops and night-vessels out the back-door, adjacent to the well, and where a natural declination carried the offensive matter immediately into that reservoir. The well was not cleaned until after the outbreak of cholera.

Directly opposite this house was a railroad round-house, car-house, and freight depot.

Bucksot's family belonged to the hard-working class of Germans, and were ordinarily cleanly about their premises.

The first case proved fatal after an illness of twelve hours. Four other cases, all of which proved fatal, occurred in this family within the next few days, and the disease rapidly spread to other habitations. It is reported that 104 cases of the disease occurred, with forty-eight deaths.

LOUISVILLE, KY., February 18, 1875.

In the Indiana Journal of Medicine, of June, 1874, the editor, Dr. T. M. Stevens, publishes a report made to the board of health of Indianapolis, relating to the epidemic, in which he states:

"There is no doubt that the disease, call it by what name we will, would have been more general in its appearance, and more fatal, if it had not been for the efficient means used by our health-officer in each case as it presented. From personal knowledge, we can testify to the indefatigable exertions of the board of health. The means adopted were the disinfection of the premises by means of carbolic acid, chloride of lime, and a solution of the sulphate of iron. The patients were isolated, and, where convalescence or death was the result, their clothes, together with the bed-clothing, &c., were either destroyed by fire or thoroughly disinfected. A local quarantine was established about each of the infected premises, and in such ways the disease was emphatically stamped out. It is very true that, in some of the cases, more efficient work could have been done had the health-officers possessed the power

to enforce their regulations in a manner as they were well aware they should have been; and especially could there have been better measures taken to prevent the further spread of the disease if such power had been vested in them. May the time soon come when to a proper set of health-officers there shall be given adequate power to enforce any necessary rules and regulations for the prevention of disease."

From Indianapolis, cholera was conveyed to other portions of Marion County, the most important of which is found to be at Cumberland, a small town ten miles east of the city and upon the line of railroad. The history of this demonstration will be found embraced in the following communications:

A.

CUMBERLAND, IND., *December* 8, 1874.

Assistant Surgeon ELY MCCLELLAN, U. S. A.:

SIR: The cholera made its appearance here about the 8th of August, 1873. The first case was a German woman, about forty years of age, married, and having four children. This case was fatal, after an illness of twelve hours. The funeral was largely attended.

The epidemic seemed to spread from this case. About five days after I was in attendance upon fifteen cases, all of whom had attended this funeral. Eight of these cases died. I treated, in all, eighty cases, of whom thirty-two were fatal. Ten of the fatal cases could not be traced to other cases. The epidemic commenced about the 8th day of August, prevailed with severity for about five weeks, when, on the occasion of a slight frost, it suddenly subsided. All the cases occurred within the area of four miles, comprising a rich, level country, with a limestone substrata, and yielding good water. A large proportion of those attacked were healthy. There were no local influences which seemed to favor the spread of the disease. Those who lived twelve hours after an attack generally got well. The treatment adopted was stimulants, narcotics, and tonics, with hot external applications over the whole surface of the body.

WM. F. COLLINS, M. D.

B.

LAWRENCE, MARION COUNTY, INDIANA,
February 8, 1875.

Assistant Surgeon ELY MCCLELLAN, U. S. A.:

SIR: In answer to your inquiries as to my first case of cholera, I will relate the case as closely as is possible.

Christ. Hartman, a German, came to me on the 17th of August, 1873, for medicine for his wife; said she had diarrhœa. I heard no more from this patient until the 20th, a lapse of three days, when I was called in great haste to see her. Arrived at her house about 4 o'clock p. m.; found patient purging rice-water and vomiting incessantly. Extremities cold; pulse feeble; skin of a leaden color. I thought at first that it was a case of pernicious fever. I made a fruitless attempt to get up reaction, and the patient died at 7 o'clock p. m., three hours from the time I first saw her.

I was so confident that it was a case of cholera that I commenced making inquiry, and learned that Mrs. Hartman had attended the funeral of a young child that had been taken from the city of Indianapolis under the following circumstances: Some time in the month of July,

a family named Bucksot were suddenly attacked with cholera; the mother and four children died, leaving only one young child and the father of the family alive. The father took this child to the country, eight miles east of the city, to the house of a man named Hartman, a brother of the husband of my first-described patient. This child died within a few days of the same disease, and was the case whose funeral Mrs. Hartman had attended a few days prior to her illness.

On the 24th, four days after Mrs. Hartman's death, I was called to see her two sons, one twelve and the other fifteen years old. Found them very severely attacked with purging, vomiting, and cramps. The youngest recovered; the eldest died; the remainder of the family, the father and an infant, remained well.

At the funeral of Mrs. Hartman there was a general gathering of the friends of the family. The lid was taken from the coffin before the funeral, and two old men, Swear and Wessling, stood by the side of the coffin for some time. By the next evening they were both dead from cholera.

The third case after the funeral of Mrs. H. was a Mrs. B., who had nursed Mrs. H. This case terminated fatally. Before Mrs. B. died, her daughter was taken with cholera, but recovered. Mr. B. was taken with cholera at his wife's funeral, and died; and other cases followed in rapid succession.

In this community forty-four cases of cholera occurred, with twenty-four deaths.

The area of infection covered a space of about from two and a half to three miles. A thickly-settled country; mostly Germans; all good livers; well-to-do farmers. The locality is well drained, and as healthy as any portion of Marion County.

S. RECORDS, M. D.

JENNINGS COUNTY.

North Vernon, the county-town of Jennings County, is located on the Madison and Indianapolis Railroad, at the crossing of the Ohio and Mississippi Road. From this point the Louisville division of the last-named railroad branches off to the southwest.

North Vernon has a population of about two thousand inhabitants. The town is seventy-three miles southwest of Cincinnati, and fifty-three miles northeast of Louisville; with both of these cities it is in constant communication.

At this town the first case of cholera in the epidemic of 1873 occurred on the 10th of July, in the person of a night-watchman at the passenger railroad depot. This case was followed by five other cases, in the persons of individuals who had been in contact with him; the first case alone was fatal.

We are informed by Dr. James W. Kyle that, previous to the occurrence of the disease at North Vernon, several cases of cholera had come to his notice in persons traveling upon railroad trains as they passed through the town.

VIGO COUNTY.

Terre Haute is a flourishing city of about seventeen thousand inhabitants, located upon the banks of the Wabash River, seventy-three miles west of Indianapolis. The bluff upon which the city is built is elevated about 60 feet above the river. The soil upon which the city stands is a light, dry sand. The drainage is most admirable. The Terre Haute and Indianapolis; the Terre Haute, Alton and Saint Louis; and the Evans-

ville and Crawfordsville Railroads pass through the town. Water-transportation is also furnished by the Wabash and Erie Canal.

It has been a matter of discussion among the local profession of Terre Haute as to whether, during 1873, any cases of epidemic cholera occurred in that city. At a meeting of the profession, held July, 1873, a number of cases were reported that were considered by the physicians who attended them to be cholera. Dr. C. E. Kusler reported that he was called, about 10 o'clock p. m. July 16, to see a clergyman, sixty-four years of age, who had been suddenly taken with diarrhœa some two hours previous. The discharges were copious, watery, without fæcal odor, and utterly painless. They were rapidly increasing in frequency. Found him in bed, much prostrated, pulse very frequent and scarcely perceptible at the wrist. Skin cold and clammy, tongue slightly coated, features pinched. Complained of cramps in the extremities; intense thirst. Found the discharges to be rice-water. Morphia exhibited hypodermically, and calomel and opium by the mouth. Was convalescent the next day.

Regarded the case as one of sporadic cholera. Do not know whether he could have come in contact with any person passing through the town or not.

Dr. Stephen J. Young reported the case of John Reiss, aged forty-six years, employed at a lumber-yard near to the Union railroad depot, who was taken early in the morning of July 27 with general malaise. One copious yellow dejection was followed by large rice-water stools, vomiting, cramps, and collapse, from which he died at 11 o'clock p. m. the same day.

July 31, was called to see a child, three years of age, who presented the prodromic symptoms of cholera; had been taken suddenly, but recovered. This child was a daughter of John Reiss.

While attending this child was asked to see an aged man residing in the same house, who, after three watery stools, was cramping and vomiting. This case also yielded to treatment, and he recovered.

August 3, the widow of John Reiss was taken with the same disease, became fully collapsed, but reacted. She, however, died of consecutive fever upon the fifth day of her illness.

Dearborn County.

Aurora, one of the largest towns of Dearborn County, is located upon the bank of the Ohio River, twenty-six miles below Cincinnati. This town is the market of a rich farming-district, inhabited chiefly by Germans; has a considerable trade, and is in daily steamboat-communication with Cincinnati.

We have been unable to elicit full information as to the epidemic at this point. Seventeen cases are reported, with eleven deaths. We are informed that these cases, with but two exceptions, used water from a well located in a low, wet bottom on the banks of the Ohio, near the mouth of Hogan's Creek, a low, sluggish stream, that at the time of the year at which these cases occurred was nearly dry. Fifteen cases occurred within an area of four or five hundred yards of this well; *and in the immediate vicinity of this well the initial case of the epidemic died on the 27th day of July.* This case occurred in the person of a white man named Miller, who contracted the disease at the city of Cincinnati.

Some few cases of choleraic diarrhœa are reported to have occurred in other portions of the town.

HENDRICKS COUNTY.

A STATEMENT OF THE EPIDEMIC OF CHOLERA WHICH VISITED LIZTON, HENDRICKS COUNTY, IND., IN THE SUMMER OF 1873.

BY DR. J. W. CULLEY.

Lizton is a small town situated in Hendricks County, Ind., twenty-two miles west of Indianapolis, on the Indianapolis, Bloomington and Western Railroad. It contains about three hundred inhabitants. The town is situated on a low, level plane. The surrounding country is low, in some places marshy and imperfectly drained. There are no streams near, excepting one very small one, which renders the drainage efficient.

The district is malarious; intermittents and remittents prevailing in the summer and fall months to a great extent. Other diseases are those which prevail generally in other localities. In August, 1873, this place was visited with an epidemic of cholera which lasted about three weeks, and which carried off twenty-two inhabitants.

Causation.—Passing by the special cause, about which I, with many others, know but little, I shall speak of some local conditions which may have acted as auxiliary causes. In July, a few weeks preceding the outbreak, heavy rains fell which flooded the place with water, many of the lots and streets remaining partly covered with water for some days. Some of the privies were built without vaults, and those which had vaults were filled to overflowing by these rains, by which their contents were spread over the ground and left after the water evaporated, impregnating the air with impure odors.

The wells in this place are shallow, being from 10 to 15 feet deep, and in wet seasons were full of water. These same July rains, which overflowed the privies, filled many of these wells full of impure, fæces-impregnated water. Of this many people drank. These rains were followed by hot, sunny days, and by cholera.

The surrounding country has been heavily timbered, but in the last two or three years much of it has been cut down, and a portion left to decay upon the ground. There are in town two saw-mills around which lie large heaps of sawdust, slowly decomposing. Dr. Harvey, of Plainfield, thought these decomposing heaps of sawdust sufficient to account for the disease. For my own part, I am disposed to regard the impure water and fæcal matter as having much to do with the spread of the disease.

There is no evidence that the disease was imported. It seemed to spring up here, though the special cause may have been imported. All the cases occurred in town, except four or five. The cases occurred in groups, the members of the family in which the disease occurred generally being all attacked. In one family of seven, six died. The disease was marked by great violence, and in many cases the patients were in collapse or in a semi-collapse when first seen by the physician, and death soon followed.

Of the cases reported as cholera, twenty-two out of twenty-four died. It is probable, however, that some mild cases which were called diarrhœa or cholera morbus were in reality cholera-cases which ended with the first stages; and on the other hand, I think it probable that three or four of the cases reported as cholera were cases of pernicious intermittent fever, as there was a tendency to call everything cholera which

terminated fatally. Among those carried away by this epidemic was Dr. John A. Dicks, a physician of more than ordinary ability.

As regards treatment, I can say but little of interest. That it was unsuccessful has already appeared. Why it was unsuccessful, may partly be accounted for thus: The attack was generally marked with great violence from the start, the patients often being in a state of collapse when first visited by the physician. But little was done to arrest the disease, except what the physician did himself, who, though not omnipresent, was almost required to be so. Vomiting was so excessive that no reliance could be placed in remedies given *per orem*. The vomiting and purging from the first case in a family was productive of much uncleanness, soiling beds, &c. The neighbors, through fear, with great energy, rendered no assistance, and in some cases the discharges, *ab ore et ano*, were left on the floor and in the beds.

In treating the disease in the first, reliance was placed on opium, which seemed in most cases to exert no controlling influence. I generally used the sulphate of morphia hypodermically, and although I could bring the system under the influence of the opiate, yet in most cases the discharges continued passing, little by little, continually and involuntarily. Malaria being rife, in most cases the sulphate of quinia was used, sometimes in large doses in the first and second stages. The mild chloride of mercury and the subnitrate of bismuth and morphia were tried with no apparent benefit. In the collapse, external heat, sinapisal baths, and stimulants of all kinds were employed, but with the same general results.

LIZTON, IND., *November* 26, 1874.

Subsequent communication with Dr. Culley elicited the following facts: The first person attacked with cholera at Lizton, in 1873, was Allen Davis, who was employed as a section-hand upon the railroad. He had not been away from his work for some time, but was constantly exposed to contact with railroad-travel. A day or two later, Mrs. Davis, his wife, was attacked with the same disease. These cases both recovered. During their illness they were visited by a relation of the same name, who also was taken ill, and died of cholera. A man named Heelmic, who worked with Davis, and who frequently visited him during his illness, was taken with cholera, and died after a few hours' illness. The same day his infant, eighteen months of age, was also attacked and died. Mrs. Christie, a married daughter of Heelmic, who had just been confined, was next attacked, and died; then three sons of Heelmic also died. On the night his wife died, Christie was attacked, and died before day. Of three remaining children in the Heelmic family, two died. Dr. Dicks, who had attended this family, was taken with the same disease, and died, as has been already stated. During his illness he was visited by Mr. Logston, who was taken also with cholera, and died. The same day Mrs. Logston took the disease, and she died.

The daughter of a Mr. Hall visited one of the Mrs. Davis during her illness. This young lady was taken with cholera and died. Within a few days her father, mother, and two sisters had the same disease; the father alone recovered.

DAVIESS COUNTY.

Washington, the county town of Daviess County, is located upon the Ohio and Mississippi Railroad, one hundred and six miles southwest of Indianapolis, and three miles west of the Wabash and Erie Canal. We present the following

ACCOUNT OF THE EPIDEMIC OF CHOLERA AT WASHINGTON IN 1873.

By J. A. Scudder, M. D.

Washington contains from four to five thousand inhabitants, is situated in a rolling valley, surrounded on three sides by hills from 50 to 200 feet above the general level of the town. The soil is clay, and the natural drainage of the site is good. The sanitary condition as to cleanliness and the artificial drainage is as good as the average of towns of its size, and the general health, with the exception of the cholera epidemic of 1849 and 1850, and 1873, is considered to be quite above the average for Southern Indiana.

The water used is principally from wells, and contains the salts of lime and magnesia, and in the older portions of the town considerable organic matter.

In July and August, 1849, out of a population of less than one thousand, there were one hundred cholera deaths; and the disease was only arrested by the absolute dispersion of the people, who fled in all directions.

On the 8th day of July, 1850, cholera again attacked the town, and within eight days over forty deaths occurred. The inhabitants again fled, and there being a decided change in the weather, almost a frost, the disease was again arrested.

The weather just preceding and during the epidemic of 1849, 1850, and 1873, was the same, the temperature varying from 85° to 94°, with a humid atmosphere that seemed not to move at all, but to be so loaded with moisture that everything became moldy. The sky was not cloudy, but a haziness was apparent.

The diseases were the same, for a low type of diarrhœa and dysentery prevailed through the country during and for some time after the disappearance of cholera.

The following cases will show the general character and type of the disease as it appeared in 1873:

Case 1.—Honeycutt, a white man, aged twenty-eight, a laborer, of good constitution and robust health. Had eaten of fruit during the day and of green corn for supper; was taken with diarrhœa at 10 o'clock p. m. August 11; rice-water discharges resulted; vomiting, cramps in stomach and extremities. At 1 o'clock a. m., August 12, was collapsed. Urine suppressed. Died at 4 o'clock a. m.

Case 2.—James Tranter, a white man, forty-four years of age, an engineer employed one mile beyond the town limits, was taken while at work at 9 o'clock a. m. August 11, with diarrhœa. In two hours he had rice-water discharges, vomiting, and cramps. The choleraic symptoms were fully developed, and he died at 1 o'clock p. m. August 12.

No connection is known to have occurred between this case and Honeycutt; they lived three-quarters of a mile apart.

Case 3.—Miss H., aged seventeen years, living about three hundred yards east of the house at which Honeycutt died, was attacked at 10 o'clock p. m., August 12, after eating a hearty supper. Cholera fully developed; died at 3 o'clock p. m. August 13. On the 20th the father of this young lady was attacked, but recovered after a collapse that lasted for thirty-six hours.

Four cases occurred in the persons of coal-miners working near the town. In another instance, a mother and son living in the same house

were both attacked; making in all, with the father and daughter, eight multiple cases, of whom seven died.

In the treatment adopted an effort was made to restore or maintain the natural heat of the body by artificial warmth in the shape of hot sand-bags, hot corn, and blankets, dry or wrung from hot water and turpentine. General stimulants with quinine, opium, and calomel in conjunction with astringents.

There existed a very noticeable feature in this epidemic; few, if any, cases occurred in persons of dissolute or dissipated habits, and the majority were persons of regular habits and the best constitutions.

It may be of importance to state that in no case were any precautions taken to prevent the spread of the contagion. Nor were means used in disinfection more than those employed in ordinary cases of death; and in only one instance did a family leave the house in which a death had occurred.

Dr. Scudder reports thirteen cases, of which twelve were fatal. He states that many cases of diarrhœa occurred, which yielded readily to treatment.

Washington is the county-town of Daviess County, and is located upon the line of the Ohio and Mississippi Railroad, one hundred and sixty-seven miles east of Saint Louis, and one hundred and seventy-three west of Cincinnati. That the disease traveled along the line of said railroad has already been demonstrated with sufficient clearness to rob the town of Washington to any claims of a *de novo* development.

CHAPTER XIV.

ALABAMA GROUP.

ALABAMA CONTRIBUTORS.

Dr. L. C. Pynchon, Madison Co.
Dr. A. R. Erskine, Madison Co.
Dr. H. A. Binford, Madison Co.
Dr. H. W. Bassett, Madison Co.
Dr. J. J. Dement, Madison Co.
Dr. A. J. Green, Madison County.
Dr. M. C. Baldridge, Madison Co.
Dr. L. D. Carter, Madison Co.
Dr. A. K. Burnett, Madison Co.
Dr. David Shelby, Madison Co.
Dr. Frank Hudson, Madison Co.
Dr. J. D. Humphrey, Madison Co.
Dr. M. H. Jordan, Jefferson Co.
Dr. W. H. Crawford, Jefferson Co.
Dr. J. B. Luckie, Jefferson Co.
Dr. J. B. Flonville, Jefferson Co.
Dr. P. Taylor, Jefferson County.
Dr. J. W. Sears, Jefferson County.
Dr. S. H. Day, Jefferson County.
Dr. W. T. Parker, Jefferson Co.
Dr. T. A. Means, Montgomery Co.
Dr. E. H. C. Bailey, Marengo Co.
Dr. Z. T. Daniel, Barbour County.

Assistant Surgeon Charles R. Greenleaf, U. S. A.
Assistant Surgeon M. K. Taylor, U. S. A.

DATES OF INITIAL CASES.

Huntsville, Madison County ..... June 3.
Birmingham, Jefferson County ..... June 12.
Montgomery, Montgomery County ..... July 17.

Before proceeding with the papers which form the *exposé* of the cholera epidemic as it affected the State of Alabama, it is proper to remark that two of the communications presented have already appeared in the transactions of the Alabama State Medical Society for 1874, viz:

I. Epidemic cholera at Huntsville, by J. J. Dement, M. D.

II. Cholera at Birmingham, by M. H. Jordan, M. D.

In regard to these papers we desire to make the following record, accounting for their republication:

I. During a visit to the city of Huntsville, Ala., in the month of June, 1874, a thorough investigation of the late epidemic was made, and after a consultation with the medical gentlemen of the city, who assembled for the purpose, it was the request of all present that Dr. Dement prepare the history of the epidemic at Huntsville. This paper, therefore, properly belongs to this report, although a copy was furnished to the State Medical Society Publication Committee.

II. The paper of Dr. Jordan was read before the State Society at its annual meeting of 1874. At a visit of inspection which we made to Birmingham, Dr. Jordan kindly went over the records of the epidemic with us, and much new and interesting matter will be found in the report which we present.

MADISON COUNTY.

A.—REPORT ON EPIDEMIC CHOLERA AT HUNTSVILLE, ALA.

BY M. K. TAYLOR,

Assistant Surgeon United States Army.

It was my purpose at the close of last year to embody a brief sketch of the epidemic in my annual sanitary report for the post of Huntsville, but ill-health and a change of station prevented my carrying out my purposes.

I had made notes in a general way of some of the more important matters at the time, with the intention of filling up the minor details when my moments of leisure would permit. Seeing, however, that neither time nor circumstances were likely to be of a character to allow of my completing what I had begun, I abandoned the project, and laid my materials aside in the expectation of having no use for them. It is now a source of regret that I did so.

Before entering upon the special consideration of the epidemic, it seems befitting to refer to the antecedent circumstances touching the general sanitary condition of the city, the action of the civil authorities in relation thereto, and to the public sentiment as to what was apparently demanded. One of the great difficulties to be encountered at all times in the promotion of sanitary measures is the belief on the part of the inhabitants, as a rule, that their particular locality is the healthiest in the whole country; and often not until a profound impression is made by some overwhelming disaster can public sentiment be sufficiently awakened to a full realization of the fact that there can be any mistake in that respect. This was the case in Huntsville. Until within a short time of the cholera outbreak there was no board of health; it was not considered necessary.

The city was one of the oldest settled communities in the State, and had escaped hitherto all the epidemics of cholera and yellow fever which had repeatedly visited surrounding cities; particularly Memphis on the west, Nashville on the north, Chattanooga on the east, and Montgomery to the southward; with all of which Huntsville had been in daily communication without contamination in times past, and it did not seem probable that a city so proverbially healthy as that would be ever made an exception to the apparently established rule.

When certain portions of the city were pointed out as possessing all the conditions of unhealthiness, the remark in substance was made not unfrequently in reply that Huntsville was an exception, and that while other less favored cities might have suffered from such causes, no inconveniences were felt there. In my annual sanitary report for Thomas Barracks for 1872, I stated that certain portions of the valley in which Huntsville is situated were particularly obnoxious to intermittent fevers of the malarial hematuria type, and more especially so in some of the western and southern parts of the city.

Now, it may be remarked, without attempting to trace any connection in the nature of the two maladies, it so happened that in those very localities where the malarial fevers were severest in years past, cholera was chiefly fatal; thereby showing in a notable manner the general fact that when bad sanitary conditions exist, and epidemic influences reach

these places, no matter what may be their characteristics, there will be a corresponding intensity of action and resultant fatality.

In the early part of the season, and before the appearance of cholera at Memphis and Nashville, the Madison County Medical Society took measures to impress upon the attention of the city authorities the necessity for a registration of deaths, ostensibly with a view of showing comparatively the salubrity of its climate.

The committee appointed consisted of Drs. A. S. Green, H. W. Bassett, and M. K. Taylor, United States Army, and upon the representations thus made the ordinance for registration was passed. It is to this measure that we are indebted for any exact records as regards the sanitary relations of the epidemic to the various parts of the city.

It was the purpose of the medical society, however, so soon as the ordinance for registering the mortality of the city was established, to move for the appointment of a board of health, but a favorable opportunity was not presented until the appearance of the epidemic at Memphis.

Thereupon another committee was selected to confer with the city authorities and urge the necessity for such action at once. As a final result of several conferences, a board was appointed, consisting of two members of the board of aldermen and two from the medical society, with the mayor as president.

Work was immediately commenced for the general police of the town. Several of the places where there was stagnant water were drained; yards, lanes, back alleys, and streets were policed; an inspection of water-closets, where the circumstances seemed to warrant it, was made; and the more dense habitations of the colored population were scrutinized, with a view of removing all contaminating influences, as far as practicable, in the event of an outbreak of the cholera. These measures undoubtedly accomplished much in preventing the subsequent spread of the disease, not only by the removal of offending matter, but by directing the attention of the people to the imperative necessity of scrupulous care in all matters pertaining to the hygiene of their respective localities.

The time intervening, however, before the appearance of the epidemic was too short to allow of the accomplishment of all that was desired or contemplated by the public authorities; and, besides, some portions of the town can only be put in a healthy condition by an elaborate and expensive system of drainage, and the extension of the water-pipes to all parts where the inhabitants now derive their supplies from surface-wells, all of which will require, not the labor of a few weeks, but of months and perhaps years, for their full accomplishment.

The city of Huntsville is located about twelve miles south of the northern boundary of Alabama, in a beautiful valley at the southwestern termination of the Cumberland range of mountains; is distant from the Tennessee River about ten miles to the northward, and with an elevation above the sea of about 600 feet.

The geological formations underlying and surrounding it belong to the subcarboniferous groups of limestone. These crop out in the eastern portion of the town, and again on the block west of the public square, in considerable ledges of from 50 to 75 feet in height.

To the eastward of the city, at a distance of a mile and a half, is Monte Sano, a mountainous elevation above the valley of nearly 1,100 feet, and about 1,700 feet above tide-water.

To the south, west, and northwest, at a varying distance of from six to ten miles, are the last spurs of the Cumberland range. The elevated

districts in the vicinity are mostly covered with a luxuriant growth of timber, while the valley is chiefly in a fair state of cultivation. The surface-drainage of the valley is in the direction of the Tennessee River, and is generally good or can be made so by a reasonable expenditure for that purpose. In high water, however, or after excessively heavy rains, a considerable portion of the valley between the city and the Tennessee is generally flooded, but more especially that along the creek leading from the spring which issues from the ledges near the public square to the river. The surfaces within the city-limits are quite diversified. Taking the spring, which is the lowest, as a starting point, and proceeding southeasterly, we have on the next block the public square, at an elevation of about 60 feet; from thence there is a gradual rise most of the distance until the hill on which the reservoir is situated, is reached, when the height attains an elevation of about 150 feet. Near the summit of this hill the reservoir is located for the supply of water to the central portions of the town.

In other directions from the public square the surface slopes off gradually, so that at a distance of three or four blocks northward and southward, and ranging round by the westward, the surface but little exceeds an elevation of 10 or 15 feet above the creek, while to the northeast of the square, and other points in the lower portions of the town, there are such depressions of the surface that without artificial drainage water would stand the greater part of the season. * * * *

The water-supply is derived from three sources, viz, from the large and somewhat famous spring issuing from the ledge west of the public square, the water from which is forced up to the reservoir by the water-works, and which is moderately hard and of excellent quality; from shallow surface-wells in the lower districts, and in a few instances from cisterns.

Much of the well-water has surface-drainage in it, and may be regarded, like all supplies from such a source, as unwholesome. This latter was the chief supply in those districts where the epidemic prevailed with greatest force. So far as cistern-water is concerned in southern latitudes, unless it is well filtered, I believe, from the casual examination which I was enabled to make, that it is by no means as wholesome as many suppose.

During the prevalence of the epidemic I examined the rain-water which was precipitated at the garrison on several different occasions, and in all of which the amount of organic matter held in solution exceeded by fourfold the quantity found in the surface well-water obtained from near the Memphis and Charleston Railroad depot. So large, in fact, was the amount of organic matters present in the rain-water, at this time, that after standing closely bottled for a few days it underwent putrefactive fermentation, and formed black precipitates with most of the metallic salts to that degree as to render it wholly unserviceable in the dispensary.

Furthermore, growing out of this condition of the water, the question naturally suggested itself as to what extent it contributed to the introduction and spread of the epidemic, for it may be observed hereafter that there was no traceable connection between the first case occurring in the town and those who had been exposed in the neighboring cities. Indeed, I was unable to find but two or three cases of deaths from cholera where the water from the public works was exclusively used. This may have been only a coincidence, and attributable, perhaps, to the better sanitary conditions of the town where it was distributed, but I apprehend not wholly so. Facts of a similar character have been elic-

ited in like investigations of cholera-epidemic in other cities in times past, and very intimate relations were established between the water-supply on the one hand and the intensity of the zymotic action on the other.

The well-water examined was from a well located nearly due east from the depot and near the Meridian pike. Cholera was prevailing at the time in several families which were obtaining their supply from this source for domestic and drinking purposes. Unfortunately my memoranda are lost or mislaid, and, as a consequence, I am compelled to fall back on my recollections as to the results. I made two examinations: the first had not been preceded by recent rain, the second was after a considerable shower. The first specimen was clear and apparently wholesome, and moderately hard, but the second quite turbid from the presence of earthy matters from the surface-drainage. After filtration this was tested with a solution of permanganate of potassa in connection with an equal quantity of rain-water caught from the same shower at the garrison, when the amount of organic matters held in solution by the rain-water quadrupled that from the well as before stated. Examined by the microscope several forms of animalcula were found in both specimens of well-water, while in the second, spores of fungi were quite abundant. The water-supply in the southern part of the town, where Madison street terminates in the Whitesburgh pike, was from a well scarcely six feet deep, and after the heavier rains the water rose to within a foot or two of the surrounding surface of the ground. All the earlier and severer cases of cholera in that neighborhood obtained water from this well. Upon ascertaining these facts the city authorities forbade the use of water from the well, and arrangements were made for a limited supply from the public hydrants by cartage.

The meteorological conditions preceding and during the prevalence of the epidemic were of much interest. * * * * * *

The month of May was of about the same temperature as that of the corresponding month in 1872, but the mean relative humidity was about one and one-half per cent. higher, or to be exact, 70.0 and 71.6 per cent., respectively. But in June, 1873, and commencing very nearly with the appearance of the epidemic, the humidity became remarkable, and continued until the latter part of July, when coincident with the resumption very nearly of the normal amount of moisture in the atmosphere there was a corresponding abatement and final disappearance of cholera-cases. With only a mean difference in the temperatures in the months of June in the two years, of about two degrees, and this difference being due to the lower temperature for that month in 1873, there was a difference in the relative amount of moistures of nearly 10 per cent. This change commenced on the 5th of June, when there was a very heavy rain-fall; cholera had appeared before in a single instance only, and no other case occurred till the 15th. In all this intervening time, however, and indeed during the entire prevalence of the epidemic in its severer manifestations, the weather had been distressingly close, humid, and oppressive. To that extent was the air saturated with moisture, that often in the middle of the day the walls of my quarters were dripping with condensed water, and writing-paper was so damp as to be hardly serviceable. The conditions were so favorable, too, for the development of cryptogamic life, that microscopic fungi appeared abundantly almost everywhere and on everything subject to their attack; indeed alike on articles of food and clothing in our dwellings, and on fruits and plants of various kinds either wild or cultivated. Leathern articles of apparel as well as the leather cases of my instruments would be covered

with a dense mold in a single night, and the same was true of wooden surfaces, recently dressed, especially pine lumber, and left unpainted, where situated in close and unventilated places. From the 5th of June to the end of the month there were fifteen days on which more or less rain fell—generally in the form of light showers in the afternoon. The amount of precipitation was 5.62 inches, or twice and one-half more than for the same month in the preceding year, and in excess of the average for that month as determined by observations of Dr. Team, of about 0.50 of an inch.

The extent of cloudiness was not excessive during the day-time, but in the early morning and in the evening there was a thin stratum of bluish mist hanging over the lower portions of the valley, and elevated above the surface of the earth, at an average, perhaps, of 50 or 60 feet; rarely rising as high as the upper portions of the town. As seen from the garrison at an elevation of about 100 feet, this stratum of mist seemed but 3 or 4 feet in thickness. Its tenuity was such that one underneath could see nothing of it, and only when in position to see it, as it were edgewise, was it observable. Similar conditions were generally witnessed during the prevalence of the severer malarial fevers in the summer and autumn in this section, and which, so far as I was enabled to judge while stationed there, had a close connection with the intensity in manifestation of the paludal poisons. It is true this mist-line may be seen frequently hanging over the lower lands in nearly all sections, but when such is the case, it indicates almost complete saturation of the air underneath, which condition is generally recognized as particularly favorable for the development of intense zymotic processes, and an active cryptogamic growth. In so far as these particular conditions of the under stratum of the atmosphere over the lower portions of the city and valley are concerned, the meteorological observations in respect to humidity at Thomas barracks are not a proper expression; for the difference at that elevation in the sense of dampness as we passed from the lower levels up was very remarkable during the time the sun was below the horizon.

The great importance of carefully considering these meteorological phenomena in the selection of locations for private dwellings, public buildings, and charitable institutions, is beyond the scope of this report; yet it seems necessary, when describing the sanitary conditions of cities, and their bearing on public health in times like these we are now considering, that at least a brief allusion should be made to them, mainly with a view of calling the attention of the public to their effects at all times and under all circumstances, and of showing that a disregard of their importance will inevitably be followed by severe penalties at one time or another.

The first case of cholera occurred on the north side of Holmes street, one door east of Church, in the instance of a little colored girl, about five years of age; the attack commencing the evening previous to June 3. As I learned the facts, she had up to that time been in good health, but on the preceding afternoon she ate some unripe fruit, apples or peaches, perhaps, when about midnight she was taken with vomiting and purging, soon passed into a state of collapse, and died in about twelve hours. The circumstances under which this case occurred led some of the attending physicians at first view to consider it only a severe form of cholera morbus.

There were none of the antecedent bowel diseases prevailing in the city, at any time before this, in a manner so frequently observed preced-

ing the outbreak of cholera; and, from the best obtainable information, this girl had no tendencies that way prior to the attack.

The location of this case will be found on chart No. I, with the date indicated near by. And I may remark here, in passing, that the figures on this chart indicate dates of death for the month of June only, but the marks thereon, as indicated at the bottom, show the location in the city of all recorded deaths from the commencement of its appearance until the close of the epidemic.

I made an effort subsequently, and when the disease became general in the town, to ascertain whether or not this girl had been away from the city, where she would be exposed to any contagious influences; or whether she had seen any one arriving from other places where the epidemic was prevailing; but I could find nothing satisfactory, except that she had not been out of town, nor did it appear probable that she had been subject to any exposure in that direction whatever.

The next case occurred on the same block twelve days thereafter, or on the 15th. This (No. 2 on the list) was a stout, healthy negro in middle life, and who had been employed about the city as a general laborer. He, too, towards night, the day before of his attack, had eaten a quantity of green pears, if I recollect rightly, or some unripe fruit of like character, when, after a few hours' sleep in the evening, choleraic symptoms supervened, and he sent for medical assistance. I saw him next morning, in consultation, and then it was the unanimous opinion of all the medical gentlemen present that there was no mistaking the nature of the malady, and that the epidemic was fairly in the city. The patient had been in a state of collapse since 2 or 3 o'clock in the morning, and was then quite in a moribund condition. No. 3 in the accompanying list lived beyond the city limits, and I did not obtain any history of her case; but No. 4 lived on the same street with the first two and in the immediate vicinity, and had more or less intimate relations with the families in which deaths from the disease had already occurred. In so far, therefore, as the general principle of contagion is concerned, he would come under the rule.

On the two subsequent days, there was one death each; but on the 24th there were six deaths, of which four were black and two white persons. On the 25th there were two, and on the 26th there were four deaths.

At this time the epidemic had spread over nearly all the lower districts, while the deaths were chiefly confined to the colored population. The white inhabitants, however, were suffering very considerably from a less severe form of the disease, and a feeling of general distress pervaded the community. Many of the cases were of a startling character and well calculated to awaken apprehensions in every one having any tendency to bowel disorders. No. 16 on the list was an example. This was a bright colored lad who had been employed by a grocer as an errand boy during the day. At 5 p. m. he started for home, a distance of three or four blocks, and at the time he left the store of his employer was apparently in good health. When about half-way to his destination, he was stricken down in the street. He was taken home immediately, and as I was passing at the moment, I was called to attend him. He was then in a collapsed state, and although stimulants, frictions, heat, and all the approved means of procuring reaction were employed, they proved of no account, and he died in a few hours. I saw him probably within fifteen minutes after his attack in the street, and his condition then was general lividity of the surface, more especially of the extremities and face; he was pulseless at the wrist; the heart's

action was tumultuous, apparently, but of diminished force; there was stupor and disposition to somnolence, and the extremities shrunken and cold. This boy had also been indulging immoderately in green fruit. During the day he had been seen climbing on the wagons having fruit for sale, and when he started for home he had a green apple in one hand and in the other a quantity of salt, into which he would dip his apple and then eat it. This mode of eating unripe fruit is very common with the negroes, and they use the salt in the belief that it prevents any injurious results from their indulgence of their appetites to any extent. So fixed were they in the habit that no amount of dissuasion would avail anything in checking the practice. When remonstrated with they generally replied that they had always done so, and it had not hurt them before, and they did not think it would do so now. Many were especially obstinate in this respect at first. One colored girl said she would eat what she liked if she knew it would kill her; she indulged her appetite at the time, and was buried the next day at the expense of the city. This unwillingness to restrain their appetites was undoubtedly a potent cause in contributing to the greater mortality of that race; and it was not until near the close of the epidemic, when by many sad demonstrations of the evils arising from the continuance of such a course, would they heed advice in this respect.

About the time of the appearance of the disease in the city, or soon thereafter, cases occurred in various parts of the whole valley, and having, so far as I could learn, no traceable connection. No. 20 on the mortuary list seems to be one of such instances. He had been working on a plantation in the direction of the Tennessee River, several miles from town, and had been in good health until two days before I saw him. During an excessively sultry day he drank freely of water when heated, and partook of a full meal in the evening. The night after, severe diarrhœa set in. He was brought to town, where he had friends, the second day, and I saw him that evening when he was verging on a collapse. He died about daylight the next morning. This man stated that he had not been in the city for two weeks before his attack.

So far as I was able to ascertain the facts, in nearly every case of severe form of the disease, there had been imprudent gratification of the appetite in the after part of the day preceding the cholera symptoms. It mattered not so much whether this indulgence consisted in eating immoderately of the usual articles of food at such hours, or the fresh fruits then coming into market. It was not, however, until the green fruits came into use that the disease broke out.

In this respect, if the newspaper reports were correct in regard to the appearance of cholera at Memphis and Nashville, simultaneously with the arrival of considerable quantities of stale vegetables and fruits from New Orleans, the disease at Huntsville conformed to the general rule that, with the introduction of unripe, immature, or unsound fruits or vegetables as articles of food, did the cholera appear.

The coincidence in this respect was remarkable, I believe, throughout the prevalence of the epidemic, in its ravages over the whole country, judging by the current reports, and certainly no section was apparently healthier than the region about Huntsville prior to June 3, when immature fruits, as affected by the meteorological conditions before alluded to, first appeared on the streets. Many instances might be given in illustration of the influence of the fruits for sale in developing the disease, but one will suffice. A gentleman living on a plantation about twelve miles from the city, and away from any principal thoroughfare, arrived on the cars at 4 o'clock p. m. July 19, in perfect health, appar-

ently. Seeing some fine-looking pears for sale at the depot, and having no food since morning, he purchased two pears and ate them at once, and in an hour or so partook of a hearty supper. In six hours thereafter, without much premonition, he was seized with vomiting and purging most violently. I saw him in a half-hour thereafter, when he was greatly prostrated and had all the appearance of a very severe attack of cholera: rice-water discharges, violent retching and vomiting, excessive abdominal distress, general restlessness, livid and cold extremities, feeble pulse, the skin on the hands and fingers shrunken, an anxious expression to the face, with all those general symptoms which constitute the prodromic conditions of collapse. Without timely assistance this gentleman would have been past help, undoubtedly, in another hour's delay; as it was, with the free administration of morphine in solution after each effort at vomiting, and stimulants, with hot drinks, sinapisms applied to the whole abdomen and to the extremities, the disease was checked by daylight the next morning, and he finally recovered. He said, in connection with the attack, that he felt considerable epigastric uneasiness in a short time after eating the fruit, but attributed this to the want of his dinner.

The last case of death from the epidemic occurred July 25, and this may be considered the close. Yet there were many cases of choleraic diarrhœas for two or three weeks thereafter, and which, but for the general alarm when symptoms of this kind were shown, and which prompted the subjects to seek for immediate relief, might have extended the time of continuance and number of fatal cases very greatly.

The abatement was as sudden as the onset. On the 24th of July there were three deaths, and two on the 25th, while the non-fatal cases were quite as abundant in the city, though of milder type.

The total number of deaths from the epidemic was sixty-two, in which is included the case of a young woman who left the town for Monte Sano when in ill-health, and died three or four days subsequently. I believe there is no record on the city registry of this case, and therefore it is not included in the list hereunto appended. Of the registered number, there were twenty whites and forty blacks; and the ratio to the respective classes of inhabitants was one death in 127 of the former, and one death in 59 of the latter, taking the census of 1870 as a basis of calculation.

But it is questionable whither that is fair data upon which to make the deductions, on the ground that, in the opinion of many of the best-informed people of the place, there has been an actual diminution of the population since the census was taken. It is the most reliable data obtainable, however, and serves the purpose of comparison in a general way; but, as applied to the white population only, it is quite incorrect in determining the ratio of deaths for this reason.

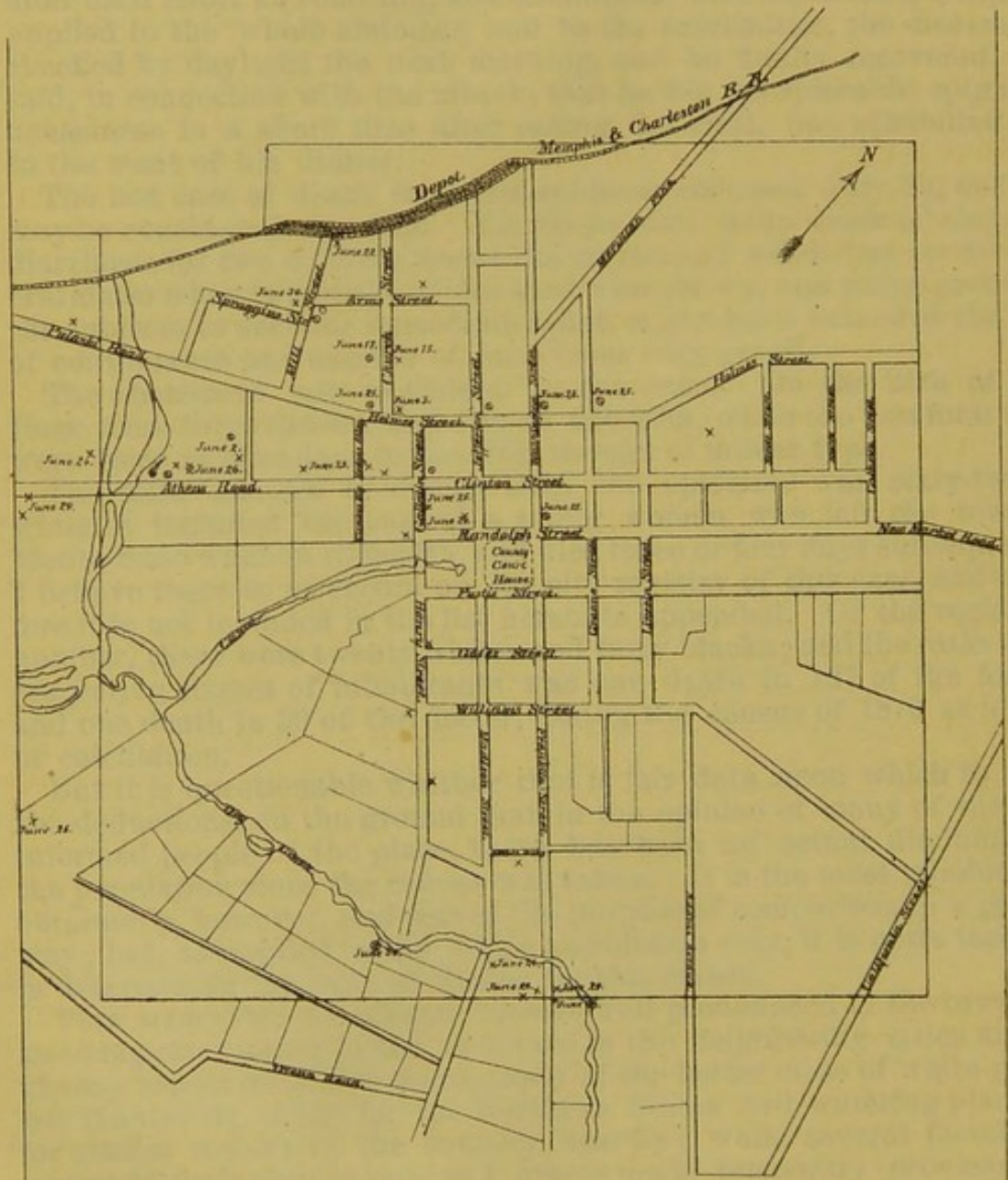
Very soon after the disease became well pronounced in the town, and knowing the fatality of the epidemic in the neighboring cities and the gloomy aspect of affairs there, many of the better class of white people left Huntsville, either for the Northern States and watering-places, or for similar resorts in the country near by; while several families removed to their plantations, and others made temporary provisions for their accommodations in Monte Sano. It is difficult to arrive at an approximate estimate of the actual number of persons leaving the city at this time—some fixing it as high as five hundred, mostly whites, but it may be safe to safe to say four hundred were absent the greater part of the epidemic season.

If this be accepted as near the facts, then the proportion of deaths

Showing the location of the fatal cases of Cholera in Huntsville Ala. for 1873.

The circle indicates White, and the cross, Colored Persons.

The figures show the dates of deaths for June only.



to the white population would be one to every one hundred and seven, nearly, or about one-half of the colored.

On the meteorological tables hereunto appended will be observed that the months of June and July are divided into three periods each, the division being made on the 10th, 20th, and last days of the month. For each of these periods the temperature, relative humidity, and mortality are stated; and these afford, perhaps, a better idea at a glance of the commencement, culmination, and decline of the epidemic in connection with the climatic conditions, than any other form of expression. Indeed, these statistics are so suggestive that I am not disposed to dwell upon the subject. They speak for themselves.

The distribution of the mortality over the city is shown in chart No. I, on which the two classes of inhabitants are indicated in connection with the location. This chart in that respect needs no explanation here. It shows that the chief mortality was confined to the low districts, inhabited largely by negroes, while the higher portions, which are equally as densely populated with whites, escaped almost entirely.

These facts are additional elements of error in the ratio of mortality heretofore given, and in consideration of which it may be safe to estimate the proportion of deaths to the living in the principally infected districts as quite double what has been heretofore stated, and based on the general statistics of the city.

The ratio of recoveries to the whole number attacked is difficult, I may say impossible, to determine, for the reason that it was not practicable to trace fine lines of distinction between cases of ordinary diarrhœa and the milder choleraic attacks, which latter, and indeed the former as well, when allowed to go unchecked, would in time give rise to the gravest aspects. If, however, the best statistics obtainable from the physicians having most to do with the epidemic be taken as a guide, we may approximate results which can be of some value in determining this point.

The following physicians report their experience as given below:

Name of attending physician.	Number of deaths.	Number of recoveries.	Total.
A. J. Green, M. D.	.....	3	3
L. C. Pynchon, M. D	2	3	5
M. D. Baldridge, M. D	3	8	11
J. J. Dement, M. D. —— Binford, M. D	13	20	33
M. K. Taylor, U. S. A.	4	9	13
A. K. Erskine, M. D	4	(*)	4
Total	26	43	69

* None reported.

In the reports of Drs. Dement and Baldridge, their own recoveries are not included, as in fact they should be, for both gentlemen were severely attacked, the latter being compelled to leave the city as soon as he was able to bear transportation.

Several other physicians were also affected by the epidemic, but as they have failed to report, and declined or neglected to furnish me with any statements of their experience, I am compelled to omit them in the basis of estimate.

From my acquaintance with the foregoing gentlemen, and from my knowledge of their views as to what should be called cholera, in fact, I am fully satisfied that the number of cases given above includes only

such as were well pronounced, and of such a character that few would be inclined to raise any questions as to the correctness of the diagnosis.

If we allow Dr. Erskine the average number of recoveries, which he omits in his report to state, but to which I believe he is entitled, the account would stand four deaths and eight recoveries for his list; giving as a total result the proportional death-rate of about 34 per cent.

Again, if we take reports of attending physicians as a basis of a further calculation in determining the ratio of the whole number of persons attacked to the total population, the statement will be as follows:

The sixty-one deaths would give one hundred and eighty-three cases in all, which, from my observation, I believe to be under rather than over the actual number. This is one case in every twenty-seven inhabitants according to the census of 1870; but, making allowances for absentees, the rate would be one to every twenty-four and one-half of the total population. Continuing the calculation, however, on the same basis for the two races, the results will show that the number of cases occurring among the whites, also allowing for the absentees, was in the proportion of one to every thirty-four and one-half, and, of the colored, one to every nineteen and a small fraction. During the prevalence of the epidemic quite a number of cases of cholera-infantum occurred, but to what extent it was fatal I have not the data at hand for determining. Within my own observation there were five cases and two deaths; the fatal cases running a very rapid course. Two of those cases had come from infected cholera districts; one, fatal, from Birmingham, Ala., and one of recovery from Union City, Ky.

Of the treatment, I can say but little that will be new or interesting. In the mortuary tables will be found some general memoranda of the course pursued in the several cases therein noted. In regard to my own experience and observations of the course pursued by other physicians, the preparations of opium, especially morphine, given in solution or hypodermically in conjunction with the free use of stimulants, such as the alcohols, camphor, ginger, and capsicum, in the earlier stages, were more generally employed. In addition thereto, when astringents like acetate of lead, tannin, catechu, &c., failed entirely in the earlier stages, and frequently as well in the latter, I found the aromatic sulphuric acid answer a much better purpose. Also, I found in some cases, that when opiates seemed to have no effect, given alone, yet combined or given simultaneously with the elixir vitriol, they became speedily effective in arresting the distressing vomiting and purging. Such, too, was my experience in treating the epidemic in 1853–'54 and in 1866.

In the later stages of recovery the vegetable or ferruginous astringents were of benefit in giving tone to the intestinal canal and promoting digestion and assimilations of the food.

Very few cases recovered when well-marked collapse supervened. I saw none; but Dr. Pynchon reports one recovery, after remaining in this condition for twelve hours, and, with this exception, I do not recollect of hearing of a case in my intercourse with the other physicians. Yet exceptional cases may have occurred, and not come to my notice. Several of them ended in a low form of typhoid, and lingered along for several days; No. 38 was an instance. After the intestinal discharges were arrested, the man seemed to rally for two or three days. The bowels were disposed to constipation, and mild purgatives were ultimately required to open them; but there was excessive *diuresis* all the time; the quantity of urine reaching several pints during the twenty-four hours; on the fourth day *sordes* collected on the teeth, the tongue became red and dry, the pulse running up to 120 or 130, and the temper-

ature toward the last ranged from 105° to 106°. The more interesting feature in this case was, that while there was great prostration of the nervous system, and a comparative arrest of the secretions in most other directions, the kidneys were unusually active, the urine being of a pale straw-color, generally of a low specific gravity, and nearly free from albumen. I examined it several times, and could only detect a trace of this, which was a different result from what I expected.

In closing this report, it is proper to refer to the sanitary measures undertaken at the garrison for the prevention of the epidemic, in case it should reach that vicinity. After the cholera had appeared at Memphis and become general, I suggested to Col. W. F. Drum, the commanding officer, that in all probability the disease would spread in that direction, and that precautionary measures should be adopted at once to mitigate, if they did not succeed in preventing its introduction among the troops. In this view he fully coincided, and proceeded to act in accordance therewith; and although the garrison was always kept in good order, additional instructions were given for a more thorough police, not only within the inclosure but of the surrounding grounds, which by virtue of the lease under which possession was held by the Government, were under control of the military authorities. The men were ordered into another building or tents, and the quarters fumigated by burning sulphur in them for twenty-four hours, then ventilated and whitewashed; the clothing of the men was frequently carefully inspected, while bathing facilities were introduced to better advantage, and at least one or more baths were required to be taken weekly by the men. The food was carefully attended to. In addition to the regular ration there was a fair allowance of fresh vegetables from the post-garden for breakfast and dinner, while for the supper the simplest food, chiefly bread and good coffee, was permitted. It has been the habit for those on guard and fatigue parties to have a more liberal meal at night, but as I observed that some were disposed to overeat at that hour, which, taken in connection with the sultry weather, produced a tendency to diarrhœas, I advised for them, also, that this meal be reduced to the simplest form of food. My advice was based on my observations in regard to overeating at night as a potent element in the propagation of the epidemic, not only in this instance, but in all the other cholera seasons which I have witnessed. All the fruits of the season were interdicted, unless well cooked, and the men were specially enjoined against the indulgence in apples, pears, peaches, cherries, &c., as they came into market; and it is believed that the men followed these instructions as faithfully as one could expect. Furthermore, they were not allowed to be out after sun-down, except when on guard. During the day-time intercourse with the town was not varied from the usual practice, except that they should return promptly at retreat; and under this custom probably not less than a dozen, and sometimes more, on an average, would go to the city daily.

The number of persons of all classes within the garrison, embracing the officers and their families and servants, the enlisted men, laundresses and children, and several negroes employed in various services, together with their children, amounted to about one hundred. Of this number there were but four persons having any bowel disturbances whatever during the cholera season. Three of these were enlisted men who had been eating to excess of hearty food after the day's fatigue, and the other was a man who had been on furlough for ten days, during which time he had visited Nashville and become most thoroughly demoralized by the gloomy aspect of that place. He returned claiming that he was suffering from diarrhœa, but inquiry developed the fact that this con-

sisted in only two evacuations in the twenty-four hours, and these of moderate consistency, but he was taken into the hospital for the purpose of quieting his apprehensions. A day or two afterward he had a slight diarrhœa, which was clearly traceable to his fears, when I made a single prescription of an emulsion of chloroform, camphor, and morphine, of which he took only two or three doses to obtain complete relief, both mentally and bodily. These were the only instances of a disposition on the part of any inmates of the garrison to diarrhœal attacks while the cholera was prevalent, not only in the city, but in the adjacent country and over the whole valley, and which approached within a half a mile to the westward of the post, where, in a suburban residence situated on low ground, there were several cases.

The distance of Thomas barracks from Huntsville is about two miles to the northeastward; and, as before stated, it is elevated on a gradual slope about one hundred feet above the lower portions of the valley. The natural drainage is such as to make at all times a very healthy post, but the efficient measures instituted by the commanding officer to carry out my recommendations contributed very clearly to my mind to the entire exemption of the troops from the visitation of the epidemic.

In my recommendation to the commanding officer I was actuated by the belief that quarantine measures are of little account against the spread of cholera, and that unless effective sanitary regulations are put in full operation the disease will overleap all such flimsy barriers, and ravage the country unrestrained; that the best and only effective check to the epidemic is by enforcement of a regular hygiene in all that pertains to food, daily exercise, personal cleanliness, and general police, together with a wholesome supply of water.

Originating in filth, the cholera germs can only propagate and spread when material of like character to its origin is abundantly at hand for its development and growth, in combination with favorable telluric and meteorological conditions. For its prevention in the garrison, therefore, I consider it of paramount importance to fight the epidemic at our own doors, by instituting such means before its arrival as would effectually deprive it of the means of sustenance. The results at the garrison seemed to fully demonstrate the correctness of these views, for we had not even the usual number of diarrhœas of the season, and absolutely nothing having the semblance of cholera. This effect I attribute mainly to the regulation of the diet, alike as regarded quantity, quality, and mode of serving. The allowance was not stinted for breakfast or dinner in any manner. The fresh vegetables from the post-gardens were gathered early in the morning in quantities sufficient for the day, and distributed immediately. These consisted of peas, beans, beets, onions, corn, potatoes, turnips, cabbages, lettuce, cucumbers, &c. By many the latter article is considered unwholesome during the prevalence of cholera, and that it should be wholly interdicted at such times, yet I have never observed any harm from the vegetable, if fresh from the vines, and eaten in moderation at the proper hours of the day. Indeed, I share very little in the prejudices against green vegetables as articles of diet during such epidemics, provided they are used fresh from the garden, and served with breakfast and dinner only. By the latter term I do not mean a fashionable dinner in the evening, say at 5 or 6 o'clock, but the midday meal of the laboring classes and the troops. This gives time for the complete digestion of the food before the hour for sleep, while the former custom does not; and the evils resulting therefrom in cholera seasons are incalculable, when the indulgence of a hearty meal at the latter part of the day is associated with extremely

prostrating weather and exhausted nervous energies. Under such circumstances, in my judgment, the simple fare of our garrison or something like it is the only correct regimen for the evening repast.

The city authorities, however, acting under the advice of the board of health, prohibited the sale of nearly all green vegetables at the market-house, and many of the inhabitants found it difficult, as a consequence, to obtain that variety of food which is clearly necessary to maintain the functions of digestion in a healthy condition. In my judgment it would have been far better to institute a thorough inspection of the articles for sale, and to condemn all such as were not unquestionably sound and fresh; and to require that the market should be cleared of these by 7 a. m., at the latest. That this rigid prohibition did not prevent cholera attacks, was demonstrative in several instances where the patients had been living on bread and meat almost entirely. In these cases the lateness of the hour at which the food was served seemed to be the chief exciting cause.

For much of the material in preparing this report, and more especially in that relating to the mortuary record, I am indebted to Dr. L. C. Pynchon, the secretary of the Madison County Medical Society, and to Drs. Green, the president; J. J. Dement, and Benford, Baldridge, and Erskine, for notes and reports of their cases. To Assistant-Surgeon Chas. R. Greenleaf, U. S. A., who relieved me at that station, I am indebted for copies of meteorological records of the post, as well as for other favors in that direction.

AUSTIN, TEXAS, *November*, 1874.

Summary of meteorological observations made at Thomas Barracks, Huntsville, Ala., for the months of May to September, inclusive, for the years 1872 *and* 1873.

Month.	Mean temperature.				Relative humidity.				Rain-fall, in inches.
	7 a. m.	2 p. m.	9 p. m.	Monthly mean.	7 a. m.	2 p. m.	9 p. m.	Monthly mean.	
1872.									
May	68.9	80.1	69.8	72.3	76.3	56.1	77.6	70.0	2.00
June	75.3	84.3	74.0	77.9	75.5	57.8	73.7	69.0	2.13
July	77.3	86.6	76.5	80.1	86.8	64.4	81.8	77.6	6.91
August	76.3	87.1	76.2	80.0	85.0	61.2	80.0	75.4	2.94
September	65.5	82.2	69.5	72.5	83.3	52.7	70.2	68.7	1.96
Monthly mean	72.6	84.0	73.2	76.6	81.4	58.4	76.7	72.2	15.94
1873.									
May	70.2	78.6	68.3	72.4	77.1	61.5	76.2	71.6	3.45
June	76.5	83.5	73.3	77.8	84.3	67.9	83.4	78.5	5.62
July	78.9	88.8	77.0	81.6	80.7	59.7	82.5	74.3	3.92
August	76.5	86.7	75.8	79.6	86.2	60.2	85.5	77.3	3.46
September	69.9	80.2	67.6	72.7	83.5	62.6	77.7	74.6	3.90
Monthly mean	74.4	83.5	72.4	76.8	82.3	62.3	81.0	75.2	20.29

Meteorological register for the month of June, 1873, transmitted by M. K. Taylor, assistant surgeon, United States Army.

[Station, Thomas Barracks, Huntsville, Ala.; latitude, ——; longitude, ——; altitude of barometer above sea, —— feet.]

Day of month.	Thermometer.				Movements of atmosphere.						Amount of cloudiness.			Rain and melted snow.			Remarks.
					7 a. m.		2 p. m.		9 a. m.								
	7 a. m.	2 p. m.	9 p. m.	Daily mean.	Winds.		Winds.		Winds.		7 a. m.	2 p. m.	9 p. m.	Began.	Ended.	Quantity.	
					D.	F.	D.	F.	D.	F.							
																Inches.	
1	72	85	73	76.66	S.	1	S. E.	0	S.	0	Fair	Fair	Fair	.....	.....	.....	
2	76	88	6	80.00	S. E.	1	N. E.	1	E.	0	Fair	Fair	Fair	.....	.....	.....	
3	76	86	75	79.00	N. E.	2	S.	1	N.	1	Fair	Fair	Fair	.....	.....	.....	
4	75	85	74	78.00	S.	0	W.	2	S.	1	Cloudy..	Fair	Fair	.....	.....	.....	
5	85	96	76	85.66	W.	2	W.	3	W.	6	Fair	Fair	Cloudy..	Night ..	.....	.....	Heavy showers during night.
6	73	78	73	74.66	S.	0	E.	0	E.	2	Cloudy..	Cloudy..	Fair	.....	.....	.....	Ended early this morning.
7	71	90	75	78.66	S.	0	W.	0	W.	1	Fair	Fair	Fair	.....	.....	.....	
8	82	95	78	85.00	W.	1	S. E.	0	N.	5	Fair	Fair	Fair	Night ..	.....	.....	
9	77	74	70	73.66	W.	2	S.	2	N.	0	Fair	Cloudy..	Cloudy..	2 p. m.	6 p. m.	0.50	
10	66	68	65	66.33	S. E.	1	S. E.	1	W.	0	Cloudy..	Cloudy..	Cloudy..	7 a. m.	7 p. m	0.80	Rain all day.
11	72	73	64	69.66	S.	1	S. E.	0	N.	2	Cloudy..	Cloudy..	Cloudy..	.....	.....	1.30	Do.
12	70	82	70	74.00	E.	1	W.	0	N. W.	1	Cloudy..	Fair	Fair	.....	.....	.....	
13	74	77	72	75.00	S.	2	S.	0	N.	1	Fair	Fair	Fair	5 p. m.	6½ p. m.	0.60	
14	73	72	65	70.00	W.	0	S.	0	E.	1	Cloudy..	Cloudy..	Fair	.....	.....	0.40	
15	74	82	75	77.00	N. W.	0	W.	1	E.	0	Fair	Fair	Fair	9 p. m.	Night ..	.....	
16	74	80	72	75.33	S.	0	S. E.	1	S. W.	3	Cloudy..	Cloudy..	Cloudy..	6 p. m.	Night...	0.26	
17	74	86	70	76.66	S. E.	1	S. E.	1	S.	0	Cloudy..	Fair	Fair	.....	.....	.....	
18	74	84	74	77.33	S W.	1	W.	0	S. E.	1	Cloudy..	Fair	Fair	.....	.....	.....	
19	74	85	76	78.33	S. W.	0	S. W.	2	S.	0	Cloudy..	Fair	Fair	1 p. m.	1½ p. m.	0.05	
20	75	84	74	77.66	W.	0	N. W.	3	S.	3	Fair	Fair	Fair	.....	.....	.....	
21	83	87	78	82.66	W.	0	W.	1	W.	0	Fair	Fair	Fair	.....	.....	.....	
22	88	95	82	88.66	W.	0	W.	0	S.	0	Fair	Fair	Fair	.....	.....	.....	
23	88	80	76	81.33	S.	0	S. W.	3	S. E.	2	Fair	Cloudy..	Fair ...	.....	.....	.....	
24	85	76	70	77.00	S. W.	0	S. W.	0	E.	3	Fair	Cloudy..	Fair	.....	.....	0.01	Light showers this p. m.
25	85	91	78	84.66	W.	0	W.	0	N. E.	1	Fair	Fair	Fair	.....	.....	0.01	Do.
26	83	88	76	89.00	S. W.	4	S.	2	E.	2	Fair	Fair	Fair	.....	.....	.....	
27	73	90	75	79.33	S.	3	S. E.	1	N. E.	0	Cloudy..	Fair	Fair	.....	.....	.....	
28	75	84	74	73.33	S.	1	S. W.	1	W.	3	Cloudy..	Fair	Fair	8½ a. m.	10 a. m	0.50	Heavy showers; light showers during the night.
29	74	81	72	75.66	S.	0	S.	2	S.	1	Cloudy..	Cloudy..	Cloudy..	12 a. m.	1 p. m.	0.30	
30	74	82	73	76.33	S. W.	1	W.	3	N.	2	Cloudy..	Fair	Fair	.....	.....	.....	
Monthly mean	76.5	83.5	73.3	77.8	.....	....	.....	....	.....	....	.....	.....	.....	.....	.....	5.62	

NOTE.—Number of days fair, 20; number of days cloudy, 10.

Meteorological register for the month of June, 1873, &c.—Continued.

Day of month.	Dry and wet bulb thermometer.						Day of month.	Dry and wet bulb thermometer.					
	7 a. m.		2 p. m.		9 p. m.			7 a. m.		2 p. m.		9 p. m.	
	D. B.	W. B.	D. B.	W. B.	D. B.	W. B.		D. B.	W. B.	D. B.	W. B.	D. B.	W. B.
1	72	66	85	75	73	65	17	74	73	86	76	70	71
2	76	66	88	75	76	68	18	74	80	84	80	74	75
3	76	67	86	69	75	70	19	74	85	85	85	76	78
4	75	72	85	70	74	68	20	75	83	84	74	74	73
5	83	79	96	72	76	65	21	83	80	87	74	78	69
6	73	72	78	75	73	69	22	88	80	95	80	82	76
7	71	71	90	78	75	70	23	88	77	80	80	76	73
8	82	76	95	84	78	73	24	85	70	76	82	70	73
9	77	73	74	70	70	69	25	85	72	91	77	78	71
10	66	65	68	66	65	64	26	83	72	88	76	76	70
11	72	71	73	64	64	62	27	73	71	90	75	75	71
12	70	70	82	76	70	65	28	75	72	84	77	74	71
13	74	71	79	75	72	71	29	74	72	81	76	72	70
14	73	71	72	68	65	62	30	74	71	82	75	73	71
15	74	68	82	75	75	70							
16	74	72	80	77	72	70	Monthly mean	76.5	72.9	83.5	75.3	73.3	69.5

[These calculations are made from Professor Guyot's tables.]

Day of month.	Relative humidity or per cent. of saturation of the atmosphere at—				Remarks.
	7 a. m.	2 p. m.	9 p. m.	Daily mean.	
	Per cent.	Per cent.	Per cent.		
1	95.8	60.9	62.9	69.9	
2	56.3	52.3	64.4	57.7	
3	60.3	38.7	76.8	58.6	
4	85.8	44.2	72.0	67.3	
5	75.6	27.3	52.4	51.8	
6	95.0	86.3	80.7	87.3	
7	100.0	56.5	76.8	77.8	Mean temperature for the 10 days, 77.7.
8	74.7	61.7	77.6	71.3	Mean relative humidity from the 1st to the 10th, 72.
9	81.7	81.0	94.8	85.8	
10	94.5	89.5	94.4	92.8	Number of deaths from cholera, 1.
11	95.0	58.8	88.8	80.9	
12	100.0	74.7	75.1	83.3	
13	85.6	82.2	95.0	87.6	
14	90.2	80.4	83.6	84.7	
15	72.0	70.8	76.8	73.2	
16	90.3	86.7	90.0	89.0	
17	81.2	75.8	89.8	82.3	Mean temperature for the 10 days, 75.1.
18	90.3	53.5	85.6	76.5	Mean relative humidity from the 11th to the 20th, 82.3.
19	90.3	68.1	95.2	84.5	
20	90.4	67.7	85.6	81.2	Number of deaths from cholera, 2.
21	87.1	69.1	86.3	80.8	
22	87.8	68.8	82.8	79.8	
23	80.1	74.1	86.0	80.2	
24	79.4	90.6	94.8	88.3	
25	79.4	60.1	90.8	76.8	
26	75.0	69.1	86.0	76.7	
27	85.4	69.8	90.4	81.9	Mean temperature for the 10 days, 80.7.
28	85.8	71.4	85.6	80.9	Mean relative humidity from the 21st to the 30th, 84.1.
29	90.3	78.4	90.0	86.2	
30	85.6	70.8	90.2	82.2	Number of deaths from cholera, 29.
Monthly mean...	84.3	67.9	83.4	78.5	

Meteorological register for the month of July, 1873, transmitted by M. K. Taylor, assistant surgeon, United States Army.

[Station, Thomas Barracks, Huntsville, Ala.; latitude, ——; longitude, ——; altitude of barometer above sea, —— feet.]

Day of month.	Thermometer.				Movements of atmosphere.						Amount of cloudiness.			Rain and melted snow.			Remarks.
					7 a. m.		2 p. m.		9 a. m.								
	7 a. m.	2 p. m.	9 p. m.	Daily mean.	Winds.		Winds.		Winds.		7 a. m.	2 p. m.	9 p. m.	Began.	Ended.	Quantity.	
					D.	F.	D.	F.	D.	F.							
																Inches.	
1	85	90	80	85.0	W.	0	S.	1	W.	2	Fair	Fair	Fair	.....	.....	.....	
2	80	90	81	83.66	W.	3	S.	1	S.	0	Fair	Fair	Fair	.....	.....	.....	
3	82	94	82	86.00	W.	1	S. W.	2	W.	0	Fair	Fair	Fair	.....	.....	.....	
4	87	95	83	88.33	S. W.	2	W.	3	S. W.	1	Fair	Fair	Fair	.....	.....	.....	
5	84	95	85	88.00	S.	1	W.	5	E.	1	Fair	Fair	Fair	.....	.....	.....	
6	85	96	80	87.00	W.	2	W.	3	N. E.	0	Fair	Fair	Fair	.....	.....	.....	
7	76	91	78	81.66	W.	0	W.	1	N. W.	0	Fair	Fair	Fair	.....	.....	.....	
8	78	85	70	77.66	W.	0	W.	4	N. E.	0	Fair	Fair	Fair	.....	.....	0.01	Light shower during night.
9	73	84	78	78.33	W.	2	W.	2	N. E.	1	Fair	Fair	Fair	.....	.....	.....	
10	75	90	75	80.00	W.	0	W.	1	N. W.	0	Fair	Fair	Fair	.....	.....	.....	
11	83	92	78	84.33	N. W.	0	N. W.	2	N.	1	Fair	Fair	Fair	.....	.....	.....	
12	86	91	79	85.33	N.	0	S.	1	S. W.	0	Fair	Fair	Cloudy..	.....	.....	.....	
13	84	92	77	84.33	N. W.	2	S. W.	1	S.	0	Fair	Fair	Fair	.....	.....	0.01	Light shower at 9 p. m.
14	85	94	78	85.66	S.	0	S. E.	1	S. W.	0	Fair	Fair	Fair	.....	.....	.....	
15	86	94	80	86.66	W.	0	W.	0	W.	0	Fair	Fair	Fair	.....	.....	.....	
16	78	80	76	78.00	S.	0	W.	0	S. W.	0	Cloudy..	Cloudy..	Cloudy..	12½	2	0.50	
17	79	95	77	83.66	S.	1	S. W.	0	S.	1	Fair	Fair	Fair	.....	.....	.....	
18	84	89	74	82.33	S. W.	0	W.	4	N.	1	Fair	Cloudy..	Cloudy..	5	6	0.50	
19	75	85	73	77.66	S.	0	S.	0	N. E.	1	Fair	Cloudy..	Fair	.....	.....	0.01	Light shower at 12 m.
20	71	84	68	74.33	E.	0	W.	1	N. E.	0	Cloudy..	Fair	Fair	.....	.....	.....	
21	76	82	73	77.00	W.	0	N. E.	0	N. E.	0	Fair	Fair	Fair	.....	.....	.....	
22	71	86	76	77.66	N. E.	0	S. E.	2	S. E.	0	Cloudy..	Cloudy..	Cloudy..	.....	.....	0.23	
23	76	82	78	78.66	E.	0	S.	0	S. W.	0	Cloudy..	Cloudy..	Fair	.....	.....	.....	
24	77	80	76	77.66	S.	0	W.	0	W.	0	Cloudy..	Cloudy..	Fair	7	7½	0.24	
25	77	88	70	77.66	S. E.	0	S. W.	2	S.	0	Cloudy..	Cloudy..	Fair	.....	.....	.....	
26	76	90	75	80.33	S. W.	1	S.	0	S. W.	2	Fair	Fair	Fair	.....	.....	.....	
27	77	94	79	83.33	S.	0	S. E.	3	S.	0	Fair ...	Fair	Fair	.....	.....	.....	
28	75	93	79	82.33	S.	0	S. E.	1	W.	0	Cloudy..	Fair	Fair	.....	.....	0.20	Light showers during day.
29	76	85	77	79.33	S. W.	0	S. W.	0	W.	0	Cloudy..	Fair	Fair	.....	.....	2.20	Light showers during day; heavy shower at 4 p. m.
30	75	84	76	78.33	W.	0	S.	1	S. W.	0	Fair	Fair	Fair	.....	.....	0.01	
31	78	85	77	80.00	W.	0	S. E.	0	S. E.	3	Fair	Fair	Cloudy..	.....	.....	0.01	
Monthly mean..	78.9	88.8	77.0	81.3	.....	....	.....	....	.....	....	.....	.....	.....	.....	.....	3.92	

Meteorological register for the month of July, 1873, &c.—Continued.

Day of month.	Dry and wet bulb thermometer.						Day of month.	Dry and wet bulb thermometer.					
	7 a. m.		2 p. m.		9 p. m.			7 a. m.		2 p. m.		9 p. m.	
	D. B.	W. B.	D. B.	W. B.	D. B.	W. B.		D. B.	W. B.	D. B.	W. B.	D. B.	W. B.
1	81	85	90	81	80	73	18	84	80	89	87	74	72
2	80	77	90	80	81	76	19	75	75	85	77	73	71
3	82	78	94	84	82	77	20	71	67	84	68	68	65
4	87	81	95	83	83	79	21	76	70	82	67	73	65
5	84	78	95	81	85	75	22	71	67	86	71	76	73
6	85	78	96	80	80	76	23	76	73	82	76	78	75
7	76	72	91	75	78	74	24	77	75	80	75	76	70
8	78	72	85	75	70	67	25	75	73	88	79	70	68
9	73	70	84	72	78	74	26	76	73	90	80	75	73
10	75	72	90	75	75	70	27	77	75	94	81	79	75
11	83	72	92	76	78	74	28	75	73	93	80	79	74
12	86	74	91	74	79	76	29	76	74	85	78	77	75
13	84	76	92	75	77	75	30	75	73	84	76	76	73
14	85	77	94	80	78	75	31	78	75	85	74	77	74
15	86	78	94	74	80	74							
16	78	75	80	75	76	75							
17	79	76	95	86	77	74	Monthly mean	78.9	74.4	88.8	77.8	77.0	73.4

[These calculations are made from Professor Guyot's tables.]

Day of month.	Relative humidity or per cent. of saturation of the atmosphere at—				Remarks.
	7 a. m.	2 p. m.	9 p. m.	Daily mean.	
	Per cent.	Per cent.	Per cent.		
1	83.4	66.3	70.1	73.3	
2	82.4	100.0	78.4	86.9	
3	82.8	64.4	78.7	75.3	
4	76.1	58.6	83.0	72.6	
5	75.3	52.7	60.9	66.3	
6	71.8	45.7	82.4	66.6	
7	81.5	44.8	81.9	69.4	Mean temperature for the 10 days, 83.5.
8	73.4	86.3	86.7	82.1	Mean relative humidity from the 1st to the 10th, 73.6.
9	86.0	53.5	81.9	73.8	
10	85.8	47.2	76.8	69.9	Number of deaths from cholera, 14.
11	56.4	45.4	81.9	61.2	
12	54.5	41.9	86.0	60.8	
13	67.7	42.5	90.7	66.9	
14	71.8	35.7	81.9	63.1	
15	64.8	52.2	78.2	65.2	
16	86.3	78.2	95.2	86.6	
17	86.5	68.0	86.2	80.2	Mean temperature for the 10 days, 82.2.
18	83.2	91.9	90.3	88.5	Mean relative humidity from the 11th to the 20th, 72.7.
19	100.0	68.1	90.2	86.1	
20	80.2	40.3	84.3	68.3	Number of deaths from cholera, 9.
21	72.7	42.2	62.9	59.3	
22	80.2	44.8	86.0	70.3	
23	86.0	67.7	86.3	80.0	
24	90.7	78.2	72.7	80.5	
25	90.4	65.6	89.8	81.9	
26	86.0	63.0	90.4	77.8	
27	90.7	55.2	82.2	76.0	
28	90.4	51.8	77.9	73.4	Mean temperature for the 11 days, 79.2.
29	90.6	71.8	90.7	84.4	Mean relative humidity from the 21st to the 31st, 76.5.
30	90.4	67.7	86.0	81.3	
31	86.3	57.4	86.2	76.7	Number of deaths from cholera, 6.
Monthly mean...	80.7	59.7	82.5	74.3	

B.—EPIDEMIC CHOLERA AT HUNTSVILLE, ALA., IN 1873.

By J. J. Dement, M. D., *Chairman of the Board of Health.*

Huntsville is situated at the base of the last western spurs of the Cumberland Mountains, ten miles north of the Tennessee River, and eighteen miles south of the Tennessee and Alabama State line. It has an elevation of 692 feet above tide-water at the city of Mobile, in latitude 34° 43′ 44″. In 1870 the city had, according to the United States census, a population of four thousand nine hundred and seven, of whom two thousand five hundred and thirty-two were whites, and two thousand three hundred and seventy-five were colored. There has been probably but little change since that time.

The character of the surface upon which a greater portion of the city is built is such as to afford abundant drainage, being supplied with natural water-sheds, which prevent the water from collecting in that portion of the city. The surface-soil is a dark, rich loam, with subsoil of pure red clay, resting on a solid limestone base. This portion of the city is well supplied with water, mainly from a large spring of pure limestone water which bursts from the base of the bluff on which this portion of the city is built. The water is pumped into a reservoir on the top of the hill, and from thence supplied to the city. This water, however, is by no means in universal use, as many premises have wells which yield freestone water after having been dug into the clay for a depth of from 30 to 50 feet.

Descending gradually about 80 feet from this high and well-drained portion of the city in all directions, except easterly in the direction of the mountains, is a low, flat, ill-drained region, in which there existed many years ago a number of ponds and marshes, which have been gradually filled by washings from the adjacent elevations, as well as from the *débris* from the older parts of the city which have been cast into them from time to time. Many of these places still exist, and during an unusually wet season retain water until midsummer, creating malarial disorders among the individuals living in their vicinity. This made soil in many places is from 1 to 4 or 5 feet deep, beneath which is at some places a yellow gravelly subsoil, at others, a white or red clay, all of which is much more porous than the subsoil of red clay in the higher parts of the city.

In these districts the colored population preponderate. They occupy tenement-houses, which are simply wooden huts, not elevated above the ground. The water in this district is freestone, and obtained from wells which are from 10 to 30 feet in depth. These wells, during the spring and early summer of 1873, were filled to the level of the ground with surface-washings.

The Memphis and Charleston Railroad runs along the western border of the city, and in close proximity to the portion which is built upon made ground. There are upon this road two daily passenger-trains from Memphis and Chattanooga, which connect with the trains from Nashville, Tenn. At this point are located the railroad-shops for the eastern division of the road, and all passing trains, freight as well as passenger, change officers and men at Huntsville.

Previous to the outbreak of cholera it was observed that we had an unusual number of intestinal diseases, generally of a mild form; and it was also observed that we had much less of those forms of disease generally regarded as having their origin in malaria.

For several weeks prior to the first death from cholera in our midst, the disease had been prevailing in Memphis, Nashville, and many of the smaller cities and towns of Western and Middle Tennessee; and under the direction of the board of health, which had just been organized, the authorities had the city placed in as good hygienic condition as was possible in so short a space of time.

Near the center of the low, flat region on the western side of the city, about 150 yards from the depot of the Memphis and Charleston Railroad, and on the main street leading to the business portion of the city, the first case of cholera occurred in the person of a negro girl, five years of age, the child of Toliver Thompson. The family consisted of Thompson, his wife, and five children; they had lived in the vicinity for many years; had no boarders, and received, they state, but few visitors. The occupation of Thompson was that of cart-driver, and for some time previous to the attack of his child was employed by the city in removing *débris* from the streets.

Immediately south of Thompson's house was a pond which had been partially filled, but which yet contained a considerable quantity of dirty water. Almost on the brink of this pond was located the well which afforded the water-supply of the family, and which was at the time filled to the brim. On the morning of June 3, the girl was taken with a watery, painless, and odorless diarrhœa. At 10 o'clock a. m. she commenced to vomit colorless water, and her mother says became very cold, restless, and thirsty. No medical aid was obtained until 5 o'clock p. m., when she was seen by Drs. Bassett, Buiford, Carter, and the writer. The patient was *in articulo mortis*, and died almost at the moment of the visit. The surface of the body was found shrunken, and the skin of the hands and feet shriveled. No other case of the disease followed the death of this child.

June 15, twelve days after the death of the Thompson child, the second of the Huntsville cases occurred in the person of Joe Smith, a negro, aged thirty-five years, who had been for several months a waiter in a restaurant in Decatur, Ala., from which town he had arrived some two weeks prior to this attack. This man had no home or employment. He slept wherever night overtook him, and ate wherever he could obtain a meal. Where he had been or what he had been doing through these two weeks cannot be determined. Smith during the night of June 15 was taken with a diarrhœa, but received no medical aid until 9 o'clock a. m. the next day, when Dr. Buiford found him in collapse, and he died during the succeeding night. This case occurred in a house upon the same street, and directly opposite to that occupied by the Thompson family.

On the 16th of June, Mrs. Susan Pollard, aged seventy-four, living one and a half miles west of the city, upon the line of the Memphis and Charleston Railroad, was taken with a slight diarrhœa, was worse on the 17th, and was in cholera-collapse on the morning of the 18th. She died during the succeeding night. This lady had walked to Huntsville on the morning of June 14, and had remained with her children within one square of the houses occupied by the first and second cases until the afternoon of the 15th, when she returned home on foot over the railroad-track, and was drenched on the way by a shower of rain.

Abner Graham, aged forty-five years, whose residence and store-house was immediately south of the premises occupied by the first case, was attacked with cholera on the morning of the 19th of June, and died on the 21st. Two other members of his family had the disease within a few days, but recovered. Larkin, a negro, aged twenty-six years, who

waited on Mr. Graham, and who assisted in shrouding his corpse, took the disease on the night of the 21st of June, and died at 8 o'clock a. m. of the 22d. The same day (June 21) a negro child living in the house in which Joe Smith had died was taken with the disease, and died in six hours.

From this case it is impossible in this portion of the city to trace the connection of the cases; the disease became epidemic, attacking alike white and black, and extending in all directions. Taking the house in which Joe Smith died as a center, and describing a circle of four hundred yards in diameter, we find that fifty cases of cholera occurred in that area within the space of ten days from the development of the disease in the person of Smith.

On the 16th of June, the disease was introduced into the eastern portion of the city through the person of Louis Harris, a mulatto fifty years of age, who was the proprietor of a drinking-saloon, which was a place of great resort for negroes from all portions of the city. Harris was taken with cholera while at his saloon, which was in the center of the city, and was immediately removed to his home, which was in a locality known as Georgia, inhabited almost entirely by negroes.

This eastern portion of the city has the same physical characteristics as the western portion, the same defective drainage, the same character of water, and the same kind of ponds and marshes.

Harris was fully collapsed in the afternoon of the 16th, but reacted during the night, slowly recovered, and was discharged quite convalescent on the fourth day.

June 23, five negroes who lived in the immediate vicinity to Harris were taken with cholera, and all died within thirty-six hours. At this time the use of well-water was forbidden by the board of health in this portion of the city, and the people were supplied with water from the Great Spring, which was carted in quantities for their use by the city authorities. This supply of water was furnished for the space of one week, during which time no new cases of the disease occurred, when the negroes, thinking themselves secure, resumed the use of the well-water, and, within four days, six fatal cases of cholera occurred in the same vicinity. The use of well-water was again prohibited, and again the progress of the disease was arrested.

When it became generally known that cholera was epidemic in the city, many of the citizens removed to the country with their families. Among these families six cases of cholera are known to have occurred. One gentleman sent his family to his plantation, ten miles from the city. After remaining there for three weeks they returned to Huntsville and remained two days, and again went to the country. Three days after their return from the city, a little boy in the family was taken with cholera and died in a few hours; the same day a lady, fifty years of age, was attacked, but recovered. The family now returned to their home at Huntsville, when all, both white and black, were affected with the disease, from which an additional death occurred. None of the workmen or their families on this plantation were affected with the disease.

Forty or fifty persons removed from Huntsville during the epidemic to Monte Sano, a mountain four miles east of town. Among these persons there were three cases of cholera, one of whom died. One case was attacked in two days, one case in fourteen days, and one case in twenty-three days after they had left Huntsville.

Some persons took refuge at Johnson's Wells, a watering-place nine miles north of Huntsville. At this time there were nearly ninety vis-

itors at the wells. One case of cholera occurred, and died after an illness of thirty-six hours. No other case occurred.

A negro woman, who lived six miles in the country, came to town to visit her daughter, who was ill with the cholera. She remained three days and returned to her home. On the sixth day after her return she was taken with the same disease and died. On the plantation were about sixty persons, but among them no new cases occurred.

The high and well-drained portions of the city remained almost exempt from the disease, only eight or ten cases having been reported, and among them only two deaths.

During the prevalence of the epidemic we had every form of the disease, from slight borborygm, with watery, easy diarrhœa, to that of the most malignant type. Under these circumstances it is impossible to give more than an approximation to the number of cases. We have, however, reports of about one hundred and fifty cases so well defined as to leave no doubt as to their true character. Of the whole number there were fifty-one deaths; of these seventeen were whites and thirty-four were negroes. Very nearly all the cases which terminated fatally were found in a state of collapse by the attending physician when first called to see them. Only four cases are reported as having recovered from this condition. The disease was found to be amenable to treatment, if seen in the early stages. The last case which was reported occurred on the 29th of July.

JEFFERSON COUNTY.

CHOLERA AT BIRMINGHAM, ALA., IN 1873.

BY M. H. JORDAN, M. D., *Member of the Board of Health.*

In reporting a history of the recent epidemic of cholera as it prevailed at Birmingham, I will not discuss any theories nor indulge in any idle speculations, but will confine myself strictly to a simple, concise, narrative of events.

Our little city was terribly scourged for long weeks; our citizens became panic-stricken; many left, almost depopulating the town, and leaving the sick and indigent principally in the care of clergymen and physicians. The latter class, however, did not escape the disease, but two of their number lay for many days and nights upon the brink of the river, and it was only by the intervention of an all-wise Providence and the assiduous care of their attendants, that they recovered.

Birmingham is located in Jones Valley, near the center of Jefferson County, with the Red Mountains lying a short distance to the south and east, and what is known as Reservoir Ridge to the north and west. The stone near the surface is blue limestone, covered with a stiff clay soil, such as is usually found in the hilly portions of Central Alabama. The bed of the valley is formed by the old Silurian limestone, which doubtless was brought to the surface through the superincumbent strata, and is found throughout the entire valley, almost on edge, dipping, as we recede from the valley, to the northeast and southwest. From this fact we are led to conclude that the only water that appears on the surface or is found in wells in this valley must be surface-water, for the strata of limestone are not water-bearing, and only afford such supply of water as may have filtered through the strata of earth overlying the edges of this formation during the winter or rainy months, which finds a ready outlet in a southwest direction along the line of upheaval. This water finds numerous outlets at various points in the valley, as is

shown by the location of the springs, to be seen on the accompanying map, all of which, with others northeast and southwest of Birmingham, are situated on the line of upheaval.

Birmingham is a railroad center, having about three thousand inhabitants, a large number of whom live in houses closely crowded together, and in defiance of sanitary laws. Each day four railway-trains pass through this town, making direct connection with Nashville, Chattanooga, and Louisville, in the north, and Montgomery, Mobile, and New Orleans, in the south. In addition, from six to eight freight-trains each day receive and discharge freight. The mineral interests in the neighboring mountains attract to the town many strangers, and during the summer months the transient population is quite large.

The ground upon which the city is located is undulating, with many elevations and depressions, in some places affording fine natural drainage; in others it is low and marshy, and remains damp throughout the entire year.

The inhabitants of Birmingham were in 1873 supplied with water from two sources. A most admirable system of water-supply had been instituted, but the work had only advanced sufficiently to supply a small portion of the city. This supply was obtained from a large creek northeast of the city, distant nearly two miles, and separated from Jones Valley by a high ridge, on the summit of which was located the reservoir, which is over one mile from the center of the city.

The inhabitants who could not yet reach this water-supply, made use of several public wells and springs within the city limits, or were obliged to haul it from springs at the foot of Red Mountains. The public wells and springs referred to were in low, damp places, and so situated that they received the washings from a large surface of ground; and it was only at such points that water could be obtained. For that portion of the city north of the railroad, (see map,) being built over the greatest dip of the limestone rock, water could not be obtained. South of the railroad, where the rock-bed is nearer the surface, water is obtained from private wells. But one house in the city was supplied with a water-cistern.

In the eastern portion of the city there is a pond, (marked A,) from which flows a small branch, which takes a westerly direction, crosses Twentieth street through a culvert, and continues in the same direction to the corner of Seventeenth street and Second avenue, where it unites with two other small branches from the south side of the railroad, (marked B and C.) At their junction these streams spread out and form a low, marshy ravine, overgrown a portion of the year with tall grasses, which continues in the same direction beyond the limits of the corporation. On the northern side of this ravine, (marked E,) from Eleventh to Fourteenth street, which pass along a hill-side, a number of shanties and negro cabins, low, dirty, and ill ventilated, were located, which were known as "Baconsides." (See map.) By each rain-fall the filth of all kinds which covered the ground around these cabins was washed into the ravine, and it was from a low spring and a number of barrels sunk in the marshy bottom of this ravine that the inhabitants of Baconsides and many of the white residents of Birmingham obtained their drinking-water.

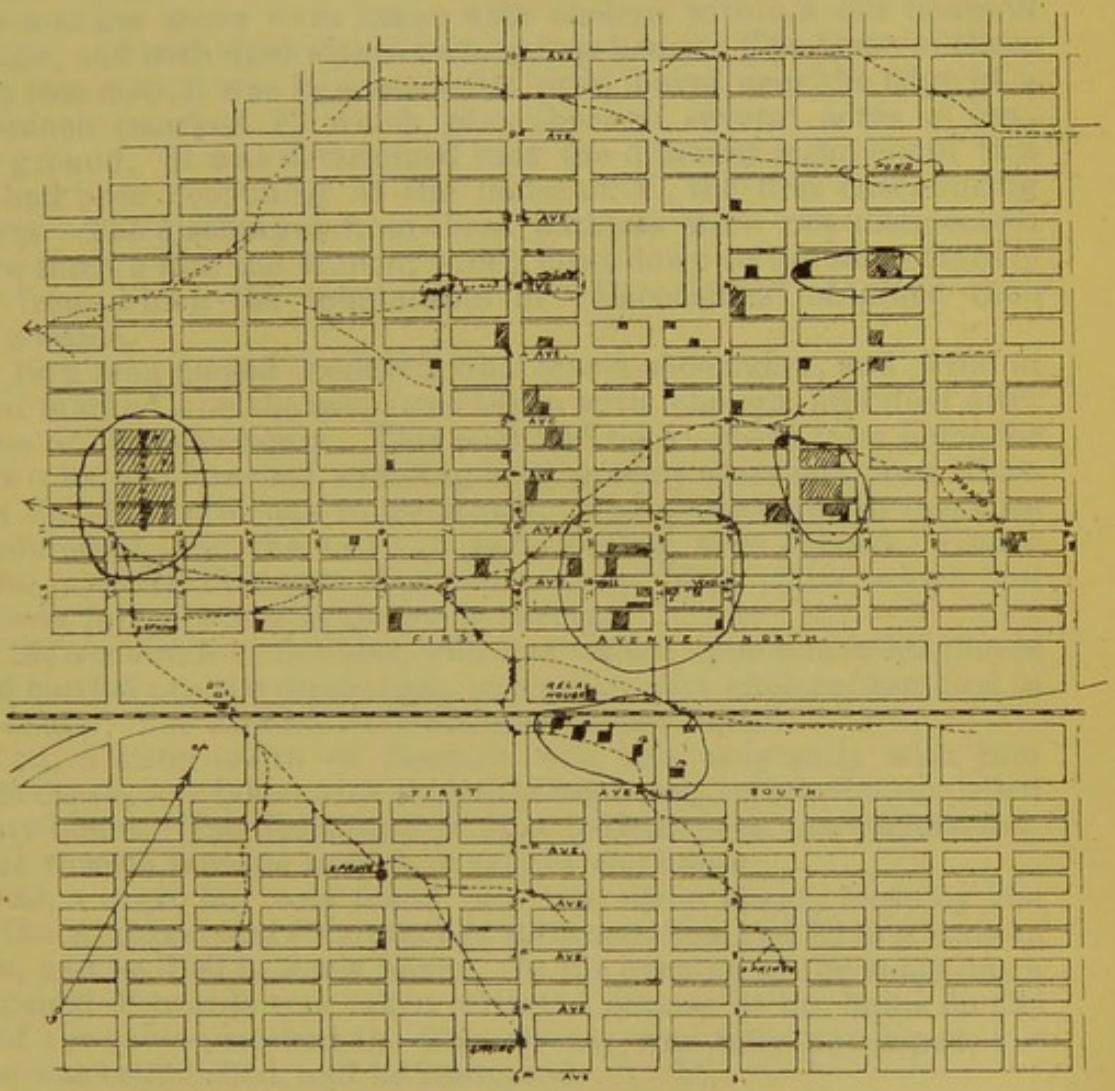
Until the alarm of cholera was sounded upon the streets, no effort was made by the city authorities to clean the streets and alleys, to drain and disinfect cess-pools and wet places, nor had cleanliness been demanded in privies and stables.

The first case of cholera that occurred at Birmingham in 1873 was

MAP
OF PART OF THE CITY OF
BIRMINGHAM
ALA.
SHEWING THE LOCATION OF THE
CASES OF
CHOLERA
IN
1873.

The cases from 1 West to Sixteenth are designated by figures.

THE DISTANCE THREE THUS ☐ FROM WHERE THE DISEASE HAS MOST PREVAILED.



A.M. HYDE LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS)

in the person of a Mr. Y., who was taken sick on the 12th day of June and died after an illness of twenty-four hours. He was an able-bodied man, who had been in the city about six weeks, and had been perfectly healthy until the arrival of his bed and bed-clothing, which had been shipped to him from Huntsville, and which were received and used by him three days before he was taken with the disease; and it was subsequently determined that these articles had been used in the portion of the city of Huntsville that was infected with the disease. Y. was taken with cholera at the point marked 1 on the map. His physicians had no suspicions that he had cholera at that time, although his symptoms greatly resembled it, as there had been no cases of the disease in this section of the State.

No care was taken to disinfect the discharges, which were thrown on the ground in the rear of the house, on the slope of the hill, immediately above the branch marked D.

No other cases occurred until June 17, when a young girl named, Hughes and her sister were taken with cholera within a few hours of each other, and both died within twenty-four hours. The home of these children (see map 2) was in a miserable little hovel near the edge of a small branch (marked F) which runs through several acres of low, marshy ground. It was determined that the different members of this family had been constantly at the house of Y., the first case, during his illness. The discharges from these patients were not disinfected, but were thrown into the branch, which flows down to the same marshy ground from which the inhabitants of "Baconsides" obtained their drinking-water.

June 19, a man named Bennett, who was a shoemaker, and lived at the point marked 4 on the map, was taken with cholera, and died after an illness of eighteen hours. This man had been absent from home for several weeks, and returned, suffering with an acute diarrhœa, from Chattanooga the night previous to his attack. The discharges in this case were disinfected, and the bed and bed-clothing were burned. Under the house in which this man died was a damp, filthy cellar, which had been nearly full of water in the early spring.

June 20, a comrade of Bennett, who had waited upon him in his illness and had carried out the discharges, was taken with cholera, and died in twelve hours. The excreta were disinfected and buried.

June 21, a sister-in-law of Bennett, who was constantly with him until his death, was taken with cholera at her house, (marked 6,) and died in twenty hours. The discharges of this patient were not disinfected, but were thrown into the branch in rear of the house.

June 22, a negro boy was found in a low, dirty shanty close by the line of the Alabama and Chattanooga Railroad, (marked 7,) in a state of collapse, and he died in a few hours. In the evening of the same day a negro named Edwards was taken with the disease at his home on the banks of the ravine marked C. The disease was fully developed, but reaction was established, and he recovered.

June 23, a negro named Eubank was taken with the disease at the residence of a gentleman, (marked 9.) He had copious rice-water discharges, cold skin, profuse perspiration, small, frequent pulse, and cramps in the extremities; he responded to the treatment and recovered. Great care was taken to disinfect and bury the excreta. He was kept as much isolated as possible, and no other case was developed on the premises or in the immediate neighborhood.

On the same day several cases of cholera occurred at Baconsides, all of which terminated fatally within twenty hours. No disinfectants were

used; the excreta were thrown upon the ground; the epidemic was inaugurated, and deaths occurred in every household. At first all of the negroes in this portion of the city who took the disease invariably died within a few hours; but when the violence of the epidemic began to subside, many recovered.

Along the banks of the branch marked C upon the map are a number of cabins, in one of which Edwards, the case of June 22, had the disease, and in one of these cabins, on the 24th, Minerva, a negro girl who had nursed Edwards and carried out the dejections, was attacked, and died within ten hours. Before this girl's body was buried, two other cases occurred in the same cabin, which rapidly proved fatal. The discharges in these cases were disinfected and buried, and by order of the board of health the beds and bed-clothing were burned. The occupants of all the cabins upon the line of this branch suffered so severely with the disease that they were abandoned.

June 27, Hughes, the father of the two girls who died upon the 17th, was taken with cholera, and died on the following day; the third death in the same house, out of a family of five individuals.

July 1, cholera was declared epidemic over the entire city of Birmingham, and it is now impossible to give step by step the progress of the disease, for the spread of the disease was so rapid and its virulence so great that the physicians could take no time to record cases.

July 2, Mr. M., who was a clerk in the city, but who slept at his home at Elyton, distant two miles, was attacked with cholera, and died within ten hours. The excreta of this case were disinfected with carbolic acid and buried. No other case of the disease occured in the village.

July 4, an excursion party of about two hundred of the citizens of Birmingham visited Blount Springs, some thirty-odd miles north, on the line of the South and North Alabama Railroad. They spent the day in eating, drinking, dancing, &c., and returned to Birmingham about 8 o'clock in the evening. Before daylight the next day seven of their number had died of cholera.

July 7, a Mrs. H. had slight symptoms of diarrhœa, and concluded to go to the house of her father-in-law, who lived on the top of Thodes Mountain, distant about eight miles. The next day she was taken with cholera, and died in twenty-four hours. Her mother-in-law, who nursed her carefully until her death, was taken with cholera July 10, and died in twelve hours. The discharges from these cases were received upon cloths, which were washed out, and the water thrown upon the grass in the back-yard, but after the arrival of a physician they were disinfected and buried, and the beds and bed-clothing were burned. No other cases of cholera were developed in this family, although several members of it suffered from diarrhœa.

July 9, was called to see Lee Anderson, the carriage-driver of Colonel T., who lived in an elevated portion of the city, in which there had been to this time no cholera, and found him with the symptoms of the disease strongly defined. This man had remained well until he had visited some of his friends at Baconsides. His system responded to the remedies exhibited, and late in the evening he had fully reacted, but the next morning at an early hour was found fully collapsed. It was discovered that during the night he had several times left his bed and had gone to the cistern on the premises for drink, and that he had several dejections in the yard, which were not disinfected. He died in a few hours.

July 10, Colonel T., his wife, and several members of his family were taken with diarrhœa, which, with the exception of Mrs. T., yielded

readily to the remedies used. This lady, however, fearing that the medicine might injure her sucking child, concluded to dose herself with Simmons's liver regulator, a proprietary medicine much in vogue throughout the Southwest; and the next day an attack of cholera was fully developed. She however reacted, and for several days seemed convalescent; her dejections contained bile; the secretion of urine was re-established, but on the fifth day she sank and died. This lady had been exposed to the disease by assisting in washing and dressing the body of a Mrs. K., who had died of cholera a few days previously in another portion of the city.

The premises of Colonel T. was one of the few in the city which were provided with cisterns of rain-water, and the generous owner, thinking that cistern-water was the safest for drinking purposes, allowed free access to his water-supply to all in his neighborhood. In this portion of the city no cases of the disease occurred until after the negro Anderson's visit to Baconsides; but after his death the persons who used this cistern-water, and the immediate neighborhood of Colonel T.'s property, suffered as severely, if not worse, than any other portion of the city.

The most popular hotel in the city, located close to the line of the railroads, around which the disease prevailed, escaped the disease. This house is built upon pillars several feet above the surface of the ground, allowing free ventilation. The drainage was admirable, the water-supply good, and the proprietor spared neither time nor expense in keeping his premises clean and disinfected.

It was observed during the course of the epidemic that wind from the south and east, or that blowing from Baconsides to the more populous portions of the city, increased the violence of the disease and the rate of the mortality, while when it came from the north and west there was a decided moderation in the severity of the symptoms.

Every shower of rain apparently aggravated the disease. These showers were unaccompanied with thunder, of short duration, and the subsequent heat was intense.

It having been stated by some physicians of local repute in the State that the disease which prevailed at Birmingham was not epidemic cholera, it is proper to state that the exhibition of the disease, both in its introduction, its mode of communicability, and in all its symptoms, closely and fully followed the history of cholera as it is laid down by authorities.

The active treatment of the premonitory diarrhœa was most successfully instituted, and the general expression of the profession of this city is that in not a single instance where this stage of the disease was treated, and where the patient followed fully the orders given, did the disease advance to its second stage; and so marked was this immunity that it is desired to add to the testimony on record, that by proper precautions, and the observance of hygienic laws, cholera attendants may enjoy the most perfect security from the disease.

The treatment adopted was the opium and mercurial. When the stomach seemed so inactive that nothing made any impression upon it, an emetic of mustard, salt, ginger, and pepper, suspended in hot water, in many cases produced a warm glow over the surface of the body in a few moments. For the relief of cramps which would not yield to ordinary remedies, a number of dry cups applied from the neck to the sacrum, over the spine, in every case in which they were used furnished the desired relief. The use of iced water *ad libitum* was found injurious; in many instances the unrestrained gratification of the thirst was followed by a fatal relapse. Ice and ice-water in small quantities and

at short intervals was found most useful. Many of the cases were complicated with uræmia, and the majority of these died, although they were carefully treated. Diuretics produced no good results. No condition in life, sex, or age escaped. The sucking babe and those of extreme age suffered alike from its ravages.

Before closing this paper, justice demands that we should briefly allude to the heroic and self-sacrificing conduct, during this epidemic, of that unfortunate class who are known as "women of the town." These poor creatures, though outcasts from society, anathematized by the church, despised by women, and maltreated by men, when the pestilence swept over the city, came forth from their homes to nurse the sick and close the eyes of the dead. It was passing strange that they would receive no pay, expected no thanks; they only went where their presence was needed, and never remained longer than they could do good. While we abhor the degradation of these unfortunates, their magnanimous behavior during these fearful days has drawn forth our sympathy and gratitude.

In closing this brief record we desire to state that, in the experience of our observations, facts will not justify us in believing that any local conditions of the soil, or peculiarity of climate, or moisture of the atmosphere, or masses of decomposing *débris*, either animal or vegetable, can in or of themselves produce the specific poison of cholera, "but they are the hot-beds in and on which the cholera excretions having been placed, the poison is reproduced with fatal rapidity."

BIRMINGHAM, ALA., *August*, 1874.

MONTGOMERY COUNTY.

REPORT OF A CASE OF EPIDEMIC CHOLERA WHICH OCCURRED AT MONTGOMERY, ALA., IN 1873.

BY T. A. MEANS, M. D., *Health-Officer of that year.*

John Rogers, aged thirty-three years, a negro of intemperate habits left his home at Montgomery to nurse the cholera sick at Birmingham some time during the month of June, 1873, and remained until the 17th of July, when he returned to his home on the evening of the same day. Meeting his former companions he indulged freely in mixed liquors, and ate largely of stale vegetables, unripe fruits, &c. After his night's debauch he returned to his quarters in the southeastern portion of the city, threw himself upon the bare floor without covering, and slept soundly until about 4 o'clock a. m., when he was seized with severe vomiting and purging, the matter cast off being only the food taken the night before. He looked upon this attack as simply cholera morbus; therefore refused medical aid until 3 p. m., when his wife, becoming alarmed, called in Drs. Williams and Michel, who recognized his case as one of cholera, and so informed me. I visited him immediately, and found him presenting the following symptoms:

Skin cold and clammy; pulse at the wrist, small, weak, and accelerated; tongue cold, moist, and not much coated; stools remarkably copious, pale, free from odor, and passed without effort, often thrown out in a continuous stream as far as two feet from his person. The abdomen was tense and the pulsation of the abdominal aorta distinctly visible. He seemed depressed and spiritless, with constant tossing of the body from side to side. He made no complaint, either of nausea or

pain, except that dependent upon cramps, which seemed only to occur immediately preceding a discharge from his bowels. I had him removed at once to the city hospital, and remained with him until his death, which occurred at 9 o'clock and 20 minutes p. m.

Up to 6 o'clock p. m. the above symptoms remained unchanged, when the more obvious features of the stage of collapse came on. The entire surface of his body became intensely cold; the skin and nails assumed the blue tint, and the skin of the hands and feet wrinkled, sodden, and insensible to pressure; yet he complained of oppressive heat of body, and made constant effort to throw off the covering; the eyes were sunken deep in their orbits; the countenance assumed a cadaverous aspect; thirst from the first, with a constant craving for cold drinks.

The tongue, yet moist, was white and cold; oppressive sense of heat is complained of at the epigastrium; suppression of urine; no bile in the matter ejected, nor was there seemingly any secretion of saliva. His voice, which from the first was husky and feeble, now became weak, labored, and hollow; respiration oppressed and slow; breath deficient in heat.

At 8 o'clock p. m. the pulse at the wrist became extinct, and could be felt only with firm pressure over the larger arteries. Coldness of body increased; the spasms, heretofore violent, now grew less severe, but more frequent, whilst the heat of the head increased quite sensibly.

As soon as it became known that this was a case of cholera, every one fled the house and left the patient to himself. Upon my arrival I had the premises cleansed, and a solution of copperas and crude carbolic acid, ten parts of the former to one of the latter, liberally applied within and without the house.

On reaching the hospital I took the same precautions; isolated the patient, and had each discharge absorbed with a large sponge saturated with the carbolic acid solution, which solution was also freely used in the room.

I cannot now recall what remedies were applied by Drs. Williams and Michel; but from his wife I learned that she had given him at his request, when first attacked, a teaspoonful of laudanum in half a glass of whisky, besides having his feet bathed, and flannels wrung out of hot water, and applied to the stomach and bowels. I found his stomach from the first too sensitive to retain anything, even cold water; and then only in teaspoonfuls could it be given at a time.

Calomel, opium, nitrate of potassa, were given, but immediately rejected. Dry-heat frictions with open hands, sinapisms over the stomach and bowels, ankles and wrists, and a free application of lard over the entire body, constituted the treatment after his arrival in the hospital. He expressed himself relieved when the lard was applied, and would often call for it.

On the 9th day of July, 1873, at the instance of the board of health, the city authorities took active measures to have the city cleansed and thoroughly disinfected. A quarantine was established against cholera-infected districts. These measures were promptly and faithfully carried out, but for which we might have had a visitation of cholera equal in extent and severity to that of our sister city Birmingham. The dread of an outbreak of yellow fever too, at this time prevailing in Pensacola, Mobile, Galveston, and other points, stimulated the profession as well as the municipal authorities to work with all the energy and means at their command to place our fair city in the best possible sanitary condition.

The means and agents employed were the thorough cleansing of privy-

vaults, sinks, and alley-ways; the application of a solution of sulphate of iron and crude carbolic acid, ten parts of the first to one of the last; lime, coal-tar, and charcoal were also liberally spread upon damp localities and open surfaces.

It is well to add, perhaps, that the board of health, although a corporate body, working under a charter from the State, has no power to act, being held subordinate to the municipal council. Notwithstanding all this, co-operation with the board was cordially entered into by the city authorities.

To the joint efforts of these two bodies, together with the individual effort of each citizen more than anything else, must be attributed our exemption from an epidemic of cholera in 1873.

MONTGOMERY, ALA., *September* 7, 1874.

BARBOUR COUNTY.

The Eufaula News of July 16, 1873, contains the following statement:

"The painful bowel-disease, of which we made mention some days since, seems to have abated but little. There are now several serious cases of illness in town."

As Eufaula is an active cotton-market, within the limits of navigation of the Chattahoochee River, and is the eastern terminus of the Montgomery and Eufaula and Vicksburgh and Brunswick Railroads, as well as the western terminus of the Southwestern Railroad, and thus in direct communication with cholera-infected districts, a letter asking information was forwarded to Dr. Z. T. Daniel, the secretary of the Barbour County Medical Society, in reply to which the following letter has been received:

"EUFAULA, ALA., *August* 22, 1874.

"Dr. ELY MCCLELLAN, *United States Army:*

"MY DEAR DOCTOR: Your communication, with forms, &c., was received last evening.

* * * * * * *

"It becomes me to say, however, that I have never had a case of cholera here, nor has there ever been a case of epidemic or Asiatic cholera developed in or brought to this place within the knowledge of any of its physicians. There have been slight choleraic attacks through every summer, but nothing like an epidemic.

"About the time cholera was prevalent in Louisville, Ky., (1873,) there was an increase of gastro-intestinal complaints, some of which have a suspicious collapse, but no case was pronounced cholera by any of the doctors. I write this after having consulted all reliable sources of information.

"Eufaula was quarantined (in 1873) against Montgomery, but no other place.

"Yours, very respectfully,

"Z. T. DANIEL."

The omitted portions of the above letter refer only to the Barbour County Medical Society.

CHAPTER XV.

WEST VIRGINIA GROUP.

West Virginia Contributors.

Dr. S. L. Jepson, Health Officer, Wheeling.
Dr. J. V. Wall, Huntington.

INITIAL CASE.

Wheeling, Ohio County, June 9.

CHOLERA EPIDEMIC OF 1873 AT WHEELING, W. VA.

By Dr. S. L. Jepson, *Health-Officer.*

[Note.—*A report by me appeared in the Transactions of the American Public Health Association for* 1873. *In a few non-essential points that report differs from this. It was written very hurriedly, and I desire this report to be regarded as the correct one.*—S. L. J.]

In the hope of contributing some little aid to the study of epidemic cholera as it existed in the South and West during the spring, summer, and autumn of 1873, I herewith transmit as full and accurate a history as possible of the disease as it occurred in Wheeling, W. Va., of which city I was at that time and still am health-officer. I desire in the outset to say that, as the cholera of 1873 was the first I had ever witnessed, I enter upon its study with no preconceived theories, and only such knowledge as has been derived from the standard medical works of the day. Hence my report, with any remarks that may be added, shall be written with the sole purpose of relating the facts as they occurred, together with such deductions as may be fairly drawn from them. In order to a more perfect understanding of the facts here given, and as directly bearing upon the sanitary condition of Wheeling, a few words as to the topography of the city may be necessary.

TOPOGRAPHY, ETC.

Wheeling is situated in latitude 40° 7′ north, by longitude 80° 42′ west, in Ohio County, W. Va., on the east bank of the Ohio river. Its average altitude is 640 feet above the sea-level. The original town was laid out on a plateau, elevated some 80 or 90 feet above the level of the river; there is a declivity of some 40 feet in this plateau, to the level of the "river-bottom" proper, upon which nearly three-fourths of the city is built. The general level of the "river-bottom" is 40 feet above low-water mark. The eastern boundary of the city is flanked by hills, having a mean altitude of about 700 feet. * * Its length along the river is about four miles, with an average breadth of one-fourth mile. The lowest points are subject to inundation during high floods of the river. Two such floods occurred in December, 1872, at which times parts of the Sixth and Eighth wards were covered with water. The same was true of

the Seventh ward, which occupies Zane's Island, in the Ohio river, and which, as it contained no case of cholera, we may here dismiss from further notice. The remaining portion of the city is divided into wards, which are numbered from north to south as follows: First, second, third, fourth, fifth, sixth, and eighth, the first being on the highest, and the eighth on the lowest ground. The city is divided between the Fourth and Fifth wards by Wheeling Creek, which is of considerable size, except in the very dry weather of summer, when it becomes low and quite offensive by reason of the waste products of soap-factories, oil-refineries, and slaughter-houses, as well as the sewage from several city sewers emptying into it. This creek is bridged at three points. The Sixth and Eighth wards are separated by a large common, through which a small stream runs. This common is now rapidly filling up with houses, but in 1873 it contained only a few scattered dwellings. A horse-car track extends from about the center of the Eighth ward to the extreme northern end of the city, and the cars are freely patronized by those living in this ward. In 1873 the population of the city was 26,000.

WATER-SUPPLY.

Water is pumped from the Ohio river into a "basin" situated high up on Wheeling Hill, and is thence distributed to all parts of the city through iron pipes. The Eighth ward until recently constituted a separate corporation, and was supplied with water from wells. Quite a number of these wells still remain, and the water from them is used as formerly by those not supplied with water from the basin. No means are provided for filtering or otherwise purifying the water in the basin, and its character is hence much influenced by rains, which cause it to become quite turbid, and after heavy rains a thick sediment of clay will settle in the bottom of the vessel, if water be permitted to stand for any length of time. The summer of 1873 being an unusually wet one, this condition of the water existed very frequently. Mr. Charles E. Dwight, of this city, gives the following as the average quantitive analysis of our water for the month of July and part of August, 1874. The mean temperature was 76° Fahrenheit:

Water	999.14150
Carbonate of lime	.02763
Carbonate of magnesia	.00531
Carbonate of iron	.00725
Sulphate of lime	.01294
Chloride of sodium	.02965
Silica	.01475
Alumina	.01210
Organic matter	.03687
Suspended matter, (clay, silica, lime, and organic matter not in solution)	.71200
	1000.00000

SANITARY ASPECTS.

While few cities are so favorably situated for good drainage as Wheeling, few are possessed of as little improvement looking to the perfection of drainage. The city is very meagerly supplied with sewers, and is likewise but poorly paved. Many of the streets and almost all the alleys south of the creek already referred to are entirely unpaved, while that portion of the city is also most deficient in sewers. The waste-water from hydrants, kitchens, and stables, therefore, finds its way into the alleys and street-gutters, while the solid offal is generously deposited in the same public place, in the confident expectation (by the assessor)

of its speedy removal by some of the innumerable hogs that are permitted to roam at will through the city as unpaid, and therefore economical, sanitarians; at least, this is the theory upon which the law is based.

As a consequence of the absence of proper sewerage, the city contains very few water-closets, the out-door privy-vault being used almost exclusively in their stead. In many parts of the city, indeed in parts of every ward except the Seventh, owing to the water-saturated condition of the ground, it is impossible to dig a vault to any considerable depth without a liability of its becoming soon filled with water. In some places this condition exists at a depth of three or four feet, and is of course always worse in wet seasons. This is due largely to the fact that many former swamps and small water-courses have been filled up without any previous attempt to drain them; and the very close proximity of the hills, on the sides of which many dwellings are built, doubtless aggravates the difficulty, as many springs of water exist in these by which the soil is kept constantly wet. As a consequence of all this, the city contains an unusual number of offensive privy-vaults, many requiring cleaning out every year, and not a few rapidly filling with water again after being cleaned. I think it may with truth be said that this city has the most abominable privy-system to be found in the country.

After a perusal of what has now been written as to the sanitary defects of Wheeling, one might be pardoned for concluding that it would be well nigh impossible to keep the city in first-rate condition. This is perhaps true, unless an unlimited amount of money and labor be expended. But while this is true, it is equally true that the city was not, previous to the advent of cholera and during its presence, in very bad condition. Laborers, under the control of the street commissioner, were kept constantly employed in some part of the city cleaning the streets and alleys, and at intervals lime was by my order scattered in the most offensive localities. When the city was "threatened with epidemic disease," an emergency in the absence of which *the health laws of the city do not permit the health-officer to employ even a single assistant in any capacity*, I employed temporarily a sanitary inspector for each ward, who made house-to-house visitations, and who were clothed with full power to compel the abatement of all nuisances on private property. In this way much good was no doubt accomplished, although the work was not entirely completed until a number of cholera-cases had occurred.* A similar visitation, however, had been made by myself in the early spring in the worst localities of the city. So that while this city was not in a condition, nor ever can be with its present sanitary defects, to especially repel an epidemic of cholera, neither was it in a condition to especially invite it. The least cleanly parts of it I believe to have been the Fifth and Sixth wards. But more on this subject again.

RAILROAD AND RIVER CONNECTIONS.

Wheeling, being very largely engaged especially in iron and glass manufacture, possesses intimate business relations with all prominent points West as well as in many parts of the South. She is in daily communication by rail with Columbus, Cincinnati, Cleveland, and inter-

* I may say here, as indicating the ideas of certain city councilmen on the "political economy of health," that when bills for the services of these inspectors were introduced, more than one member of council desired to know by what right the health-officer had employed men to do work for which he himself was paid. To the credit of our "city fathers," be it said, the bills were paid by an overwhelming vote.

mediate points, and during the whole of the spring and summer of 1873, the river being unusually high, three boats weekly arrived from Cincinnati, two of which were regular Wheeling and Cincinnati packets, the other a Pittsburgh and Cincinnati boat. In addition to these, other boats occasionally arrived from Cincinnati and points above that city, which were not making regular trips. The steamboat-landing is in the Second and Third wards. The boats, however, frequently land at the iron mills, located principally in the Sixth ward; they also occasionally land at a wharf in the Eighth ward, the object at these points being to put off or take on freight. Passengers almost universally get on and off at the wharf in the Third ward.

The Baltimore and Ohio Railroad depot, at which all trains from Columbus, Ohio, and all points south of that city arrive, is near the river-bank in the Fourth ward. The track crosses Wheeling Creek at that point, and extends along the river-bank on the western side of the Fifth and Sixth wards until it reaches Thirty-second street. At this point it crosses the city, forming the division-line between the Sixth and Eighth wards for three-fourths of their width, and thence it changes its direction southward and extends entirely through the Eighth ward. The trains generally run at so slow a rate through the city as to allow passengers to get off and on the cars.

The machine-shops of this road are located in the lower end of the Sixth ward, and give employment to about two hundred hands.

I give the above particulars as having a direct bearing upon a probable mode of importation of the disease, upon which point I withhold further remarks until later in my report.

METEOROLOGICAL OBSERVATIONS.

The points embraced in the following table, with notes, for which I am indebted to Dr. E. A. Hildreth, of this city, may be of some little interest in connection with a study of the origin of cholera here.

Meteorological Observations.—Monthly means.

1873.	Maximum temperature.	Minimum temperature.	Mean temperature.	Rain-fall in inches.	Number of rainy days.	Number of cloudy days.	Number of clear days.	Prevailing winds. Number of days of each.					
	°	°	°										
May	86	44	62.66	5.95	10	2	19	5	3	.....	7	14	2
June	92	60	75.33	3.98	10	5	15	5	1	3	9	12	.....
July	94	56	75.56	8.72	16	2	13	7	.....	1	5	18	.....
August	90	60	69.66	8.55	11	6	14	13	4	.....	2	9	1
September	84	50	65.16	3.08	8	6	16	13	5	.....	3	9	.....

Storms, with thunder and lightning, occurred on May 9, 20, 27; June 24, 27; July 4, 5, 14, 15, 18, 26, 29; August 25, 27, 28. Storm, with hail, on August 12. Frosts occurred on May 14, 15, 18, and September 15. Light snow on September 13.

NOTES BY DR. H.—"First half of June very dry. Only 0.23 inch rain-fall in first twenty days; balance of the month wet. First case seen resembling cholera was on the 27th.

"First half of August attended with bad cases of cholera infantum and cholera morbus. Typhoid fever and erysipelas the prevailing diseases. Typhoid fever became epidemic about the middle of September, and was generally of a mild type."

HISTORY OF CHOLERA CASES.

I defer speaking of the introduction of cholera into Wheeling until after a reference to those cases which seem to merit special attention, of which such details as are thought necessary will now be given. It is impossible, without a map, to indicate to those unacquainted with the city the exact location of the cases. In the hope that at least an imperfect idea may be obtained on this point, I will state that our streets running north and south are named, commencing at the river, Water, Main, Market, Chaplain, Eoff, Jacob, Woods, &c.; those running east and west are named from the northern end of the city, First, Second, Third, &c. The houses on the streets running north and south are numbered on a basis of 100 to each square; hence the first house in the first square is numbered 100; in the Twenty-third square, 2,300, &c. The houses on the cross-streets, east and west, are numbered continuously from the river, commencing with No. 1. In the accompanying table of cases, each house in which cholera occurred is numbered.

Case 1.—The first case presenting the symptoms of cholera did not come to my knowledge until the end of the month in which it occurred, when the death certificate was returned from the cemetery, in which "cholera nostras" was given as the cause of death. The attending physician was a very intelligent German, formerly health-officer of this city. From him and from a personal visit to the house of the deceased, the following facts are gathered.

The date of attack was June 9, the patient, a German woman aged fifty years, the wife of the proprietor of a lager-beer saloon, at No. 2114 Main street, Fifth ward. This saloon was in the same house as that occupied by the family, who lived in the rooms in the rear of the saloon. The second and third stories of the house were rented out to two families, six individuals being on the second, and four on the third floor. The head of the family on the second floor was a newspaper-carrier; one son was employed with his father, and one worked in a cigar-store. The remaining children were small, and remained at home. The man on the third floor and his son were laborers, with no regular place of employment.

The sanitary condition of the premises was bad. A privy-vault was in common use at this house, and was also used by visitors to the saloon, which was much frequented by Germans. The rear wall of the cellar formed one wall of the privy-vault. This wall was in bad condition, and permitted the contents of the vault to ooze through into the cellar of the dwelling-house. On June 9, about 3 o'clock p. m., after her morning work, this woman was suddenly seized with diarrhœa, the discharges being liquid and copious. Full choleraic symptoms rapidly developed, and after about three hours of collapse, she reacted, but died on the sixth day after with cholera typhoid. Thorough disinfection was resorted to, and no other case, even of diarrhœa, occurred in the house or neighborhood. This woman was somewhat of an invalid, being subject to attacks of what her physician calls "catarrh of the stomach and bowels," every summer. She had not been absent from home, nor had any of the occupants of the house, during the spring or summer, nor had any one been visiting the house. No means of introduction of cholera has been discovered in connection with the case. There exists the possible solution that one of the numerous visitors to the saloon may have been a stranger from an infected part of the country, and in some way bearing the germs of the disease, but the probabilities are decidedly against this theory, of the correctness of which there is not the slightest evidence.

In view of this patient's predisposition to diarrhœa; in view of the facts that no other case at all resembling cholera was reported here until June 20; that no case was reported, even as high up the Ohio river as Cincinnati until June 14, and that sporadic cases identical in symptoms, though rare, do occasionally occur in all cities during the summer months,* it might be worth while to inquire whether this case should not be excluded from our list of cholera cases. I throw out the suggestion for the consideration of the reader.

Case 2 occurred on June 20, at No. 3600 Chaplain street, Eighth ward, in a two-story brick tenement-house occupied by four families, and an additional male adult who lived in a room alone. Up-stairs, in the rear wing of the building, lived the family in which this and the next case occurred. This family consisted of husband, wife, and two sons, aged respectively 21 and 26 years. The husband worked at a glass-house in the ward, which employs about two hundred hands. The sons worked at the La Belle iron-mill, in the Sixth ward, which also employs several hundred hands. The other family up-stairs consisted of man, wife, and five small children. The man was a laborer, having no steady employment. Down-stairs was a single man, a shoemaker, who worked and lived in the house; also a family consisting of man, wife, and one child, and another family consisting of a widow-woman and three sons. These males worked at the above-named glass-works and iron-mill.

The premises were in bad sanitary condition. The cellar contained a small quantity of water which had been there so long as to become offensive; an open wooden drain, intended to carry off waste water from the hydrant, was defective and filthy, and the ground near and under it filth-sodden, and at the foot of the yard was an unused privy-vault almost full, and but imperfectly covered.

The first case occurring in this house was that of a male, aged twenty-one years, a boiler in an iron-mill; previous health good; an occasional drinker. Had for several days been suffering with diarrhœa, and was, consequently, unusually prudent in diet; had eaten nothing which would serve as an exciting cause of the symptoms which later presented. He had been so prostrated by a copious diarrhœa that he twice faint ed on his way home from his physician's office, a distance of two squares, whither he had gone for medical assistance. On this day, June 20, vomiting and cramps set in, followed by cold surface, shriveled skin, cyanosis of face and fingers, vox cholerica, and all signs of collapse, after the existence of which for some time, reaction set in, and recovery resulted on the 26th. This case was not reported, and I knew nothing of its existence until the occurrence of—

Case 3.—This patient was the mother of the above, aged sixty years, in only moderate health. She had nursed her son during his sickness, and was thus constantly exposed to the poison of the disease. She was attacked suddenly on June 28, having had no premonitory diarrhœa. Vomiting, purging, and cramps occurred, followed by collapse, from which she reacted in a few hours, recovering on the 30th. This case was not so severe as the previous one.

Neither of these patients had been absent from the city, nor do they know that they had been in any way exposed to any case of cholera, or to any person coming from a cholera-infected district.

As soon as this case was reported, which was not until several days after its occurrence, the premises were put in good sanitary condition. No other cases occurred in the house.

* Two such cases, one fatal, were reported to me here during the past summer. I saw one of these, and it presented all the symptoms, in an aggravated form, of the cases witnessed during the epidemic of 1873.

Case 4.—Male, aged thirty years, 3631 Eoff street, one and a half squares from Nos. 2 and 3. This patient worked at the La Belle mill, the same at which case 2 was employed, but in a distant part of it, and the two men had no acquaintance with each other, nor had their families. The home-premises were in good sanitary condition; the patient in perfect health, until attacked with diarrhœa some days before, by which he was not kept from work. On the night of July 3 he was seized with symptoms of cholera, which were succeeded by collapse of a few hours, followed by reaction and recovery after four days' illness.

The fact that this man was employed at the same iron-mill as case 2 renders it possible that during his premonitory diarrhœa he resorted to the same vault. This is not certain, however, as there are several vaults around the mill, and one of them is nearer to the point at which case 4 was engaged than is the vault used by case 2.

Case 5.—Male, aged sixty-six years, justice of the peace, residence 2523 Chaplain street, nearly a mile from any previous case. Had diarrhœa for nearly a week, for which he had received treatment, and the disease was controlled. A day or two after, which was July 4, he went to a picnic several miles in the country. He there doubtless exercised too violently, being a man of active habits, but committed no imprudence in eating. He, however, drank freely of lemonade made from limestone water, to which he was not accustomed, and to this attributed his relapse. At 1 o'clock a. m. of July 5 violent purging and vomiting, with cramps of abdomen and extremities set in, followed by collapse, which early came on. All the symptoms were well marked, and the discharges decidedly rice-water in character. The collapse was long-continued, and for a time the case was regarded as well-nigh hopeless. The urine was suppressed for fifty-four hours. Reaction finally came on, and the patient recovered in 7 or 8 days.

The attending physician, one of the oldest and most able physicians in the city, with whom I saw this case several times, says the case resembled in all respects those witnessed by him in three former cholera epidemics. Disinfection was freely employed as soon as the case was seen, and no further cases occurred.

It is not necessary here to give at length the history of every case, all essential facts being given in the accompanying table. The cases detailed below, however, seem to have some special interest by reason of their connection with other cases or with each other, and are therefore given somewhat fully. In the cases given above no probable connection other than stated in the histories recited, either with each other or with the disease in other places, has been traced. The same is true of the cases which will not be detailed in this report.

Case 7.—Male, aged sixty-two years, residence 3834 Eoff street, occupation, night-watchman at Riverside nail-mill, on Main street, between Twenty-fourth and Twenty-fifth streets. On duty with this patient, Mr. Hughes, was another man, Armstrong, who tells me he had a diarrhœa for three days, but still kept at his post, using the vault at the mill during the night. He described his diarrhœa as being painless, and so loose and watery as to necessitate great haste in reaching the vault. It was also so very prostrating as to compel him to lie at home for a week, after it was completely checked, which was done by early medical treatment. Mr. H. had a similar diarrhœa at the same time, and, during some days after its existence, not only remained with Mr. A. in the mill, using the same vault, but also visited him at his home after he was laid up. He was a man of strong constitution and good habits,

and his diarrhœa existed for nearly two weeks before he was attacked with symptoms of cholera. On the evening of July 9, he started for the mill to go on duty, but, when he arrived there, found himself so prostrated that, after resting, he was compelled to return home. Soon after reaching home he was seized with vomiting and purging, followed by cramps of the extremities and speedy collapse. I saw him the day following, with his attending physician, when reaction was coming on. After this was established, typhoid symptoms manifested, as they did in almost every case that recovered, and the patient was considered cured on the eighth day. The sanitary surroundings of this man's promises were excellent. .

Cases 10 and 11 were those of a man and wife, aged respectively seventy-three and seventy years; residence, No. 30 Fifth street; local sanitary condition excellent, the house being high, and the neighborhood, as well as the premises themselves, very clean. The husband, a man vigorous for his years, of perfectly temperate habits, was a manufacturer, and was in the habit of frequently visiting the mills in the Sixth ward in a business capacity. He was attacked with diarrhœa on July 20, received medical treatment on the 21st, but the disease did not yield to treatment. On the evening of the 22d the stools were decidedly rice-water in appearance. The next morning collapse came on, some reaction afterward manifested, but it was only temporary, and death occurred on the 24th, at 3 o'clock p. m.; no cramps or pain at any time. The wife was a constant watcher at her husband's bed-side, and although in excellent health previously, was worn out with watching and anxiety. Without any previous diarrhœa, she was attacked suddenly with violent cholera symptoms at 5 o'clock a. m. on the 25th, and died in collapse at 9 p. m. of the same day. In this case, vomiting, rice-water, purging, and cramps were all present.

Case 12.—Female, married, aged 48 years; kept a boarding-house at No. 1102 Chaplain street; somewhat run down in health by over-work and the cares and trials incident to her occupation. An additional source of annoyance, as I learned after the occurrence of this case, was a large privy-vault in the yard, only 10 or 12 feet from the kitchen-door. This had been cleaned out in May by my order, but had rapidly filled again, owing to the nature of the ground, and at this time was exceedingly offensive, and at the side toward the house the liquid contents sometimes leaked through at one point. Two of the upper rooms of the house, also, one of which was occupied as the patient's sleeping-apartment, from some mysterious and still undiscovered cause, emitted a very offensive, indescribable odor. The floor had more than once been partially taken up in the expectation of finding dead rats, or some other clue to the mystery; and disinfectants were employed. These facts I learned after the occurrence of the case. The lady was in her usual health, and rather costive, so that she was sometimes compelled to remain in the privy for some length of time soliciting an operation. On the night previous to her sickness she had eaten a dish of ice-cream with a friend in the neighborhood. On the morning of July 25, she went to the butcher-shop, one square away, but after her return complained of not feeling well, and about 7 o'clock an exhausting diarrhœa commenced, the stools being very liquid and passed without pain. At 9 o'clock a. m. all the usual symptoms of genuine cholera appeared, in an aggravated form, and speedy collapse came on, terminating in death at 9 p. m.

I had been boarding at this house for several weeks, and while there suffered with a persistent diarrhœa, to get rid of which I went to my

family in the country on the 23d of July; had also treated a son of this cholera patient for a diarrhœa of some days' standing. On my return to the house, on the 28th, I treated a servant girl, and also a daughter of the deceased, both having diarrhœa, loose and painless, and very prostrating. Both recovered without alarming symptoms. From the character of these cases, I think it quite probable that both would have terminated in cholera had early treatment not been employed. Two or three days after the death of the cholera-patient, a boarder was attacked with what was called cholera morbus, making in all six cases of diarrhœal disease that occurred in this one house about the same time. No imprudence in diet was at the time considered as the cause. I had prior to this time visited five cholera-patients in my official capacity, and had, as already stated, a persistent diarrhœa for about two weeks; but I had never used the vault on these premises, nor did I sleep in the house, but only took meals there. In addition to this, my complaint was rather dysenteric in character, and in no respect resembled cholerine. The same is true of the son's case above referred to.

Case 13.—Male, aged 47; artist; health good. From Philadelphia two weeks previous, on a visit to a brother at No. 59 Twenty-sixth street. Was in his usual health until the time of attack, which was at 8 p. m. of July 29, two hours after he had eaten his supper. The symptoms were violent, and the patient was in a collapse when the physician arrived at 10 o'clock. Reaction took place, however, and recovery resulted after a week's sickness. The brother with whom this patient was staying had a similar, though less severe, attack a few days before. The case was not reported.

Cases 14, 19, 32, 33, 34, and 35 constitute a group of considerable interest, and I shall speak of them together. They all occurred in a small farm-house of two rooms, located in the Fifth ward, on an elevated point overlooking Wheeling Creek, and about one-third of a mile from any other residence on the same side of the creek. There was no bridge within that distance of the house, and it was hence entirely isolated. This house was occupied by two families, each occupying one room, and the total number of individuals was ten or eleven. These were dirty, drunken, and vile. The husbands were laboring men. Case 14, male, aged fifty-eight years, occurred on August 29; was comparatively mild, and being at the time regarded as cholera morbus, was not reported. The patient, however, did not recover until September 10. Case 19, female, aged twenty-eight years, intemperate, occurred on September 2, was also mild, the patient recovering on September 6, without the use of other than domestic remedies. The other cases occurred, respectively, on September 14, 19, 24, and 25, were all severe, all received medical treatment, and all terminated fatally. It was not until September 25 that any of these cases were reported as cholera. I immediately visited the house, where I saw one woman lying dead, a child in a dying condition, and another woman in a condition of semi-collapse. From a sober and somewhat intelligent man, not a member of either of these families, but who had nursed the patients, I received a full account of all the cases that had occurred, as also from two of the patients who had recovered; and, after a consultation with the physician who had attended the first case, we had no doubt that all the cases occurring in this house were the same disease.

I found on the premises no privy-vault nor any pretext whatever as a substitute; and the dejecta of all these patients had been thrown out on the ground in the neighborhood of the house. The appearance of the floors indicated that they had not been scrubbed for weeks. No

attempt had been made at disinfection. Is it any wonder, under all the circumstances, that this fell destroyer found here a congenial home?

I, of course, did all in my power, by enforcing cleanliness and disinfection, to put the premises in good condition. Cholera had disappeared from the city proper on September 7. In this isolated position it lingered until these measures were enforced, after which no other case occurred in any part of the city. That so many cases occurred in this one isolated house *because* of intemperance and filthiness, and the neglect of all hygienic laws, is in accordance with the known nature of this disease. That no case occurred after the adoption of sanitary measures, *because* of this change in the condition of the premises, is probable, although it is possible that all *susceptible material* was exhausted.

Case 24.—Male, colored, aged sixty-seven, laborer, very intemperate; residence in a private alley near the junction of Tenth and Market streets; sanitary surroundings bad; house low, being situated against a high stone wall, which kept it damp and prevented it from being properly lighted and ventilated. This man had been suffering with a watery diarrhœa for some days, which had very much reduced his strength; no medical treatment had been received. On September 3, at 10 o'clock a. m., he was attacked with cholera, and died at 12 o'clock p. m. of the 4th. Case 31, a daughter of this patient, aged twenty-six years, a prostitute, was attacked with diarrhœa on the day after her father's death, but, like him, neglected it, and on September 7, at 8 p. m., violent cholera-symptoms set in, which terminated her life in six hours.

Case 27.—Female, aged fifty-two years; German; intemperate. Had been in the city about a month, and was engaged in selling pictures, &c., from house to house. Was boarding at a German hotel at No. 1214 Water street. Had diarrhœa for some days, for which no medical treatment was received. On September 5, at 6 or 7 o'clock in the morning, she was seen vomiting in the back yard by the hotel proprietor. She ate no breakfast. Cholera in its usual form soon after developed; a physician was called, the patient was removed as soon as possible to the hospital, and died there at 9 o'clock p. m. I visited this patient at about 10 o'clock a. m. in conjunction with two other physicians, and by chance noticed that the face of her husband, who sat on another bed in the same room with his wife, presented a pinched and cyanosed appearance. He had made no complaint of being sick, but on examination I found that he too had diarrhœa, and now was suffering with slight cramps in the muscles of the legs. His pulse was feeble, fingers and lips cyanosed, and his surface shriveled and of a death-like coldness. He was immediately put to bed and received a dose of medicine. An hour or two later he was removed to the hospital with his wife, and after a few days of close watching, with constant medical treatment, he recovered. The probabilities are, that had not this man's condition been discovered thus early, he would have neglected, like many others, to secure medical assistance, and would have lost his life in consequence. This case is not included in my table, and yet it would be difficult to give a good reason for not placing it there.

I have now given somewhat in detail the histories of a few of the first-reported cases of cholera occurring in the city, and also all cases having a connection with one or more other cases; in short, of all groups of cases. I have taken the liberty of including in my table two cases which were called cholera morbus by the attending physician. These are Nos. 12 and 15. The full history of the former has been given above. These cases were called cholera morbus, not because they differed in any respect from the other cases reported as cholera, but because of the pecu-

liar views of the physician in attendance, who did not regard any of the cases occurring in this city, or elsewhere in the country, as genuine cholera.

Having learned the full particulars from this physician, and also from the families in which the cases occurred, I have no doubt whatever that they were identical with the other cases, and hence include them. I would prefer to omit them were I justified in so doing.

Before making any comments on the facts here given, I desire to refer to a very interesting group of cases which occurred in the country, about four miles away, and between which and the epidemic in the city I have been unable to trace any connection whatever.

Mr. J. T. C., a medical student for some time resident in the Good Samaritan Hospital of Cincinnati, and now a resident physician in that institution, took passage for this city on the steamer Andes on June 13. On the 15th he was attacked with a watery diarrhœa, which continued without treatment until he reached home. The boat landed at Wheeling on the morning of the 17th, and Mr. C. started immediately for his home, walking one and a half miles, and riding in a wagon the remainder of the distance. The diarrhœa continued, and vomiting set in the next day, (18th.) The dejecta were described to me by Mr. C. as "resembling water into which a small quantity of milk has been poured." Treatment was commenced on the day after Mr. C. reached home, and the disease was controlled, but the patient was not well for ten days.

On June 21, four days after Mr. C.'s arrival home, his mother, aged fifty-two years, in previous good health, was attacked with vomiting, purging, and cramps, but was promptly placed under treatment by her son, and recovered in about a week. On June 25 his grandmother, aged seventy-three years, was similarly attacked, and died in collapse in twelve hours. On June 30, Miss C., a sister of the first patient, aged nine years, healthy, was seized with the same symptoms, and recovered after a week's illness. All these cases occurred in the same house, which is favorably situated in the country, and with no sanitary defect. Neither could the cases be traced to any error in diet. On this point I made particular inquiry, and, as Mr. C. is a personal friend, doubtless received all the facts correctly. The fact also that several days elapsed between the occurrence of the different cases renders this theory improbable. That the disease was genuine cholera as we had it in the city, and that Mr. C. was the carrier thereof to his home, I cannot doubt. This additional fact seems to render positive that which might, in its absence, be received with some little degree of doubt, viz, the only place between the steamboat and his home at which Mr. C. left any dejecta was at a blacksmith's, three and a half miles east of this city. This blacksmith was attacked with "watery discharges, cramps, and vomiting soon afterward; the exact date I cannot give," writes Mr. C. in a letter to me. I remember this case having been reported in our city papers at the time of its occurrence, and it was then regarded as similar to the cases occurring here; and the fact of a case occurring away in the country was used as an argument to prove that the disease was not imported to the city, by one or two physicians here who regarded the cholera of 1873 as different in origin and character from that of former epidemics. On the contrary, in the light of all the facts here given, importation in this instance is proved almost to a demonstration.

Unfortunately, the origin of Mr. C.'s case cannot be so satisfactorily accounted for. It has been noted that he left Cincinnati on June 13. It is worthy of remark that, according to the report of Dr. Quinn, the health-officer of that city, the first death from cholera occurred there on

the 14th of June. Nothing at all resembling cholera had occurred in the Good Samaritan Hospital previous to Mr. C.'s departure. Whether he came in contact with any case on the boat, it is impossible to say. He writes: "I know of no one on the boat similarly affected to myself. I was not acquainted with any one, and cannot say positively whether or not there were any."

Since the above was written, I have visited the blacksmith referred to, and from him obtained the following facts: He was attacked, as already stated, several days after Mr. C. had visited his place. Within ten days after this, his mother, wife, and six children, being every occupant of the house, were attacked with diarrhœa, and nearly all of them with both diarrhœa and vomiting. None of the cases, however, were serious. His own was the worst, he being confined to his bed for several days, and not returning to his work for about ten days. I made particular inquiries concerning the diet of this family, but learned nothing that would indicate that these attacks had been caused by imprudence. On the contrary, this blacksmith stated that he at the time of their occurrence thought, and still thinks, that his family "caught the disease from Mr. C." It seems difficult to resist this conclusion, and yet it is strange that none of the cases assumed a serious aspect.

Cholera cases occurring in Wheeling, W. Va., in the epidemic of 1873.

No.	Ward.	Residence.	Sex.	Color.	Age.	Married or single.	Occupation.	Date of attack.	Date of recovery.	Date of death.	Duration of fatal cases.	Local sanitary condition.	Habits and physical condition of patient.	Remarks.
1	5	2114 Main st	F.	W.	50	M.	Housekeeper	June 9	.....	June 15	6 days	Bad....	Delicate health	Premon. diarrhœa.
2	8	3600 Chaplain st	M.	W.	22	S.	In iron-mill	20	June 26	.....	.....	Bad....	Temperate—healthy	Premon. diarrhœa.
3	8	3600 Chaplain st	F.	W.	60	M.	Housekeeper	28	July 1	.....	.....	Bad....	Not very strong	Sudden invasion.
4	8	3631 Eoff st	M.	W.	30	M.	In iron-mill	July 3	6	.....	.....	Good...	Healthy—mod. drinker	Premon. diarrhœa.
5	6	2523 Chaplain st	M.	W.	66	M.	Justice of the peace.	5	12	.....	.....	Md'm..	Healthy—temperate	Premon. diarrhœa.
6	6	2629 Chaplain st	M.	W.	60	M.	In B. & O. R. R. shop.	6	10	.....	.....	Good...	Healthy—temperate	Half day's diarrhœa.
7	8	3824 Eoff st	M.	W.	60	M.	In iron-mill	9	17	.....	.....	Good...	Healthy—temperate	Premon. diarrhœa.
8	4	1714 Eoff st	M.	W.	48	M.	Street-paver	16, 4 p. m.	.....	July 17, 5 a. m.	13 hr's	Bad....	Intemperate	Premon. diarrhœa.
9	8	3426 Market st	M.	W.	48	M.	Laborer	21, 9 p. m.	.....	23, 6 p. m.	45 hr's.	Good...	Good health	Premon. diarrhœa.
10	1	30— 5th st	M.	W.	73	M.	Manufacturer	22, 8 p. m.	.....	24, 3 p. m.	43 hr's.	Good...	Healthy—temperate	Premon. diarrhœa.
11	1	30— 5th st	F.	W.	70	M.	Housekeeper	25, 5 a. m.	.....	25, 9 p. m.	16 hr's	Good...	Healthy—temperate	Sudden invasion.
12	2	1102 Chaplain st	F.	W.	48	M.	Housekeeper	25, 9 a. m.	.....	25, 9 p. m.	12 hr's.	Bad....	Worn down by care	Sudden invasion.
13	6	59— 26th st	M.	W.	49	S.	Artist	29	Aug. 5	.....	.....	Good...	Healthy—temperate	Sudden invasion.
14	5	Poverty Point	M.	W.	58	M.	Laborer	Aug. 29	Sept. 10	.....	.....	Bad....	Healthy	Premon. diarrhœa.
15	2	1057 Morrow st	M.	W.	59	M.	Cigar-maker	30, 3 p. m.	.....	Aug. 31, 11 a. m.	20 hr's.	Good...	Very intemperate	Premon. diarrhœa.
16	5	2219 Eoff st	M.	W.	30	S.	In iron-mill	30, 4 p. m.	.....	30, 11½ p. m.	7½ hr's.	Md'm..	Intemperate	Premon. diarrhœa.
17	8	3722 Eoff st	M.	W.	35	M.	Teamster	31, 3 a. m.	.....	31, 11 a. m.	8 hr's	Good...	Intemperate	Premon. diarrhœa.
18	5	2224 Main St	M.	W.	28	S.	In iron-mill	31, 6 p. m.	.....	31, 12 p. m.	6 hr's.	Good...	Intemperate	Unknown.
19	5	Poverty Point	F.	W.	28	M.	Housekeeper	Sept. 2	Sept. 6	.....	.....	Bad....	Intemperate	Premon. diarrhœa.
20	6	2408 Short st	F.	W.	38	M.	Housekeeper	2, 8 a.m.	.....	Sept. 2, 12 p. m.	16 hr's	Md'm..	An invalid	Premon. diarrhœa.
21	8	Country Road	M.	W.	32	M.	In iron-mill	2	Sept. 14	.....	.....	Bad....	Intemperate	Premon. diarrhœa.
22	6	3013 Market st	F.	W.	48	M.	Housekeeper	2, 12 p. m.	.....	Sept. 9, 10 a. m.	6½ days	Good...	Healthy—temperate	Sudden invasion.
23	1	North of 1st, on Main st	M.	W.	40	M.	In iron-mill	3, 10 a. m.	.....	4, 7 a. m.	21 hr's.	Md'm..	Healthy—temperate	Premon. diarrhœa.
24	2	Near 10th & Market sts	M.	Col.	67	M.	Laborer	3, 10 a. m.	.....	4, 12 p. m.	38 hr's.	Bad....	Very intemperate	Premon. diarrhœa.
25	6	2407 Alley Court	M.	W.	37	M.	In iron-mill	3, 9 p. m.	.....	4, 12 p. m.	27 hr's	Good...	Very intemperate	Premon. diarrhœa.
26	8	3725 Jacob st	M.	W.	48	M.	Shoemaker	3, 12 p. m.	.....	5, 6 a. m.	30 hr's	Good...	Very intemperate	Premon. diarrhœa.
27	3	1214 Water st	F.	W.	52	M.	Peddler	5, 7 a. m.	.....	5, 9 p. m.	14 hr's.	Good...	Intemperate	Premon. diarrhœa.
28	6	2318 Woods st	M.	W.	44	M.	In iron-mill	5	Sept. 10	.....	.....	Good...	Healthy	Premon. diarrhœa.
29	8	3638 Eoff st	M.	W.	57	M.	In glass-works	6	14	.....	.....	Good...	Not robust, mod. drink'r	Premon. diarrhœa.
30	6	2623 Jacob st	M.	W.	23	M.	In iron-mill	6	11	.....	.....	Good...	Healthy—mod. drinker	Premon. diarrhœa.
31	2	Near 10th & Market sts.	F.	Col.	26	S.	Washerwoman	7, 8 p. m.	.....	Sept. 8, 2 a. m.	6 hr's	Bad....	Healthy—prostitute	Premon. diarrhœa.
32	5	Poverty Point	F.	W.	11	S.	Child	14, 8 a. m.	.....	14, 8 p. m.	12 hr's.	Bad....	Healthy	Premon. diarrhœa.
33	5	Poverty Point	F.	W.	55	wid	Housekeeper	19	.....	30	11 days	Bad....	Unknown—intemperate	Unknown.
34	5	Poverty Point	F.	W.	41	M.	Housekeeper	24, 10 a. m.	.....	25, 5 p. m.	31 hr's.	Bad....	Unknown	Unknown.
35	5	Poverty Point	M.	W.	10	S.	Child	25, 9 a. m.	.....	26, 4 a. m.	31 hr's	Bad....	Healthy	Unknown.

Having now completed the history of cholera-cases occurring in this city and vicinity during the epidemic of 1873, it is only proper to state that the facts here recorded were received at second-hand in no instance, but directly either from the attending physician or the patient, or the friends present with and nursing the patient; frequently from at least two of these sources. I have visited every house in which cholera occurred, many of these at the time of the occurrence of the case. My aim, as already remarked, has been to arrive at the exact facts, regardless of what theory they may tend to support. In the few remarks I shall now add, the same purpose to develop the truth will be kept in view.

MORTALITY.

By an examination of the table it will be observed that we had two distinct visitations of cholera. One commenced on June 9, or, if we throw out case 1 as having been sporadic, on June 20, and ended on July 29, during which time only thirteen cases occurred, with six deaths, a mortality of 46 per cent. The disease then suddenly disappeared, not a single case occurring until exactly a month later, nor did I during this time hear of any case having occurred that at all resembled cholera. From August 29 until September 7, no less than eighteen cases occurred, when it again disappeared from the city proper; four additional cases occurring, however, between September 14 and 25, in an isolated dwelling. Thus we had in the second epidemic twenty-two cases, with sixteen deaths, a mortality of 73 per cent. During the summer, then, there occurred thirty-five cases and twenty-two deaths, giving a mortality of 63 per cent., which certainly entitles the disease to be called *malignant*, whether it be of *Asiatic* or *American* origin.

DISTRIBUTION OF THE DISEASE.

By a reference to the table it will be seen that the cases were located by wards as follows: In the First, 3; Second, 4; Third, 1; Fourth, 1; Fifth, 9; Sixth, 8; Eighth, 9. Thus the three last-named wards, which are south of the creek, and contiguous to one another, contained twenty-six out of the thirty-five cases. The Seventh ward, situated on Zane's Island, with the main channel of the Ohio river separating it from the other wards, entirely escaped. The one person attacked in the Third ward was not a resident of it, but a peddler temporarily stopping there, and who may have been exposed to the germs of the disease in some of the houses visited by her daily. She was a German, able to converse but little, if at all, in English; the wards south of the creek contain a very large proportion of our German population; facts which render it probable that this woman plied her vocation principally in that part of the city. The man who lived in the Fourth ward was a street-paver, and on the day of his attack, and for some time previously, had been at work in the Fifth ward. One of the three in the First ward—the patient whose wife also died—was in the almost daily habit, in conducting his business, of visiting some of the nail-mills in the lower part of the city. I mention these facts as pointing to a possible mode of origin of some of the cases occurring in the upper wards of the city. It is evident, from the facts here given, that the disease was in a great degree localized in the three southern wards of the city, these being separated from the other wards by Wheeling Creek.

LOCAL SANITARY CONDITION, EFFECTS OF.

After a careful study of all the circumstances, I am not convinced that the location of the cases was affected by the comparative uncleanliness of the different parts of the city, since there is no great difference in this respect between the different wards. The Third and Seventh are always the cleanest, and these contained but one case; but the Second, which contained four cases, and the Fourth, which contained but one, are both less cleanly than the Eighth, which contained nine cases. The latter, however, as already stated, is the lowest, and next to it the Sixth and Fifth, which likewise are generally in the poorest sanitary condition, being to a very great extent unpaved and unsewered. Thus elevation, rather than cleanliness, seemed to exert a protecting influence, if indeed we are justified in drawing any conclusion where so few cases occurred.

The sanitary surroundings of the houses in which cases occurred certainly did not in many instances exert any great influence. I have endeavored in the table to give some idea of the condition of each house in which cholera occurred, and its surroundings. Of course this can be but imperfectly done without a full description of the premises in each case. By the term *good* I desire to represent those cases in which I detected nothing which would, in my opinion, serve as a predisposing cause of disease; by the term *bad* those cases in which such predisposing cause did exist, and by the term *medium* those cases in which the premises were in fair condition only. The local sanitary condition was regarded as *bad* in fourteen cases, *medium* in four, and *good* in seventeen. Multiple cases, however, occurred in several houses, which would leave the following as true of each house, viz, sanitary condition *bad* in seven cases, *medium* in four, and *good* in sixteen. In but four or five instances were the sanitary defects so bad as, in my opinion, to serve in any great measure as the predisposing cause of cholera. Certain it is that, with these few exceptions, not a few much worse places entirely escaped, while a number of the houses visited by cholera were very favorably located, and the premises in excellent condition. A second case ocurred in but one house whose sanitary condition I have indicated as *good*, while multiple cases occurred in three houses whose sanitary condition was *bad*. In those marked *medium* no second case occurred. In this respect the difference is so small as to warrant no conclusion.

HABITS, ETC., OF THE PERSONS ATTACKED.

I am convinced that in this, as in other epidemics of cholera, the personal habits and mode of life, together with the previous state of health of those attacked with the disease, had much influence not only in inducing the attack, (the presence of the cholera-poison being presumed,) but also in bringing about a fatal termination. It will be seen from the table that twelve of the patients had been "intemperate," four of them "moderate drinkers," five in impaired health, and fourteen, as far as ascertained, in good health, of which last number four were over sixty-five years of age. The "moderate drinkers" were all Germans, who, while seldom becoming intoxicated, yet almost daily consume large quantities of beer. This they consider moderate drinking, and I have so marked it. Others might possibly be added to one or other of the unfavorable classes here named were full data at hand. But even with these partial positively-ascertained facts, we have a total of twenty-five persons who, by reason of either habits of drinking, previous ill-health,

or advanced years, were certainly not in a condition to resist this disease. (I might also add to this list two fatal cases in children aged ten and eleven respectively.) Of the twelve intemperate, no less than ten died, a mortality of 83 per cent.

It will be observed also that ten out of the thirty-five patients were employed in our iron-mills. These iron-mill men are generally of strong constitution, but extremely careless concerning their health and habits of living. Their occupation calls them to labor in an atmosphere whose temperature is excessively high, and very commonly, after finishing a short piece of work, they step to the coolest place they can find, and sit down until their services are again required, often also drinking freely of ice-water, and sometimes having cold water by the bucketful poured over their naked backs, from which the perspiration is streaming. To this I find a number of these men attribute their sickness; and that it had an influence, as in some measure an exciting cause, it is not unreasonable to believe.

MODE OF ATTACK.

It is interesting to note the large number of cases in which premonitory diarrhœa occurred, viz, twenty-seven. The duration of this diarrhœa varied from half a day to over a week. In only a few cases was the disease ushered in suddenly. The diarrhœa was universally watery, painless, and very prostrating. We had during the epidemic an unusual number of cases of diarrhœa in the city in which the stools were very liquid, and often of a light color, being sometimes described as "milky." A few of these cases were accompanied with very feeble cramps of the extremities. Judging from the readiness with which these yielded to treatment—though a few of them were quite rebellious—I cannot doubt but that a number of deaths could have been prevented had the patients given early warning of the existence of a diarrhœa, and at once placed themselves under intelligent medical treatment. This is a point, indeed, already well established by past experience, and one which should be impressed upon the public mind on all proper occasions.

SANITARY TREATMENT.

The health-officer is the sole health authority in Wheeling, save a committee on health of the city council, to whom the health-officer is responsible, who audit his bills, hear cases of appeal when any person feels aggrieved by any order issued by him, but, being unsalaried and not clothed with the powers usually vested in boards of health, do not care to assume any responsibility in the administration of the health-laws. The sanitary work, then, must be done solely by the health officer. Our health-laws require physicians to "report promptly to the health-officer all cases of Asiatic cholera, &c., which they may attend." Great doubt, however, existed in the minds of physicians, here as elsewhere, as to the exact nature of the disease when it first appeared; and, indeed, two or three still claim that the cases were not genuine cholera. Hence there was at first a hesitancy in announcing a case to be cholera, and hence delay, and in not a few instances entire failure, to report the cases. Even late in the epidemic in some instances the first intimation the health-officer received of the existence of a new case was from the local columns of the morning papers, or from rumors heard on the streets. As soon as a case was discovered, however—which was sometimes done by tracing these street rumors and newspaper reports—measures for thorough cleansing and disinfection were at once instituted. In this I

labored under very great disadvantage from the limited power conferred by the health-ordinance, and the want of assistants upon whom I could rely to properly apply disinfectants, and to gratuitously distribute them in the infected district, as would have been done had the means for so doing been at my command. In the disinfection of cases, however, I was materially aided by the attending physicians, who generally ordered disinfectants as soon as called to the cases. This was not always done, however, nor were the directions always carried out when given. Isolation of the cases was also urged by me, but not enforced, and the advice given was in most instances disregarded. No special precaution was enjoined in the preparations for burying the dead, and some of the funerals of cholera-patients were very largely attended. The houses also were freely visited previous to the funerals by friends of the deceased persons. The only precaution taken after death was to have the clothing of the deceased and the room in which the body lay disinfected.

Whether any positive good was accomplished by the means employed is a question in my mind undetermined. All the facts to be derived from my observations as to the benefits of disinfection may perhaps be best briefly expressed as follows:

Case 1 disinfected promptly; no second case.

Case 2 not disinfected; a second case (No. 3) six days later.

Case 3 disinfected; no second case.

Case 4 probably not disinfected; no second case.

Cases 5, 6, 7, 8, and 9 disinfected; no second case.

Case 10 disinfected after active cholera-symptons developed; a second case, (No. 11,) the wife, who died the day following the death of her husband. Thorough disinfection; no further case.

Case 12 disinfected; no second cholera-case; two cases of diarrhœa in adults, neither severe, and a case of cholera morbus after disinfection.

Case 13 disinfected; no second case. This case followed three days after a case of what was called cholera morbus which was not disinfected.

Case 14 not disinfected; five additional cases (Nos. 19, 32, 33, 34, and 35) followed before disinfection, after which no other case occurred.

Cases 15, 16, 17, 18, 20, 21, and 22 disinfected; no second case.

Case 23 disinfected. Two children of this patient were attacked with diarrhœa and vomiting the day following their father's death. The cases were easily controlled by immediate medical treatment.

Case 24 disinfected; a second case, a daughter, (No. 31,) after which no other case.

Cases 25 and 26 disinfected; no second case.

Case 27 disinfected. The husband of this patient had mild cholera-symptoms at the same time, and probably contracted the disease in the same way.

Cases 28 and 29 disinfected; no second case.

Case 30 not disinfected at all. A young child of this patient died with "cholera infantum" ten days after this case occurred. No disinfection after this, and no other cases.

In none of these cases was disinfection resorted to until active cholera-symptoms set in. An analysis of the facts just given would seem to indicate that disinfection had been productive of good results. The facts may be summarized thus:

Houses disinfected after the occurrence of a cholera-case, in which no second case of any diarrhœal disease occurred, *nineteen*.

Houses disinfected, &c., in which a second case did occur, *four;* in two instances followed by cholera-cases, and in two by cases of diarrhœa.

Houses not disinfected (probably) in which no second case occurred, *one.*

Houses not disinfected in which a second case occurred, *three;* in one instance followed by one "cholera-infantum" case, fatal; in one instance by one and in another by five cholera-cases.

Did the premonitory diarrhœa during this epidemic contain the germs of cholera? This is a question of vital importance in the study of this disease. Accepting the doctrine that the dejecta of cholera-patients are the chief source of infection, the following facts seem to indicate that the excreta of the premonitory diarrhœa were in these cases devoid of cholera-germs, or at least, that these germs were possessed of very feeble reproductive power. It will be seen by the table that at least twenty-seven cases out of thirty-five were preceded by diarrhœa. This diarrhœa existed from one-half day to over a week in the different cases, all this time no disinfection or other precaution against the spread of the disease being resorted to; and yet in but four houses did any second case of *cholera* occur, and in three others, cases of diarrhœal disease other than this. Of these seven houses, three were not disinfected until after the occurrence of the second case.

Again, as noted in the table, eleven of the subjects of cholera were employed in iron-mills and glass-works, five separate establishments, employing not less than eight hundred men. So far as I have the facts, all of these men suffered with premonitory diarrhœa, and before giving up work used the privy-vaults frequented in common by all the men employed in the mills. In no case was disinfection used in any of these vaults. Why did not cholera prevail extensively among these mill-men if this premonitory diarrhœa was capable of propagating the disease? Or is it possible that the germs of cholera could have been destroyed by the disinfectants always present in the atmosphere of iron-mills?

On the other hand, we have the facts related in connection with the cases in the country, viz: Mr. C., while suffering with premonitory diarrhœa, and one day prior to his attack of cholera, used a privy-vault at a house occupied by three adults and six children. Within ten days all of these nine persons were attacked with diarrhœa, or diarrhœa and vomiting, which could not be traced to any other cause.

Thus the question propounded is not answered in a manner altogether satisfactory.

MODE OF INTRODUCTION TO THE CITY.

The consideration of this point I have purposely postponed until now, in the hope of gaining some accurate information on the subject. We have in the case of Mr. C. a history of direct importation, and communication of the disease to a number of persons. This seems to me to demonstrate, as well as a hundred cases could do the portability and communicability of the cholera of 1873. But I am satisfied the disease in the city had no connection with this case. Mr. C. did not stop in the city at all, merely passing through it afoot to his home. Besides, our first case occurred eight days before his arrival. And, if we exclude the first case as one of sporadic cholera, the next, which occurred on June 20, three days after Mr. C.'s arrival, was located about two miles from the steamboat-landing. The same is true of the next five cases, while but one case occurred very near to the wharf. Thus far no history of direct importation has been traced in connection with any case

in the city. The difficulty of this undertaking is very great, if we grant that the premonitory diarrhœa may propagate cholera. It is not necessary to enlarge on this point.

All the facts I have been able thus far to collect are briefly these:

An officer of the Andes, a boat plying between Cincinnati and Wheeling weekly, informed me that during June and July, 1873, they brought from the former city a large number of persons who suffered on the route with some form of acute diarrhœal disease. Some of these were simple diarrhœa, while others were attended with vomiting and severe pain. This officer kept several bottles of "cholera-mixture" on board, and had frequent occasion to employ the medicine. He gave particulars of three cases that he remembered as being especially severe, but could not recall the names of the patients, and the boat being laid up at Cincinnati on account of low water at this time, he has not access to the books. Two of these persons were men, sick with some disease resembling cholera, and they suffered so much as to disturb the passengers by their loud cries of pain in the night.

Another was an old lady, who, with her husband and daughter, took passage at Cincinnati. This was soon after cholera was reported in that city, and the officer thought that they were by its presence induced to leave the place. This lady took sick about Pomeroy, and was exceedingly nervous and apparently alarmed. Some of the cholera-mixture was administered, but she grew so much worse that at Parkersburgh a physician was sent for. She improved before reaching Wheeling, but was so sick still as to require a carriage to convey her to her residence in this city. We hope yet to obtain the full facts concerning this case.

The porter on the R. R. Hudson, another weekly Cincinnati packet, informs me that the bar-keeper on that boat experienced a severe attack of what he called cholera on his way up the river, and he also was compelled to secure a physician at Parkersburgh. The porter described the excreta as being watery and very white. This patient is now in Cincinnati, and we have been unable to learn where he spent his time while in this city, where his clothing was washed, and other facts of interest connected with the case.

An application to the clerk of the Hudson for further information concerning cases occurring on that boat was not responded to, and I am hence unable to give any additional particulars.

Although the facts here given prove nothing conclusively as to the importation of cholera into this city, yet they indicate a probable mode of introduction, and encourage further investigation in this direction. I have said nothing concerning a possible importation of the disease by railroad, because I have learned no facts upon which I could rely touching this point. It is manifestly more difficult to hunt out cases arriving by rail than those coming by river; but since I have no facts bearing upon the subject, and have no desire to press the question of importation in their absence, I forbear remarking anything further, and here close my report, believing that all essential facts concerning the cholera-epidemic of 1873, as it appeared in Wheeling, W. Va., have been given, so far as it is possible to collect them.

Huntington, West Virginia.

The following letter has been received in answer to a request for information as to cases of cholera which were supposed to have occurred at Huntington during the summer of 1873:

"HUNTINGTON, W. VA., *October* 10, 1874.

"Dr. ELY MCCLELLAN,
"*Assistant Surgeon U. S. A.:*

DOCTOR: Your communication of the 3d instant at hand. The circular-letter and blanks to which you refer were handed me some time ago, but not being able to furnish you with any information in regard to the cholera-epidemic of 1873, I delayed writing you longer than I should otherwise have done.

"Diarrhœa and cholera morbus prevailed extensively during the summer of 1873, and during the month of July three deaths occurred which were called cholera, but were not so reported by the physicians. I saw two of the cases in consultation. One was a very feeble old lady; she evidently died from a congestive chill. The second was an aggravated case of cholera morbus brought on by overeating. The third I did not see, but her physicians reported the case cholera morbus.

"Yours, very truly,

"J. V. WALL, M. D."

CHAPTER XVI.

GEORGIA GROUP.

GEORGIA CONTRIBUTORS.

Drs. Reeves and Malone, Calhoun Co.
Dr. J. R. McAfee, Whitfield Co.
Dr. G. J. Grimes, Muscogee County.
Dr. J. M. Boring, Fulton County.
Dr. J. B. Baird, Fulton County.
Dr. W. J. Armstrong, Fulton Co.

Assistant Surgeon A. A. Woodhull, U. S. A.

DATES OF CASES.

Atlanta, Fulton County, July 2.
Dalton, Whitfield County, July 3.

During the epidemic of 1873, in the United States, but two authenticated cases of cholera occurred within the limits of the State of Georgia, so far as can be ascertained.

In both instances the subjects were residents of, and refugees from, the city of Chattanooga, Tenn. In neither instance did the subject leave Chattanooga until after the disease had become epidemic, and one individual at least came from a cholera-infected house.

At the first glance it would seem to be scarcely worth the labor of isolating these cases, in the general history of an extensively-diffused epidemic, but no cases that could be presented are of greater value in illustrating the generally-accepted theory of the infectiousness of, and the means for the prevention of, the disease.

In both instances these cases, as will be shown hereafter, terminated fatally in communities in which the auxiliaries to the rapid development of a cholera-epidemic were present, the specific causes once having been imported; yet, in both instances, by the prompt and energetic action of the medical men having the cases in charge, the power of the disease was confined to the infected individual, and the health of the residents of the respective houses and of each community were efficiently guarded.

It has already been demonstrated in the narrative, that throughout the area of infection in the United States during the year 1873, in the great majority of instances the arrival of but a single infected individual was sufficient to establish a focus from which the cholera-infection radiated; and that in the few instances in which the arrival of a cholera-infected individual failed to produce this morbific influence the solution of the problem is found to be in the fact that the excreta of the case were disinfected, or that they were so disposed of as not to gain entrance into the alimentary canal of the healthy residents of the house.

In tracing such cases, the announcement that no disinfectants had been used should always be received with caution and hesitancy, until at least the observer has become fully possessed of all the facts of the case, for a very practical disinfection may have been secured by means which were not recognized by the narrator. We instance the cases of cholera that were brought to Paris, Ky., from Millersburgh and Cyn-

thiana. These cases proved fatal, but without infecting other individuals. This was advanced as a proof of the non-infectiousness of cholera. It is stated that disinfectants were not used, but at the same time it is shown that fresh earth was thrown upon the excreta after they had been emptied upon the ground. *Fresh earth is a recognized disinfectant.* When Macnamara wished to test the length of time the specific properties of cholera-dejections could be preserved, he did not select *fresh earth* with which to mix the rice-water discharges, but *fine dry sand.*

Of the two cases to be accredited to the State of Georgia, one occurred at the city of Atlanta, Fulton County. This is one of the most important of the southern cities, having a population of over 22,000 inhabitants, a railroad-center of considerable importance, which brings the city into constant connection with all sections of the country.

On the 2d of July, 1873, Mrs. S., a lady thirty-three years of age, healthy, but never robust, childless, living in easy circumstances, was attacked with cholera, and died, after an illness of about twelve hours, in a healthy location of the city. The case was in the charge of Dr. John M. Boring, and was visited in consultation by Drs. James B. Baird and William S. Armstrong. To these gentlemen, through the kindness of Assistant Surgeon A. A. Woodhull, U. S. A., post-surgeon McPherson barracks, Atlanta, we are indebted for the following history:

Mrs. S. arrived at Atlanta from an infected district of the city of Chattanooga, Tenn., accompanied by her husband, on Sunday afternoon, June 29, and went immediately to the residence of her mother, in a thickly-settled portion of the city. On Monday (the 30th) she was attacked with diarrhœa, which yielded to the administration of some domestic remedy. On Tuesday (July 1st) the diarrhœa recurred with greater severity; again domestic aid partially relieved the disorder, but during the succeeding night it returned, and she was obliged to make frequent use of the water-closet. On Wednesday (July 2) Mrs. S. dressed herself and was present with the family at breakfast, but complained of great prostration. During the early hours of the day the diarrhœa had increased in severity, and when first seen by Dr. Boring she was vomiting and cramping violently, and verging on collapse. At 2 o'clock p. m. Dr. Armstrong saw the case in consultation, found the patient in complete collapse, pulseless, skin blue, cold, and shriveled, eyes sunken, voice husky, her mind clear, and intelligence not impaired. At 6 o'clock p. m. Dr. Baird saw the case with Drs. Boring and Armstrong. The collapse deepening. The surface of the body icy cold. Thirst was excessive, and the patient complained of great heat, requiring to be constantly fanned, declaring that she was "burning up." The dejections were constant, involuntary, colorless and odorless. The physiognomy was that of an aged woman. The case terminated fatally at 10.30 p. m.

The excreta of this case were carefully disinfected, and although Mrs. S. was surrounded by her family, and by a large number of friends during her illness, no other case occurred in the city.

The treatment adopted was the application of sinapisms and dry heat, and the application of camphor, capsicum, laudanum, and tincture of rhei combined. But little opportunity was presented for treatment, the disease being fully developed before the patient was first seen by Dr. Boring.

The second case, to which attention is asked, occurred at the town of Dalton, the county-town of Whitfield County. This town is the southern terminus of the East Tennessee, Virginia and Georgia Railroad, and has a population of about 5,000 inhabitants.

Dr. J. R. McAfee, of Dalton, Georgia, reports the case of Robert Linzy, who died at that city of cholera on the 3d day of July, 1873.

On the 2d of July this man arrived at Dalton on the morning train from Chattanooga, Tenn., at which city several members of his immediate family had died of cholera. At 12 o'clock m. of Thursday, July 3, Linzy was attacked with the same disease, and died at 9 o'clock p. m. the same day.

The treatment adopted was the exhibition of stimulants and astringents, but no good results were obtained.

The excreta of this case were carefully disinfected, and agents of that order were freely used on the premises; and although a number of persons were exposed to the disease no other cases occurred.

COLUMBUS:

The Alabama State Journal, (Montgomery,) July 30, 1873, noting a death from cramp colic at Columbus, Georgia, application for information was made to Dr. George J. Grimes, from whom the following letter was received:

"COLUMBUS, GA., *August* 13, 1874.

"SIR: Your letter of inquiry relative to the number of cases of cholera occurring at this place (in 1873) has just been received.

"In reply, I have to say that, not having had any cases myself, I have made diligent inquiry from all the physicians here, but with a negative result in each instance, none of them having come in contact with the disease, so far as I can learn, and hence I would infer that cholera had not made its appearance here for many years.

"Very respectfully,
Your obedient servant,
"GEORGE J. GRIMES, *M. D.*

"ELY MCCLELLAN,
"*Assistant Surgeon U. S. A.*"

CHAPTER XVII.

MINNESOTA GROUP.

MINNESOTA CONTRIBUTORS.

Dr. D. W. Hand, President State Board of Health, Saint Paul, Minn.
Dr. E. S. Frost, Willmar, Kandiyohi County.

INITIAL CASE.

Crow River, Kandiyohi County, July 3.

The history of the cholera-epidemic of 1873, as it affected the State of Minnesota, is strongly corroborative of the third proposition presented in the chapter on the etiology of the epidemic.

Minnesota is one of the Northwestern States of the United States. This State lies between 43° 30′ and 49° north latitude, and between 89° 30′ and 97° west longitude; at an elevation of about 2,000 feet above the waters of the Gulf of Mexico; with an area of 81,259 square miles, and a population, according to the census of 1870, of 439,706 inhabitants. The area of the State containing 52,005,760 acres, there is an allowance of about one hundred and eighteen acres per individual of its inhabitants.

The geology of the State is described "as drift, lying on crystalline and metamorphic rocks, which occasionally protrude to the surface, in that portion of the State east of the Red River of the North. In the southeastern portion of the State, the lower magnesian limestone crops out in the valleys of the Mississippi and Saint Peter's rivers, and on the latter river sandstone, and occasionally igneous rocks, are found. In the northeast of the State is a tract of hornblendic and argillaceous slates, with bedded porphyries and intrusions of greenstone and granite."

The meteorological observations made at Fort Snelling, Minnesota, which post is on the same latitude as the locality hereafter to be noted as the point within the confines of the State that became infected with cholera in 1873, are presented as of value.

Mean temperature of 1873 and 1874, 41° 41′.

Maximum temperature, 92°; minimum temperature, 26°.

Amount of rain-fall in same period, 17.26 inches.

Early in the month of July, 1873, a family, named Antonson, arrived at a settlement of Swedes upon Crow river, Kandiyohi county, in Southwestern Minnesota. This family consisted of Errick Antonson, his wife Johanna, four children, who ranged from fourteen to two years of age, and one Christian Oleson, a young man and a family friend.

On the 3d day of July, the day after their arrival, Christian Oleson was attacked with diarrhœa, which lasted for two days, when vomiting and cramping occurred. The patient became collapsed, but reacted, passed into the typhoid stage, and died July 10.

July 6, Bertol Antonson, a lad nine years of age, was attacked with diarrhœa, cramping, and vomiting, became collapsed, and died within forty-eight hours.

July 9, Malina Antonson, a girl of eleven years, was attacked with a similar disease, and died within twenty hours.

July 12, Breta Antonson, an infant of two years, was attacked, and died after an illness of ten hours, and the same day Errick Errickson, at whose house these people had been taken ill, was attacked and died within eight hours.

These five cases were ill, and died without receiving any medical assistance. On the 12th instant Dr. E. S. Frost, of Willmar, thirty miles distant, was called to the cases, but on his arrival both were dead.

July 13, Johanna Antonson, the mother, was attacked, but under the care of Dr. Frost recovered.

July 16, the remaining child, a girl of fourteen years of age, was attacked, but recovered.

Dr. Frost is decided that the cases which came under his observation were cholera, but is unable to trace any connection with the infection in the United States with this family.

All the inmates of this house suffered with diarrhœa, and three deaths from cholera are reported among persons living at a distance, but who had visited the house during the illness of Christian Oleson.

Through an interpreter, Dr. Frost was able to gather the following outline of the fatal cases:

"Christian Oleson commenced with diarrhœa and vomiting, and on the second day was stupid and senseless to those around him, yet they noticed that he had cramps by the twitching of his eye-balls, which were retracted. His face was of a black-grayish color, and all who died looked the same. The vomit was green and yellow at first, but later nothing but water. Their stools were made every minute in bed, and were nothing but water. They were very thirsty, and drank much water. They did not complain of being cold, but skin was ice. The muscles were knots under the skin, and moved from their hips to their feet. They cried much with pain, but became still when near death."

This disease was recognized by the people as cholera; the neighbors avoided the house, and even the wind blowing therefrom. Errick Errickson had long been a resident in the county. His brother dare not approach the house, and his body was cared for by those of the Antonsons who were well enough to do so.

The Antonson party left Viik, Alfoden, which is some two hundred miles north of Bergen, which distance they traveled by steamer. At Bergen they remained for three weeks awaiting the departure of a steamer, and finally took passage for New York upon the steamer Peter Japson, Captain Wolf, and arrived at New York on the 26th of June, 1873. Upon this vessel were two hundred and ninety-eight passengers, but the quarantine records of New York Harbor show that no illness had occurred upon the vessel during the voyage.

From New York City the Antonson party were transported to Grand Haven, Mich., remaining but one half hour at Pittsburgh, Pa. At Grand Haven they remained over night, and the next day crossed Lake Michigan to the city of Milwaukee, Wis., where they remained one half day and one night, and thence proceeded direct to Saint Paul, Minn., where they rested twenty-four hours; thence to the Crow river settlement via Willmar.

Before leaving Bergen, the effects of this family were packed, except such articles as were required for use upon the journey, and which passed as hand-luggage; but at Willmar, on the 2d day of July, the trunks and boxes (packed at Bergen) were opened, and additional articles of clothing were distributed; *the next day Christian Oleson sickened with the diarrhœa.*

Upon the journey from New York City, this family subsisted upon

bread and milk *exclusively;* after they arrived in Minnesota they had pudding and milk, but no vegetables or fruits.

At our solicitation, Dr. Frost was kind enough to make two distinct visits to the remaining members of this Antonson family, for the purpose of testing the information obtained, and, at our suggestion that Bergen was the point of infection, directed his inquiries in that direction, when from Antonson he learned the facts as now published, that prior to their departure cholera had occurred at Bergen, and that since their arrival in America they had learned of the death of friends from that disease.

The above is presented as a distinct, isolated, but positive epidemic of cholera occurring in the United States during the summer of 1873, produced not by local causes, influenced not by individual indiscretions, but by positive importation. When the trunks or chests that had not been touched since they were packed at Bergen on the island of Rugen, a port of the Baltic sea, at which city cholera had been present during 1872 and 1873, were opened at Willmar, Kandiyohi county, Minnesota, United States, then and there was the person of Christian Oleson infected with cholera, the material of which had been conveyed from the Baltic in the fabrics of which the articles of clothing were prepared, and from Oleson, the Antonson family, and Errick Erickson, and three other persons who are unknown, were infected.

In the report of the State board of health of Minnesota for 1873, it is erroneously stated that the Antonson family had passed through the city of Chicago, Ill.; it is shown by more careful investigation that not only did they not pass through Chicago, but that they passed through no territory infected with cholera in the United States. The only point through which this family passed, that at any time during the year 1873 became infected with cholera, was the city of Pittsburgh, Pa., and the few cases (four) in that city did not occur until thirty days after the death of Christian Oleson and the Antonsons in Minnesota.

It is most earnestly urged, that had a system of disinfection of the effects of emigrants arriving at the port of New York, from cholera-infected ports of Europe, been in operation during the year 1873, it would have saved to the State of Minnesota the valuable lives of five immigrants and four residents.

CHAPTER XVIII.

PENNSYLVANIA GROUP.

PENNSYLVANIA CONTRIBUTORS.

Dr. W. Snively, Allegheny County, Physician to Board of Health.
Mr. Crosly Gray, Allegheny County, Health-Officer.
Dr. A. Arthurs, Allegheny County.
Dr. M. A. Arnholt, Allegheny Co.
Dr. T. P. Graham, Allegheny Co.
Col. Jno. E. Addicks, Philadelphia Health-Officer.
Dr. A. Bournonville, Philadelphia.
Dr. W. H. H. Githens, Philadelphia.

INITIAL CASES.

Pittsburgh, Allegheny County, August 1.

Pittsburgh, a city of nearly one hundred thousand inhabitants, is located at the confluence of the Alleghany and Monongahela rivers, in Western Pennsylvania, three hundred and fifty-seven miles west of the city of Philadelphia. The population of the towns of Allegheny City and Manchester, at the junction of the Alleghany river with the Ohio, and of Birmingham on the left bank of the Monongahela, should properly be added to that of Pittsburgh, making a total population of two hundred thousand people closely connected in all conditions of life.

Pittsburgh is a manufacturing city of immense importance; a shipping port for vast quantities of coal, oil, &c., and is one of the great railroad-centers of North America.

To Dr. William Snively, the physician to the board of health, we are indebted for a history of the cases of cholera which occurred at the city of Pittsburgh in 1873.

About the 29th day of July, 1873, Mr. Mooney—who was a railroad contractor—and his wife returned home from a visit to Cadiz Junction, Ohio. They resided at a point on the Ohio river about five hundred yards beyond the city line. Directly in front of the house lies the public road and Ohio river, while a few feet to the rear, and at a considerable elevation above the house, are the tracks of the Pittsburgh, Cincinnati and Saint Louis Railroad.

Two days after their arrival home, August 1, Mrs. Mooney, who was four months and a half advanced in pregnancy, was attacked with painless diarrhœa, soon succeeded by vomiting, cramps, suppression of urine, rice-water discharges, clammy skin, shriveled extremities, &c., the case terminating in death Monday morning, August 4, at 8 o'clock a. m. Dr. Stephenson, who was in charge of the case, reports that Mrs. Mooney, when in the collapse stage, and a short time before death, was taken with labor, and that she was delivered of a fœtus of about the fourth month of gestation. The physicians in attendance, although disposed to consider the case one of Asiatic cholera, did not report it to the board of health, as it occurred beyond the limits of the city.

Monday evening, August 4, Mr. Mooney was suffering from diarrhœa; was prescribed an opiate by his physician. Tuesday morning he felt better, and visited the city for the purpose of making arrangements for

the burial of his wife. While in the city he became very ill, and called on his physician, who prescribed for him, and ordered him to go home and to bed immediately. He did so, continuing to grow worse, suffering from the same train of symptoms described in the previous case. Tuesday night he sank rapidly, and Wednesday morning was in collapse. He died at half past 5 o'clock p. m. During his illness he was visited by a number of physicians, all of whom (skeptical before seeing the case) concurred in pronouncing it Asiatic cholera.

Case 3.—Mary Ward, married, age forty years. Mrs. Ward resided in a small frame house which stands about five yards within the city line, and about five hundred yards from the house where the former cases occurred. Mrs. Ward, who had always enjoyed good health, was with Mrs. Mooney at the time of her death, and assisted in the performance of various duties, remaining in the room probably an hour altogether. This was her only visit to the house.

Two days after, Mrs Ward was attacked with diarrhœa, rapidly succeeded by all the symptoms observed in the two former cases. She died Thursday, August 6, at 8 o'clock p. m.

Case 4.—James Lyons, single, age twenty-five years. He worked in an iron-mill, and had never been sick in his life. He assisted the "sanitary inspectors" to burn the bedding, carpets, &c., at Mr. Mooney's house, on Wednesday evening. He was attacked with painless diarrhœa on Friday, August 8. The preliminary diarrhœa was soon succeeded by violent cramps of the muscles, particularly those of the extremities. Slight vomiting of a clear, watery fluid, containing no bile. Rice-water discharges not so copious as in the former cases. There is suppression of urine, intense thirst, and marked restlessness. Pulse weak, but natural in frequency. Tongue foul, face and extremities cold, breath and tongue warm. Whole surface changing in appearance. Skin from middle joints of fingers to tips inelastic, shriveled, and of a bluish tinge. Intellectual faculties unimpaired. There is slight disposition to stupor, but he is easily aroused, and converses sensibly and intelligently. Temperature in axilla, 99° Fahr.

The vomiting, cramps, and evacuations gradually cease, and the voice begins to get husky; greater tendency to stupor; pulse becomes fluttering, thready, very difficult to count. Whole surface covered with clammy perspiration. Temperature, 99°.

The respiration becomes feebler, the breath and tongue cold, the voice lost, and the pulse imperceptible; only a feeble, oscillatory movement of the heart being perceptible upon auscultation. Temperature, $99\frac{2}{5}$°.

He died at 1 o'clock p. m. Sunday, August 10. Temperature of body, two hours after death, $97\frac{4}{5}$°.

The duration of the disease in the first case (Mrs. Mooney) was about seventy-two hours; in the second case (Mr. Mooney) about forty-six hours; in the third case (Mrs. Ward) about twenty-four hours; in the fourth case (Mr. Lyons) about forty hours.

These four cases terminating fatally in rapid succession, occurring at this isolated point on the city line, and originally traceable to Mr. and Mrs. Mooney's visit to Cadiz Junction at a time when Asiatic cholera was reported as prevailing there, seems (in the absence of any local cause) sufficient to establish the nature of the disease. That it did not become epidemic is due to several causes: 1. The remoteness of the locality from the populous portions of the city, rendering isolation easy. 2. The immediate disinfection with carbolic acid and sulphate of iron of all the excreta, and the destruction by fire of bedding, carpets, and

clothing that had become soiled with the discharges, and which might have conveyed the infection to others.

Mr. Mooney informed his physician that, prior to his leaving Cadiz Junction, Ohio, where he had been superintending some repairs to a railroad-tunnel, several deaths had occurred within a few hundred yards of the house at which he and his wife were boarding, and that he had been informed that these persons died of cholera morbus.

We have made every endeavor by communications to obtain information from Cadiz, Ohio, as to this occurrence, not having been able to make a personal inspection of the locality, but have been so unfortunate as to fail to elicit sufficient interest to secure a reply.

Dr. Snively is kind enough to inform us that there has been in Pittsburgh this season (1874) about the usual number of cases of cholera morbus. Fourteen deaths from this cause were reported during the months of July, August, and September. The *cause* of this disease was generally traceable to error in diet, exposure to cold, &c. The cases generally recovered, unless suffering from some vice of constitution. No particular sanitary precautions were taken with regard to this disease, and in no instance was there any evidence of *contagion*.

PHILADELPHIA.

During the summer of 1873 the following dispatch was extensively copied throughout the United States: "There are many cases of what is called by the physicians sporadic cholera in the up-town sections of the city, especially in the densely-populated districts. It is particularly bad in the Eighteenth and Nineteenth wards, and the disease seems on the increase."

A careful investigation, however, demonstrates the erroneousness of this report. By Col. J. E. Addicks, the health-officer, we have been furnished with a copy of the records of all reports made of such cases to the health-office, and from them we find that during the months of June, July, and August, 1873, eight cases of cholera were reported, with two deaths. The official returns of the physician to the board of health upon these cases is as follows:

June 21.—Case at No. 1118 North Front street; sporadic cholera; death.

June 24.—Case near Sixth and Pine streets; sporadic cholera; death.

June 28.—Case at No. 2052 Lombard street; cholera morbus; recovery.

June 28.—Case at No. 1732 Lombard street; cholera morbus; recovery.

July 7.—Case at No. 2058 Lombard street; cholera morbus; recovery.

July 9.—Case at No. 612 Peach street; cholera morbus; recovery.

July 20.—Case at No. 120 Cottage street; cholera morbus; recovery.

August 20.—Case at Fourth and Vine streets; sporadic cholera; recovery.

Of the first case we learn that the patient was a female who was taken sick upon a Monday morning with cramps in abdomen and vomiting; that the matter vomited was dark-colored and mixed with food that had been taken; that the dejections were mucous and fœtid. She died the next day with all the symptoms of collapse. The physician in attendance pronounced the case sporadic cholera. The neighborhood in which this case occurred was clean. No other cases occurred. Privy-well disinfected.

Dr. W. H. H. Githens has reported to us that the second case in this series occurred in the person of a shoemaker in very miserable circumstances, who lived in an overcrowded tenement-house, and who slept upon the floor. The privy-vault was under the house, and the gases escaped into this main room. This case resisted all treatment, and died after a few hours' illness. The locality at which this case occurred was in a very bad sanitary condition. Disinfectants were employed. No other case occurred.

Case 3 was pronounced, upon inspection, simply a case of light cholera morbus in a delicate woman.

Case 4.—A slight attack of cholera morbus in a female who had for years been liable to such attacks after any imprudence in diet.

Case 5.—Was not even cholera morbus; only a slight colic.

Case 6.—A case of cholera morbus after imprudence in diet.

Case 7.—A case of cholera morbus after imprudence in diet.

Case 8.—Dr. A. Bournonville has been kind enough to report this case as having occurred in the person of a confectioner in good circumstances, who was attacked during the night with diarrhœa, vomiting, and cramps. The discharges became rice-water in character, the skin was shriveled, the surface blue, &c. This patient was, however, convalescent in six days. No cause could be assigned for the attack.

As it has been shown that at both New York and New Orleans there arrived during the early months of 1873 the infection of cholera, it is of importance that an exhibit of all arrivals during the same period be made for the port of Philadelphia, a port of entry, and the second city in size and population in the United States.

From statistics furnished by the Health-Officer of Philadelphia we are able to present the following tables:

I.—*Table of number of vessels, with number of passengers and number of crew, that arrived at the port of Philadelphia from ports of Great Britain during the first six months of* 1873.

Port of departure.	Number of vessels.	Number of passengers.	Number of crew.	Total.
London	22	.....	263	263
Liverpool	63	312	1,234	1,546
New Castle	7	.....	91	91
Shields	3	.....	35	35
Falmouth	1	.....	8	8
Ipswich	2	.....	29	29
Harwich	1	.....	10	10
Gloucester	2	.....	25	25
Fowey	1	.....	7	7
Hull	1	.....	13	13
Grimsby	1	.....	15	15
Plymouth	1	.....	11	11
Glasgow	1	.....	14	14
Greenock	1	.....	12	12
Cardiff	1	.....	14	14
Swansea	1	.....	11	11
Dublin	4	1	49	50
Belfast	2	.....	30	30
Londonderry	1	.....	16	16
Aligo	1	.....	12	12
Warren Point	1	.....	12	12
Total	118	313	1,911	2,224

II.—*Table of number of vessels, with number of passengers and number of crew, that arrived at the port of Philadelphia from European ports during the first six months of* 1873.

Port of departure.	Number of vessels.	Number of passengers.	Number of crew.	Total.
Amsterdam	6	3	89	92
Rotterdam	6	.....	89	89
Antwerp	20	729	483	1,212
Stockholm	3	.....	31	31
Gottenburg	5	.....	55	55
Gefle	5	.....	32	32
Bergen	1	4	14	18
Reesaer	1	.....	16	16
Bremen	10	.....	177	177
Hamburg	21	.....	294	294
Stettin	1	.....	12	12
Havre	7	.....	113	113
Marseilles	4	.....	49	49
Cette	1	.....	11	11
Dieppe	1	.....	13	13
Cadiz	1	.....	10	10
Alicante	1	.....	11	11
Tarragona	1	.....	9	9
Lisbon	3	8	56	64
Oporto	1	.....	11	11
Genoa	6	.....	82	82
Leghorn	4	3	54	57
Messina	18	12	189	201
Palermo	15	5	167	172
Licata	1	.....	10	10
Total	143	764	2,077	2,841

It is demonstrated by these tables that there arrived at the port of Philadelphia during the first six months of 1873, 261 vessels, with 1,077 passengers, and 3,989 in crew. From the statistics that have been furnished us, we find that during the second six months of 1873 there arrived at the same port 319 vessels, with 3,048 passengers, and 5,895 in crew. Also, that from the same ports there arrived during 1874, 568 vessels, with 10,290 passengers, and 11,884 in crew; while from all ports there arrived at Philadelphia during 1873, 1,176 vessels, with 4,497 passengers, and 15,298 in crew; during 1874, 1,126 vessels, with 10,785 passengers, and 17,089 in crew.

To the small number of passengers who arrived during the first six months of 1873, Philadelphia certainly owes her exemption from the disease.

CHAPTER XIX.

TEXAS GROUP.

TEXAS CONTRIBUTORS.

Dr. James Johnson, Grayson County.
Dr. B. K. Wood, Grayson County.
Dr. A. W. Atcheson, Grayson County.

Surgeon John F. Hammond, U. S. A.,
Medical Director Department of Texas.

INITIAL CASE.

Denison, Grayson County, August 1.

TEXAS.

Having been informed by Dr. C. B. White, the president of the Louisiana State board of health, that early in the year 1873 he received a letter from a medical friend resident at San Antonio, Texas, inquiring as to the existence of cholera in the city of New Orleans, and stating that suspicious diarrhœal cases had occurred at or near San Antonio, we addressed Surgeon John F. Hammond, U. S. A., medical director Department of Texas, asking information on this subject, from whom we have received the following letter:

"SAN ANTONIO, TEXAS, *September* 10, 1874.

"Assistant Surgeon ELY MCCLELLAN:

"MY DEAR DOCTOR: On inquiry among the physicians of this place, I have ascertained that there were in San Antonio—

"I. An unusual number of cases of diarrhœal diseases in the month of December, 1872, and that during January and the succeeding five months the number of such cases was greater than usual.

"II. Several cases are said to have assimilated cholera. One case, that of the Rev. Mr. Guion, chaplain Tenth United States Cavalry, which was under my care, occurred during the latter part of May or early in June. It was a severe attack of cholera morbus. I was struck with its resemblance to cholera. He was decidedly convalescent within thirty-six hours from the commencement of the attack.

"III. All the cases, *so far as my information extends*, except that of Mr. Guion, occurred among Mexicans.

"I see by the monthly reports of sick and wounded on file here, that among the troops stationed here at the time, both white and blacks, there was no unusual occurrence of these diseases.

* * * * * * * *

"Truly yours,

"J. F. HAMMOND."

GRAYSON COUNTY.

The only authentic evidence which we have received of the epidemic of 1873 in the State of Texas, is from the town of Denison, in Grayson,

a northern county of the State, bordering on the Red river, which separates it from the Indian Territory.

We present two communications which we have received, and which are of interest as representing the two classes of views held upon the identity of the epidemic of 1873.

I.—CHOLERA AT DENISON, TEXAS.

By James Johnston, M. D.

The town of Denison is situated in Grayson County, Texas, and is the terminus of the Missouri, Kansas and Texas, and the Houston and Texas Central Railroads. It was only one year old when the cholera made its appearance. It contained at the time between three and four thousand inhabitants, who were principally emigrants from the Northern and Eastern States. The first case of cholera that came under my notice was that of Dr. Moyse, who was attacked on the morning of the 8th of August, 1873; went into collapse same evening, and died at 3 o'clock a. m. of the 9th instant.

Having to leave town on business, I did not return until the 19th September, and I learned from other physicians that few cases occurred during this interval.

About the 27th September we had some rain, and afterward heat, when it broke out with greater violence, and for the eight days following, the average deaths numbered seven to eight per day, and from the middle to the end of September the average was about four per day. Few cases occurred after this up to the latter part of October, when the last case came under my observation.

When the disease first made its appearance the town was in a filthy state. Being a new town, crowded with a floating population, there were not sufficient improvements in the city, and the people were not so comfortably fixed as in older towns.

There was diversity of opinion among the physicians with regard to the nature of the disease, some asserting it was not cholera, and the board of health and city council, with a view of preserving the town in its prosperity, published circulars to this effect; and in order to set the public right, and establish a correct diagnosis, I wrote a paper on the subject, which appeared in the Sherman Patriot of November 1, 1873. (A copy of the manuscript I herewith inclose.) The medical association of this county have since confirmed my opinion. I return you a list of the cases that occurred, or as many of them as I could get any account of, only a few of which I attended professionally. Some were attended by other physicians, who have since left town, and some died without medical aid.

In making up the statistical account allowance must be made for those that have been attacked and got well without any medical treatment, and that never came under the notice of the physicians, and consequently do not appear on the list.

The probable number of deaths during the epidemic amounted to eighty, and the number of those attacked (giving due allowance for those that got well without our knowledge) would be, as near as I can guess, twice that number. The fatality of the disease seemed to be in proportion to the amount of filth about the locality in which they lived, and the habits of the patients, &c., being more fatal to those of dissipated habits and those deprived of their ordinary rest and food, and those exposed to excessive fatigue. Grief and fear, on account of the

depressing effects they produce on the nervous system, have a wonderful tendency to induce an attack.

With regard to treatment, my experience has led me to the conclusion that the treatment of cholera, to be comparatively successful, must be commenced early, when the first symptoms of choleraic diarrhœa makes its appearance. I believe that a locality may be almost entirely saved from the scourge by adopting at once proper sanitary and hygienic measures; the treatment must consist more of prophylactic than curative. When the disease first breaks out, all yards should be cleaned and water-closets disinfected, decaying vegetable substances removed, &c. People should observe regular habits, eat their accustomed food, avoid undue fatigue and excessive impulses of the mind, such as grief and fear, or great anxiety, and see that all the functions of the body are kept in proper order.

On the treatment of well-established cases, or those who have passed into collapse, I have nothing new to say, as volumes have been written on the subject. I will close these few remarks by giving my treatment of one of the worst cases I attended.

Peter Linn, an Irishman, who worked in a brick-yard, was attacked on the 29th October, 1873. I was called to see him about 7 o'clock p. m., and found him in a collapsed condition, perfectly cold, even his tongue and breath, shrunken features, husky voice; he could not speak above a whisper; he had all the symptoms of approaching dissolution. At this advanced stage I did not see any use in giving medicine by the mouth, so I made a solution of one grain of strychnia, and with the hypodermic syringe injected it at different points all over the extremities until almost half of the mixture was used up. I did this in order, if possible, to arouse the action of the nervous system and establish the capillary circulation. I saw him the following morning when the alarming symptoms had passed away; the heat of the body had returned; he took some nourishment and continued to improve, and finally got well. He suffered a little from singultus, from the effect of the large amount of strychnia and the manner in which it was used, as the patient was a very bad cholera subject. He was a man about fifty years of age, with a very feeble constitution and dissipated habits; his digestive organs were very much impaired by drinking bad whisky. I consider the strychnia used in this way at different points all over the extremities much better than giving it by the mouth, as in such cases the stomach and bowels are almost inactive, and very little certainty can be placed on medicines given in that way, and the greater number of points it is inserted the better. In the case mentioned I used the syringe at eight different places, all over the feet and legs, hands and arms.

[From the Sherman (Texas) Weekly Patriot, October 4, 1873.]

"We were in Denison about an hour on Tuesday evening last on our return from Saint Louis, and we were informed by two reliable citizens of that place that on the day and night previous there had been nine or ten deaths from cholera, and that considerable excitement existed, many were leaving, and business perfectly dead. On Tuesday last and night following there were seven deaths, as we learn from Mr. Burke, who came down on Wednesday morning. The News of Denison is very silent on the subject; we think this is wrong, as the people should be fully advised. * * * Since the above was penned, we learn from Mr. O'Bannan that there were five deaths on Wednesday, October 11. * * We learn that up to Tuesday last there had been about thirty deaths at Denison from the prevailing disease, which has been called

by some doctors cholera, and by others congestion. We learn from Mr. Munson, who came down on Monday morning from Denison, that four deaths took place there the day and night previous. * * * * We learn that on Wednesday and the night previous there were six or eight deaths there. * * * Governor Owings and others of that place informed us that a large portion of the population had left, probably over a thousand or fifteen hundred." * * *

THE CHOLERA AT DENISON, TEXAS.

To the Editor of the Sherman Patriot:

For some weeks past a disease has visited the thriving town of Denison, and about sixty deaths during the past three weeks have been the result of this sad visitation. The inhabitants have been startled, and many inquiries have been made with regard to what this disease is. Some physicians of good standing pronounce it by one name, and others another; and the public are puzzled to know what the malady is, and how it may be averted; and the people very justly look to the medical profession for information. And it has been suggested that if the physicians here could not diagnose and treat the disease, that a subscription be raised for the purpose of bringing experienced physicians from a distance, who were capable of treating such cases successfully.

Now, for my own part, I cannot see any reason for not coming to the conclusion that the disease with which we have been afflicted is cholera; and those who coincide with me in this conclusion are physicians who have been in practice in the South for a number of years. I may mention the names of Lipscomb, Field, Cooke, and Harris.

I do not wish to be dogmatical in my assertions, and give due respect to those who differ from me. I have no desire to come out in the public press on a subject suited for discussion among medical gentlemen, or at a medical association; but circulars have been printed and published, and articles have appeared from the press, that the disease with which we have been afflicted is not cholera, and is not an epidemic.

* * * * * * *

The absence of malarious influence we have in this locality would not warrant us in coming to the conclusion that these cases are exclusively of a malarious character. The number of deaths we have would represent several thousand cases of ordinary remittent and intermittent fever that always, under proper treatment, get well, even in the most malarial-infected localities, and a large number of the very worst cases of this class will yield to treatment.

"Under cinchonism and other proper management not more than one in eight probably die." (Hartshorn Essentials, page 323.)

In none of the forms of congestive fever is the first paroxysm apt to be of a pernicious character. In the majority of instances the disease begins as an ordinary periodic fever, and it is only in the second or third paroxysm the alarming symptoms appear. Nor is the first congestive paroxysm very likely to prove mortal; generally it is not until the second or third that a fatal issue is to be apprehended. (Da Costa on Diagnosis, page 725.)

The history of cholera goes to show that it is not confined to any particular locality or country. Since 1545 we have accounts of its frequently breaking out, from time to time, in different parts of Europe, as far north as 64° north latitude, and on this continent we have ac-

counts of its progress since 1832 as far north as Canada, and south to Mexico, the West India Islands, and Central America, and this season we have accounts of it in several parts of Europe, and the eastern cities of this country. I am happy to state that with the change of the season, and the sanitary arrangements that have been adopted, scarcely a trace of it exists at present in this place, and I can state, without fear of contradiction, that the general health of the people of Denison is better, and there is less mortality than there has been for the last eight months.

II.—THE PREVAILING DISEASE AT DENISON, TEXAS, DURING THE FALL OF 1873.

By Alex. W. Acheson, M. D.

A disease called cholera visited Denison, Texas, in 1873 and 1874. A few isolated cases were met with during the summer of those years. In 1873, during the month of October, from two to six cases were met almost every day.

Denison is a new town; was born September 23,1872. When the disease prevailed at its worst the town was but one year old. The inhabitants were all new-comers, therefore unaccustomed to the climate, the water, the food. There were not sufficient conveniences of any kind. Four thousand people lived on six acres. This is denser than New York is crowded. Such a state of affairs will intensify any prevailing disease. There was considerable sickness previous to this outbreak. Pneumonia, meningitis, measles, bilious fevers, infantile diarrhœa, and dysentery prevailed. They were unusually severe and fatal.

The majority of the inhabitants were men; railroad-hands, loose in morals, careless in habits, living in and around saloons. The site of Denison is good, high, well-drained, sandy soil, pure water, no ponds. The town is three miles south of Red river; the prevailing wind is from the south; no reason why it should be a sickly town. The year just past has been very healthy.

The symptoms presented in this scourge were those usually seen in cholera. There were vomiting, purging, profuses weating, extreme thirst, coldness of surface, loss of elasticity in the skin, washer-woman's fingers, altered respiration, loss of voice, quickened and weak pulse, decreased temperature, cramps in the bowels in the beginning, cramps in the legs towards the close, collapse, &c. We will not describe these symptoms *in extenso*. There were other symptoms present; to these we will refer hereafter.

Popular opinion said this was cholera. Half of the physicians of Denison said so, too. Was it?

What is cholera? A disease originating in India.* It acts by impairing the power of the nerve-centers governing the thoracic and abdominal viscera. Consequent on this defective innervation are vomiting, purging, sighing, respiration, collapse.

To prove this cholera, first, the possibility of importation must be shown; second, the impossibility of other diseases impairing these nervous centers, and giving rise to these symptoms.

First. *Importation.*

Cholera (?) prevailed in Tennessee in the summer of 1873. (Tennessee is five hundred miles from Denison; no direct connection between

* International Sanitary Conference, Vienna, July, 1874.

the two.) It then prevailed in Kentucky; then in Missouri. In September it was as far west as Boonville, Mo. There was no cholera prevailing east, south, or west of us. If imported, it came from Boonville, which is six hundred miles north of Denison, on the same line of railroad. It is claimed that a man from Boonville direct, stopped at the hotel in Denison, when the disease appeared in its violence a day or two after his arrival. Great importance is attached to this. We do not stop to question any link in this chain of importation. Grant that all is true; then explain the deaths from this disease before this man's arrival.

There was a death from this disease on June 25, 1873. This was three months previous to this man's arrival, and previous (we believe) to the outbreak of cholera at any point in the United States. A second case occurred on August 8, a third on August 12, both previous to the appearance of the disease at the point from which it is claimed to have been imported. Again, not only have many cases occurred before importation was thought of, but cases are met with every year. During the summer just past (1874) we have encountered thirteen distinctly marked cases of this disease. Ten others have been brought to our knowledge. These make twenty-three. As Asiatic cholera was prevailing nowhere, it could not have been imported. Hence the cause must be indigenous. If indigenous it is not cholera.

SECOND. *The impossibility of other diseases impairing these nervous centers, and giving rise to these symptoms.*

If we show that other diseases act like cholera, we show the probability of this having been something else than cholera. Is there any disease which prevails in the South that presents the symptoms of cholera?

"The skin continues to grow colder, and is bedewed with a cold, unnatural perspiration. He feels oppressed with excessive heat, calls for ice, and while his skin is cold and wet, wishes to be continually fanned. The skin becomes motley and bluish, its sensibility is impaired; the impress of the finger remains some seconds after pressure is removed; respiration is irregular, with frequent sighing; countenance haggard. In some cases there is watery purging, resembling Asiatic cholera."—(Congestive intermittent fever. Hunt, 1st ed., vol. I, p. 511.)

"A form called algid is characterized by notable reduction of temperature; the extremities becoming as cold as marble, or the coldness being like that of a cadaver. Profuse sweating characterizes some cases. Vomiting and purging are not infrequently prominent symptoms, leading to a state of collapse, like that in cases of epidemic cholera."—(Pernicious intermittent fever. Flint, 3d ed., p. 867.)

"Indeed, the analogy between many of the symptoms above described and those of epidemic cholera is very striking."—(Pernicious intermittent fever. Wood, 6th ed., vol. I, p. 331.)

Dickson says: "The system seems to sink at once prostrate before the invasion or exacerbation, which can scarcely be called at times febrile. Reaction does not take place. The skin is cold and covered with a clammy sweat, as in the collapse of cholera; the pulse is weak and fluttering, the stomach is very irritable, the countenance is sunken and pale or livid. The phenomena are evidently the result of defective innervation. The propriety of denominating these cases bilious remittent fever, when they frequently run their course without exhibiting the slightest sign of febrile reaction, has been doubted by some. They are, however, produced by the same cause as bilious fever."—(Bilious remittent fever. Watson, 3d Am. ed. p. 967.)

"In a word, we perceive effects which bear, in the more severe and

malignant forms of the disease especially, a close analogy to those occasioned by other and more tangible toxical agents, like some of these, as oxalic acid or nicotine. The malarial and several other zymotic poisons sometimes suddenly prostrate the system to the verge of the grave, or even destroy life in a few hours, and during the first access, or, as Dr. Simon says, in the tremendous shock and depression thereby occasioned in the system. So rapidly destructive, indeed, is the effect, that were it not for concomitant circumstances, it would often be difficult to form an idea of the real nature of the case."—(La Roche on Pneumonia and Malaria, p. 379.)

The above quotations regarding malarial fevers, which are the prevailing diseases of the section in which Denison is located, show that they may assume the appearance of cholera. Proof to this effect could be multiplied, if necessary. In the absence of positive proof of importation, and in the presence of positive proof that malaria simulates cholera, are we not justified in concluding that this was malaria?

In examining special cases of this disease, we noted a disposition to pass from the ordinary forms of malarial fevers to a malignant type simulating cholera, or to pass back, when proper remedies were used to arrest it. In several instances patients were seized with well-marked bilious remittent fever; after this had continued some time, the disease assumed all the appearances of cholera. In other instances, where the choleraic symptoms were checked, bilious fever presented itself. In still other cases the choleraic symptoms exhibited periodic movement without fever.

We are aware that these facts have been noted by writers upon cholera, and claimed as illustrations of the erratic manner in which that disease acts. But may they not be examples of the erratic course of malaria? It acts thus, as writers on malarial disorders will testify.

It is claimed that this was cholera, because epidemic; and epidemic, because fifty cases occurred in one month.

To this we attach no importance. The summer and early autumn are healthy; after the long-continued heat sickness ensues, but not until the weather breaks. Then fifty cases of pneumonia, bilious fever, abortion, bronchitis, menorrhagia, or leucorrhœa may be encountered, and these cases will be mild or severe according to the condition of the systems attacked.

In claiming that this disease was imported, it is implied that it was contagious. There is not a single fact in the history of the disease pointing toward contagion.

In one house, 14 feet square, where fourteen persons slept, the vomit and the stools were spilled upon the floor, and yet the disease did not spread.

Throughout the continuance of the disease in the city, no effort at disinfection whatever was made, and yet there is not the slightest evidence of the disease being propagated.

In a few well-marked cases, post-mortem examinations were held immediately after death. Inquiry was only made concerning the abdominal viscera. The stomach and bowels were usually empty, and always congested, though generally slightly so. The liver was always bronzed and congested. In one case it was intensely congested, and in another softened. The spleen was always congested, in one instance intensely, in one enlarged, and in one softened. However doubtful the ante-mortem symptoms might be concerning the nature of the disease, the post-mortem symptoms pointed unerringly to malarial poisoning.

DENISON, TEXAS, *November* 17, 1874.

CHAPTER XX

IOWA GROUP.

IOWA CONTRIBUTORS.

Dr. A. W. Cantwell, Health-Officer, Davenport.
Dr. A. S. Maxwell, Davenport.
Dr. W. F. Peck, Davenport.
Dr. J. F. Baker, Davenport.
Dr. W. W. Grant, Davenport.
Dr. L. French, Davenport.
Dr. J. Bell, Davenport.
Dr. E. H. Hazen, Davenport.
Dr. J. W. W. Baker, Davenport.
Dr. J. J. Tomson, Davenport.
Dr. R. J. Farquharson, Davenport.
Dr. C. H. Preston, Davenport.
Dr. W. D. Middleton, Davenport.
Dr. H. Heed, Chariton.

INITIAL DATE.

Davenport, Scott County, August 14.

SCOTT COUNTY.

Davenport is the county-town of Scott County, located on the west bank of the Mississippi River, three hundred and thirty miles above Saint Louis, and one hundred and eighty-four miles west of Chicago. The city is laid out at the foot of a bluff which rises gradually from the river, with a range of rounded hills in the background. Davenport is the eastern terminus of the Mississippi and Missouri Railroad; the western terminus of the Chicago and Rock Island Railroad.

The cities of Davenport and Rock Island are connected by a bridge, which touches Rock Island, upon which is built the United States ordnance arsenal.

We are indebted to Dr. A. W. Cantwell, Health-Officer of Davenport, for the following outline of the epidemic of 1873:

On the 14th of August, a white man from Saint Louis, who had come to Iowa to obtain work as a harvest-hand, was carried off a steamer from Saint Louis and placed upon the levee at Davenport. The man was found to be ill with cholera. He was cared for, but died in a few hours. No other cases occurred until August 28, when a gentleman from the northern portion of the State, who had arrived a day or two previous from his home, was taken with diarrhœa at the Burtis House. In a few hours cholera was developed, and he died.

On the same day a young man, one of the telegraph-operators, who boarded at the Burtis House, was seized with the same disease, and died after a few hours' illness. It was found after his attack that he had been suffering with diarrhœa during the previous week.

August 30, a white man, living in the interior of the State, was taken from a train from Chicago in the collapse of cholera, and died after an illness of two days at the Mercy Hospital.

From these cases the disease became epidemic, but was mostly confined to the district known as "Flat-iron Square," (see map,) which is bounded by Iowa and Le Clair streets, and extending from the river to Fourth street. At the foot of Iowa street a sewer empties into the river.

This sewer drains the portion of the town in which the cases noted had occurred. The river being very low the mouth of the sewer was exposed, and the effluvium was perceptible in the locality.

The disease was chiefly confined to the foreign population, and especially to the Danes. Many of these people were residents of the city, but large numbers were attracted to the city in hopes of obtaining work, as some twenty miles of water and gas pipes were to be laid in the streets of the city.

Disinfectants were freely used, and the city was cleansed as rapidly as possible. The epidemic lasted about ten days, and subsided rapidly upon a change of the weather.

Dr. W. F. Peck reports having treated eleven cases, between the 14th of August and the 25th of September, of whom six died. The duration of the disease was from six to seventy-two hours. These cases were all of the lower classes. They all used impure drinking-water.

Dr. A. S. Maxwell reports having treated thirty cases, between the 18th of August and 20th of September, of whom nineteen were males, eleven were females. Of these cases six died. Twenty-one persons on this list used well-water; eight used river-water; one, cistern. The majority were among the lower classes. In twenty-seven cases there was premonitory diarrhœa. The duration of the disease was from six to forty-eight hours. In ten cases the convalescence was slow. In four, typhoid symptoms were developed; one case relapsed; one case had icterus.

Dr. A. W. Cantwell reports twenty-one cases, with fourteen deaths. Seventeen were males, four were females; all of lower classes; had used impure drinking-water. Treated at cholera-hospital. Seventeen had the premonitory diarrhœa. The disease lasted from three to seventy-two hours.

Dr. J. F. Baker reports five cases—one male, four females; all of the lower class; all had used bad water; four had diarrhœa. The disease lasted from four to sixty hours. Three died.

Dr. W. W. Grant reports nine cases—six males, three females. In all, the surroundings had been bad. Three cases died.

Dr. L. French reports seventeen cases—ten males, seven females; all of lower classes. The disease lasted from six to forty-eight hours. Six of these cases died.

Dr. John Bell reports eight cases—seven males, one female; all in poor condition in life; all used bad water. None died.

Dr. E. H. Hagen reports three cases—two males, one female; all had diarrhœa; all very poor. One case died.

Dr. J. W. W. Baker reports fifteen cases—nine males, six females; all had premonitory diarrhœa; some in good condition of life, but the majority poor. Five deaths occurred.

Dr. J. J. Tomson reports eleven cases—six males, five females. Four of these cases lived in good locality, seven in bad. Two cases died.

Dr. R. J. Farquharson, reports two cases—one male, one female; both in good condition of life. One died.

Dr. C. H. Preston reports one fatal male death.

Dr. W. D. Middleton reports thirteen cases—eight males, five females; all of poor class. Disease lasted from twelve hours to three and a half days. Five cases died.

One hundred and thirty-two cases are reported of whom no particulars can be obtained. Of these, eighty-nine recovered, forty-three died.

The convalescence of the majority of the cases which recovered is reported as being slow and complicated.

Additional evidence is offered in the following letter received from Dr. R. J. Farquharson, of Davenport:

"DAVENPORT, IOWA, *December* 23, 1874.

"DEAR SIR: According to promise I send you some facts concerning the origin and progress of the so-called cholera-epidemic of 1873, as it appeared in this city.

"The city is divided by an escarpment into two plateaux, the lower being on an average 30 feet above low-water mark, and is composed of alluvial soil, overlying Hamilton limestone, of the Devonian system, which rock in some places crops out, or comes near the surface, and in others is buried many feet. The upper plateau is composed of drift exclusively, no rock being found in it but bowlders; it has an average elevation of 160 feet above low-water mark. On the upper plateau there are no sewers, the drainage being on the surface, and taking place down many ravines, which widen as they join the lower level near the river; near their termination in the lower level their banks are rather densely inhabited, and here many cases of cholera occurred. On the lower level in 1873, there were but the two main sewers. These sewers were old, built of stone and mortar, of more than 2 feet diameter, with a flat bottom. As they had very slight fall, the flow in them was very sluggish, and as they did not reach to the higher ground were never flushed by the rains.

"The upper sewer, or that in Iowa street, during the time of the cholera-outbreak did not reach the water by the space of 10 feet or more, so that here upon the shore its putrid contents were discharged, and a back draught or reflux of foul air must have taken place from the direction of the prevailing wind (southwest) during the months of August and September, 1874. Most of the deaths took place upon the lower plateau, some of these, as upon the upper one, being really in the ravines running up from the lower level.

"Two cases with one death, to my knowledge, were remarked, where both parties, one a bootmaker and the other a founderyman, passed most of their time upon, and drank the water of the lower level. At Mercy Hospital eight cases and five deaths occurred, six of which cases were sent from the town, and two were inmates of the institution. Of these cases I shall speak more fully when discussing the subject of the sequence of cases at the hospital.

Near the railroad is a square bounded by Fourth and Fifth, Perry and Rock Island streets, occupied by a new passenger-depot and a large hotel, the Burtis House, then just finished and but recently occupied; as will be seen further on, here several deaths occurred. This hotel had been but recently connected with the Iowa-street sewer. In Main street, near the river, is the site of the temporary cholera hospital. Here twenty-one cases, with fourteen deaths, occurred. The cases were, however, brought from other parts of the city, mostly from near the upper sewer; few cases or deaths taking place near the lower sewer, *i. e.*, in the vicinity of the temporary hospital.

It may be stated that of the then population of the city, (23,500,) considerably more than half was contained in the lower and smaller part. In regard to water-supply, it may be said that both wells and cisterns were used by those attacked with cholera, yet near the upper sewer well-water was the prevailing drink, and the water of those wells was undoubtedly impure from the long-continued drought.

STATISTICS.

Upon the receipt of your letter, I took the report of Dr. Maxwell, and endeavored to make it complete by addressing letters to physicians and others not included in that list; I also visited an apothecary who had attended a number of cases.

I have answers and reports from five physicians, and none from five others addressed. I deem it, therefore, impossible to ever get a perfectly accurate account of the number of cases. As to the number of deaths, the information is fortunately much more reliable, being derived from the undertakers, who keep more trustworthy accounts than the physicians, and are more ready to impart information.

From the books of the three undertakers of the city, it appears that eighty-two persons were buried who died of the cholera, to which number should be added three more, two of whom died at De Witt, and one at Durant, in this State, all having fled from the city, (two from a spot near the upper sewer,) making a grand total of eighty-five deaths. This differs from Dr. Maxwell's report, but is, I think, perfectly reliable. Dr. M., in making up his report, (which was compiled soon after the epidemic in 1873,) gets fifty-seven deaths from physicians' reports, then adds seven deaths in domestic practice, and again thirty-six not reported. Now, taking his fifty-seven deaths as reported by physicians, I am able to add twenty from additional reports, making a total of seventy-seven deaths, leaving only five deaths to be accounted for. Taking as a basis of calculation my reports—two hundred and fifteen cases, with seventy-seven deaths, (a mortality of nearly 36 per cent.)—eighty-five cases, at the same rate of mortality, would give two hundred and thirty-seven cases, which, I think, may be safely assumed as nearly correct.

NATIONALITY.

Under this head may be mentioned some curious facts. Most of the cases, and a large majority of the deaths of adults at least, were among foreigners; few Americans died, and no negroes died or were attacked, though many lived near the affected spots, and with the usual bad sanitary surroundings.

Of the eighty-five deaths, a large portion, fifteen at least, were Danes. When we consider their small number, (not over two hundred, including children,) this fact is a remarkable one.

Having some acquaintance among the Danes, I have made personal inquiry as to the truth of the above, and also to discover, if possible, some national peculiarity by which to account for their greater liability to this epidemic. As a result of my inquiries, I would state that none of the Danes dead from cholera had been less than one year in this country; indeed, most of them had been here several years. But I discovered that most of them, being day-laborers, partook at a late hour, say 9. p. m., of a peculiar dish called beer-soup, which undoubtedly, in many cases, seemed to be the exciting cause of the attack.

This dish is prepared by boiling stale bread in beer, this often stale, and adding thereto at the time of serving beaten-up eggs.

We come now to the dates and sequence of the early cases in the city and also in Mercy Hospital.

The first case of cholera in Davenport in 1873 was that of Charles Miller, a steamboat deck-hand, a German, and residing in Saint Louis, who was landed very ill on June 27, taken to Mercy Hospital, and died next day. The next case was that of Mr. Bennet, who died at the Bur-

tis House July 28. Then Brown died at the Burtis House, August 29; then Stoeckel, August 30; and lastly, Prettyman, September 3.

Of these cases, Brown and Prettyman resided in the city, and boarded at the hotel; the others were strangers stopping for a few days only. Indeed, Stoeckel had just come over from Rock Island (where he had been for several days) was taken ill in the street, carried to the Burtis House, and died in a few hours.

Coming now to Mercy Hospital and its cases, I may be allowed to state that I am secretary to the medical board, and also one of the visiting surgeons, and that I have carefully examined the hospital records, and think the following statements absolutely correct. I would add that I was not on duty at the hospital during the period of cholera, and only saw one of the cases in the hospital.

The first case of cholera admitted into the hospital was that of Charles Miller, mentioned above, who died June 28. No other case is recorded until the 27th of August, when Abram Stoner, a man from the interior of the State, was taken ill at the depot while waiting for the train, and sent out to the hospital. He died on the 29th of August, and the same day also died the expressman, Reed, who hauled Stoner to the hospital. Reed was a man of feeble health.

It may be here remarked that this was one of those curious coincidences which confirm persons in the plausible notion of the direct transmission of cholera from person to person. Here we have one man, apparently in good health, taking another writhing with the cramps of cholera in his wagon to the hospital. A few hours afterward he is taken with like symptoms, and actually dies before the first.

On the 5th of September, just a week afterward, a Mrs. Manning and three children (named Wesson) are brought to the hospital. On the 6th one of the children, a girl named Johanna Wesson, died; the others recovered. These all came from the fatal spot near the upper sewer. These were all the cases of cholera admitted into the hospital from town.

The hospital building is of brick, three stories high, with a large attic; it was built originally for a female school, and is under the charge of the Sisters of Mercy. The first or ground floor, and also the second, have many rooms for private patients, while the general patients occupy two large rooms on the third floor, designated the men's and women's wards; above these again comes the attic, occupied by convalescents, attendants, &c. Mr. Stoner died on August 29, in one of the private rooms on the ground floor in the rear of the building. On September 6 the child died in the women's ward on the third floor.

On September 8 an old man (May) who lived at the hospital and occupied the attic, died there.

On September 9 a patient (Holm) who had been recently operated on for fistula in ano died in the men's ward, in a few hours after the first attack.

This is a full history of the cholera epidemic in Mercy Hospital, to which I may add that at no time were any means used to disinfect the discharges, or any attempts made at isolation of the affected persons. The drainage of the house was good; the water used was from a well, and quite hard. You will observe that, excluding the case in June, five cases were introduced, and two cases occurred among the inmates, both being fatal.

Having thus given you as correct and as detailed an account of the cholera here as was in my power, I should, perhaps, refrain from any

deductions or comments. But everyone has a theory and likes to state it, so that I shall presume to give mine, which is as follows:

I regard the nature of the epidemic as malarial; that, though it took the form of Asiatic cholera, it was of a different nature and origin; that it began at New Orleans and advanced up the Mississippi Valley with the increasing temperature; and that it suddenly disappeared everywhere upon the appearance of frost.

An exactly parallel case, I think, is that of the "cholera" which arose at Estero Bellaco in 1866, '67, and '68, progressed southward one thousand miles (along the Parana and La Plata rivers) to the cities of Montevideo and Buenos Ayres, at the mouth of La Plata river, ceasing in each instance upon the approach of winter. In regard to the symptoms, I would state that while living on the Arkansas river, in 1866, I saw, among negroes lately brought into that region, several cases with almost exactly the same symptoms as those observed here last summer; not so sudden in its onset, nor so rapidly fatal, however. But enough of theory. This bit of it you may consider the price or penalty of this communication.

Very respectfully,
Your obedient servant,

R. J. FARQUHARSON.

Dr. ELY MCCLELLAN,
Assistant Surgeon U. S. A.

DES MOINES COUNTY.

The only information that we have been able to obtain as to the epidemic of 1873 at Burlington, Iowa, is conveyed in a note from Dr. G. R. Henry, who reports one cholera death at that city on the 12th day of August. We quote the note:

"This was the only case of genuine cholera which I saw, although during the months of August and September I lost five patients from cholera morbus, which prevailed in a very malignant form, but was confined to one locality, where the people drank water contaminated by drainage, and about all the population were ignorant Swedes, who neither knew nor cared to take care of the sick. During the year 1874 we had less disease of the bowels than usual."

In the narrative of the Illinois group, it has been demonstrated that, at two points at least, the initial cases contracted the infection at the city of Burlington.

LUCAS COUNTY.

From Chariton the following letter has been received:

"CHARITON, IOWA, *October* 28, 1874.

"DEAR SIR: Your circular letter came duly to hand. In answer, have to say that we had no epidemic cholera at this point in 1873. We had several cases of sporadic cholera, or bad cholera morbus, nothing more.

"Very respectfully,

"H. STEED, M. D.

"ELY MCCLELLAN,
"*Assistant Surgeon U. S. A.*"

UTAH.

At Kelton, Box Elder County, a small town of about four hundred and fifty inhabitants, in the extreme northwestern portion of the Territory of Utah, and located upon the line of the Union Pacific Railroad, a localized epidemic of cholera occurred on the 18th of August, 1873, and resulted in four deaths.

The location of this town is almost in the heart, or rather upon the summit, of the Sierra Nevadas, and therefore remote from ordinary malarial causes.

The outbreak occurred in a family who had recently removed from the State of Missouri. The clew to the absolute point of infection is lost. Dr. B. M. Mallory, who has kindly noted the fact, is rather inclined to attribute the outbreak to atmospheric influences. Of the cases that are reported, all are whites; all males. The ages ranged from nineteen months to forty-five years. Two of the cases occurred in adults, two in infants. Two of the cases occurred in one family. The others lived within two hundred yards. It cannot be learned whether or not there had been any communication between the houses at which the disease occurred. No emigrants had arrived in the town prior to the outbreak.

CHAPTER XXI.

DAKOTA GROUP.

DAKOTA CONTRIBUTORS.

Dr. J. B. Van Velsor, Yankton County.
Dr. R. J. Thomas, Yankton County.
Dr. G. E. Moon, Yankton County.

INITIAL CASE.

Yankton, Yankton County, August 25.

TERRITORY OF DAKOTA.

Dakota is a Territory of the United States, adjoining the British possessions and the States of Minnesota, Iowa, Nebraska, Montana, and Utah. The western portion of this Territory is mountainous, the peaks ranging from 8,000 to 13,000 feet above sea-level. The eastern portions are more nearly level, but they represent a level of 1,500 feet above tide-water.

The Territory is drained by the Missouri, the Red River of the North, the North Fork of the Platte, the Big Horn, the Yellowstone, and Powder rivers. The meteorological observations made at Fort Randall present a fair indication to the climate of this Territory:

Mean temperature during 1873 and 1874, 49.90°; maximum temperature, 103°; minimum temperature, 28°.

Rain-fall during the same period, 14.69 inches.

Yankton, the capital city of Dakota, is located upon the north bank of the Missouri, about seven miles above the mouth of the Dakota river. The last-named stream is also known as the James river. In 1870 Yankton had a population of about fourteen hundred inhabitants.

The history of the cholera epidemic at this point is of value, as it demonstrates that the infection did not reach Yankton from any point within the United States, but that it was developed at that point only after the arrival of certain bands of Russian emigrants, who undoubtedly conveyed the specific infection in their personal effects from cholera-infected districts of Russia.

EPIDEMIC CHOLERA AT YANKTON, DAKOTA, IN 1873.

BY J. B. VAN VELSOR, M. D., *City Physician.*

During the month of August, 1873, the first bands of Russian emigrants reached the Territory of Dakota, and were lodged in unoccupied buildings throughout the city of Yankton. It is estimated that during the season at least two thousand five hundred of these individuals reached this Territory. They arrived in companies, which consisted of from ten to twenty families, each family having an average of eight children. The majority of these people came from the Odessa and Crimea districts of Russia; the majority had arrived directly from their

port of entrance into the United States; each band was a community headed by one man selected to assume the responsibilities of his party.

Some few of these emigrants were persons of wealth and respectability, but the large majority were of the lower classes, filthy in their persons and habits.

Each family brought with them boxes and bales of their personal effects, which consisted of articles of clothing, bed-furniture, and cooking utensils. In the boxes which contained the articles for use upon the journey, articles of clothing and those of food were generally to be found in an undivided chest.

Upon their arrival at Yankton, these people were cared for by the citizens of the city. They were given quarters in unoccupied buildings, supplied with food, and every effort was made to render them comfortable, until such time as they could be located upon the farms in the territory that had been selected for them. It was observed that in the majority of instances it was impossible to compel them to adopt any sanitary precautions in their lives; the utmost repugnance was shown to the use of privies, both sexes preferring to urinate and defecate immediately around the building in which they were located.

On the 25th of August, immediately upon the arrival of a party of these Russians, who had reached Yankton immediately from New York, two cases of cholera occurred in the persons of children, who with their parents and several other families were lodged in an unoccupied schoolhouse. These cases terminated fatally after a few hours' illness. The next day five other cases occurred in the same room, and nine others in an adjoining room. Of these fourteen cases but two recovered. From these cases the disease spread, and the epidemic continued in force until about the 15th day of September, when its epidemic influence disappeared. From August 25 to September 15, forty-two cases of cholera occurred among the bands of emigrants; of these, twenty-nine were fatal. The large majority occurred among children of less than sixteen years of age. Comparatively but few deaths occurred among the adults. In this connection, it must be borne in mind that over two-thirds of the entire body of emigrants were minors.

After the development of this disease among the Russians, a few well-defined cases of cholera occurred among the residents of Yankton, while at the same time diarrhœal diseases were unusually frequent. Early in September a lot at the corner of Third street and Broadway was cleared for the purpose of erecting a block of buildings. The dirt and *débris* that were removed from this site were used to fill some inequalities on Third street. Among other refuse removed was the contents of an old privy, which had been used by some Russians who had been quartered in an adjoining building. This privy-soil was scattered over the street to secure its rapid oxidization, but in so doing the stench was unendurable.

September 5, a Mr. M., whose business called him many times each day to pass over this ground, was attacked with cholera, and died after a few hours' illness. The next day his wife was attacked with the same disease, but recovered after a severe illness. In these cases a thorough system of disinfection was instituted; the bed, bedding, and soiled clothing were burned.

September 6, a man named McUmber, who was working upon some new buildings in the vicinity of the point on Third street, upon which the *débris* from the privy-vault had been scattered, was taken with cholera and died after a few hours' illness. The same active system of disinfection was instituted. The same day an Indian, who had pitched

his tent immediately adjoining the house in which McUmber was sick, was attacked, but recovered after a serious illness.

September 7, a man named Faust, who lived fourteen miles north of Yankton, and who had been in the city on the previous day, was taken with cholera, and died after an illness of about ten hours. This man was attended by some friends who had been through the cholera-epidemic of 1866 and 1867. By them everything was carefully disinfected. The wife of Faust and his child were removed from the house before his death. After death sulphate of iron in quantity was placed in the coffin under the body. His bed, bedding, and clothing were destroyed with fire.

September 9, a Mr. Presho, who lived in close proximity to the polluted point upon Third street, was taken with cholera, but ultimately recovered. September 14, a little girl, whose family resided in the district in which the Russians were lodged, and directly opposite to a house occupied by a number who were intensely filthy in their habits, was taken with cholera, and died after an illness of six hours. The next day a second child in the same family was attacked, but recovered. These cases were followed by six well-marked cholera-cases in the city, all of whom recovered; a total of twelve cases, with four deaths.

After the removal of the Russians from the city to the farms in the counties of Yankton, Bonhomme, Hutchinson, and Turner, no accounts can be obtained. That fatal cases of the disease still occurred there is no doubt; but as no American physician was called in, it is impossible to bring them to light.

YANKTON, D. T., *November*, 1874.

During the month of November, 1874, an inspection of the cholera-infected districts of 1873, in Dakota Territory, was made by the writer. A most careful and patient research among the emigrants failed to elicit any new information. By some of intelligence, it was admitted that the districts of Russia from which they had departed were cholera-infected, and many instances corroborative of published reports as to the prevalence of this disease in the southern provinces of Russia were obtained. One man of much intelligence and refinement recounted interestingly the frequent arrivals of the disease at the city of Odessa, and another man from the vicinity of the city of Taganrog confirmed the cholera-reports published from the Crimea during the past few years. But one and all were interested in concealing the events among them, as far as the influence of cholera was concerned, after their arrival in the United States. Had it not been that the physicians of the city were active in their observation of the disease, an extended outbreak would have occurred.

A personal inspection of these people will demonstrate that they are peculiarly liable to become the porters of disease. In their persons and in their habits they are filthy. The use of water is almost unknown among them, and when personally used is in the majority of instances perverted. A gentleman of Yankton, who was much interested in the study of these people, informs us that upon one occasion he observed a female wash her hands, head, feet, and other portions of her person in a pan of water. Her ablutions having been accomplished, she proceeded to wash a cooking-utensil in the same water, and finally, before it was discharged from use, some meat and potatoes, upon which in a short time the noon-day meal of her family was made.

The clothing of these people consists of heavy, coarse, woolen fabrics. Their beds are generally of feathers, their blankets thick and heavy. The men wear a great-coat of the shape and size of an Ulster, made of

dressed sheepskins with the wool retained. Their persons are unkempt, their hair and beards long. The adult male is the only individual of the family of importance. The children, alive or dead, are noticed but by the mother, who, besides her household duties, performs the labor of a field-hand.

At a meeting of the physicians of Yankton, held on the night of November 14, 1874, the history, as given by Dr. Van Velsor, was corroborated; and it was given as the unanimous opinion of the gentlemen present that during the summer of 1874 a modified demonstration of the same disease occurred, during which but one American family was attacked, one member of which died; but among the Russians a number of fatal cases occurred.

A great diversity of opinion was found among the citizens of the city of Yankton as to the disease of 1873. While the physicians of the city are unanimous in pronouncing it to be cholera, many prominent citizens persistently deny that the disease ever occurred in the Territory; while many others who have had experience in former epidemics of the disease fully corroborate the opinion expressed by the profession.

It is respectfully submitted that a disinfection at quarantine-grounds of material from cholera-infected districts of Russia, during the year 1873, would have prevented this outbreak of the disease.

CHAPTER XXII.

CHOLERA AT NEW YORK QUARANTINE.

NEW YORK CONTRIBUTORS.

Dr. S. O. Vanderpoel, Health-Officer of the Port.
Dr. Walter DeF. Day, Sanitary Superintendent.
Dr. Elisha Harris, Registrar of Vital Statistics.
Dr. John C. Peters, of New York City.
Dr. A. B. Judson, of New York City.
Dr. Samuel McClellan, of New York City.

NEW YORK CITY AND HARBOR.

During the year 1873 the city of New York was free from epidemic cholera, as shown by the following letter:

"HEALTH DEPARTMENT,
"*No.* 301 *Mott Street, New York, June* 27, 1874.

"MY DEAR DOCTOR: It gives me pleasure to inform you that we had no cases of cholera in this city last summer. There was the usual number of cholera-morbus cases, but nothing more.

* * * * * * *

"WALTER DEF. DAY.

"Dr. ELY MCCLELLAN."

At the quarantine of New York Harbor, however, one of the most instructive lessons of the epidemic is to be found, the facts of which have been furnished through the courtesy of Dr. S. O. Vanderpoel, health-officer of the port.

During the months of September and October, 1873, four steamships arrived at quarantine-grounds upon which cases of epidemic cholera had occurred.

I. The steamship Westphalia arrived September 10 from Hamburg, which port she had left on the 27th of August, touching at South Hampton August 30. Upon this vessel a cholera death occurred September 1, and upon the 3d a second death was recorded. Upon arrival at quarantine station September 10, nine cases of cholera were sent to hospital on Dix Island. Of these cases one died; the others recovered.

All of these cases had occurred in the persons of members of two German families, and it was most satisfactorily determined that they had been infected before coming upon the vessel.

The cases had been most rigidly sequestrated; all excreta had been disinfected. The soiled clothing had been destroyed by fire. No other cases occurred upon the steamer or at the hospital.

II. The steamship Ville du Havre arrived at quarantine September 24, from Havre and Brest. She had started upon her voyage September 12. On the 16th a gentleman of New York City was attacked with cholera. The disease was at once detected by the surgeon. Absolute isolation was enforced. The passengers in the neighboring state-rooms were removed. The dejections were disinfected as soon as voided.

All soiled linen was burned. The case terminated fatally, and was buried in the ocean the same night.

The state-room was scrupulously cleansed and was disinfected daily. No other case of the disease occurred upon the vessel.

III. The steamship Washington arrived at quarantine October 26, having left Stettin October 6, and London October 14, with two hundred ninety-eight passengers. Upon the 21st of October three fatal cases of cholera occurred. Every precaution had been adopted to prevent the spread of the disease. The means adopted were successful, for no other cases occurred.

IV. The steamship Holland arrived at quarantine October 28, having sailed from London September 18, and from Havre September 20.

Upon this vessel one fatal case of cholera occurred ten days prior to her arrival. This was in the person of a steerage passenger, and occurred so suddenly that the surgeon was not informed until the patient was in a collapse. Upon inquiry it was found that no dejections had taken place except at the water-closet into the sea, and none occurred after the collapse. The clothing was at the time carefully examined. Upon the occurrence of death the body was at once thrown overboard, and the effects were destroyed. No other cases occurred.

We quote from a letter of Dr. Vanderpoel, dated September 27, 1874:

"In all these cases satisfactory evidence was furnished on board the ships that strict sanitary isolation and regulations had been adopted in anticipation of the rigid requirements of our quarantine. The vessels were detained sufficiently long to become conversant with all the circumstances of the outbreak, and of the precautionary measures adopted to prevent the spread of the contagion. Satisfied, after rigid inquiry, that the medical officers of the vessels had taken prompt and full measures to prevent others being attacked; that the cases in question had undoubtedly contracted the disease before coming on board the ship; that the dejections had been promptly removed, the linen destroyed, and that a full period of incubation had passed without the appearance of new cases, the vessels were allowed pratique.

"In the cases removed a rigid isolation and sequestration had been maintained on the vessel, in connection with all the precautions of cleanliness, so that in this case also detention was only for twenty-four hours. There were no cases occurring from the vessels after being permitted to pass quarantine, and no cases occurred among passengers after landing."

These cases are of great value, as demonstrating the efficacy of disinfection in stamping out cholera, and the institution of a new era in quarantine history.

Under the present enlightened management of the quarantine of the port of New York, to which reference is made elsewhere, the medical officers of vessels which may become infected with disease, knowing full well that their efforts to arrest the disease will be fully recognized and sanctioned, are incited to the utmost exertions; and thus the advance is a triumph of science, and not a result of a pecuniary dread of detention. It is safe to predict that never again in New York Harbor will the tragedy as enacted in 1866 on the Virginia and the England be repeated.

Three distinct outbreaks of cholera occurred in the United States during 1873 among emigrants, and within a period ranging from seven to ten days after they had landed at the port of New York. These individuals, in one instance at least, passed through no infected districts in the United States. In each instance the disease occurred among them at

localities at which they formed the initial cases; and in all the evidence is strong that the disease developed only after the trunks, boxes, &c., were opened that contained property packed in Europe.

The very valuable paper which Dr. Peters has contributed exhibits the location of cholera in Europe during 1872 and 1873. We have extracted from the annual report of the commissioners of emigration of the State of New York for the year ending December 31, 1873, tables which show the number of cabin and steerage passengers that arrived at New York upon vessels employed in carrying emigrants, and the ports from whence they came during 1873; also, a table of the nationality of said passengers. These tables show that during 1873 the large number of three hundred and sixteen thousand nine hundred and fifty-six passengers arrived at the port of New York, exclusive of the officers and crews of the vessels; that of this number, two hundred and sixty-eight thousand two hundred and eighty-eight individuals were of the class coming directly under the control of the emigration commissioners; that of the last class one hundred and fifty-two thousand one hundred and thirty-five were from the districts of Europe infected with cholera.

The emigrants bring with them effects of all kinds. The commissioners' report shows that about fifteen thousand packages of all kinds pass yearly through the United States Customs Bureau established at Castle Garden. Although no authority is exerted to cause the speedy removal of emigrants from the emigrant establishment, yet arrangements are perfected by which they leave rapidly for their inland destination. "Thousands arrive and depart the same day," carrying with them all that they brought from their distant homes.

The vast majority of these emigrants are of the class among whom contagious diseases find their most numerous victims. A large proportion of those who arrived at the port of New York in the year 1873 were from districts of known contagion in Europe, or who had sailed from infected ports. These people arrive at American seaports *en masse*, but they gather at the ports of embarkation in small bands. At such points they remain until arrangements are effected, or until the day of departure arrives, and generally they are deprived of almost all the comforts of life. During an extended cholera epidemic, the emigrant may leave a healthy locality to become infected in the mass congregated for departure; and upon arriving at their destination, they may establish an epidemic of the disease in communities as healthy as those they originally left.

It is earnestly suggested that infected fabrics are only too often the cause of cholera outbreaks, and that one great lesson taught by the cholera epidemic of 1873 is that the quarantine of individuals alone will not exclude contagious diseases of exotic origin; but that during the prevalence of any contagious disease, cholera in particular, upon a continent from which emigrants or travelers are to arrive, a thorough and absolute disinfection of all effects which may arrive from infected districts should be accomplished.

It is respectfully suggested that this duty devolves upon the General Government, and that it may be so conducted as not to add additional weighty expense to the emigrant. By such means a national *cordon de sante*, such as has heretofore existed but in dreams, may be realized and made effective.

From the statistics furnished in the report of the commissioners of emigration of the State of New York we have formed the following tables:

I.—*Statement of the number of vessels, with the number of their crew, and the number of passengers who arrived at the port of New York during* 1873 *from English, European and South American ports.*

Ports of departure.	No. of vessels.	No. of cabin-passengers.	No. of steerage-passengers.	Total No. of passengers.
Liverpool and Queenstown	299	18,049	143,570	161,619
London and Havre	32	380	9,230	9,610
London	2	12	53	65
Bristol	19	153	1,778	1,931
Glasgow and Londonderry	104	2,929	21,294	24,223
Cardiff	9	275	772	1,047
Bremen	123	6,780	43,022	49,802
Hamburg	64	6,084	32,275	38,359
Stettin	16	376	6,472	6,848
Antwerp	8	34	1,481	1,515
Rotterdam	16	164	2,855	3,019
Bergen	15	152	3,308	3,460
Marseilles	3	.....	92	92
Havre and Brest	26	3,331	541	3,872
Havre	2	15	264	279
Messina	3	.....	142	142
Palermo	14	.....	563	563
Cette	1	.....	7	7
Gibraltar	1	135	49	184
Lisbon	1	.....	50	50
Halifax	1	.....	423	423
Rio Janeiro	1	.....	40	40
Montevideo	1	.....	7	7
Total	760	38,869	268,285	307,157

II.—*Table showing the nativity of Emigrants who arrived at the port of New York during the year* 1873.

Europe	152,135	East Indies	17
Great Britain	113,920	Isle of Man	160
Armenia	14	Malta	13
Asia	1	Mexico	6
Australia	5	Nova Scotia	21
Africa	9	New Brunswick	52
Canada	55	South America	11
China	4	United States	1,839
Egypt	2	West Indies	24

NOTE.—The steamers of the Cunard and General Transatlantic Companies that carry only cabin-passengers do not land at Castle Garden; during the year, nine thousand seven hundred and ninety-nine passengers arrived upon these vessels, and are not included in the tables. The grand total of passengers arrived at the port of New York from foreign ports during the year 1873 was three hundred and sixteen thousand nine hundred and fifty-six individuals.

CHAPTER XXIII.

CHOLERA-EPIDEMIC OF 1873 IN THE UNITED STATES ARMY.

The cholera-epidemic of 1866 having been diffused throughout the Southern and Western States by the movements of troops, it has been thought advisable to present the facts of the epidemic of 1873, as they relate to the Army of the United States, in a distinct chapter.

The experience of the majority of the officers of the United States Army is strongly in favor of the establishment of a *cordon de santé*, it having been demonstrated that, so far at least as military posts are concerned, they are effectual in excluding the infection of cholera. The experience of the cholera epidemic of 1873 adds weight to the experience gained in former epidemics.

It is undoubtedly to be found that whenever the disease has invaded a post so secluded, the cordon has not been rigidly enforced, and that individual violations will always be found to account for the outbreak. In opposition to such measures there has been noted during the past year the instance of a supposed *de novo* development of cholera at Mussoorie, of the Himalayas, in 1872. At that time cholera was epidemic at the villages on the plains, some six miles distant from the sanitaria, and between these villages and Mussoorie a *cordon de santé* had been established. In spite of these precautions a cow-feeder, who lived at the center of the station, died of cholera, and it was asserted that he had never been without the lines.

Dr. Pringle, however, found "that this man had gone to his village on the plains when cholera was present, with some cows that had gone out of milk, to be replaced by others in full milk, without, however, remaining overnight." Within three days he was seized with cholera and died.

Department of the East.

The cholera-epidemic of 1873 having been announced, extraordinary precautions were adopted by the officers of the United States Army to prevent the introduction of the disease into any of the military posts of New York Harbor. The following circular was issued by the medical director, Department of the East:

"Headquarters Department of the East,
"Medical Director's Office,
Circular. "*New York City, July* 19, 1873.

"As the cholera is in the country, and may at any time make its appearance among us, medical officers serving in this Department will look well to the sanitary condition of their stations, and use all the means at their command to prevent, as far as possible, the disease getting among the troops. Timely advice and directions to the officers and soldiers will put them on their guard should the disease appear in their vicinity.

"The attention of all medical officers is called to circular No. 2,

Surgeon-General's Office, 1868, the requirements of which will be promptly complied with, in the event of the disease breaking out in any military station in the Department.

"JOHN M. CUYLER,
"*Surgeon, United States Army,*
"*Medical Director.*"

By the post-surgeon of Fort Columbus, New York Harbor, the following letter was addressed to the post-adjutant. It will be remembered that it was from this post in 1866 that the disease was carried to other posts in the harbor, and also widely distributed over the country.

"POST-HOSPITAL, FORT COLUMBUS,
"*New York Harbor, July* 9, 1873.

"SIR: Health-officers and sanitary superintendents officially report that cholera is prevalent in certain cities in the West and Southwest, and its appearance may be looked for at any time in the different cities east of the Alleghanies. During the epidemic of 1866, cholera was introduced into this post by a recruit, who arrived, three days before being taken sick, from the rendezvous at Minneapolis, Minn. In 1867 the cholera was again introduced by a recruit who arrived, the night before being taken ill, direct from Saint Louis, Mo.

"Notwithstanding the timely recommendations and warnings of the medical officer, recruits had been allowed to accumulate at this depot, and the disease on its arrival on the island found a large number of recruits collected together, ready to fall an easy prey to its ravages. Detachments of recruits sent off from here to posts in different parts of the country carried with them to their destination the cholera, to spread far and wide with very disastrous results.

"The experience of these epidemics has made it patent that a very *grave* error was committed in thus allowing recruits to accumulate at the depot in the face of an approaching epidemic, and it is to be sincerely hoped that the lesson taught by the fatal consequences of this error will prevent its repetition. It is with this view, therefore, that I respectfully submit the following suggestions for the serious consideration of the commanding officer, and of the superintendent of the general recruiting service, viz:

"To prevent the introduction of cholera on this island by recruits and others, I would respectfully recommend that each recruiting-officer be ordered to stop sending to this depot recruits and parties as soon as the disease declares itself at all prevalent in the city where his rendezvous may be located.

"I would further recommend that all recruiting-officers be cautioned against taking men coming from infected localities.

"Although the strictest sanitary measures be enforced, and all reasonable precautions be taken, this command cannot expect an entire immunity should cholera become epidemic in the immediate vicinity; still its ravages may be limited, and the danger of spreading it much diminished by retaining on the island the smallest number possible of recruits for distribution, and I would strongly recommend that they be distributed as promptly as possible, and in small detachments of less than fifty men, because a small detachment is more easily managed than a larger one, the men can be more readily accommodated, their comfort and welfare better secured, while excesses in eating and drinking can be more effectually checked. Diseases are less liable to break out in a

small command, and when a disease does show itself the number of sick will not be so large but that all can receive proper care and attention.

"A medical officer should accompany each detachment. In conclusion, I would respectfully recommend that the distribution of recruits cease the moment cholera appears at this depot.

"Very respectfully, your obedient servant,

"JOHN J. MILHAU,
"*Surgeon, U. S. Army,*
"*Post-Surgeon.*

"To the POST-ADJUTANT,
"*Fort Columbus.*"

The representations of Surgeon Milhau, United States Army, in the foregoing letter, led to the issuance of the following order:

"HEADQUARTERS GENERAL RECRUITING SERVICE,
"UNITED STATES ARMY,
Circular No. 6. "*New York City, July* 16, 1873.

"Whenever cholera is declared prevalent at any city or town, where a rendezvous is established, the officer in charge of the rendezvous will at once discontinue the enlistment of recruits, and forward no more to the depots.

"No enlistment will be made when it is ascertained that the applicant has come from an infected district.

"By command of Col. John Gibbon.

"LOUIS R. STILLE,
"*First Lieutenant Twenty-third Infantry,*
"*Acting Assistant Adjutant-General.*"

DEPARTMENT OF THE GULF.

In reply to a communication addressed to Col. James Simons, U. S. A., medical director Department of the Gulf, asking information as to the epidemic of cholera as it affected the military posts of that Department, the following answer has been received:

"OFFICE OF THE MEDICAL DIRECTOR,
"HEADQUARTERS DEPARTMENT OF THE GULF,
"*December* 12, 1874.

"SIR: In reply to your letter of the 17th of October, asking what precautionary measures were adopted to prevent the introduction of Asiatic cholera in the military posts of this department, and requesting me to give any facts personally known as regards the epidemic of 1873, I have to say that the first cases of cholera that appeared in the United States doubtless occurred in this city, but as the disease was not suspected, the first cases were reported as cholera morbus; nor were any of the cases which occurred in the three or four following weeks reported as Asiatic cholera.

"As far as I am able to ascertain, there is no evidence of a case having been introduced into this city from abroad. It has been suggested as probable that the disease may have been brought in the cargo of some ship, or in the baggage of immigrant passengers.

"No precautionary measures were taken to prevent its introduction in the military posts in this department, nor was it practicable to carry out any orders in regard to a sanitary cordon.

"The only posts at which the appearance of the disease was apprehended was at Jackson barracks, in this city, and at the post of Jackson,

Miss. No cases occurred among the troops at either of these places. Both of these posts were in excellent sanitary condition when personally inspected by me.

"In the last of May, 1873, a case of cholera was reported among the troops at Monroe, La., and in June another case was reported at the same place; both of these cases terminated fatally. An additional medical officer was immediately ordered to Monroe, and the detachment was withdrawn as soon as possible.

"No other cases were reported at any of the military posts in this department. I am informed there were many cases among the negroes at different points in the State, but nothing as regards its history or progress has reached me in a reliable form.

"Very respectfully, your obedient servant,

"JAMES SIMONS,
"*Surgeon, U. S. Army,*
"*Medical Director.*

"Assistant Surgeon ELY MCCLELLAN, *U. S. A.*"

II. A communication from Assistant Surgeon Van Buren Hubbard, U. S. A.:

"JACKSON BARRACKS, LOUISIANA,
December 14, 1874.

"DEAR DOCTOR: In compliance with your verbal request made to me a few days since, that I would furnish you with a statement in writing of the precautionary measures, if any, which were adopted at this post during the months of February, March, April, May, and June, 1873, with the view to secure immunity from 'epidemic cholera,' said to be prevailing in this city during these months, I cheerfully place the following at your disposal.

"There were no extra precautionary measures adopted whatever. Indeed, the sanitary condition of the post was such as scarcely to admit of improvement, and that, too, when the existence of an epidemic was not suspected. There were no orders, instructions, circulars, or letters received from the medical director of the department, or from any other authoritative source, warning me, as medical officer of the post, of the probable approach or actual presence of an epidemic of cholera. In truth, I suspect it was not until the epidemic had abated, and all danger from it had passed, that it became settled in the minds of medical men in this city that we had suffered from a visitation of 'epidemic cholera;' though there had been much discussion as to the real nature and true character of the disease, with no little diversity of opinion on the subject, which diversity of opinion has not been entirely reconciled, even at this date.

"During the period mentioned, or the greater portion of it, Dr. R. S. Vickery, U. S. A., was on duty at the barracks, while I was on duty with troops stationed in the more central portions of the city, viz: the artillery in the Mechanics' Institute, in Dryades street, between Canal and Common streets, and the infantry and cavalry in Magazine street, between Julia and Saint Joseph streets.

"I would respectfully invite your attention to the tabular statement given below, showing the number of troops serving in the city of New Orleans during the first half of the year 1873, and the number of cases of bowel complaints for each month, embracing diarrhœa, acute and chronic, and acute dysentery.

"The percentage of bowel complaints to mean strength of the command for each month is also given. There is not reported in the hos-

pital records for that period, nor was there, a single case of cholera morbus or epidemic cholera among the troops.

"During the same period there were three deaths, two in the month of March; one from pneumonia, and one from chronic diarrhœa; and one in the month of May, from chronic bronchitis.

Tabular Statement.

Month.	Diarrhœa, acute.	Diarrhœa, chronic.	Dysentery, acute.	Strength of the command.	Percentage of the command sick from bowel complaints.	Remarks.
1873.						
January	29	.....	.....	542	5.35	There were no cases of "epidemic cholera" or cholera morbus among the troops during the period here specified.
February	12	.....	1	428	3.03	
March	7	1	1	442	1.80	
April	10	.....	.....	363	2.70	
May	6	.....	.....	168	3.57	
June	5	.....	.....	261	1.91	

"Deducting from these figures the percentage of cases of bowel complaint in the command for the whole period of five months, commencing with February and ending with June, it will be found to be 2.46. The month of January is omitted in this calculation, as the first authentic case of cholera did not occur until the 9th of February. No mention is made of any period subsequent to June, as the epidemic terminated quite abruptly with that month.

"Here is, in my opinion, a very important fact, which should arrest attention. That there should be an epidemic disease, and that disease cholera, prevailing in a large city, to an extent in point of severity to sweep off ninety victims in the month of April, and one hundred and twenty-five in the month of May, (*vide* Annual Report of the Board of Health, city of New Orleans, for 1873,) and that troops stationed in the city to the number shown in the above table should possess entire immunity from the disease, presents a problem worthy of consideration. Moreover, the percentage of bowel complaints during the period, as shown in the table, was small. The hygienic conditions and surroundings of the troops, though the best probably that could be provided in the emergency and under the circumstances, were, nevertheless, very far from what they should have been. Nor is any special credit to be given to the medical officers on duty with the troops for this happy event, as neither of them knew nor suspected the existence at the time of epidemic cholera. It establishes beyond controversy, one would say, the fact that the epidemic tendency or influence or atmospheric conditions could have been neither strong nor favorable to the rapid spread of the contagion; and, further, that the material upon which the disease fed was speedily consumed.

"I did not see a case of the disease.

"Very respectfully, your obedient servant,

"V. B. HUBBARD,
"*Assistant Surgeon U. S. Army,*
"*Post-Surgeon.*

"Assistant Surgeon ELY MCCLELLAN,
"*United States Army.*"

III. A note from Acting Assistant Surgeon William R. Manderville, U. S. A., in relation to the epidemic as it occurred at Monroe, La.:

Monroe is located upon the Ouachita River, about eighty miles from the city of Vicksburgh. The town has a population of about two thousand inhabitants. In the spring and early summer of 1873 the sanitary condition of this town was good.

Company H, Sixteenth United States Infantry, arrived at Monroe, from Jackson, Miss., on the 23d of April, and immediately went into camp two miles below the town. The camp was about twenty-five or thirty yards from the bank of the river, having on one side and in the rear a small lagoon of still water, formed by backed water from the river.

During the first four weeks of the occupancy of this camp there were daily deluging rains.

About two weeks after the arrival of these troops, diarrhœas became very prevalent among them; this, in the first instance, was attributed to the impure water which they drank and the fish-diet in which they had been indulging.

Having heard of several cases of cholera among the negroes of the town and its vicinity, the men were prohibited from eating fish, and pure well-water was provided for them. The men were ordered to report at the hospital-tent on the first symptom of diarrhœa; to all who so reported, small doses of calomel and opium were administered in broken doses, and with good result.

The first case of cholera occurred May 11; the patient was attacked at 4 o'clock a. m. and died that night at 11 o'clock p. m.

No more cases occurred until June 5; this patient was taken at 5 o'clock in the morning and died that day at 3 o'clock p. m.

Three other cases occurred, but none of them proved fatal, (myself constituting one of the cases that recovered.) During the month of May twenty-two cases of diarrhœa and cholerine occurred, and for the month of June nine cases of diarrhœa and four of cholera morbus.

The command numbered forty-eight men.

Those who were attacked with the disease were isolated as much as possible, and the hospital-tent thoroughly disinfected from the very start; the camp was placed in a state of cleanliness as far as practicable. The sink for the men was removed to a considerable distance from the camp, and covered with fresh earth every night; the discharges from the cholera-patients were quickly removed, mixed with carbolic acid, (it doubtless being the best antiseptic known,) and buried. The bedding and clothes used by the cholera-patients were immediately destroyed by fire. The hygiene of the men was placed in as favorable a condition as possible.

The cholera was undoubtedly brought to Monroe by way of the railroad; the first case appearing at Vicksburgh, then at Delta, a small town opposite, and so on along the line of the road.

Department of the South.

The epidemic of cholera having been announced in the Gulf States, and the fact having been ascertained that the disease had been carried as far north as the city of Memphis, General William J. Sloan, U. S. A., Medical Director of the Department of the South, called the attention of all medical officers of the Army serving in the department to the following circular order of the Surgeon-General of the Army:

WAR DEPARTMENT,
SURGEON-GENERAL'S OFFICE,
Circular No. 2. *Washington, D. C., June* 12, 1868.

Hereafter, on the appearance of the first recognized case of cholera, yellow fever, or of any other epidemic disease, at any military post or station, whether among the officers and men or among citizens in the vicinity, the medical officer in charge will at once address a letter to the medical director of the department announcing the fact, and forward a duplicate copy direct to the Surgeon-General.

Besides the usual reports of sick and wounded, every medical officer in charge of cholera or yellow-fever patients will forward to the Surgeon-General, at the close of each month, list of patients in the following form:

List of patients suffering from epidemic —— *at* ——. *Month of* ——, 186-.

Name.	Nativity.	Age.	Rank.	Regiment.	Company.	Length of service in months.	Length of time at station in months.	Date of attack.	Date of recovery.	Date of death.	Remarks.

This report will embrace all cases of officers and enlisted men so far as known, and will be made in duplicate, one copy to be forwarded to the Medical Director, and one direct to the Surgeon-General. Blanks for this report can be obtained of the Medical Director, who will receive them from the Surgeon-General.

At the close of the epidemic, or of his term of service, the medical officer in charge will also forward, with as little delay as practicable, a *history of the epidemic*, setting forth, so far as known to him, the facts connected with its origin or importation, its progress, and decline, together with an account of the methods of treatment or prevention employed, and their results, and of the results of autopsies.

This report will be written on one side of foolscap paper, with a margin of one inch on the left-hand side, and will be sent through the Medical Director; a letter will be sent on the same day to the Surgeon-General direct, informing him that such a report has been forwarded.

These reports are required in connection with all cases of cholera or yellow fever occurring among officers or men. In the case of other epidemic diseases, only when specially ordered by the Medical Director or the Surgeon-General.

J. K. BARNES,
Surgeon-General.

I. The earliest intimation of the near approach of cholera to the stations of the United States troops in the Department of the South is found in a telegram which was received at department headquarters on the 9th of June, from Lieut. Col. James Van Voast, commanding the Sixteenth Regiment of United States Infantry and the post of Nash-

ville, Tenn., which states "that it is quite certain that cholera to some extent prevails in the city of Nashville. Upon consultation with the surgeon of the post, we are both of opinion that it may be prudent to move the troops of this post into some healthy camp about ten miles from the barracks; this movement to be made in case the disease becomes epidemic in the city."

The recommendation of the medical director of the department upon the telegram was as follows:

"Respectfully returned with the remark that although it is doubtful whether the cholera can be prevented among the troops at Nashville by their removal to a *temporary camp ten miles distant*, yet every measure of precaution should be adopted. I therefore recommend that the matter be left to the best judgment of the commanding officer and surgeon in charge, in the event of a probable epidemic."

In accordance with the recommendation of the medical director, the following telegraphic order was issued to the commanding officer of the United States barracks at Nashville:

"LOUISVILLE, KY., *June* 9, 1873.

"The general commanding thinks, with the medical director, that it is doubtful if the movement from barracks to camp will prevent the appearance of the disease. If it does appear, you would have exchanged the comfort and resources of a good permanent hospital for a poor temporary one at camp. Still the general gives you and the medical officer present the discretionary authority you ask for, as, being on the spot, you may have better means than himself of judging as to the best course to follow. Whatever you do, the officers, except the post-quartermaster, must go with the command, leaving the post under a small guard of a non-commissioned officer and six men."

It being strongly the opinion of the commanding officer and post-surgeon that the troops in garrison could only be preserved from the influences of the epidemic by removal to an uninfected district, on the 11th day of June the command was removed to camp at White Creek Springs, ten miles northwest of the city. This camp was at an isolated position off the lines of travel, and was supplied with an abundance of pure freestone water. Assistant Surgeon D. G. Caldwell, U. S. A., the surgeon of the post, insisting, if any removal of the command was to be made, that it be accomplished before any men had become infected, and that if the disease should be developed in camp, then, if necessary, the return to barracks could be effected without any increase of danger.

The command having reached camp, a *cordon de santé* was established and maintained as rigidly as was possible. The diet and general health of the command were held under close surveillance. *No cases of the disease occurred.*

The non-commissioned officer and the enlisted men who were left under the command of Maj. W. V. Richards, regimental quartermaster, an experienced officer, were especially selected for this duty as being sober, steady, and reliable men. One officer of the command, being of the opinion that his family would be in reality more isolated from the epidemic at the barracks, the troops having been removed, obtained permission for his family to remain in their quarters.

June 13, the non-commissioned officer who had been left in barracks was attacked with cholera, but recovered. In the family that elected to remain at the barracks a fatal case occurred June 25.

The special report of Assistant Surgeon D. G. Caldwell, United States Army, to the Surgeon-General of the Army, is herewith presented *in extenso:*

"ASH BARRACKS, NASHVILLE, TENN.,
"*July* 30, 1873.

"GENERAL: I have the honor to submit the following brief history of epidemic cholera as it appeared in the city of Nashville, Tenn., during the months of May, June, and July, 1873.

"The first case occurred in Nashville in the latter part of May, but the disease was not recognized as epidemic cholera until about the 10th of June, and no mortuary record was kept until June 7.

"From June 7 until July 10 the undertakers' report for Nashville and vicinity was six hundred and ninety-seven deaths; in many instances persons were buried by others than the regular undertakers; adding these to the list, and then add those that died prior to June 7 and since July 10, it would be safe to say that fully one thousand have died since the appearance of cholera in Nashville.

"Comparatively few deaths occurred in the highest and best-drained and cleanest portions of the city. The disease was almost exclusively confined to the outer limits and low portions of the city, along the foul streams known as Wilson's Spring Run and Lick Branch, which almost encircle the city. On the low ground in the vicinity of these streams are settlements made up of small shanties, occupied by negroes, one shanty being considered large enough for from five to fifteen inmates.

"In the town of Edgefield, on the opposite side of the river from Nashville, where the streets are wide, good surface-drainage, and an abundant supply of cistern-water, there were only twenty deaths out of a population of five thousand.

"The precise manner in which the disease was imported to Nashville would be difficult to determine. It made its appearance in the latter part of May, and was founded upon such a malarial condition of the atmosphere and the people that almost all of the physicians in Nashville doubted its true character. Even the large number of cases occurring so rapidly failed to satisfy them of its true epidemic nature. The localizing cause of the cholera was so extended and apparent that no importation of the disease was looked for, or generally believed in.

"Recent investigation has developed the following facts in regard to the importation of the epidemic: Some negroes came up from New Orleans, where the disease was supposed to be prevailing, in the latter part of May, a part of whom died suddenly in Memphis, Tenn., and the rest came to Nashville, since which time their whereabouts cannot be traced.

"Another supposed origin of the disease is based upon a report that there were a number of convicts working on a railroad twenty miles north of Memphis; the cholera made its appearance among them; several of them died, and the camp was then broken up, and the convicts were brought to Nashville and returned to the penitentiary, from whence a few were soon after discharged, and came into the city. The warden of the penitentiary informs me that one of the convicts died with some disease resembling cholera a few days after returning from Memphis, but thinks those discharged were in good health, and that no new cases of cholera occurred among the convicts until after the disease had become epidemic in the city.

"In favor of the local origin of the disease much has been urged. That the essentials for its development and propagation (except the specific germ) existed at Nashville, there can be no doubt. An incredible amount of filth had collected in and around the city; the sewers leading from the city empty their loathsome tides upon the surface of the ground

within the corporate limits, and small wooden drains, leading from bath-rooms, wash-rooms, or sinks, emptying through the curbing into the street-gutters are found, even in the best portions of the city.

"The city receives its supply of water from the Cumberland River, but many of the poor whites and negroes, unable to pay water-tax, have recourse to the public springs. These springs are situated on low ground, and the water is more or less contaminated with the products of the decomposition of animal and vegetable matter.

"As the disease was progressing rapidly, and no efforts were being made by the city authorities to check or control it, the post-commander and myself deemed it prudent to remove the troops from Ash barracks into camp farther away from the infected city. Permission was obtained from the department commander June 10, 1873, and on the following day the troops were moved into camp at White Creek Springs, twelve miles from the city.

"The site selected for the camp was an elevated ridge, with sufficient level surface on its crest to accommodate two rows of tents, the decline on either side affording good surface-drainage.

"An excellent quality of water was obtained from springs located at the base of the ridge, some distance from the camp.

"On arrival in camp the post-commander issued orders stopping all communication between the camp and the city, except by permission to one teamster to haul bread from Ash barracks to the command. This order was strictly enforced until the command returned to Ash barracks.

"The epidemic having entirely abated on the 10th of July, the troops were ordered to return to Ash barracks on the 22d of July, 1873, and no cases of cholera or cholera morbus occurred among the troops while in camp or since their return.

"A detachment, composed of one commissioned officer and eight enlisted men, was left at Ash barracks to take charge of the Government property, and the post-commander authorized to make a contract with Dr. Stoute to take charge of the sick of the detachment.

"Dr. Stoute reported to me for the month of June, as shown in monthly report of sick and wounded for that month, one case of cholera and three cases of cholera morbus. All of these cases recovered. The only fatal case reported by Dr. Stoute at Ash Barracks was that of Archibald Clapp, aged eight years, son of First Lieut. W. H. Clapp, Sixteenth Infantry, and regimental adjutant. He was taken with a slight diarrhœa on the 24th of June, which was partially controlled by one or two doses of Squibb's mixture. On the next day, at about 6 o'clock, violent vomiting and purging supervened, and he died at 9 oclock a. m., in a state of collapse.

"As I was on duty with the troops in camp, while the epidemic prevailed in Nashville, I am obliged to depend greatly for information upon the statements of physicians practicing in the city. They inform me that the clinical history of the disease did not differ materially from that noticed in previous epidemics, and that recent experience has failed to throw any new light on the treatment of the disease.

"To Lieutenant-Colonel Van Voast, Sixteenth Infantry, post-commander, much credit is due in preventing the spread of the disease among the troops. His promptness in having all of my recommendations fully complied with, making many daily inspections of the men, causing the grounds in and around the camp to be kept clean, sinks to be inspected and filled up when required, and his vigilance in watching

and correcting lack of personal cleanliness in the men, produced good results.

"I have the honor to be,

"Very respectfully,

"Your obedient servant,

"D. G. CALDWELL,

"*Assistant Surgeon U. S. A.*"

All military posts in the Department of the South were placed in the most rigid sanitary police. Disinfectants were freely used at all points that might become infected by individuals or fabrics from infected localities. The officers of the Medical Department watched carefully for any development of the disease at or in the vicinity of their respective posts.

II. On the 24th of June the commanding officer at Chattanooga, Tenn., reported, by telegram to headquarters Department of the South, that cholera had suddenly broken out in that city, and asked authority to transfer his command to a camp upon Lookout Mountain. The authority thus asked was immediately granted. It having been found impossible to obtain a suitable camp at the point indicated, upon the recommendation of the post-surgeon, that the *morale* and hygienic condition of the command could be better preserved in the barracks than at an exposed camp, it was determined to remain in garrison. Every sanitary precaution was adopted to prevent the introduction of the disease into the garrison. One fatal case of cholera occurred, which is reported in full elsewhere.

The report of Assistant Surgeon Charles Styer, U. S. A., post-surgeon of the post of Chattanooga, to the Surgeon-General of the Army, is herewith presented.

"The record of the medical history of the post" indicates the active and efficient manner in which Dr. Styer discharged his duties of sanitary officer.

"CHATTANOOGA, TENN., *August* 8, 1873.

"SIR: I have the honor to report that I have applied verbally and in writing to the principal physicians of Chattanooga, and have tried every practicable way to trace the history of the first cases of cholera in the late epidemic, but with unsatisfactory results.

"Hearing that Dr. Price, a homœopath, attended the first case, I questioned him, and learned that the first case he saw was a Swedish woman, in poor circumstances, on June 21, 1873. When first seen, she was in a state of collapse, with rice-water discharges, &c. This was in the morning, and she died during the day. The same evening he was called to see a negro living opposite, on the same street, with cholera-symptoms. The man had just arrived from Nashville, where cholera was prevailing, and had mild diarrhœa and vomiting for two days. This man recovered. Although he was the second case seen by Dr. Price, he may have been the first taken ill. On this point I could get no definite information. There was no known communication between the two families, and they did not use the same water-closet.

"Subsequently, the disease was most general and most fatal in this same portion of the city; but this would be expected, as it is the dirtiest part and inhabited by the poorest classes, who are badly housed, badly fed, and live in filth, making the locality a natural hot-bed for the development and spread of any epidemic.

"The physicians generally describe the disease as genuine epidemic-

cholera, with all the usually-described symptoms. At the same time they attribute to it a malarial character, and almost universally state that quinine influenced its progress, and acted more satisfactorily than any other remedy. They used opium and calomel to combat symptoms, but quinine was their chief reliance. I have not heard of any autopsies being made. I regret that I omitted it in my case, but my steward was ill, I was fatigued myself, and the commanding officer was desirous of making a prompt interment.

"No other case appeared in the garrison. There was some increase in the morning sick-report from diarrhœa, but this could be attributed to fright on the part of the men.

"At this date cholera is again reported in Chattanooga. The mayor has re-issued his proclamation, prohibiting the sale of vegetables and fruits, which had been rescinded July 21.

"During the epidemic, so far as my recommendations went, the soldiers and officers and their families used such mature vegetables and fruits as could be obtained and properly prepared for the table, in liberal though not excessive quantity. I set the example in my own house and in the hospital, and recommended a similar mode of living to others, and the result was satisfactory.

"Certain officers who could not free themselves from the influence of former teachings, confined their diet to ham and eggs, coffee, bread, pudding, &c., and before the cholera-scare had subsided, had considerable trouble, chiefly diarrhœa, in different members of their families.

"So far as the disease now prevailing (since August 6) is concerned, I believe it to be almost entirely caused by excess in eating water-melons, which are raised in great numbers, are very cheap, and are devoured by the negroes almost without limit as to quantity.

"Very respectfully,
Your obedient servant,
"CHARLES STYER,
"*Assistant Surgeon U. S. A.*
"The SURGEON-GENERAL OF THE ARMY."

III. The commanding officer of the post of Lancaster, Ky., reported to the headquarters Department of the South that several cases of cholera had occurred at that town in the following telegram:

"LANCASTER, KY., *August* 19, 1873.
"ASSISTANT ADJUTANT-GENERAL,
"*Department of the South:*

"Cholera is prevalent in the town; no case in garrison, but Dr. G. is so infirm that I do not think (in which he coincides) that he will be able to attend to cases, should there be any. I therefore urgently request that another medical officer be sent here at once. Cannot Dr. McClellan be ordered up on first train to examine and report as to cholera in town, condition of garrison, and Dr. G.?

"J. S. FLETCHER, JR.,
"*Captain Sixteenth Infantry, Commanding.*"

Upon receipt of which communication the following telegraphic order was issued:

"LOUISVILLE, KY., *August* 19, 1873.
"Dr. ELY MCCLELLAN, U. S. A.,
"*Lebanon, Ky.:*

"Proceed to Lancaster, by the first train, and confer with Captain Fletcher with reference to the cholera there. Report by telegraph;

and before returning contract with a physician, if one can be obtained, and if advisable. Acknowledge receipt.

"W. J. SLOAN,
"*Medical Director.*"

Authority was given for the purchase of such stores as might be required for immediate use. Hospital-beds with their furniture were sent to Lancaster from the post of Lebanon, with a full supply of hospital-stores.

On the 24th the following telegram was received by the Adjutant-General, Department of the South:

"LANCASTER, KY., *August* 24, 1873.

"ASSISTANT ADJUTANT-GENERAL,
"*Department of the South:*

"Cholera has appeared in garrison; one man and one woman past recovery. Please send another physician; also a hospital-steward.

* * * * * * *

"It may be advisable to move; shall decide in the morning, and if cases are fatal shall go at once. Will advise you as to my decision.

"J. S. FLETCHER, JR.,
"*Captain Sixteenth Infantry, Commanding.*"

[Telegram.]

"LANCASTER, KY., *August* 26, 1873.

"ASSISTANT ADJUTANT-GENERAL,
"*Department of the South:*

"No more cases of cholera in camp. The two reported died Sunday. No more cases of actual cholera in town; considerable cholerine, however, among the men and the citizens.

* * * * * * *

"J. S. FLETCHER,
"*Captain Sixteenth Infantry, Commanding.*"

[Telegram.]

"LANCASTER, KY., *August* 31, 1873.

"ASSISTANT ADJUTANT-GENERAL,
"*Department of the South:*

"Two deaths from cholera in town yesterday, and two in garrison. Total deaths in garrison, four. Have gone into camp about two miles from town; good water, healthy locality.

"J. S. FLETCHER,
"*Captain Sixteenth Infantry, Commanding.*"

"LANCASTER, KY., *September* 5, 1873.

"MEDICAL DIRECTOR,
Department of the South:

"SIR: I have the honor to inform you that no cases of cholera have appeared in garrison since Saturday; and as I have moved the troops into camp to a fine, healthy locality about two miles from town, I am encouraged to hope that we shall have no more cases, although there is an unusual number of men on the sick-report.

* * * * * * *

"Very respectfully, your obedient servant,
"J. S. FLETCHER,
"*Captain Sixteenth Infantry, Commanding.*"

"LANCASTER, KY., *September* 15, 1873.

"ASSISTANT ADJUTANT-GENERAL,
"*Department of the South:*

"SIR: I have the honor to report that I broke camp on the 13th instant, and marched the command into the garrison.

"There is little or no sickness at the post, and the health of the town is good.

"Very respectfully, your obedient servant,

"J. S. FLETCHER,
"*Captain Sixteenth Infantry, Commanding.*"

When it had been definitely ascertained that cases of epidemic cholera had occurred in the town of Lancaster, with the view of establishing a *cordon de santé*, the following orders were issued:

Company order.] "POST OF LANCASTER, KY., *August* 19, 1873.

"From and after this day no enlisted man will be allowed to leave the garrison without a written pass signed by the post-commander.

"All men absenting themselves from the post without such pass will be confined, and charges will be preferred against them, with a view to their being brought before a court-martial for trial.

"J. S. FLETCHER,
"*Captain Sixteenth Infantry, Commanding.*"

Circular.] "HEADQUARTERS, POST OF LANCASTER, KY.,
"*Lancaster, Ky., August* 20, 1873.

"From and after this date, until further orders, no citizens will be admitted within the grounds of this garrison.

"The guard on duty at this post will take particular care to see that this order is strictly carried out.

"By order of Captain Fletcher.

"W. C. MCFARLAND,
"*Second Lieutenant, Post-Adjutant.*"

The narrative of the epidemic demonstrates the way in which the *cordon de santé* thus instituted was evaded.

The special reports of Assistant Surgeon McClellan and of Acting Assistant Surgeons Warren and Smith are presented.

Special report of Assistant Surgeon Ely McClellan, U. S. A.

LEBANON, KY., *August* 24, 1873.

To the MEDICAL DIRECTOR,
Department of the South:

SIR: I have the honor to report that, in obedience to your telegraphic order of the 20th instant, I proceeded to Lancaster, Ky. Upon my arrival upon the ground I was soon satisfied that cholera was indeed epidemic in that town. The town was nearly deserted, all the houses and stores were closed, business was entirely suspended. The cases which had occurred up to that date were, with but a single exception, confined to the blacks.

In company with Captain Fletcher I at once made an inspection of

the camp, which I found in most admirable order and police. After a most critical inspection I could find nothing to suggest beyond the removal of a mass of rank vegetation from a field adjoining the camp-grounds, to which some of the company women had been removed from the town.

* * * * * * *

All the physicians of the town, and the gentlemen who still remained, having assembled at the National Bank for the purpose of consultation with me, I joined them, and, by inviting a narrative from each individual, I was enabled to obtain all the facts of the outbreak.

* * * * * * *

No organized effort had been made by citizens or physicians to suppress the disease. At the camp alone had disinfectants been used or other sanitary measures instituted. Earnestly I impressed the necessity of general police and disinfection, and secured a pledge from each person present that sulphate of iron, carbolic acid, and lime should be freely used by them, and that the work of general disinfection should be commenced at once.

* * * * * * *

Up to my departure at 8 o'clock a. m. on the 23d, there had been twenty-one cases of cholera in the town, with nineteen deaths; of these deaths two were white females who had fled into the country. Two cases were still alive. The president of the board of trustees authorized me to procure for the town the services of doctors and nurses from Louisville. Upon my arrival at this post I forwarded such medicines and hospital stores as to my knowledge were deficient in the hospital at Lancaster.

* * * * * * *

Having obeyed to the utmost your orders, I returned to my station, feeling that, from the rapid progress of the disease, my services were demanded by the troops and families of that command.

Very respectfully, your obedient servant,

E. McCLELLAN,
Assistant Surgeon U. S. A.

Special report of Acting Assistant Surgeon J. S. Warren, U. S. A.

POST OF LANCASTER, KY., *August* 28, 1873.

To the MEDICAL DIRECTOR,
Department of the South:

SIR: I have the honor to report that on August 22, 1873, I was contracted with by Dr. E. McClellan, Assistant Surgeon United States Army, to take charge of the post hospital at Lancaster, Ky. I reported immediately, and upon my arrival inspected the garrison, finding everything in a good sanitary condition, so far as cleanliness goes.

The garrison is located in the eastern portion of the town, just outside the town limits. It is upon a high elevation, much higher than any other point about the town. The natural drainage is excellent. The cholera seems to have been confined to certain localities along a drain which bounds the garrison-grounds on the west. About the head of this drain is a well, which furnished water to the majority of the persons who have died of cholera. * * *

August 23, while sitting in Colonel Fletcher's quarters, at about 9 o'clock p. m., Drummer Rushbrook came in and told me he did not feel well. I examined and prescribed for him. At that time he did not have

any symptoms of cholera. About 11 o'clock p. m. his wife came and asked me to visit him; she said that his bowels had moved several times, and that he had also been vomiting. I found that what she told me was true; he had all the symptoms of cholera. I immediately instituted what I thought to be the proper treatment by hypodermic injections of atropia, but nothing seemed to do him any good. About an hour after he was taken, his wife, who had been well all day, and even up to the time she sent for me, was taken with cholera. The same treatment was adopted with the same result. The man was dead in twelve hours after being attacked; the woman in eleven.

Very respectfully, &c.,

J. S. WARREN.

POST OF LANCASTER,
Lancaster, Ky., November, 1873.

To the SURGEON-GENERAL OF THE ARMY,
Washington, D. C.:

GENERAL: I have the honor to report for your information the following circumstances connected with the outbreak of cholera at this post during the months of August and September last.

Although epidemic cholera had appeared during the summer at Nashville and other places in the valley of the Mississippi, the authorities of Lancaster neglected to adopt precautionary measures to prevent its outbreak. In consequence, the sanitary condition of the town at the time of the recent epidemic was deplorable. The streets and alleys had not been cleaned for years, and contained the refuse of kitchens and the contents of stables and overflowed water-closets.

The character of the ground upon which the town is built is of such a nature as to carry the sewage into the adjacent ravines. The principal drainage is toward the east into a hollow where the poorer class of the population, mostly composed of negroes, reside in huts and shanties badly ventilated and extremely filthy. Through this hollow runs a small stream, having its source at the base of Cemetery Hill, and after passing through a meadow overgrown with rank vegetation, it becomes the main sewer for the neighborhood. On the bank of this stream, at the foot of the hill on Richmond street, was a public well—marked "Tate's" on the map—so situated that it must inevitably receive the contents of the stream, with the washings from the adjacent hill-sides. It supplied a large part of the population with water. The post, located on an elevation near by, and garrisoned by Company E, Sixteenth Infantry, Capt. J. S. Fletcher, jr., commanding, obtained water from a fine spring on the premises, exempt from surface-drainage. The barracks and outbuildings were neatly whitewashed, and the camp policed.

Such, briefly, was the sanitary condition of the town on Sunday, August 10, when a farmer named Bewley, aged thirty-five, residing near Russellville, East Tennessee, arrived on horseback, and remained at the house of one named Tate. The country in the neighborhood of his home at the time was afflicted with epidemic cholera. He was attacked, while traveling, with diarrhœa, and compelled to remain over one day at Loudon. After his arrival here he was prostrated with symptoms resembling typhoid fever, accompanied with vomiting and excessive involuntary rice-water discharges, which resulted in death the twelfth day.

No endeavor was made to disinfect or bury the dejections. They were

carelessly thrown on the hill-side at the foot of the lot, immediately above the public well on Richmond street, into which, it is presumed, they were carried by the first rain. The water of this well, although possessing an unpleasant odor and disagreeable taste, was in constant use by the families living convenient, many of whom were attacked and died of cholera.

It was undoubtedly the contamination of this water by the discharges of Bewley that occasioned the outbreak of the disease in the community, although other causes exerted an influence in promoting its distribution.

The first case of cholera occurred August 15, five days after the arrival of Bewley. A negro man living on the same square, and reported to have used water from the Richmond-street well, was attacked with cholera and died in twelve hours. He was accustomed to work about the depot, and at the time was employed opposite the house in which Bewley was sick. The evening before he had washed a buggy in a stagnant pond, and committed some excess in diet. The same day the father-in-law of Bewley, in whose employ was the above-mentioned negro, and who had nursed and staid in the same room with his son-in-law, was taken violently ill on his way home, in the country, and died in eight hours.

On Sunday, August 17, a negro woman, occupying a low, damp, and filthy hovel with her daughter, was stricken with the disease, and died in twenty-two hours. The following Thursday the daughter, also, fell a victim to the epidemic.

Tuesday, the 19th of August, there were four cases of cholera, and four deaths, among the colored people, of six, seven, six, and ten hours' duration.

The announcement of the result in these cases occasioned intense excitement. The presence of cholera in the community could no longer be denied, and the citizens generally sought safety in flight. Three trustees of the town, and the resident physicians, with two exceptions, accompanying the fugitives. In a few hours the population of the town was less than two hundred. Those who remained to face the disease engaged vigorously in the work of disinfection. Lard and sulphur were burned in the streets, and solutions of carbolic acid and sulphate of iron thrown profusely into the sinks, and scattered about the premises. The use of water from the Richmond-street well was interdicted, and the people urged to exercise the utmost caution in their diet. The chairman of the board of town trustees directed the only remaining druggist to dispense medicine to all who applied, at the expense of the town, and organized a corps of nurses for night and day work among the poorer class of the population, who appeared to suffer most from the epidemic.

The commanding officer of the post, Capt. J. S. Fletcher, jr., attended personally to the disinfection of the garrison-grounds. The sinks were carefully watched, and the men directed to report immediately any case of diarrhœa or sickness. The company-table was limited to such articles as did not affect the bowels, and only water from a neighboring spring directed to be used.

There were no deaths from cholera until Wednesday, when a negro man, living in the ravine on the Sugar Creek pike, was attacked with the disease and died in six hours. The same day a lady, who had left town to escape the ravages of the epidemic, was taken suddenly ill and died in sixteen hours.

On Thursday, the 21st, there were five cases and five deaths among the negroes; the first used water from the Richmond-street well, and died in six hours. The discharges were not disinfected, but thrown into

a privy used by the family, two of whom died the next day. The second case was the daughter of the woman who died the 17th. She was sick fifteen hours. The third case left town on Tuesday and died at Camp Nelson after an illness of twelve hours. A row of houses near by were occupied by fifteen persons, who were supplied with water from the well on Richmond street; of this number, one died of cholera and four were attacked with cholerine; and another, living on the opposite side of the town, died of choleraphobia. He ran home, jumped into bed, and could not be persuaded otherwise. There was no vomiting, cramps, involuntary discharges, or premonitory symptoms of the prevailing epidemic. The fifth case was the husband of the woman who died on Tuesday. He lived in the same room and died in ten hours. The house contained three rooms, and was occupied by eight persons, three of whom suffered from cholerine, while two died of cholera.

The surgeon of the post being sick and of advanced age, it was deemed best to relieve him. Assistant Surgeon E. McClellan, United States Army, stationed at Lebanon, was sent here to confer with the Commanding officer upon all matters connected with the cholera outbreak. He obtained the services of J. S. Warren, M. D., of Crab Orchard, and returned to his station. The next day, Friday, there were three deaths. The first was a lady who had left town with her family, but who was taken sick and died at the mouth of Hickman Creek. The next was the wife and nurse of a negro who died the preceding day, and whose discharges were thrown into a privy. She was taken sick and died in twelve hours at her father's house, in a hollow on the other side of the town. The discharges, as before, were thrown into a privy used by two families. The result was that a sister who had nursed the case, returned to her husband's house, and soon after was taken violently ill with the disease and died in twenty hours. The discharges were carefully disinfected and buried, and no other case occurred in the family. On Saturday, a drunken miller, who boarded near the depot, was stricken with the disease and died in ten hours. The discharges were buried. There were eight or ten occupants in the house at the time, but no other case occurred. One of the number suffered for several days with vomiting and diarrhœa.

Thesa me day a negro, who had used the privy into which the discharges from the colored woman dying the day before were thrown, was taken ill in an unfinished building, and died in twenty hours. A workman on this building, boarding at the hotel, where little attention was given to disinfection, died in Lincoln County, of cholera, after an illness of eight hours. Up to this date there had been no evidence of the disease in camp, and it was thought the garrison would escape its ravages; but about 9 o'clock p. m. a soldier, Samuel B. Rushbrook, musician, Company E, Sixteenth Infantry, living outside of the grounds, in the quarters of the commanding officer, which were neat and well policed, was attacked with premonitory symptoms, and died at 8.30 o'clock a. m.

On Monday, August 25, in accordance with the requirements of Special Order No. 150, Headquarters Department of the South, Louisville, Ky., dated August 25, 1873, I reported for duty to the commanding officer of this post, and immediately inspected its sanitary condition. The garrison grounds were found to be in admirable order, and the utmost nicety to prevail in regard to cleanliness. The police regulations were perfect; the barracks and tents well ventilated, clean, and comfortable. The sinks and privies were daily disinfected, and the refuse from the kitchen buried. The water for the garrison had been brought from a spring on the premises, but fearing it might become contam-

inated, its use was prohibited, and rain-water from an inclosed cistern substituted. The men generally were complaining of diarrhœa, but its progress was carefully watched and checked by the administration of an opiate combined with astringents.

An allowance of whisky and quinine was issued twice a day, and such other precautions adopted as were thought advisable. The same day a lady who had visited Tate's house died in the country of cholera.

On Wednesday, August 27, an old negro man who had nursed most of the cases was taken with violent purging, cramps, and vomiting. He had been complaining several days, but refused to take medicine. I saw him with Dr. Wilson at midnight, when the pulse was almost imperceptible, and he was fast passing into a state of collapse. The temperature was 97° in the axilla, under the tongue 96.6°, and in the rectum 102°. A solution of morphine and atropia was given hypodermically. The catheter was introduced and no urine found in the bladder. Involuntary discharges were constantly occurring. The patient lingered until 8.30 o'clock a. m., and died from exhaustion.

The evening of the same day, Thursday, a lady who had been living in town died in the country of cholera. The rest of the family in the same house had used water from the Richmond-street well, and were attacked with premonitory symptoms of cholera, but recovered. Early Friday morning, August 29, private Eugene Hasbrouck, Company E, Sixteenth Infantry, who occupied a tent with others on the garrison grounds, was admitted to the post hospital, complaining of vomiting and diarrhœa. At 6.30 o'clock a. m., when first seen, he was very much debilitated from the excessive discharges. The temperature in the axilla was 97½°, and under the tongue 98°. I introduced hypodermically one-sixtieth of a grain of atropiæ sulph., and ordered sinapisms to be applied to the stomach and abdomen, and prescribed as follows: ℞. pulv. opii, gr. iv; pulv. camphoræ, gr. viii; hyd. chlor. mite, gr. viii; M. ft. chart. No. iv; one to be given every third hour. The first dose was immediately vomited, the others retained. At 8 o'clock a. m. there was an action of the bowels in a bed-pan; the discharge was watery, rice-colored, and slightly flocculent; it was immediately disinfected and buried. The temperature at this hour was 96°. I again introduced hypodermically one-sixtieth of a grain of atropiæ sulph., and by advice of Dr. Wilson ordered an administration of five grains of hyd. chlor. mite to be given dry on the tongue every hour and a half. The extremities becoming cold, I ordered bottles of hot water to be applied, and the patient wrapped in blankets. At 9.30 o'clock a. m. the temperature had increased to 97⅖°, when the following was ordered: ℞. Albumen ovi recentis, No. 1; sodæ chlor., gr. x; spts. frumenti, ℥ss. To be given as required. A catheter being introduced, and the bladder being found void of urine, a flaxseed poultice moistened with ext. digitalis fld. was ordered applied to the small of the back, over the region of the kidneys, and ℞. Tinct. digitalis, gtt. xv; spts. æth. nitrosi, ℥i, to be given at once, and as often as required. At 10 o'clock a. m. the temperature was 98⅖°. The patient complained of pain in the chest; was restless and perspiring freely. I gave hypodermically one-fourth of a grain of morphine, which relieved the distress and enabled him to sleep. At 11 o'clock a. m. the temperature was normal, and the patient sleeping soundly. At 12 o'clock m. the temperature was 98⅘°; at 2 o'clock p. m. 102½°. At 3 o'clock p. m. the symptoms changed; the surface became cold and livid; the skin shrivelled and clammy; the breathing short and labored. A catheter was introduced and not a drop of urine found in the bladder. The patient continued in this condition until death occurred, at 5 o'clock p. m.

During the last hours of Hasbrouck's illness, Private Hermann Rathjin, Company E, Sixteenth Infantry, who had occupied the same tent and bunk, was admitted to the hospital suffering from diarrhœa. He had been to the rear four times since morning. He reported at sick-call at 7.25 o'clock a. m., when Acting Assistant Surgeon Warren prescribed the following: R. Quiniæ sulph., gr. xxiv; pulvis opii, gr. viii; hydrarg chlor. mite, gr. iv; bismuthi subnitras, ʒij. Mix in eight powders; one to be taken three times a day. When brought into the hospital his temperature was 99°, and he was complaining of cramps in the extremities. There had been no vomiting. Acting Assistant Surgeon Warren ordered one drachm of Squibb's mixture to be given as occasion required. A wall-tent was erected, and the patient removed from the neighborhood of the hospital where Hasbrouck was dying. At 4 o'clock p. m. he had a thin and slightly flocculent discharge. It was disinfected with carbolic acid and buried. At 5 o'clock the temperature in axilla was 99°. He was restless and complaining. The bowels moved again; the second time since the patient was admitted. The discharge was excessive in quantity, and wet the bed. I introduced hypodermically one-sixtieth of a grain of atropia and one-fourth of a grain of morphine, with evident relief. At 6 o'clock p. m. the patient was in good spirits; so much so that when asked as to his condition, he replied, "Bully; I never felt better in my life." At 7 o'clock p. m. his features had undergone a great change; the face emaciated; the orbits sunken; hands shriveled; nails blue; upper extremities cold and pulseless; lower extremities, body, and face warm. At 8 o'clock p. m. the surface was cold and clammy, and the patient comatose. I introduced the catheter, and found the bladder empty. At 10 o'clock p. m. the temperature was 99°, and the pulse still imperceptible. At 10.30 o'clock p. m. I ordered mustard bandages applied to the extremities, when the patient slightly reacted. At 1 o'clock a. m., August 30, he was moribund. The catheter was again introduced, but no urine found in the bladder. At 4 o'clock a. m. his condition was the same; still sinking, with lower extremities slightly warm; 7 o'clock a. m. the same. At 7.30 o'clock a. m. the patient died.

In tracing the origin of this and the preceding case, I learned that Private Rathjin had nursed Musician Rushbrook and wife during their illness, and that Private Hasbrouck had passed several times through the room. Both, however, are reported to have visited certain abandoned negro shanties, where cases of cholera had occurred, and it is supposed that they contracted the disease in that way. The day these two soldiers died the command moved two miles to a new camp, where there was a fine spring of water, and remained there until the disappearance of the disease in town. The troops while encamped enjoyed excellent health. The same day, Saturday, the 30th, a feeble old negro died of the cholera in a law-office in town, after an illness of sixty hours, and the child of a negro who had nursed nearly all the cases was taken ill with the symptoms of cholera, and died in six hours. The discharges were at first thrown on the ground, but afterward disinfected and buried.

The following Tuesday, September 2, a colored woman who had nursed the last case was attacked with vomiting and diarrhœa, which soon became rice-water in character. Atropine, opium, quinine, and calomel were prescribed without effect; the temperature in the axilla being 98°, and the patient rapidly sinking. Drs. Wilson and Berry, the attending physicians, determined at 10 o'clock p. m. to resort to the transfusion of milk. The following is their report of their experiment:

"Having to improvise an apparatus, the necessary preparations were not completed until 11.30 o'clock p. m., at which time the patient was pulseless, could only speak in a husky whisper, and was so weak as to be unable to raise her head. It being impossible, because of her dark color and the lateness of the hour, to find the cephalic vein, the median cephalic was exposed, the tube inserted, and milk fresh from the cow, and kept at the temperature of 100°, was slowly passed into the vein. In five minutes six or seven ounces had been transfused, when the pulse became moderately strong, the voice returned, so that she could be heard in an adjoining room, and her strength was increased, so that she partially raised up in bed and turned over on her side. The movement of the arm threw the tube out of the vein, when we determined to let her rest for an hour, and then procure more fresh milk with which to repeat the injection. At the end of half an hour she was found sinking rapidly, and before the preparation could be made she was dead."

The same day a lady, who had left town, died in the country of cholera.

On Thursday, September 4, a colored woman, who had been ill some time, was attacked and died of the disease in twelve hours.

At the same time the wife of a negro preacher was taken sick and died in twenty-three hours. These cases for a time were supposed to terminate the disease; and those citizens who had been absent since its first appearance returned to their homes. Among the number returning was a lady who stopped at Tate's house, and occupied the same room in which Bewley died. She had been there but a few days when she was attacked with a severe diarrhœa, that rapidly culminated in cholera. She died Sunday, September 21. This case terminated the disease.

I have enumerated, in the foregoing report, only those cases that resulted in death. There were several cases pronounced cholera that recovered. The first case was a stout, healthy young colored woman, living in the rear of Tate's house, who had unmistakable symptoms of the disease. She used water from the Richmond-street well.

The next was a consumptive, the undertaker of the town, who used a privy in common with persons nursing cholera-patients, some of whom afterward were attacked and died of the disease. He had quite a number of thin rice-water discharges, accompanied with vomiting and cramps and entire suppression of urine. The symptoms readily yielded to treatment, and the patient rapidly convalesced.

The third recovery was a young man living opposite the Richmond-street well, who was taken sick in the country with violent vomiting, diarrhœa, and cramps. He was greatly prostrated, and had complete suppression of urine for two days.

The fourth was a colored woman, the mother of the child that died on the 29th. The discharges in this case were very copious, and resembled soap-suds, but afterward became rice-water in character. There was vomiting and cramps, with partial suppression of urine. The treatment, as in the former cases, consisted in the hypodermic injections of atropia with morphine, and the administration of ten grains of dry calomel on the tongue every hour. The patient speedily recovered.

The fifth case was Private William Graff, Company E, Sixteenth Infantry, who was severely prostrated by an acute attack of vomiting, purging, and cramps. His symptoms were carefully watched by Acting Assistant Surgeon Warren, and counteracted by the administration of dry calomel on the tongue, and the injection hypodermically of one-sixtieth of a grain of atropia and one-fourth of a grain of morphia. The patient slowly convalesced.

The sixth and last case of recovery occurred at a hotel in town which was in an extremely filthy condition. The cook, a colored woman, was taken with a profuse diarrhœa, which speedily became choleraic. The vomit was thin and watery; the patient complained of excessive thirst, and of severe cramps in the extremities; the voice became husky; the orbits sunken; the skin shriveled, and the surface cold and clammy. The bowels moved involuntarily, the patient's expression being, "it's all the time running from me;" but there was no suppression of urine. I introduced hypodermically a solution of atropia and morphia, with the effect of controlling the cramps and pain and quieting the stomach. I then ordered five grains of dry calomel to be given every hour until the discharges became tinged with bile. The involuntary movements of the bowels ceased, and the patient rested comfortably. The next day I directed fifteen or twenty drops of aromatic sulphuric acid to be given every four hours, and the patient to be well nourished. Secondary fever soon afterward occurred, and the recovery was protracted.

During the prevalence of the epidemic almost every remedy was prescribed, but nothing found so beneficial as the hypodermic use of atropia and morphia in controlling the cramps and vomiting. It was not an uncommon occurrence to give ten grains of dry calomel on the tongue every hour until the discharges were distinctly tinged with bile.

The tongue usually indicated a malarial influence, in which case quinine was prescribed. It was noticed during the epidemic that a sympathetic diarrhœa prevailed among the citizens, and that in many cases it was accompanied with a partial suppression of urine.

Out of the thirty-four cases of cholera that occurred, only six of them happened on the west side of town, while the greater number are located in the immediate neighborhood of the Richmond-street well, or in the ravine in which it is situated.

Six cases of cholera are reported from Tate's house, in which Bewley died, and where undoubtedly originated the outbreak. The largest number of cases occurred Thursday, August 21.

The following is an exhibit of the number of white and colored, male and female, cases that occurred during August and September:

Months.	White.		Colored.		Total.
	Male.	Female.	Male.	Female.	
August	6	5	11	7	29
September	.....	2	.....	3	5
Total	6	7	11	10	34

The following table shows the duration of illness, the complexion, and sex:

Hours.	White.		Colored.		Total No. of cases.
	Male.	Female.	Male.	Female.	
6	.....	.....	4	1	5
7	.....	.....	1	.....	1
8	2	.....	1	.....	3
10	2	1	2	2	7
12	1	.....	1	3	5
15	.....	.....	.....	1	1
16	1	1	.....	.....	2
20	.....	.....	1	1	2
22	.....	.....	.....	1	1
23	.....	.....	.....	1	1
60	.....	.....	1	.....	1
Unknown	.....	.....	.....	.....	5

Very respectfully,
Your obedient servant,

SAML. L. S. SMITH,
Acting Assistant Surgeon
United States Army.

IV.—Lebanon, Ky.

On the 31st of August, an explosion of epidemic cholera occurred at the town of Lebanon, Marion County, Kentucky.

The command in garrison at the United States barracks upon the northern outskirts of the town, was in most admirable condition, with almost a clean sick-report.

Extraordinary precautions were adopted to discover any case of cholera (should it occur among the troops) at its inception. A guard was kept over the camp-privy, and any individual having two actions of his bowels within twenty-four hours was at once reported, and was required to use at the next dejection an earth-closed commode, that its character might be inspected.

The official history of this post during the epidemic is presented in a series of official telegrams, letters, and reports.

Headquarters Department of the South,
Louisville, Ky., September 3, 1873.

Commanding Officer,
Lebanon, Ky.:

Sir: I am instructed by the department commander to direct that, in case the cholera makes its appearance among your command, it be removed to a camp to be selected by yourself and the medical officer of the post.

Very respectfully,
Your obedient servant,

J. H. TAYLOR,
Assistant Adjutant-General.

Headquarters Post of Lebanon,
Lebanon, Ky., September 8, 1873.

Assistant Surgeon Ely McClellan,
Post-Surgeon, Lebanon, Ky.:

Sir: Inclosed herewith please find a copy of letter from headquarters Department of the South, directing, in case "cholera" appears

among this command, that it be removed to a camp to be selected by the commanding officer of the post and yourself. In view of your extensive knowledge of the surrounding country, the commanding officer would be pleased to hear from you of a locality suitable for a camping-ground.

Very respectfully,
Your obedient servant,
W. W. BARRETT,
First Lieutenant Sixteenth Infantry, U. S. A.,
Post-Adjutant.

"LEBANON, KY., *September* 8, 1873.

"SIR: I have the honor to acknowledge the receipt of your communication of this date, relating to the removal of the command from the barracks in case cholera should appear among the troops.

"It is impossible for me to designate any locality in this vicinity which would be suitable for a camping-ground.

"In the entire country around Lebanon cholera is or seems to be epidemic, and the cases attacked have all gone rapidly to a fatal termination.

"The present indication seems to be that the disease is arrested in the town, and for the present, in my opinion, the barracks are the safest point at which the troops could be placed.

"Should a removal become imperative, I would suggest that the camp selected should be in a portion of the country uninfected, and that would require a considerable distance to be placed between the camp and Marion County.

"Very respectfully, your obedient servant,
"ELY McCLELLAN,
"*Assistant Surgeon U. S. A.,*
Post Surgeon.

"Lieut. W. W. BARRETT,
"*Sixteenth Infantry,*
Post-Adjutant, Lebanon, Ky."

"HEADQUARTERS, POST OF LEBANON,
"*Lebanon, Ky., September* 9, 1873.

"SIR: I have the honor to submit herewith report of Assistant Surgeon Ely McClellan, U. S. A., post-surgeon, upon the question of moving the troops in case cholera should make its appearance among the command.

"Upon receipt of the letter containing the order above referred to, Dr. McClellan and myself made an extended tour of observation of the country adjacent to the town of Lebanon, the result of which satisfied our minds that cholera was raging to a much greater extent and with more virulence in the country, say within twelve or fourteen miles of the post, than within the limits of the town of Lebanon, (and where cholera is not prevailing, flux is.) In interviews with members of the medical profession, who have every opportunity to know the condition of the health of the county, I find, without exception, that they indorse my opinion. Under such circumstances, and in view of the facts that the troops are comfortably quartered; that they are accustomed to the water at the post; that the post is in very good sanitary condition, (as the Medical Director of the Department can testify,) and that if the troops were moved it would almost be impossible to proceed to any point that

is uninfected within two days' march of the post, and then it would be very doubtful if a building could be obtained to quarter the troops in; that if they had to live under canvas at this late period of the year, with warm days and cold nights, it would probably induce diseases similar to those prevailing through the country; that the health of the command is very good—(out of a total of nearly eighty persons only six persons are sick)—and that in making the move the regular routine of duty at this post would be broken into and the command would be more or less alarmed, I have the honor to respectfully ask that the order referred to be so amended as to leave it within the discretion of the Post-Commander and Medical Officer if the move be made and should they decide so to do, that the command may be permitted to move by rail to such a point as in their judgment may seem best.

"Very respectfully,
Your obedient servant,

"CHAS. E. MORSE,
"*Captain Sixteenth Infantry U. S. A.*,
Commanding Post.

"ASSISTANT ADJUTANT-GENERAL,
"*Headquarters Department of the South,*
Louisville, Ky."

"HEADQUARTERS DEPARTMENT OF THE SOUTH,
"*Louisville, Ky., September* 12, 1874.

"SIR: I am instructed by the department commander to say that the question of removing the troops from Lebanon, in the event of the cholera appearing among them, is left to the judgment of the Post-Commander and Medical Officer.

"Very respectfully,
Your most obedient servant,

"J. H. TAYLOR,
"*Assistant Adjutant-General.*

"COMMANDING OFFICER,
Lebanon, Ky."

The special report of Assistant Surgeon Ely McClellan to the Surgeon-General of the Army is herewith submitted:

"SEPTEMBER 30, 1874.

"To the SURGEON-GENERAL U. S. A.

"SIR: I have the honor to forward herewith the report of the epidemic of cholera which occurred in the vicinity of this post during the months of August and September of this year. As soon as the presence of cholera was announced in New Orleans in May last, I succeeded in forming among the medical men of this town a sanitary association. The co-operation of the town trustees was secured, an inspector was appointed, and every effort was made to place the town and its surroundings in as perfect a state of sanitary police as possible. Under the able administration of Capt. C. E. Morse, Sixteenth Infantry, commanding the post of Lebanon, Ky., the garrison was placed in the most admirable police; drains were cleared and disinfected; the *débris* was collected and burned; a careful supervision was kept over the diet and personal cleanliness of the men of the command. Special means were adopted to secure the well from which the drinking-water was procured from all surface-

drainage. I have no hesitation in stating that the sanitary condition was admirable and could not have been improved.*

* * * * * * *

"During the epidemic the medical gentlemen of this town were constantly engaged in the country, and for the majority of the hours after the outbreak of the disease until September 2, when Acting Assistant Surgeon R. G. Redd, U. S. A., who had been ordered to report to me, arrived, I was the only physician in the town.

"The commanding officer wisely maintained all camp regulations; duty went on as usual; no unusual restrictions were employed, but a constant vigilance was maintained.

"Impressed with the value of prophylactics, or rather internal disinfection, sulph. of iron and sulphuric acid were exhibited in all cases, and a mixture containing quinine, sulph. of iron, and sulphuric acid largely diluted, was kept upon the hospital-table, and all the command were encouraged to use it. The officers and their families were requested to occasionally use a pill of iron, gentian, and nux vomica. With the exception of two cases of diarrhœa threatening to terminate in dysentery in the families of two of the officers, that portion of the command remained healthy. Laundresses and their families were subjected to the same regulations as enlisted men, except that the supervision was with them, if possible, more exacting."

DEPARTMENT OF TEXAS.

To the courtesy of the Medical Director, Department of Texas, we are indebted for the following information:

"SAN ANTONIO, TEXAS, *November* 4, 1874.

"DOCTOR: The epidemic of cholera of 1873 was heard very little of here. In May of that year I learned, indirectly, from private sources, that the cholera was at that time prevalent and very fatal in New Orleans; and as there was then a military post here, with a garrison of two companies of infantry, I addressed a communication in relation to it to the mayor of this place. (See inclosure.)

"The report was corrected very soon afterward, and nothing more was heard here of the epidemic until September, when it was rumored that both cholera and yellow fever were at one or two points on the Houston and Texas Central Railroad, at Denison and below; but it was not definitely understood that it was truly cholera until subsequently.

"There was but one case reported among the troops in this department in 1873. It occurred in a soldier, Private William J. Carson, Company G, Eleventh Infantry, while on detached service, on escort duty from Fort Griffin, Texas. He died at Denison, Texas, of cholera, at 4 o'clock a. m. the 14th of October of that year. The report was received at this office the 13th of December. The case was reported by Acting Assistant Surgeon J. S. Cooper, U. S. A., then acting as post-surgeon at Fort Griffin, who states in his report, "I am informed that the disease was epidemic in Denison at the time, and the mortality ranged from nine to fourteen persons daily."

"I was on a tour of inspection at the time, and heard nothing of this

* The omitted portions of this report refer only to events which have already been stated at length in the narrative of the Kentucky group.

case, and very little about the existence of cholera anywhere; and there were no steps taken to prevent its introduction.

"Very respectfully,

"Your obedient servant,

"J. F. HAMMOND,

"*Surgeon U. S. A.*"

Dr. ELY MCCLELLAN,

"*Assistant Surgeon U. S. A.*

"HEADQUARTERS DEPARTMENT OF TEXAS,

"MEDICAL DIRECTOR'S OFFICE,

"*San Antonio, May* 23, 1873.

"To HON. F. GIRANDL,

"*Mayor San Antonio, Texas:*

"SIR: I have the honor to call your attention to the fact that an epidemic of cholera is said to be prevailing largely in New Orleans, and the mortality great. As the quarantine-laws are not in force along the coast of this State, the disease may make its appearance by any arrival of the stage from Austin or Columbus. I would respectfully suggest that you take, as early as practicable, such measures as the law allows to have and to keep the city thoroughly policed and disinfected, and to have inspected the markets, with the view to excluding all unsound meats, fish, and vegetables.

"Very respectfully,

"Your obedient servant,

"J. F. HAMMOND,

"*Surgeon U. S. A.,*

"*Medical Director Department of Texas.*"

INDEPENDENT POSTS.

"SAINT LOUIS BARRACKS, MO.,

"*October* 15, 1874.

"SIR: I have the honor, in compliance with your request, to furnish you with the following account of the occurrence of cholera at this post in 1873, and of the measures adopted to prevent its spread.

"The only case of cholera that occurred during the year 1873 was in the person of private John T. Morton. This man was a new recruit of large frame and healthy constitution. He reported sick about 10 o'clock a. m. on the 14th of July, 1873, and stated that he began to have diarrhœa at daylight that morning, and that he did not report at sick-call, as he thought it would soon pass off.

"On admission to hospital he had all the characteristic symptoms of cholera. He rapidly became worse, and died at 9 o'clock p. m. the same day, having retained his consciousness and exhibited the most striking indifference to his approaching death. No autopsy was made. Careful inquiry elicited nothing of importance in regard to the source of his disease. He had not been drinking, and had always slept in the quarters of his troop.

"In June cholera prevailed extremely in the adjacent city of Saint Louis, and in July diarrhœa prevailed in the command to the extent of 55.6 per cent. of the whole number taken sick.

"On the 30th of July, in addition to urging in writing that the guard-house be more thoroughly ventilated by suitable openings, I made the following recommendations, which were at once carried into effect:

"I. The old sinks in the rear of the quartermaster's and commissary's storehouses should be filled with dry earth, and no more rubbish thrown in.

"II. The two main sinks on the north and west sides of the post should be flushed daily, and all others that do not communicate with the sewers should be disinfected daily. Attention should be particularly given to the daily emptying and cleansing of the earth-closets used at the married soldiers' quarters.

"III. The back yards of all married soldiers' quarters should be thoroughly policed and inspected twice a week.

"IV. Prisoners should be required to bathe every other day ordinarily, and every day in hot weather.

"Attention to the foregoing measures should be given persistently and continuously, spasmodic efforts in such matters being of little avail.

* * * * * * *

"The floor of the wood-shed ought to be scraped and sprinkled with lime.

"A nuisance is committed at the rear of the quartermaster's storehouse by men urinating there.

"B. A. CLEMENTS,
"*Surgeon U. S. A.*"

"Dr. ELY MCCLELLAN, U. S. A.,
Lebanon, Ky.

I gave daily personal attention to the police of the post, and especially to the flushing and disinfection of the sinks.

On July 1, I addressed the following letter to the superintendent:

"CAVALRY DEPOT, SAINT LOUIS, MO.,
"*July* 1, 1873.

"GENERAL: In view of the prevalence of a form of cholera in a number of cities bordering the Mississippi and its tributaries, and of its prevalence in this city to the extent of twenty-five deaths in adults during the week just passed, I have the honor, in accordance with your request, to suggest the advisability of detaining recruits at this depot only for the shortest length of time that the interest of the service will admit of.

"Very respectfully,
"Your obedient servant,

"B. A. CLEMENTS,
"*Surgeon U. S. A.*

"General B. H. GRIERSON, U. S. A.,
"*Superintendent G. M. R. S.*"

On July 15, as the occurrence of diarrhœa was becoming more prevalent, I addressed the following letter to the superintendent, and an order in substantial conformity therewith was at once issued and caused to be scrupulously observed:

"CAVALRY DEPOT, SAINT LOUIS, MO.,
"*July* 15, 1873.

"GENERAL: A marked tendency to the occurrence of choleraic diarrhœa having manifested itself among the command, I deem it proper respectfully to recommend that troop-commanders be advised and instructed to forbid the use in their troop mess-rooms of the following vegetables, which are believed to be hurtful, viz, cabbage, corn, string-beans, turnips, cucumbers.

"The following vegetables afford sufficient variety for a wholesome

diet, and are deemed not to be injurious, viz, potatoes, beets, tomatoes, squash, okra, onions.

"I also recommend that the men be advised and ordered to report to the hospital without delay, and without regard to hours, whenever they become affected with diarrhœa.

"Very respectfully,

"Your obedient servant,

"B. A. CLEMENTS,
"*Surgeon U. S. A.*

"General B. H. GRIERSON, U. S. A.,
"*Superintendent G. M. R. S.*"

On the 21st July means were taken on my written representation to diminish the overcrowding of the guard-house.

During all this period the cholera, and diseases resulting in death, called in the official reports cholera morbus, prevailed very extensively in the city of Saint Louis, and but one case occurred here.

In view of the known predisposition of recruits to the attacks of cholera, in consequence of the change in their accustomed diet, and their imprudences, it seems probable that the measures adopted assisted in preventing the further occurrence and spread of the disease at this post.

Very respectfully,

Your obedent servant,

B. A. CLEMENTS,
Surgeon U. S. A.

APPENDIX.

METEOROLOGICAL RECORDS FROM DECEMBER, 1872, TO NOVEMBER, 1873, IN THE UNITED STATES.

While engaged in collecting the facts upon which the narrative of the cholera-epidemic of 1873 is based, we were frequently urged to present with the report a complete history of the meteorological conditions which may have been recorded during the months in which the epidemic influences were observed.

Through the courtesy of the Chief Signal-Officer of the Army, we are able to present extracts from the monthly weather review from December, 1872, to November, 1873.

MONTHLY WEATHER-REVIEW, DECEMBER, 1872.

STORMS.

During this month no less than twenty-seven storm-centers have been traced in their progress over various parts of the country upon the War Department weather-maps, Signal Service, United States Army. Two of these storms have apparently traveled entirely across the country from the Pacific coast, but the paths of the remainder are mostly confined to the country east of the Rocky Mountains, and are about equally divided between the two favorite winter-routes of these disturbances, the one from the northwest eastward over the lake region and northern New England to the eastern British provinces, and the other from the southwest northeastward to the Middle States and New England, or eastward along the Gulf coast, thence following the trend of the Atlantic coast northeastward toward Nova Scotia.

RAIN-FALL.

The returns from the signal-service stations show that an excess of rain, amounting to from 2 to 5 inches above the mean rain-falls for December, has, during the month, fallen in Texas, Louisiana, and Western Mississippi. A surplus, varying from 1.12 inches to 2.69 inches, has also fallen in Southern Virginia, North Carolina, Eastern Tennessee, interior portions of South Carolina and Georgia, and in Northeastern Florida. In all other sections east of the Rocky Mountains (excepting at New London, Rochester, Leavenworth, and Breckenridge, which exhibit amounts slightly above the mean) the figures show that the fall of rain and snow has been less than the average for December. This deficiency is comparatively small for New England, the Middle States, and lower lake region, but is large in Western Tennessee, the Ohio and Upper Mississippi Valleys, and over the country adjacent to Lakes Michigan and Superior, the precipitation having been scarcely one-fourth as much as the average for the month at many stations in these sections.

TEMPERATURE.

The mean temperatures for the month at the signal-service stations compared with the mean temperatures for December, as ascertained by a long series of observations, show that the month has been much colder than usual everywhere east of the Rocky Mountains. This excess of cold amounts to from 5° to 7° at stations in all parts of the country, and at Chicago, Milwaukee, Leavenworth, Breckenridge, and Rochester, it amounts to over 8°. Much colder weather has prevailed than in December, 1871, in all sections east of the Territories, except from Virginia to Southern New Jersey, and from Nebraska to Northern Illinois, where the temperatures have been about the same. This unusually severe weather may be attributed to the large number of areas of high barometer, or high atmospheric waves, which, with their attending low temperatures, have rolled across the country from west to east. No less than fifteen of these areas of high pressure have been traced upon the weather-maps for this month, while during the corresponding month last year only nine made their appearance.

MONTHLY WEATHER-REVIEW, JANUARY, 1873.

STORMS.

During the past month the progress of twelve storm-centers has been traced on the weather-maps of the signal-service. Of these, three have crossed the country in a northeastward direction from Texas to New England and the British provinces; five have moved from the extreme northwest eastward over the lakes into Canada or New England; one from Manitoba over Lake Superior into Canada; two northeastward up the Atlantic coast to the Eastern States and Nova Scotia or Canada; and one has progressed eastward through the Gulf States, and thence northeastward up the coast.

Of these storms the most severe have been that of the 7th and 8th in the northwest, and that which from the 21st to the 24th crossed the country from Texas to Nova Scotia. The westerly winds closely following the center of the former increased to strong gales, which, with heavy snow and temperatures far below zero, served to render it one of the most terrific which has visited that section for many years. The latter (that of the 21st) was very extensive in its effects, as during its course nearly the whole country east of the Rocky Mountains was reached by its rain or snow belts. Its northeasterly gales were felt with most severity from Lake Michigan to Lake Erie, and heavy snows fell from Kansas and Missouri northeastward to Canada.

RAIN-FALL.

The monthly rain-fall returns for January from the signal-service stations show that there has been in general a deficiency on the Pacific coast; but east of the Rocky Mountains an excess of rain and snow. This latter excess is most decided in Missouri, New Jersey, and Connecticut. A small region of deficiency also appears to extend over Kentucky, Tennessee, Mississippi, and Alabama.

TEMPERATURE.

The mean temperatures for January, as given by the signal-service reports, show that over the country east of the Rocky Mountains the weather has been generally colder than usual. This difference is greatest in the northwestern section, being in Michigan and Northern Ohio about 6° below the mean temperature for the month, and from Wisconsin and Minnesota to Kansas ranging from 7° to 12° lower than usual. In the lower Mississippi Valley, and also Northwestern New York, the average temperatures have been from 5° to 6° lower than might have been anticipated, while this difference in New England and throughout the Middle States generally has been from 2° to 4°. In the South Atlantic States about the mean temperatures have prevailed, except in Northern Florida, where they are shown to be somewhat lower, as also in the Gulf States.

MONTHLY WEATHER-REVIEW, FEBRUARY, 1873.

STORMS.

During this month ten different storms have crossed portions of the country east of the Rocky Mountains. The paths of their centers have, approximately, been traced upon the War Department weather-maps, Signal Service, United States Army.

That of February 3d and 4th passed over Nebraska, Iowa, Wisconsin, and Michigan into Canada, accompanied by rain, at places heavy, from Texas to Iowa and eastward to the middle Atlantic coast, but by generally light snow or rain, thence northward over New England and the lakes, and by brisk and high winds over the lake region, westerly winds being most severe; thunder-storm reported from Knoxville, 4th.

February 5, 6, 7, and 8.—Over Gulf and South Atlantic States and thence northeastward off the middle and east Atlantic coasts and over Nova Scotia, accompanied by heavy rain to Massachusetts, and by fresh and brisk winds over Gulf coast, and brisk and high over Atlantic coast, easterly to northerly winds most severe.

February 6 and 7.—Eastward over Northern Minnesota and Lake Superior into Canada, accompanied by areas of very light snow and brisk and high winds over the lake region, southwesterly to northwesterly being most severe.

February 9, 10, and 11.—Eastward from Dakota over Minnesota, Wisconsin, and Michigan into Canada, accompanied by generally light rain or snow from Missouri, Tennessee, and Virginia northward and northeastward, and by brisk and high winds, southeasterly to southwesterly being most severe.

February 11 and 12.—Northeastward over Southern States and beyond middle Atlantic coast, accompanied by heavy rain from Kentucky to Southern New Jersey and southward to Gulf, but snow from Ohio to lower lakes and Connecticut, and by brisk to high southerly to westerly winds over western Gulf coast, brisk and high southwesterly over South Atlantic States, and brisk and high easterly to northerly from Virginia

to Massachusetts; thunder-storm reported from Knoxville, 12th; storm very severe from Cape Cod southward.

February 15, 16, and 17.—Northeastward from Texas over the Ohio Valley; thence eastward over and beyond middle Atlantic coast, accompanied by rain, generally heavy, from Iowa to Connecticut and southward to Gulf, but areas of light rain and snow thence northward to Maine and the lakes, and by brisk and high winds over western Gulf and Atlantic coasts; severe thunder-storm reported from Memphis on 15th.

February 17 and 18.—Northeastward from Dakota over Minnesota and Lake Superior into Canada, accompanied by light rain and snow and by brisk and high winds, followed by low temperature.

February 20 and 21.—One over the Southern States, and thence northeast along the coast, with fresh and brisk southerly winds over west Gulf, veering to high northerly; brisk southerly over south Atlantic coast, and brisk and high northeasterly to northwesterly over middle and east Atlantic coasts; other northeastward over Missouri, Illinois, and Michigan into Canada with brisk and high winds; the two accompanied by heavy rain over the country east of the Rocky Mountains, except snow from Iowa and Minnesota eastward over the lake region and Northern New England.

February 26 and 27.—From Nebraska and Missouri northeastward over Michigan into Canada, accompanied by brisk and high winds; at the same time a diminished pressure from Texas eastward over Gulf and South Atlantic States, and thence northeast off middle and east Atlantic coasts with brisk and high winds; the two accompanied by rain from Missouri to Northern Louisiana and eastward to Virginia and south Atlantic coast, but by snow thence northward over northwest lakes and Southern New England.

RAIN-FALL.

As compared with the means of a number of years for the month, the rain-fall returns from the signal-service stations show a deficiency over the lake region, Northwest, Gulf States, Southern Georgia, and South Carolina, New York, and Northern New England, but an excess from the northern portions of Alabama, Georgia, and South Carolina to Tennessee, Southern Indiana and Ohio, Pennsylvania, and Southern New Jersey, being most marked over Tennessee; also an excess over Rhode Island and Eastern Massachusetts and Connecticut.

TEMPERATURE.

From the mean temperature for the month, taken from the signal-service reports and compared with that for a number of years at the same stations, or close by, it is observed that the former has been somewhat higher over the Gulf States, eastern portions of Kentucky and Tennessee, and southern portions of Ohio and Indiana, by from 1° to 4°, but otherwise east of the Rocky Mountains lower by from 1° to 8°, being principally over New York, Michigan, Wisconsin, and Minnesota.

MONTHLY WEATHER-REVIEW, MARCH, 1873.

STORMS.

During this month eleven storms have crossed portions of the country east of the Rocky Mountains. The paths of their centers have approximately been traced upon the War Department weather-maps, Signal-Service, United States Army.

The center of that of March 1, 2, 3, and 4, passed from Texas over the Gulf States as a diminished pressure on the 1st and 2d, accompanied by heavy rains and brisk winds, which increased to high northerly along the Texas coast on the 1st and 2d; thence northeastward along the Atlantic coast, followed by brisk and high northerly to westerly winds over South Atlantic and Middle States, but brisk and high northeasterly, backing to northwesterly, over east Atlantic coast, and accompanied by heavy rain over the South Atlantic States, but by generally light snow over the Middle and Eastern States; this was followed on the 2d and 3d by very cold weather and brisk and high northwesterly winds from the northwest and upper lakes to the Gulf, which, on the 3d and 4th, extended eastward over the Atlantic coast; on the 3d, thermometer readings from 15 to 36 degrees below zero were reported from Minnesota.

March 6, 7, and 8.—Nearly due east over Dakota, Minnesota, and Upper Michigan into Canada, preceded by rain and brisk to high easterly and southerly winds from the Upper Mississippi Valley and Tennessee to the lakes and northern portions of the Middle and Eastern States, followed by occasional snow over the lakes and Minnesota, and by brisk and high westerly winds from the Missouri Valley eastward over the Middle and Eastern States, increasing to gales over the lakes.

March 8, 9, and 10.—From Southern Dakota, a little south of east over Iowa, Illinois, and Indiana, as a diminished pressure, accompanied by fresh and brisk winds only; but thence east over Ohio, Pennsylvania, and beyond Cape Cod increasing in severity, with brisk and high winds and generally light rain or snow from Tennessee and North Carolina to Ohio, and thence to Maine.

March 10 and 11.—From Dakota over Minnesota and Lake Superior into Canada and continuing north of the Saint Lawrence Valley; preceded by brisk and high easterly to southerly winds, and followed by brisk and high westerly to northerly winds, accompanied by areas of light rain or snow from Missouri to Minnesota and Lake Superior and Huron, but thence eastward over the Middle and Eastern States becoming general and at places heavy.

March 14, 15, and 16.—Eastward from Nebraska and Southern Dakota over the lake region and apparently the eastern British provinces, accompanied by rain from Northern Louisiana to New England and north of this line to the lakes and northwest; preceded by brisk to high easterly and southerly winds, and followed by brisk and high northerly to westerly, increasing at places to gales.

March 17 and 18.—Eastward over Wisconsin, the lakes, New York and New England, accompanied by brisk winds and rain, generally light, from Tennessee and Virginia, northwest, north, and northeastward.

March 18, 19, 20, and 21.—Eastward over Dakotah to lower Michigan, apparently as a diminished pressure, but then developing into two; one passing over Virginia, and thence northeastward along the coast; the other north of the lower lakes and over the northern portion of New England, accompanied by rain and snow over the entire country east of the Rocky Mountains, also by brisk and high winds, the easterly having probably been the most severe, increasing to gales.

March 22 and 23.—From Dakota over the upper lakes into Canada, and thence over Northern Maine, accompanied by occasionally light snow and brisk winds which at places increased to northeast gales.

March 23, 24, 25, 26, and 27.—Northeastward over the Ohio Valley, and developing into two; one over the lower lakes, down the Saint Lawrence Valley, the other over the middle and east Atlantic coasts and New Brunswick, accompanied by heavy rain over the entire country east of the Rocky Mountains, except that from Northern New England westward over the lakes to the northwest it was snow, and by brisk and high winds, which at places increased to gales, the north and west having been most severe, except at Quebec, where a very severe northeast gale prevailed on the afternoon of the 26th; this storm was followed by a severe "norther" in Texas on the 25th.

March 28, 29, and 30.—From Southern Dakota eastward over the lakes, New York, and New England, accompanied by areas of light rain or snow over the northwest and upper lakes, but by rain, generally very heavy, from the Lower Mississippi and Ohio Valleys and lower lakes to the Atlantic coast, also by brisk and high winds; on its passage over the Middle and Eastern States it increased in severity, and the winds to southerly gales on the coast, shifting later to northwest; it has undoubtedly been the most severe storm of the month, and the barometric depression most remarkable, the lowest reading having been 28.80 inches at Burlington, Vt., 11 p. m. on the 29th.

March 30 and 31.—Over the northwest lakes and New England, accompanied by generally very light rain or snow from the northwest eastward over the lake region, Ohio Valley, and Middle and New England States, and by brisk winds, increasing occasionally to high.

RAIN-FALL.

As compared with the means of a number of years for the month, the rain-fall returns from the signal-service stations show a general deficiency at the stations east of the Rocky Mountains and at San Francisco, from 0.05 to 4.00 inches, except over the southern portion of New England, northern and western portions of the Middle States, Southeastern Louisiana, Jacksonville, Florida, and Eastern Tennessee and Kansas, where the excess varies from 0.10 to 4.86 inches.

TEMPERATURE.

The mean temperature for the month, as taken from the signal-service reports, at all stations east of the Rocky Mountains is higher, from 1° to 10°, than the same for last year, except for Jacksonville and Key West, Fla., which is slightly lower, at latter 1° 5′. By comparing same of this year with that for a number of years at the same stations or at others close by, it is observed that the former is from 1° to 5° lower over the Southern, Middle, and New England States, Ohio and southern portions of Michigan, Illinois, and Missouri, but northwest of this region to Minnesota, Iowa, and Nebraska, it varies from 4° above to 5° below. During the month the weather has therefore been generally colder than usual, but warmer than March of last year, except in Utah, where it has been somewhat colder this than last, and at San Francisco, where there has apparently not been any change.

MONTHLY WEATHER-REVIEW, APRIL, 1873.

STORMS.

During this month seven storms have been felt over a portion, or nearly the whole, of the country east of the Rocky Mountains. The paths of their centers have, approximately, been traced upon the War Department weather-maps, Signal Service, United States Army.

The center of that of April 1 and 2 passed over Missouri, Illinois, and Michigan into Canada, sending out a minor disturbance over the middle Atlantic coast, accompanied by brisk to high winds and heavy rain in all the States east of the Rocky Mountains, except that it was partly snow and sleet over northern New England, the lake region, and the northwest; it was felt as a very severe storm from northern Texas to the lakes and northwest.

April 3, 4, 5, 6, and 7.—Over Nebraska, Iowa, Missouri, Illinois, and lower Michigan into Canada, accompanied by brisk and occasionally high winds, and sending out several minor disturbances to the eastward; also by rain-areas, generally light, from the Missouri and Ohio Valleys and east and middle Atlantic coasts to the lakes and Saint Lawrence Valley, except over the lake region, where it was partly snow.

April 7, 8, 9, and 10.—Over Texas, Arkansas, Illinois, and Lake Michigan into Canada, sending out a branch over the Ohio Valley, middle Atlantic coast and to the south of New England, both accompanied by brisk and high winds; also by rain, generally heavy, from Texas to Minnesota and eastward to the Atlantic coast, except that it was partly snow over the upper lakes and northwest; it was followed by a severe "norther" in Texas on the 8th.

April 10, 11, 12, and 13.—Over the northwest, and developed into two; one passing over the lower lakes into Canada, accompanied by brisk and occasionally high winds and by rain or snow from Missouri and Kentucky to the lakes; the other over the Ohio Valley and Middle Atlantic coast, and thence slowly northeastward, preceded by severe northeasterly gales, rains, sleet, and snow from Chesapeake Bay to Nova Scotia, New Brunswick, and the lower Saint Lawrence Valley.

April 13, 14, 15, 16, 17, 18, and 19.—Eastward over Wyoming, Nebraska, and Kansas to Iowa and Missouri; then diminishing in intensity and breaking up into, and sending out to the eastward over the lower lakes, several minor disturbances, and another to the middle Atlantic coast, moving thence very slowly on the 17th, 18th, and 19th, along the New England coast to Nova Scotia and New Brunswick as quite a severe storm; it was accompanied by rain, generally heavy, over the entire country east of the Rocky Mountains, except that it was partly snow over northern New England, the lake region and the northwest; on the 12th, 13th, 14th, and 15th it was felt as a very severe storm of rain, sleet, and snow in Wyoming, Dakota, Nebraska, and Minnesota, on the afternoon and night of the 14th and morning of the 15th as a very severe "norther" in Texas; east of the Mississippi numerous minor disturbances were left, producing light rain or snow.

April 21, 22, and 23.—Southeastward over Dakota, the Lower Missouri and Lower Ohio Valleys, and beyond the Carolinas, attended by fresh to very brisk winds, and by areas of generally light rain or snow from Missouri, Tennessee, and North Carolina to Minnesota, the lakes, and Massachusetts, and followed by a severe "norther" in Indian Territory on the 22d, and in Texas on the 23d and 24th.

April 27, 28, and 29.—Over Indian Territory to Kentucky, then apparently developing into and disappearing to the eastward as several minor disturbances, accompanied by fresh and brisk winds and rain from the interior of the Gulf States to the lakes and Massachusetts, which was generally heavy over the interior and along the Atlantic coast.

RAIN-FALL.

The returns for the month from the signal-service stations show that there has been an excess of rain and snow over southern New England, the lower lake region, from Indiana and Southern Michigan to Kansas, Iowa, and Southern Minnesota, and over Central Alabama and Southeastern Georgia, varying from 0.65 inch to 3.06 inches, being greatest in Illinois and Missouri. Elsewhere east of the Rocky Mountains there has been a deficiency of from 0.07 inch to 3.87 inches, being most marked in the western Gulf States.

TEMPERATURE.

During the month the weather has been generally colder than usual east of the Rocky Mountains, and colder than April of last year at the Rocky Mountain stations and eastward. The mean temperature for the month, taken from the signal-service reports, and compared with that for a number of years at the same stations, or others close by, is lower from Kansas and Missouri to Minnesota, 3° to 8°; in the Middle States and lake region, 0°.5 to 5°.7; in New England and from Kentucky to the Gulf, 0°.5 to 3°; while in the South Atlantic States it varies a little above and below.

The same compared with that of last year is lower at the Rocky Mountain stations, 2° to 6°; thence eastward, 0°.5 to 8°; the difference being greatest over the Northwest and the Middle States.

MONTHLY WEATHER-REVIEW, MAY, 1873.

STORMS.

During this month ten storms have traversed the country east of the Rocky Mountains.

I. *May* 1, 2, and 3—Apparently originating on the last day of April in the Rocky Mountains, the center of this storm progressed eastward over Kansas, Missouri, Northern Indiana, Southern Michigan, and Lake Erie, moving thence southeastward over Pennsylvania and Maryland to the Atlantic, sending out a branch on the 2d over Ohio, Virginia, Chesapeake Bay, and thence off the coast. Its passage was attended by heavy rains and brisk and high winds from the Mississippi to the Atlantic, sleet and snow falling in New England.

II. *May* 4 to 8—Appearing first in Southern Texas, this storm moved slowly northeastward over Arkansas, Missouri, Illinois, Southern Michigan, and Lake Huron. The highest winds during its passage were experienced on the coast of Texas, the lower lakes, and the middle Atlantic coast.

III. *May* 8 and 9—Developed among the mountains of North Carolina and moved northeastward along the middle Atlantic coast, accompanied by heavy rains and high winds.

IV. *May* 8, 9, and 10—Appeared first in Kansas, and moved eastward over Missouri, and thence rapidly northeastward over Illinois, Indiana, Michigan, and southern Lake Huron into Canada. Heavy rains fell in Northern Illinois and Eastern Iowa, and a belt of lighter rains and brisk winds, from four hundred miles to eight hundred miles in width, attended its progress.

V. *May* 10, 11, and 12.—Like III, this storm seemed to develop among the mountains of North Carolina, passing northeastward over Virginia, eastward over Chesapeake Bay, and again northeastward along the coast to New Brunswick.

VI. *May* 12 and 13.—Traveled from Minnesota very rapidly eastward over the lakes, Saint Lawrence Valley and northern New England to Nova Scotia, causing light rains and high winds throughout its course.

VII. *May* 13, 14, and 15.—From the plains of Kansas and Indian Territory this storm-center moved eastward over Southern Missouri, southeastward into Alabama, and then again eastward off the coast, rapidly diminishing in intensity after crossing the Mississippi. Considerable rain fell in all the Southern States, except Texas, but no dangerous winds were reported.

VII. *May* 18, 19, and 20.—Developing in the southwestern plains, this depression traveled rather slowly northeastward from the Indian Territory over Lakes Michigan and Huron into Canada, attended by rain-belts and fresh to brisk winds throughout the lake region and western and northwestern sections of the country.

IX. *May* 21 to 24.—From Montana this disturbance moved slowly eastward over Dakota, crossing, with somewhat increased velocity, Minnesota, the upper lakes, the Saint Lawrence Valley, Maine, and Nova Scotia, causing, by its slow progress, several days of cloudy and rainy weather over the entire northern portion of the country. It was during its passage over the Northwest that the terrible and destructive tornado swept through Iowa.

X. Two depressions, one slowly descending from the Upper Missouri Valley, the other moving northward over Kansas and Nebraska, seemed to unite in Southern Dakota to form this storm-center. From Dakota it moved southeastward into Iowa, northeastward to Lake Superior, and thence nearly due east over the Saint Lawrence Valley, Maine, and New Brunswick. Its rain-belts reached nearly the whole country east of the Mississippi, and brisk winds, increasing occasionally to high, were experienced throughout the northern sections.

TEMPERATURE.

The temperatures for the last month were generally lower than for May, 1872, the chief exceptions being Key West, Oswego, and Grand Haven. As compared with the mean May temperatures of a series of years, the thermometric figures for May, 1873, show excess of warmth over northern Lake Michigan, Northern Michigan, Lake Huron, Southern Ohio, Kentucky, Tennessee, and Eastern Massachusetts, but a deficiency of temperature in Kansas, Missouri, Iowa, Minnesota, Wisconsin, Indiana, Illinois, and the Gulf States, Florida, and Southeastern Georgia, and generally throughout the Atlantic States and the lower lake region. The regions of minimum rain-fall and thermometric maxima nearly correspond.

RAIN-FALL.

As compared with the mean May rain-falls, the rain-fall returns of last May show deficiencies in the northern and western parts of Lake Superior, Lake Michigan, and in the entire country stretching from the Saint Lawrence Valley to Maine, and thence over the lower lakes, Western New York, and Western Pennsylvania, West Virginia,

Ohio, Central Indiana, and Southeastern Illinois. Excess of rain occurred in Iowa, Missouri, Eastern Kansas, East Tennessee, and also along the Atlantic seaboard, except near Portland, Me., and Savannah, Ga., and a very great excess, from 2.00 to 14.58 inches, over the Gulf States.

RIVERS.

The river reports for the month show a slight decline in the Red and Missouri Rivers from the beginning to the middle of the month, after which a decided rise occurs until the end. The Arkansas rose slowly at Little Rock until the 23d, after which it subsided slowly. The Mississippi has alternately risen and fallen; at Saint Paul the water was 7 feet lower on the 19th than on the 31st, at which dates, respectively, it was lowest and highest; at Saint Louis the lowest and highest extremes occurred, respectively, on the 3d and 31st, the difference being 6 feet and 3 inches. At Cairo the river was lowest on the 28th and highest on the 16th, the extremes being about 13 feet. At Memphis the difference between the highest and lowest water for the month has been about 9 feet, having been highest on the 22d and lowest on the 28th. A very rapid rise occurred on the Cumberland at Nashville from the 1st to the 4th, after which the water gradually subsided until the 21st, rising again until the 27th, and then again falling until the 31st.

The Ohio was affected by a great swell which traveled from Pittsburgh on the 4th to Evansville on the 14th; since then it has fallen almost uninterruptedly. The difference between the highest and lowest water has been 15 feet at Pittsburgh, 19 feet at Marietta, 23 at Cincinnati, 7½ at Louisville, and 16½ at Evansville.

The indications are that the Missouri and its tributaries will continue to rise.

MONTHLY WEATHER-REVIEW, JUNE, 1873.

STORMS.

During this month ten disturbances have crossed portions of the country east of the Rocky Mountains.

The center of that of June 1 and 2 moved over Eastern Florida into Southern Georgia and disappeared, producing heavy rains and brisk winds.

June 3 and 4.—From Dakota over Iowa, Lake Michigan, lower lakes, New York, and New England, accompanied by fresh and brisk winds over the Northwest, lakes, and Atlantic States, and by rain, at places heavy, east of the Rocky Mountains, except on the Gulf coast.

June 7, 8, 9, 10, and 11.—From Dakota over Minnesota, the lake region, and northern New England; with rain, generally heavy, fresh and brisk winds, and occasionally severe thunder-storms, over the northern portion of the country.

June 12, 13, 14, and 15.—One southeastward over Minnesota to Lake Erie, and thence northeast into Canada, causing thunder-storms, with rain-areas, generally light, and fresh and occasionally brisk winds from the Ohio Valley to the lakes; a second, apparently developing in the Southern States, thence eastward to the coast and northeastward over probably Nova Scotia, with fresh and brisk winds and rain-areas on the coast.

June 14, 15, 16, and 17.—Over Dakota, Lake Superior, and thence probably over Maine, producing areas of light rain and fresh and brisk winds over the northern portion of the Middle States and the lake region.

June 18, 19, and 20.—Over Northern Minnesota, Lake Superior, and thence over Maine and Nova Scotia, attended by occasional rain-areas and brisk and high winds over the Northwest, lake region, and New England.

June 21, 22, 23, and 24.—From Dakota over Southern Minnesota to Iowa, then breaking up into and sending out to the eastward several minor disturbances, producing severe thunder-storms of short duration from Missouri and the Ohio Valley northward.

June 25, 26, 27, and 28.—Eastward over Northern Dakota, Minnesota, Lake Superior, and northern New England, sending a branch over Iowa, with severe thunder-storms from Tennessee to the Northwest, lakes, and New England.

June 28, 29, and 30.—Over Minnesota and the upper lakes into Canada, accompanied by severe thunder-storms north and west of the Ohio Valley, brisk winds over the Northwest, lake region, and Atlantic States, and rain, often quite heavy, from the Lower Mississippi, Northwest and lakes to the Atlantic coast.

TEMPERATURE.

The mean temperature for June, 1873, is higher than the mean for the month, except for the vicinity of Lake Superior, where it is lower by 0°.7 to 1°.8; in the South Atlantic States it varies from 1°.6 below to 1°.0 above, and from New Jersey and Eastern Pennsylvania to Maine, 1°.2 below to 1°.1 above. The excess is greatest in Northeastern Virginia, 4°.5; Northern New York, 1°.1 to 4°.7; Kentucky, Ohio, Indiana, and Southern Michigan, 1°.7 to 6°.5; Southern Alabama, 4°.9; Illinois, Southern Wisconsin,

and Eastern Iowa and Missouri, 0°.5 to 2°.1; Eastern Kansas, 4°.2; Southern and Western Minnesota, 4°.8 to 6°.7; Fort Sully, Dakota, 8°.0, (?) and Cheyenne, 4°.4.

The mean for June, 1873, is lower than that for June, 1872, at San Francisco, 1°.1; in the Gulf States, 0°.4 to 1°.6; in the South Atlantic States, 0°.3 to 2°.9; in the vicinity of Lake Superior, 0°.4 to 1°.6. It varies in the Middle, Atlantic, and New England States from 1°.1 above to 3°.9 below. The former is the higher in Iowa and Southern and Western Minnesota, 4°.5 to 5°.5; in the Ohio Valley, 1°.0 to 4°.7; over the lower lake region, 1°.1 to 2°.7.

Mean Temperature.

Signal-service stations.	1871.			1872.			1873.		
	April.	May.	June.	April.	May.	June.	April.	May.	June.
Washington	57°.6	64°.0	73°.2	56°.2	67°.8	76°.0	53°.3	63°.6	76°.5
New York	54.2	58.6	69.0	49.7	61.9	72.8	46.3	57.6	68.9
Boston	46.7	57.4	66.2	46.3	57.2	67.6	44.6	56.8	67.2
Chicago	51.2	56.7	66.8	47.9	56.1	69.5	42.3	53.9	70.2
Saint Louis	60.3	69.1	79.0	57.5	67.4	76.9	51.2	65.1	77.1
New Orleans	70.8	76.0	82.5	70.4	75.8	80.5	66.9	73.7	80.0

RAIN-FALL.

The returns for the month from the signal-service stations show that there has been an excess of rain over the mean from Florida to Western Tennessee, and westward to Arkansas and Eastern Texas, varying from 6.50 inches to 0.86 inch, from Eastern South Carolina to Southern Virginia 1.29 inches to 0.60 inch, from Central Indiana to Southeastern Missouri 1.42 inches to 0.68 inch, over Northeastern Ohio 1.23 inches, and from Eastern Nebraska northeastward to Eastern Minnesota and Northern Wisconsin and over Northern Michigan 4.34 inches to 0.45 inch.

There has been a deficiency in New England varying from 1.79 to 4.00 inches, in the Middle States, except Southern Virginia, 0.44 to 3.26 inches, from northern portions of Georgia and South Carolina to the Ohio Valley 0.35 to 2.03 inches, from Northeastern Kansas to Southern Wisconsin and Northern Illinois 1.67 to 3.90 inches, over Northwestern Ohio and Southeastern Michigan 0.29 to 1.23 inches, and over Western Minnesota 0.98 inch.

RIVERS.

The Red River rose steadily at Shreveport during the first week, after which it remained nearly stationary until the 28th, when it began to fall slowly.

The Arkansas fell and rose alternately during the first twenty days, then fell steadily, having been eight and a half feet lower on the 30th than on the 1st.

The Missouri at Fort Benton rose steadily until the 19th. Throughout the lower portion of the river an almost continuous rise occurred, although a slight fall was observed between Kansas City and Brunswick after the 26th.

The Mississippi fell slowly at Saint Paul and between Cairo and New Orleans, (excepting some slight oscillations,) the difference between highest and lowest water for the month being at Saint Paul nearly five feet, between Cairo and Vicksburgh nearly eight feet, and at New Orleans eleven inches; between Le Claire and Warsaw a gradual rise occurred from the 4th until the middle of the month, after which a steady fall was observed; at Saint Louis the water rose slightly between the 3d and 11th, falling slowly after that date.

The Cumberland at Nashville fell from the 1st to the 9th, then rose until the 19th, fell again until the 27th, rose until the 29th, but on the 30th it began again to fall; the difference between highest water (19th) and lowest water (9th) being six feet.

The Ohio, at Marietta and above, as well as its tributaries, has changed comparatively little; from Cincinnati to Evansville it has fallen almost continuously—the difference between highest and lowest water being nearly nine feet at Cincinnati and Evansville and three at Louisville; at Paducah the water fell from the 1st to the 11th, rose until the 21st, falling again from that date until the 30th.

MONTHLY WEATHER-REVIEW, JULY, 1873.

STORMS.

During the month of July, 1873, thirteen areas of low barometer have been recorded on the daily weather-maps of the Signal Office; they have in general passed centrally over the extreme northern limit of the United States. This feature has indeed been

this year rather more noticeable than in former years, as is seen from the following statement:

July, 1871. The mean latitude of the tracks of 15 centers of low barometer was 45°.
July, 1872. The mean latitude of the tracks of 14 centers of low barometer was 44°.
July, 1873. The mean latitude of the tracks of 13 centers of low barometer was 47°.

As in former years during this month, so in the present year, with scarcely an exception, the areas of low pressure first became apparent in or beyond Dakota and Manitoba. On most occasions the appearance of a low barometer in the Northwest has been preceded by slight barometric depressions on the coasts of Oregon and California, but it has been impossible to decide whether the disturbances have passed from the Pacific Ocean eastward or have originated in the Rocky Mountains of British America.

The numerous local storms that are experienced during the summer months have a certain relation to the large areas of high and low barometer, to the topography of the country, the position of the ocean and other bodies of water, &c. The local storms (which are almost invariably attended with lightning, &c.) have been most numerous in Florida, on the west and southwest side of the area of high barometer that prevails during July on the Atlantic between the latitudes of 12° and 30° north. The region of next greatest frequency is in Ohio and Western Pennsylvania, where the south and southwest winds attending the areas of low pressure rise up over the high country of those States. The storm-frequency diminishes as we proceed from the Gulf coast northward over the low, flat country, and northwestward toward the high arid plains; on the other hand, it increases as we proceed from the middle and east Atlantic coasts westward up a rapid slope to the summit of the Appalachian range. The local storms are least frequent on the dry plains west of the valley of the Mississippi River, and there are indications of a region of diminished frequency in the northern part of the province of Ontario, though this may possibly be due to the scarcity of our stations in that region.

WINDS.

No winds of special severity have been reported during this month, except the tornado of July 3, at Indianapolis. The winds have reached the limit of *high* (a velocity of thirty miles an hour) only twice in the Middle Atlantic States, and thrice in Dakota and Northern Minnesota. In general it may be stated that south and southeast winds have prevailed in the Gulf States, Iowa, and Minnesota, but elsewhere over the country east of the Rocky Mountains the prevailing winds have been from the south, southwest, and west.

RAIN-FALL.

The total amount of rain during the month appears to have been in excess in Indiana, Illinois, and Michigan, and on the southern border of Lakes Superior, Erie, and Ontario, as also in New England. The reports from the summit of Mount Washington show a rain-fall of 13.5 inches, as contrasted with only 3.5 inches in July, 1872. On the other hand, the rain-fall of June was 3.5 inches, while in June, 1872, 18.5 inches were reported. By combining the two, we obtain for June and July together, in 1872, 22 inches, and in 1873, 17 inches. A deficiency of rain is apparent in the province of Ontario, on the Middle Atlantic coast, over the Lower Mississippi valley, and in the Northwest. The details of the rain-fall are given for each geographical subdivision in the accompanying table.

Table showing the Rain-fall and Temperature for July, 1873.

District.	Average rain-fall.	Average temperature.
	Inches.	*Degrees.*
New England	3.5 or an excess	70 or an excess.
Middle Atlantic States	3.5 or a deficiency.	77 or an excess.
Lower lake region	5.0 or an excess	71 or normal.
Upper lake region	4.5 or an excess	66 or normal.
South Atlantic States	5.5 or normal	81 or a deficiency.
Eastern Gulf States	5.0 or normal	82 or an excess.
Western Gulf States	5.0 or normal	82 or a deficiency.
Ohio Valley	4.5 or a deficiency.	77 or an excess.
Lower Mississippi Valley	2.0 or a deficiency.	80 or normal.
Upper Mississippi Valley	4.0 or a deficiency.	75 or a deficiency.
Lower Missouri Valley	2.0 or a deficiency.	75 or an excess.
The Northwest	3.0 or a deficiency.	75 or normal.

TEMPERATURE.

The temperature has very generally averaged one or two degrees lower than for the corresponding month of 1872, which latter was indeed in many places one of the warmest on record. Compared with the average of many years, the past month seemed to have been from one to four degrees warmer than the normal temperature over the Middle Atlantic and the Eastern Gulf States. In general, however, over the rest of the country east of the Rocky Mountains the temperature has been slightly below the average, the deficiency amounting to one or two degrees in the valley of the Mississippi River.

The accompanying table shows for each geographical subdivision the general mean temperature, as observed and as compared with normal values resulting from many years of observation.

The monthly range of temperature, or the difference between the highest and lowest temperatures that have occurred during the month, is given by the lines of equal monthly range on map No. 4. It will be seen that the range is greatest in high and dry localities, and least in low and damp regions. The range also increases decidedly with the latitude, even on the Atlantic coast; a phenomenon doubtless due to the greater changes in cloudiness and humidity.

RIVER-OBSERVATIONS.

The Red River fell steadily during the entire month. The Missouri fell almost continuously, except at Leavenworth, where it rose during the first week of July. The Upper Mississippi declined somewhat; the middle portion of the river was at first stationary or slightly rising, and then began to fall steadily; the lower portion of the river, after falling and rising, has again begun to fall. The Cumberland has experienced three sudden rises and subsequent falls, attending three periods of rain. Similar oscillations have occurred in the Ohio, a specially large wave having moved from Pittsburgh to Louisville between the 6th and the 10th of the month.

MONTHLY WEATHER-REVIEW, AUGUST, 1873.

STORMS.

The areas of low barometer were accompanied with slight disturbance while in the western portion of the United States, but no marked change in the weather occurred until the 11th of the month, when the area of low barometer was first observed in Kansas.

This storm moved slowly to the eastward, with cloudy weather, rain, and light to fresh winds, the winds increasing in force as the center approached the Atlantic coast, and finally producing the northeasterly gale which occurred on the Middle Atlantic and New England coast on the 14th and 15th.

The second storm was by far the most severe one that has occurred since the establishment of the signal-service. Although this storm did not occur within the limits of our stations, there were indications of some atmospheric disturbance off the Middle Atlantic coast on the 23d, which warranted the prediction made in the Probabilities written from the afternoon report of that date, viz, "For the New England and Middle Atlantic coast, threatening weather," and from the midnight report of the same date, "For the New England and Middle Atlantic coast, stormy weather."

This storm, in consequence of its severity, is one of unusual interest, and the course marked for it may vary from the actual, which cannot be determined until additional data have been obtained, when a complete and accurate description will be published by this office.

The third decided storm of the month was first observed as an area of low barometer in the western portion of Kansas on the 29th at 11 p. m. This area moved to the eastward over the lake region without any marked disturbance until the night of the 31st, when brisk and high winds, with areas of rain, were reported. On the morning of the 1st of September it had become unusually well defined in the lower lake region, after which it passed over northern New England and off the Atlantic coast with increasing force, finally producing a violent storm since reported from vessels which were in the North Atlantic on the 2d and 3d of September.

WINDS.

Apart from the storms above referred to, no winds of special severity have been reported, except from Dubuque, Iowa. At this station a violent tornado occurred on the 7th, which, although entirely local in its nature, developed an unusual force and

caused great destruction of property. Owing to the carrying away and destruction of the anemometer at this station no recorded velocity of this wind has been obtained.

The unusual velocity of one hundred miles per hour was reported from Mount Washington, N. H., during the storm of the 16th. The force developed by this wind has not been equaled at any other station since the establishment of the signal-service.

The direction of the prevailing winds of the several stations is indicated, and in comparing these directions with the isobarometric lines, it will be observed that they incline toward the area of mean low barometer.

RAIN-FALL.

In the Middle Atlantic States and in Minnesota there has been a decided excess over the mean rain-fall as calculated from observations of previous years; while there has been about the usual amount in the South Atlantic and Eastern Gulf States; in the remaining districts there has been a deficiency. In the table referred to the quantity of rain given has been deduced by taking the general average of the reported rain-fall from the several stations in each district.

TEMPERATURE.

Table showing the Rain-fall and Temperature for August, 1873.

District.	Average rain-fall.	Average temperature.
	Inches.	*Degrees.*
Saint Lawrence Valley	1.5 or a deficiency	
New England	4.0 or a deficiency	67 or a deficiency.
Middle Atlantic	8.0 or an excess	70 or a deficiency.
South Atlantic	6.0 or a deficiency	79 or a normal.
Eastern Gulf	6.5 or a normal.	80 or a deficiency.
Western Gulf	1.5 or a deficiency	82.5 or a normal.
Lower Lakes	2.0 or a deficiency	68.5 or a deficiency.
Upper Lakes	1.5 or a deficiency	67 or an excess.
Ohio Valley and Tennessee	3.0 or a deficiency	75.5 or a normal.
Upper Mississippi	1.0 or a deficiency	75 or an excess.
Lower Missouri	1.0 or a deficiency	77 or an excess.
Minnesota	4.0 or an excess	67 or an excess.

In New England, the Middle States and thence westward over the lower lake region and adjoining States, the mean temperature has been from two to five degrees below the normal, and about three degrees above the normal in the upper lake region, the Upper Mississippi and Lower Missouri Valleys, but in the districts last named the temperature has been lower than reported for August, 1872. The results of the observations for the month are given in the accompanying table, in which is noted the comparison of the temperature of the several districts, with the mean temperature deduced from observations of previous years. The isothermal lines for the month indicate the general distribution of temperature throughout the United States.

RIVER-OBSERVATIONS.

In general these observations show that the rivers draining the eastern slope of the Rocky Mountains were steadily falling during the entire month; and that those draining the western slope of the Appalachian range experienced fluctuations attending the rains of these districts.

MONTHLY WEATHER-REVIEW, SEPTEMBER, 1873.

STORMS.

During this month eleven low barometers have crossed the country east of the Rocky Mountains. The paths of their centers have passed over the lake region in a northeastward or eastward course, excepting the two on the South Atlantic coast. Several of them were remarkably severe over the upper lakes, and destructive to shipping.

That of August 30, 31, and September 1, was accompanied by occasional rain and brisk winds over the Northwest, Ohio Valley, lake region, Middle States, and New

England, the winds increasing to high from Michigan eastward over the lower lakes and Saint Lawrence Valley.

September 2, 3, 4, and 5, by brisk and occasionally high winds and rain from the Northwest eastward over the lake region, Ohio Valley, Middle States and New England. A hurricane was reported as having lasted about one hour on Lake Michigan, and tornadoes in Massachusetts on the 4th; very severe thunder-storms with high winds in Eastern Tennessee on the 3d, and Southeastern North Carolina on the 5th.

September 11, 12, and 13, by rain at nearly all of the stations east of the Rocky Mountains; brisk and high winds over the Northwest and upper lakes; severe "norther" in Texas on the 13th; heavy snow on Mount Washington on the night of the 14th.

September 14, 15, and 16, by high south and west winds over the Northwest and upper lakes; occasional rain over Minnesota, the lake region, and New England.

September 17, 18, and 19, by high winds over the Northwest, lakes, and Saint Lawrence Valley; by rain from the Northwest eastward over the lakes, Ohio, and Saint Lawrence Valleys, Middle States, and New England.

September 18, 19, and 20, by brisk and high winds and heavy rain from Florida to Southeastern Virginia, having been very severe on the coast.

September 22 and 23, by brisk winds and heavy rains on the South Atlantic coast.

September 23 and 24, by high winds over the Northwest and lakes; rains from the Missouri and Ohio Valleys to the lakes and Middle and East Atlantic coast. This was the severest storm of the month, especially on the upper lakes, whence very heavy gales were reported.

September 25 and 26, by high winds over the Northwest and upper lakes, with occasional rain; light snow in Montana on the 26th; heavy gales on the upper lakes.

September 27, 28 and 29, by high winds on Lake Ontario and the lower Saint Lawrence Valley; rain in all sections east of the Rocky Mountains, except the east Gulf States; followed by a severe "norther" in Texas during the night of the 29th and the morning of the 30th, and by light snow from Northern Minnesota and Dakota northward.

On the 7th, 8th, and 9th, an area of high barometer extended itself eastward over the Northwest, lake region, Ohio Valley, Middle States, and New England, with falling temperature, and with light frost over the Northwest and upper lake region.

13, 14, and 15.—A second, over the same region with quite heavy frost, which was very severe on the morning of the 13th over Dakota, Minnesota, and the northern portion of the upper lake region.

16 and 17.—A third, over the Northwest, lakes, Middle States, and New England, with frosts over the northern portions of these sections.

September 19, 20, and 21.—A fourth, from the Northwest, over the lakes, Ohio Valley, Middle States, and New England, with frost, except probably on the immediate coast.

September 29 and 30.—A fifth, from the Northwest south and east over the entire country, with low temperature, producing frost over the northern sections.

TEMPERATURE.

Average Mean Temperatures for September, 1873.

District.	Average.	Compared with the mean for the month.	
New England	59°.5	Normal.	
Middle Atlantic States	67°.6	Slightly above.	(0°.5)
South Atlantic States	76°.	Normal.	
Eastern Gulf States	77°.5	Slightly above.	(0°.4)
Western Gulf States	78°.5	Slightly above.	(0°.6)
Lower lake region	61°.5	Slightly above.	(0°.4)
Upper lake region	55°.7	Below.	(1°.2)
Ohio Valley and Tennessee	68°.4	Normal.	
Upper Mississippi Valley	50°.7	Below.	(2°)
Lower Missouri Valley	63°.2	Below.	(1°.5)
Minnesota	51°.3	Below.	(2°.5)

For New England, the South Atlantic States, the Ohio Valley, and Tennessee, it is the same as that for many years. For the Middle Atlantic and Gulf States, and the lower lake region, the former is the greater, from 0°.4 to 0°.6. For the upper lake region, Minnesota, and Upper Mississippi and Lower Missouri Valleys, it is less, from 1°.2 to 2°.5. Compared with the average for the same month of last year,

the former is the lower for the stations in all of the districts, except the South Atlantic States, Tennessee, and the Ohio Valley, where it varies slightly above and below the latter.

RIVERS.

The observations show that the Missouri, Red, Mississippi, and Ohio Rivers fell quite steadily during the month, excepting slight oscillations in the head-waters of the two latter produced by rains. The Cumberland fluctuated more or less, having been lower October 1 than September 1.

MONTHLY WEATHER REVIEW, OCTOBER, 1873.

STORMS.

During this month fourteen well-defined areas of low barometer have been indicated on the tri-daily weather-maps of the Signal Service, some of which have, however, passed over the extreme limits of the territory covered by our stations. Besides these, there have been several indefinite barometric depressions, accompanied by rain and cloud. In detail the storms have been as follows:

No. I. *October* 3, 4, 5, 6, 7, and 8.—This was a severe cyclone that was first recognized as existing some distance southwest of Cuba; it passed over Florida on the 6th, and continued its course northeastward parallel to the Atlantic sea-board. Numerous disasters were caused by it at sea, and the settlement of Punta Rassa, Florida, was entirely destroyed, a hurricane velocity of ninety miles having been recorded at that place. It struck Lake City very suddenly October 6, at 6.10 p. m. Reports of damages have been received from Jacksonville, Saint Augustine, and Charleston. The wind was not severely felt at Savannah. Destructive gales were also felt off Cape Henry. A severe norther was induced by the extensive area of low pressure, and was felt along the entire coast of Texas and Louisiana, as far as Mobile. This cyclone appears to have passed over the Shetland Islands on the 10th and 11th.

No. II. *October* 3, 4, and 5.—Produced a very general rain in the lake region.

No. II.* *October* 4 and 5.—This kept to the north of the lake region, and on the 5th apparently united with No. II as the latter passed down the Saint Lawrence Valley. The barometer fell with unusual rapidity at Eastport, where the wind-velocity rose to thirty-two miles on the 5th.

No. III. *October* 6 and 7.—This may be regarded as a disturbance subsidiary to Nos. I, II, and III. It arose in the Middle Atlantic States, and as it slowly moved northeastward was accompanied by heavy rains on the Atlantic coast. Violent lightning was reported at New Haven on the 6th, and a heavy blow, with rain, at Cape May.

No. IV. *October* 6 and 7.—This storm-center kept so far to the northward that it only produced strong southwest winds and cloudy weather on Lake Superior.

No. V. *October* 5, 6, 7, 8, 9, 10, 11, and 12.—The rains and barometric depression prevailing over the Californian coast on the 4th, 5th, and sixth of the month reappeared on the 7th as an incipient storm-center in Utah, which, after extending northeastward over Dakota and Manitoba, turned to the east and southeast into Minnesota and the upper lake region; it then disappeared in Canada, but reappeared after inducing a small center of disturbance, No. V*, on the Lower Lakes, which latter moved eastward over New England, joining No. V in Nova Scotia. Violent thunder-storms were reported at Indianapolis and La Crosse.

No. VI. *October* 12.—This was but a slight barometric depression moving northeastward across Minnesota. High winds prevailed at Yankton.

No. VII. *October* 14 and 15.—This disturbance appears first in Kansas, although there is reason to suspect its existence two days earlier in Northern Arizona. In its passage toward Lake Superior it seems to have lost most of its intensity, a change due possibly to the presence of the more extensive disturbance. No. VIII, far to the north and northeastward.

No. VIII. *October* 16 and 17.—This barometric depression became first recognizable as such in the valley of the Saginaw, having probably pursued its previous course far to the northward. On the 16th it moved rapidly southeastward over Nova Scotia, and then turned to the east. Brisk winds prevailed over Massachusetts and the Bay of Fundy.

No. IX. *October* 16, 17, and 18.—This storm originated as a general rain on the morning of the 16th, extending from Northern Texas to Nebraska, and was probably produced by the cooling of the mass of air that was then being forced from the Gulf of Mexico and the Mississippi Valley northwestward up the slopes of the western plains. The consequent area of low pressure gradually closed in on all sides, losing its very extended elliptical form, until on the afternoon of the 17th; its center appeared as a small oval in Minnesota, attended by high winds and an extended area of rain. A severe gale was reported at Breckenridge on the 17th, and high winds at Saint Paul.

The storm-center moved northeastward, and the gale of the night of the 17th and 18th on Lakes Superior and Michigan was, according to the reports from Milwaukee, one of the severest on record, while Alpena reports a gale of forty-four miles per hour from the south. The barometer at Marquette fell to 28.59 inches. Brisk southwest winds and rain prevailed on the lower lakes on the 18th and 19th.

No. X. *October* 18, 19, 20, 21, and 22.—This began as a slight depression in the Western Gulf States and moving eastward, was followed by a severe norther on the Texas coast, while itself increasing in intensity; on reaching the Atlantic coast the depression turned its course to the northeast and developed into a severe storm in the Middle Atlantic States on the 19th and 20th. It then turned to the northwest and held on this extraordinary course until the 21st at midnight, when it had reached the Strait of Mackinaw, being recorded as the severest storm since 1859 on Lakes Huron, Erie, and Ontario, and continuing for forty-eight hours at most places. Its severity is especially commented upon in reports from Cleveland, Oswego, and Buffalo, while the winds on the 20th at Portland, Me., and Saint John's, New Brunswick, were the severest of the month.

No. XI. *October* 20.—This depression was attended by a gale in Manitoba, but passed so far to the northward as not to seriously affect the upper lakes. Reports from Fort Benton, when they come to hand, will probably throw some light on its previous course.

No. XII. *October* 25, 26, and 27.—This storm may probably be traced in Northern Texas on the 24th, but came within the cognizance of our stations on the 25th, when it was apparently central in Indian Territory. At that time snow was falling throughout the northwest and extreme northwest, being very heavy, with high winds at Yankton. The barometric disturbance was of minor importance, until the 26th, while the snow and rain were increasing in amount; on the latter day the storm-center passed over the lower lakes, and heavy lightning was seen to the northwest of Vicksburgh in the evening. On the night of the 27th and 28th the storm was central in New Brunswick, while a southeasterly gale prevailed on the coast of Maine. This was reported as the heaviest storm of the season at Eastport, Portland, Me., Wood's Hole, and New Haven.

No. XIII. *October* 27, 28, and 29.—This low barometer was formed over the Upper Lakes, following closely in the wake of No. XII, and in some sense connected with it. The snow and fog that prevailed on the lakes, united with the high wind, made the night of the 28th and 29th one of the wildest description, and numerous disasters were reported from Milwaukee. A southeast gale of forty-four miles velocity prevailed at Alpena. The disturbance disappeared over New Brunswick.

No. XIV. *October* 28, 29, 30, and 31.—This storm, after passing slowly eastward, turned southeast to Lake Huron and the Lower Lakes, accompanied by snow and followed by brisk northwest winds. On the afternoon of the 31st a westerly gale prevailed at Buffalo.

TEMPERATURE.

Average Temperatures for October, 1873.

District.	Average temperature.	In comparison with the mean of many years.
New England	51.3	1°.3, above.
Middle States	55.1	—1°.1, slightly below.
South Atlantic States	63.5	—2°.3, below.
Eastern Gulf States	65.9	—0°.7, slightly below.
Western Gulf States	67.	—2°.3, below.
Lower Lake region	49.7	—1°.3, slightly below.
Upper Lake region	44.6	—2°.4, below.
Ohio Valley	53.8	0°.1, normal.
Upper Mississippi Valley	46.3	—5°.0, below.
Lower Mississippi Valley	61.6	—0°.8, slightly below.
Lower Missouri Valley	50.5	—0°.3, normal.
Minnesota	41.	—4°.5, below.

For the Middle States, the Eastern Gulf States, the Lower Lake region, the Lower Mississippi Valley, the Ohio Valley, and the Lower Missouri Valley, it will be seen that the temperature averages about the same as for many years past.

The average temperature for New England is about the normal value; while for the South Atlantic States, the Western Gulf States, the Upper Lake region, the Upper

Mississippi Valley, and Minnesota, the temperature during the past month, especially in the latter sections, is decidedly below the average of previous years.

Average Rain-fall for October, 1873.

District.	Amount. Inches.	In comparison with the average for October.
Saint Lawrence Valley	6.0	or an excess.
New England	6.0	or an excess.
Middle States	6.25	or an excess.
South Atlantic States	2.0	or a deficiency.
Eastern Gulf States	0.75	or a deficiency.
Western Gulf States	2.25	or a deficiency.
Lower Lake region	5.5	or an excess.
Upper Lake region	2.5	or a normal.
Ohio Valley	3.75	or a slight excess.
Upper Mississippi Valley	2.75	or a normal.
Lower Mississippi Valley	2.5	or a normal.
Lower Missouri Valley	1.5	or a slight deficiency.
Minnesota	1.3	or a deficiency.

The table shows the excess or deficiency for the various geographical subdivisions. It will be seen that the region of heaviest rain was over the northern and eastern sections of the country, the quantity diminishing very regularly as we proceed thence south and west. Droughts are reported from Denver, Lake City, and Savannah.

EARLY FROSTS.

The first frosts of the season were reported at the following stations:

October 1.—Lexington, slight; Wytheville, light; Oswego, light. 6. Toledo, heavy; Detroit, heavy; Saint Paul, severe; Leavenworth, heavy. 7. Saint Louis, heavy; Cincinnati, heavy; Lexington, heavy; Milwaukee, heavy; Detroit, heavy; Vicksburgh, light. 8. Charleston, heavy; Vicksburgh, light. 13. Wytheville, heavy. 19. Milwaukee; Duluth, heavy. 20. Milwaukee, Lake City, heavy; Vicksburgh, heavy. 21. Baltimore, light; Jacksonville, light; La Crosse, heavy; Nashville, heavy. 24. Louisville, heavy. 26. Buffalo, heavy. 29. Baltimore, heavy; Jacksonville, slight; Milwaukee, light; Mobile, light; Knoxville, heavy; Nashville, heavy; Vicksburgh, heavy. 30. Mobile, heavy. 31. Mobile, heavy; Nashville, heavy.

PART SECOND.

A HISTORY

OF THE

TRAVELS OF ASIATIC CHOLERA.

IN ASIA AND EUROPE:

By JOHN C. PETERS, M. D., of New York City.

IN NORTH AMERICA:

By ELY McCLELLAN, M. D.,
Assistant Surgeon, United States Army.

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Cholera prevailed in all the places which are underlined, commencing near Calcutta and spreading in every direction.

CHAPTER I.

HISTORY OF EPIDEMIC CHOLERA UP TO A. D. 1817.

We agree with Macpherson* that cholera is one of the most ancient diseases of which distinct descriptions exist, and that there are few disorders respecting which such an uninterrupted chain of evidence has been preserved. The following summary of what is known of the history of cholera from the earliest historic times to A. D. 1500 is derived for the most part from his elaborate and scholarly researches, and from those of Drasche and Macnamara.

Sporadic or spasmodic cholera was common enough in the days of Hippocrates, (B. C. 460–370,) especially in the summer months; and he gives most of the symptoms, including suppression of urine and severe cramps of the limbs.

Ayurveda of Suçruta, in Sanscrit, describes a fatal disease, called visuchika, some of the striking symptoms of which were diarrhœa, vomiting, lividity, retraction of the abdomen, hollowness of the eyes, and loss of voice.

In A. D. 7, Celsus gave a clear account of very decided cholera.

Aretæus, of Cappadocia, A. D. 50, as quoted by Dr. Cragie,† describes, under the name of cholera, a most acute disease, in which the juices of the whole frame were supposed to be carried by a retrograde motion into the œsophagus, stomach, and bowels; in which the vomited matters were watery, ejected with great force, and the intestinal discharges, though sometimes feculent, were fluid and mucous; and in which, as the disease proceeded, the muscles of the arms and legs were cramped, the fingers becoming incurvated, the nails blue, the extremities cold, and the whole body stiff and covered with sweat; in which urine was not secreted, because the fluids were diverted into the intestines; the voice was lost, and the pulse became very small and frequent, as in syncope; and in which, after continued ineffectual efforts to vomit, and calls to stool without discharging anything, death took place by convulsion, suffocation, and retching.

Galen, about A. D. 131, gives a description of a disease which presents a very great similarity to Indian cholera. ‡

Cœlius Aurelianus, about A. D. 151, described serous cholera, noticed blackness of the countenance, sharpening of the features, discharge of thin watery fluid, and used the very phrase, "consecutive fever," now so much employed. At that early date Heraclitus used opium and henbane for it. Aurelianus gave directions how to prevent relapses, and was quite aware of the gravity and antiquity of the disease, for he says the ancients knew that it was very acute and swift, being but rarely protracted to the second day.

Oribasius, of Pergamos, A. D. 230, speaks, § if not connectedly, still very accurately, of cholera.

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* Annals of Cholera from the Earliest Periods to the year 1817, by John Macpherson, M. D., London, 1872.

† Remarks on the History and Etiology of Cholera, by David Cragie, M. D., Edinburgh Medical and Surgical Journal, April, 1833.

‡ Die epidemische Cholera, Anton Drasche, M. D., Vienna, 1860.

§ Drasche, *op. cit.*

Aëtius, about A. D. 360, puts the theory of the evacuation of morbid matter (in modern phrase, the eliminating treatment of the disease) in a strong point of view.

Alexander, of Tralles, about A. D. 460, stated that the evacuations were often serous and not at all bilious, and insisted on the importance of seeing the patient early in the attack.

Paulus Ægineta, about A. D. 700, gives a full account of the disorder.

Serapion, about A. D. 890, mentions all the essential features of the disease.* He describes the nausea, the watery discharges, the shrunken body and features, the coldness, the cold sweat, the cramps, and the speedy death.

Rhazes, of Bagdad, A. D. 900, described the diarrhœa, failure of pulse, oppression of breathing, sharpening of features, discoloration of the skin like that of the dead, coldness of the limbs, cold perspiration, spasm of hands, feet, and legs, urgent thirst, with vomiting of all that was drank, and the collapse.

Avicenna, a century afterwards, made remarks on the greater prevalence of the disease during the Ramazan, a fasting period of the Mohammedans, and described the discharges as milky or rice-water like.

Drasche,† quoting from Deguigne's History of the Huns, speaks of an epidemic of cholera in A. D. 1031, which proceeded from India through the provinces of Ghiznee and Khorassan, extended through Armenia and Syria, and even ravaged Constantinople.

Bernard Gordon, of Montpellier, John of Gadesden, of England, and Gilbertus Anglicus, in the beginning of the fourteenth century, describe the disease. The latter wrote of collerica, or collerides, and described the cramps and collapse with fatal result in the course of a day, in some cases.

In certain historical data of Arabian origin, Drasche finds a reference to an epidemic of cholera in 1347 and 1349, which, proceeding from India through Egypt, Nubia, and Abyssinia, was lost in the deserts of Africa. And in the Persian records of Aby Ben Hussein there are suggestive hints of a disease similar to cholera, which extended, in the years 1364 and 1376, far beyond the boundaries of Hindostan.

According to Rigler‡ there are historical proofs that cholera prevailed several times, especially after the capture of Constantinople by Sultan Mohammed the Second, in the year 1453; and also at later periods in Syria, Arabia, and Egypt.

Thus almost every known writer in medicine, up to the close of the year 1500, has described a disease attended with violent vomiting and purging, serous evacuations, suppression of urine, lividity of skin, collapse, and death either after a brief interval, or protracted convalescence with secondary fever. A large proportion of these attacks were sporadic, but a few were epidemic and pestilential. In the earliest writings the communicable and migratory characteristics of the disease entirely escaped observation and record; but it is not surprising that the writings of the ancients contain no trace of these features of a pestilence which, without reasonable doubt, seems to have swept at times over the continents of Europe and Asia. Exact knowledge was then rare in any of the branches of medicine, and the received opinions in regard to epidemics were, from the nature of the subject, founded on imagination and superstition. Information passed from country to country only by the toil-

* Cragie, *op. cit.* † *Op. cit.* ‡ Drasche, *op. cit.*

some progress of the caravan, or the slow march of an army, or by the oft-arrested voyages of small and imperfectly equipped coasting-vessels. In many cases, as in modern times, it was doubtless considered necessary, by commercial communities, to conceal all knowledge of the pestilences from which they suffered. Thus cholera, or any other of the diseases now considered migratory, might have gained a foot-hold in a community before a knowledge of its approach was obtained. In the low state of medical knowledge, such a visitation, coming without warning or apparent cause, and disappearing in the same mysterious manner, would be soon forgotten, or remembered by the superstitious as an exceptional instance of divine displeasure. It is only by such considerations as these that we can explain the failure of ancient writers to detect and describe the migratory nature of a disease, the other features of which they have recorded in such vivid and unmistakable terms. That cholera might have been imported from India into Persia, Arabia, Egypt, Turkey, Greece, and Italy, traveling, for centuries before the Christian era, over the same highways along which it has been traced in later times by modern exactness of observation and improved means of communication, is evident from a brief survey of ancient and medieval history.

The intercourse between different countries in the East was carried on at first entirely by land. Merchants could often undertake long and toilsome journeys with the aid of the camel, whose persevering strength, moderation in the use of food, and ability to lay in a stock of water for several days, put it in their power to convey bulky commodities through those deserts which must be traversed by all who travel from any of the countries west of the Euphrates toward India. Trade was carried on in this manner, by the nations near the Red Sea, from the earliest periods to which historical information reaches. Numerous bodies of merchants assembled at stated times, and, forming a caravan, performed journeys of such extent and duration as appear astonishing to nations not accustomed to this mode of carrying on trade.

Again, navigation made its first efforts on the Mediterranean and Red Seas, and in these waters the earliest active operations of commerce were carried on. The Egyptians and the Phœnicians of Sidon and Tyre are the most ancient navigators mentioned in history.

Sesostris was able to fit out a fleet of four hundred ships in the Red Sea, and subdue all the countries stretching along the Indian Ocean to India. At the same time his army, led by himself, marched through Asia, and conquered successive countries as far as the Ganges.

The commerce of the Phœnicians was adventurous, and their trade with India was considerable and lucrative. They took possession of Rhinocolura, the Mediterranean port nearest to the Red Sea, and seized commodious harbors in the Red Sea, with India on the one hand and the eastern coast of Africa on the other. The Jews under King Solomon fitted out fleets which, under Phœnician pilots, went down the Red Sea to Golden Sofala, and to Tarshish and Ophir, on the African coast, opposite Madagascar and near Zanzibar.

Next, Darius, son of Hystaspes, sent an expedition through Persia and Central Asia down to the mouth of the River Indus; and about one hundred and sixty years afterward, Alexander the Great made his well-known excursion in the same direction. In no place in the earth is the line of approach better marked and defined more conspicuously than on the northern frontier of India, insomuch that the five great invaders of that country, Queen Semiramis, Darius, Alexander, Tamerlane, and Nadir Shah, in different ages and with views and talents extremely dis-

cordant, advanced by the same route, with hardly any deviation; and cholera follows the same roads to the present day. Alexander penetrated India as far as Lahore. Seleucus reached Allahabad. Ptolemy Lagus, and Philadelphus also carried out the designs of Alexander the Great.

The Greeks traded to the Black Sea and the Danube. Abaris, the Scythian, visited Delphi, and put a stop to an epidemic.*

Anacharsis, a not less famous Scythian, traveled into Greece in the time of Solon. He taught his followers how to heal acute diseases and to stop pestilences.

The ancient Indian trade of Persia was carried on by caravans from the banks of the Indus to those of the Oxus, down that stream to the Caspian Sea, and from thence to the different countries on the Black Sea, especially to Constantinople.

The Romans under Augustus secured the control of the Red Sea, and were thus enabled by commerce with India to amass such enormous wealth, as to produce an alteration in the value of property and the state of manners in Rome itself. Besides receiving Indian commodities by the Red Sea, the Romans also traded by way of Aleppo and Beirut, in a straight line to Damascus, Bagdad, Palmyra, the Euphrates, and the Persian Gulf. Palmyra, situated on an oasis only four miles in extent, achieved a great measure of her grandeur and opulence by an active trade with India. Hippalus, commanding a Roman ship engaged in the Indian trade, was carried by the western monsoon directly to the Malabar coast near Goa, and returned with a cargo of spices, pearls, jewels, and silks. The Romans also traded to Tatta, at the mouth of the Indus, and to Baroch, on the sacred river Nerbudda. The elder Pliny described the course of navigation from the Red Sea to the Malabar coast and Ceylon. Ptolemy described the river Cauveri, Masulipatam, Arcot, and the Coromandel coast.

At the time of Justinian, Persian traders frequented all the principal ports of Western India, and by means of the Persian Gulf and the great rivers Euphrates and Tigris distributed Indian goods through every province of their empire.

Eighty years after the death of Justinian, Mohammed published his new religion, and his followers commenced a course of conquest which reached from the frontiers of China to the shores of the Atlantic in Africa and Spain. Egypt was one of the earliest of their conquests, and they soon excluded the Greeks from all intercourse with Alexandria. Next the Caliph Omar, a few years after the Mohammedan conquest of Persia, founded the City of Bassora, at the head of the Persian Gulf, in order to control the trade from India to the Tigris and Euphrates. Europe was in consequence almost excluded from the East. The great port of Alexandria was shut, and the caliphs, the new lords of the Persian Gulf, neglected to send goods to the Mediterranean. The citizens of Constantinople were thus forced to encourage the caravan-trade which came from Chersi, (?) the westernmost province of China, a march of from eighty to one hundred days to the banks of the Oxus, from there down to the Caspian, across to the river Cyrus or Kur, and from there to the Phasis, which empties into the Black Sea near the modern city Poti, and thence by an easy and well-known course to Constantinople. The commodities of Hindostan were also carried from the banks of the Indus to those of the Oxus, and then followed the above-mentioned route.

The Huns, or Oriental Mongols, came in the fifth century from the

* Dunglison's History of Medicine, p. 81 to 83.

regions watered by the Oxus, crossed the Don and the Dneieper, pushed down into Turkey and Greece, and thence into Hungary, Lombardy, and Italy. The Alans also came from Asia, A. D. 280 to 375, and passed through Germany, and France, down to Spain; while the Saracens from Arabia pushed along the whole northern coast of Africa and crossed into Spain. (See map.)

The crusaders swept up to Constantinople, Syria, and Palestine, followed by Genoese and Venetian traders, to Tyre and Antioch. The Venetians finally concluded a treaty with the Sultan of Egypt, by which they re-opened the trade with Damascus and Alexandria, and soon controlled all the Indian trade to Europe by way of the Persian Gulf and Red Sea.

In the thirteenth century the people around the Baltic united in the Hanseatic League, with the center of their trade at Bruges, in Belgium. Thither the merchants of Venice and the Mediterranean resorted with commodities of the East in exchange for naval stores and other products of the North. This continued till near the close of the fifteenth century, when the discovery of America, and the opening of a direct course of navigation to Hindostan by way of the Cape of Good Hope proved fatal to the power and opulence of Venice. Vasco de Gama sailed from Portugal around Africa, and landed at Calicut A. D. 1498, ten months after his departure from Lisbon. The Venetians, foreseeing the ruin of the lucrative Indian branch of their commerce, incited the Sultan of Egypt to fit out a fleet on the Red Sea, supplied him with timber from Dalmatia, built twelve ships of war at Suez, which were destroyed after several conflicts by the Portuguese; who then seized the island of Ormuz, at the mouth of the Persian Gulf, and thus secured to Portugal the benefit of that extensive trade with the East which the Persians had been carrying on for several centuries. It would have been strange, indeed, if cholera had not reached Europe by some of these expeditions and routes.

According to Robertson, Nolan, and others, previous to the discoveries of the Portuguese the only commercial route between Hindostan and Europe was by way of the Red Sea and the Persian Gulf. The cloves of Amboyna; the nutmegs, camphor, and mace of Borneo; the sandal of Timor; the spices, gums, perfumes, and curiosities of China, Siam, Java, and other kingdoms, were first conveyed to Malacca, and thence to Ceylon and India. Precious stones and spices from Pegu and Ceylon, the diamonds of Golconda, Dacca stuffs from Bengal, and spices from the Coromandel and Malabar coasts, were brought to Calicut, Goa, Surat, and Cambay, on their way to golden Ormuz, at the foot of the Persian Gulf; thence to Bassora, at the mouth of the Euphrates; whence they were distributed by caravans through Armenia to Trebizond, on the Black Sea, and through Aleppo and Damascus to Beirut, on the Mediterranean. From these depots the Venetians, Genoese, and Catalonians distributed them throughout Europe. That portion of this rich trade which was diverted to the Red Sea touched at Aden or Mocha, and passed thence to Suez, reaching Cairo by caravan and Alexandria by the river Nile, to be shipped to Europe.

When this magnificent traffic was broken up by the discovery, by the Portuguese, of a practicable route to India by way of the Cape of Good Hope, the more civilized nations of Europe were placed in direct communication with Hindostan, and we began at once to have clear records of Asiatic cholera. In A. D. 1500, cholera was found to have been present in every place in the west coast of India where Europeans had an opportunity of observing the diseases of the country. Six distinct accounts of it came from Calicut, Goa, and Surat. Again, the native

name for cholera, mordshee or mordexin, is a Mahratta word; and as these people had come from the interior to Goa and Calicut, it seems probable that they brought the disease with them, as they had been in possession of the great shrines at Bejapore, below Bombay, and of Bagginugger, near Bellary, where cholera always prevails.

The following history of cholera from A. D. 1500 to the beginning of the present century, is also derived in a great measure from Macpherson's Drasche, Macnamara, and other annals:

Vasca de Gama first reached the southwest coast of India in 1497. The Portuguese took Calicut, on the same coast, in the year 1502, and noticed a great outbreak of cholera in 1503. They took Goa, higher up, in 1510; and in 1543 an epidemic of frightful intensity was observed there. The child at the breast, the aged man, the sound as well as the feeble, fell victims, with vomiting, excessive thirst, cramps in the limbs and feet, while the nails of the hands and feet became black and curved. Scarcely 10 per cent. of those attacked escaped alive. The church-bells of the Portuguese tolled all day, and there were from twelve to twenty burials of Europeans a day. Garcia D'Orta described another epidemic in 1563. Some of the attacks were cholera morbus, produced by eating cucumbers and shell-fish, especially in those weakened by venery and debauchery. In others, bilious vomiting lasted from four to thirty days. In others, after the patient had vomited and purged for several hours, at last he only discharged water with no acid or bitter taste. The pulse was weak, with great coldness, and cold prespiration, while the sufferer complained that he was burning; and cramps succeeded. D'Orta distinctly pointed out the varied forms of the disease. He mentions a case of partial convalescence from rice-water discharges, which ended fatally after many days of bilious vomiting.

General Beaulien met with the pestilence in Sumatra in 1620. It destroyed a great many Europeans, especially Frenchmen, who accused the Dutch and English of having poisoned them; although Beaulien himself attributed the disease to indulgence in copious draughts of water, and sleeping afterward in the open air with the abdomen exposed, as is not uncommonly done in hot climates. Anderson wrote about cholera in Java and Sumatra, between 1644 and 1650, under the name of white diarrhœa.

Bontius, in 1629, called cholera mordeshi, and as the Dutch had been preceded by the Portuguese in Java, there is every probability that it was an imported disease. Bontius states that the hot, bilious, but white and watery, matter irritated the stomach and intestines and was incessantly and copiously discharged by the mouth and anus. It was a disorder of the most acute kind, the principal cause of which, next to a hot and moist disposition of the air, was an intemperate indulgence in eating fruits, which, as they are generally green and obnoxious to fermentation and putrefaction, irritate and oppress the stomach by their superfluous acidity and humidity, and produce an æruginous and coppery tasting but white bile. The discharges might with some degree of reason be reckoned a salutary excretion, but the purgations were so excessive that the strength was soon exhausted, and those who were seized with it generally died within twenty-four hours. He says the disease was attended with a weak pulse, difficult respiration, coldness of the extremities, great internal heat, insatiable thirst, restless and incessant tossing of the body, followed at times by convulsions; and if a cold and fetid sweat break out, certain that death was at hand. Bontius saw another epidemic of the same kind twelve years later, in 1641 and 1642, having previously lost his wife by the same disease in 1631.

Zacutus Lusitanus, a celebrated Jewish physician, banished from Lisbon by Philip IV, retired to Amsterdam, and had opportunities of communicating, first with Portuguese, and afterward with Dutch navigators. Letters addressed to him from Goa and other places in the East, show that he was in close communication with India. In 1632, he wrote that the Arabs suffered from cholera, and had a tradition that it had traveled over Persia, Syria, and Egypt, and finally disappeared in the African desert.

Cholera is said to have again prevailed in Goa in 1638.

Mandelsloe in 1639, and Baldaeus in 1641, make allusions to mordexin in India and Ceylon.

Colonel Tod gives an account of cholera in the provinces of Mewar in 1661, and Marwar in 1681, both near Cambay and Surat, on the west coast of India. Also, in the camp before Goa in 1684, when as many as five hundred men perished daily.

Sir John Malcolm says, in 1621, that cholera always exists in the province of Malwah, on the sacred river Nerbudda, just above Surat.

De Thevenot found cholera in Boorhampore, near Nagpore, in Middle India, in 1666, and described four varieties: first, the dry, with great colic; second, the diarrhœal; third, with both vomiting and diarrhœa; and fourth, with all the above and cramps.

Cleyer noticed cholera in China in 1669, imported perhaps from Malacca.

Dr. Fryer, who gives the best statement by an English observer, saw it again in Surat in 1674, (one hundred and seventy-miles north of Bombay.) This is a large and very dirty city. Its commerce was extensive, but the moral condition of its inhabitants deplorable. Six miles from the city there was, and is, a noted place for religious ablutions and for funeral pyres; their sacred groves and temples were crowded with devotees.

In 1679 Then Rhyne alludes to cholera in Java, and the chemist Homberg in 1689; while Kaempher states that it was frequent and fatal in Japan.

Imperfect accounts are given of a severe pestilence at Masulipatam, between Madras and Juggernaut, in 1687, by Forbin.

A carelessly-described pestilence appeared at the holy city Beejapore, below Bombay, in 1689; while a similar pestilence raged at Surat from 1684 to 1690; and a sweeping epidemic at Balsora, between Juggernaut and Calcutta, in 1691. Carreri noticed cholera at Damaun, near Bombay, in 1695.

CHOLERA IN EUROPE IN THE SEVENTEENTH CENTURY.

In 1610, yellow cholera and bilious fluxes were common in England. In 1617, 1623, and 1626, white fluxes, possibly of a choleraic character, were again noticed in England, Germany, and France.

In 1643 Van Der Heydon, of Belgium, described the furious onset of *trousse-galant*, which so altered the appearance of the patients in a few hours that their best friends might not recognize them.

In 1649 Riverius gives a full account of sporadic cholera of considerable intensity, sometimes followed by secondary fever, expulsion of enormous quantities of fluid by vomiting and purging, and sudden death; unless the attack was produced by something which was eaten, when recovery was probable. But the more severe the convulsions and coldness of the extremities, the more fatal the attack. Riverius believed

in the existence of contagious and pestilent epidemics of diarrhœa and cholera, as did Piso in 1638.

In 1665 cholera of some kind was epidemic in Ghent, Belgium.

We now come to the English epidemics described by Short, Sydenham, Willis, and Morton. According to Short, owing to the great heat in 1669, came cholera morbus, which reigned till 1672.

In 1676 the convulsions were more violent and continued than Sydenham had ever seen there before. He regarded the autumn cholera as very different from the ordinary cholera induced by indigestible food. Willis has not omitted the leading symptom of white or watery evacuations. He says the disease invaded suddenly, and frequently without any manifest occasion, and did reduce those laboring with it by great vomiting and frequent and watery stools quickly to a very great debility, with a weak, small pulse, cold sweats, and short and quick breath. Very few had bloody stools, and not many bilious; but very many had vomits, and plentiful watery, almost clear stools. It raged in London; but did not extend three miles beyond the city, nor seem to be propagated by contagion. The main cause of the disease he thought to be an evil influence of the air, (or water,) which was increased by errors of living; but he could not connect the disease with overeating of fruit.

The celebrated Morton speaks of great epidemic diarrhœas, accompanied by awful twitching cramps, as prevailing annually from 1666 to 1672 in London to such an extent as to occasion a weekly mortality of from three to five hundred. The discharges consisted of a copious purging of colliquative white, but apparently virulent, serum. In the year immediately preceding the great fire in London, and when the sanitary condition of the city was horrible, this "plague in the guts" caused thousands of deaths.

Ettmüller, in 1685, regarded cholera as only an expanded and unusually malignant form of diarrhœa. He believed it to arise from a ferment, either inspired with the air or taken in with the food, (or drink,) or arising from the excreta of the sick, and which multiplied itself after being introduced into the body. It became more or less epidemic, and was at such periods apparently contagious. He repeats, that the disease was caused by the air, by bad water, and by bad fruit. The contagion of epidemic diarrhœa, but especially of dysentery, he supposed to be propagated by latrines, and sometimes even by injection-syringes. Riverius had previously pointed out that in contagious dysentery all (or many) members of a family got it from the use of common latrines, or privies.

Pechlin, about this time, describes a cholera which he calls serosa, or without bile.

In 1689 there was cholera and dysentery in Europe, in Nuremberg; in 1691 in London; in 1695 in Ulm; in 1696 in Switzerland.

Hoffman, about this time, compared cholera to the effects of arsenic.

CHOLERA IN INDIA IN THE EIGHTEENTH CENTURY.

To return to India. A French Jesuit, Pere Martin, met with cholera in extreme Southern India, between Madura and Trichinopoly, in 1702.

The Sieur Suillier found it in Hooghly, below Calcutta, in 1703, as did Frère Papin, in 1709.

In 1733 Dr. Arbuthnot described cholera as common at Madras from April to August.

In 1736 Paxman said it was frequent in India.

In 1739 it attacked Nadir Shah's invading army, probably near Delhi, in the north of India.

The year 1756 marks the commencement of periodically-returning epidemics, the first occurring in 1756 and 1757; the next in 1768 and 1769; and the third in 1780 and 1781, with recurrences in 1783 and 1787.

In 1756 the disease was peculiarly severe in Arcot, city and province, about sixty-four miles southwest of Madras; which included Tripetty, the most celebrated Hindoo temple south of the Kistna River. Tripetty is situated in an inclosed plain, entirely encircled by hills, and into which it is said no Mohammedan or Christian has ever entered. Every year, from 1758 to 1811, the Brahmins are reported to have paid from $100,000 to $150,000 to their conquerors for the privileges of this reservation. Vast numbers of pilgrims visit it from every part of India, bringing offerings of every conceivable character, from horses, elephants, gold, jewels, and silk, down to fruits and grain. Several thousand priests are here supported in luxury and idleness.

In 1766 J. H. Grove said cholera was common on the Malabar or west coast of India, below Bombay, but had been scarcely seen in that city for a long time; showing that it had periods of increase and decrease. In 1756 Johnson, of Chester, saw it on board an English fleet in India. After 1756, when the disease scourged Arcot, it persisted at Vellore, near by the valley of Ambore or Amburpet, for a series of years. Orme says it caused great and sudden mortality in Southern India in 1757.

Niebuhr says it was seen in Arabia from 1761 to 1763.

Gentil alludes to it in 1761 and 1769 in the Coromandel, or east coast of India, near Pondicherry. Shortly after this it was present in China as well as in India.*

Sonnerat's travels extended from 1774 to 1781, but his allusions to cholera probably include the epidemics about Pondicherry in 1768 and 1769. Père Martin had already corrupted the Mahratta word *mordeshi* into *mort de chien*, and this name was now popularized by Sonnerat.

It prevailed at Paliconda, in the Amboor Valley, and at Arcot from 1769 to 1771. It was frequent in Bombay in 1772 and at Madras in 1774, and in 1775 was carried down to the Isles of France and Madagascar.

Sonnerat once considered it as of a catarrhal or rheumatic nature, for he says it never appeared except in the cold weather of India. Some were attacked after having passed the night in the open air, others from having eaten cold rice and curds, but the greater number from eating just after they had washed and bathed in cold water. He says there was great reason to imagine that the perspiration, thus being stopped, reflowed into the mass of the blood, and, finding its way to the stomach and bowels, caused a watery flux, accompanied by vomiting, universal spasms, violent pains, extreme faintness, burning thirst, oppression of chest, suppression of urine, and death after twenty-four hours or less. At first, this epidemical disease happened near Madras, during the northeasterly winds in December, January, and February only; and when they ceased it disappeared. But the epidemic which followed two years after was the more dreadful, and did not proceed from the same causes, as it began in July and August. It first showed itself by a watery flux, which came in an instant, followed by twenty or thirty evacuations in five or six hours, which reduced the patients to such a state of weakness that they could neither speak nor move. They were often without pulse; the hands and ears were cold, the face shrunken, and the eyes sunk in

* Voyage aux Indes orientale, Paris, 1772.

their sockets. They had neither pains in the stomach, colics, nor gripings, like the first class of cases; but their greatest torment was a burning thirst. Death often ensued in less than twenty-four hours. The first form was probably bilious cholera, for it selected debauchees and those suffering from indigestion; the latter was Asiatic.

The chief epidemic described by Sonnerat probably occurred from 1776 to 1778 on the Coromandel, or east coast of India. It was supposed to have been epidemic in the Bundelcund below Allahabad in 1779. It was at Tanquebar, below Madras, in 1780.

From this time on, Macpherson thinks, the English records in the Bengal, Bombay, and Madras reports contain all that is known about the subsequent history of the disease.

For ten years previous to 1781 there is almost constant notice of the prevalence of the disease along the Madras coast and in southern India, and it seems nearly inconceivable to Macpherson how the outbreak in Colonel Pearse's troops at Ganjam, below Juggernaut, in 1781, should have caused so much astonishment, and how this wonder could have been repeated at the next great outbreak in 1817. He says it shows that very little was known in those days of what was going on in different parts of India.

From 1781 to 1783 numerous and severe outbreaks of cholera occurred in different parts of India. On the 22d of March, 1781, at Ganjam, not far from the great temple of Juggernaut, it assailed Colonel Pearse's division of Bengal troops, of about five thousand men, with almost inconceivable fury. Men in perfect health dropped down by dozens, and were dead or past recovery within an hour. About five hundred men were admitted into the hospital on that day, and within three days one half of the army was sick. The celerity and fury of this attack is suggestive of the probability of its origin in the use by the troops of contaminated water. It was subsequently discovered that the disease had been prevalent among the natives and pilgrims in that part of the country before the arrival of the soldiers. In the next month it appeared in Calcutta, about two hundred and fifty miles northeast from Ganjam, and made alarming havoc for about ten days.

In the following year, 1782, cholera was largely diffused in Southern India.

In the next year, 1783, it appeared at Hurdwar, during the festival, and killed twenty thousand people; and the Madras reports described the malady as epidemic along the whole east coast.

In 1782 Konig, the botanist, had a narrow escape from death by cholera at Tanquebar, below Madras; followed a long convalescence, probably from consecutive fever.

The epidemics of 1781 to 1783 were observed and described by several English physicians. Dr. Davis, of the hospital board at Madras, was deputed to investigate the disease at Arcot. He found many cases of true destructive rice-water cholera, many cases of simple cholera morbus, with colic and spasms, and much bilious cholera with copious discharges of yellow, green, or dark-colored bile from the stomach and bowels. In the latter cases the mortality was only two or three out of sixty.

Its appearance at Madras in 1782 is described by Girdlestone, who states that, among the troops which had just arrived from England with Sir John Burgoyne, more than fifty men perished within three days after landing, and in less than a month upward of a thousand had suffered from the disease. It attacked Sir Edward Hughes's squadron at Madras early in 1782, and was probably carried over to Trincomalee in Ceylon, which was and is the first and last stopping-place for all vessels going

to and from Madras and Bengal. This Ceylon epidemic is described by Curtis, who had seen the disease in the Madras fleet and in the Madras hospitals. He says that attacks of watery purging generally came on at night or in the early morning, and were followed after some hours by cramps and great weakness and sinking, with coldness of the extremities and lividity of the countenance. The vomiting brought up nothing bilious; the patient complained much of the cramps, and wanted to be rubbed hard; the eyes were sunken, hollow and surrounded by a livid circle; pulse feeble, and often absent at the wrist; great thirst and desire for cold drinks were present; profuse clammy sweat; the fingernails became livid and bent in, while the skin of the palms was white, bleached, and wrinkled up in folds, as if long soaked in water; the countenance and limbs were livid; finally the spasms abated and the patient died in perfect possession of his faculties; being able to speak calmly, although the body was cold and the pulse had ceased.

The Rev. Father Sangermano, who was sent to Rangoon, in July, 1783, says that a malady of a malignant nature, and not confined to the Burmese Empire, but spread over all India, is that called by the Portuguese *mordazzino*, consisting of a violent indigestion, which causes what the physicians call cholera. The continual evacuations, both by vomit and stool, will reduce a man in a few hours to such a state of exhaustion, that he is scarcely to be recognized as the same person. To these evacuations succeed a cold sweat, hiccough, faintness, and death.

Sometimes the disease had a totally different effect, which is to make the stomach incapable of expelling the contained matter, and in these cases the convulsions of the patient are indescribable. This species of cholera, to which the name of dry *mordazzino* was given, was supposed to be more dangerous than the other variety.

In 1788 cholera prevailed epidemically at Bellary, and it was in Batavia in 1789.

Macpherson says: Singularly enough another Bengal army was attacked in 1790, much in the same way as that of Colonel Pearse, in 1781, in the same country, Ganjam, near Juggernaut, and at the same season in March and April, viz, at the time of the pilgrimages.

Jukes says it was prevalent in the Mahratta country, in Central India, in 1794, and reached Tannah, on the west coast, near Bombay.

In 1797 it was prevalent at Backergunge, near Calcutta, although when it reappeared there, twenty years later, the great majority of the European observers regarded it as an unknown pestilence. As European life in Bengal was then rated at two monsoons, it might easily have been unknown to new-comers.

CHAPTER II.

HISTORY OF EPIDEMIC CHOLERA FROM A. D. 1800 to 1823.

Dr. James Johnson,* in his work on the diseases of tropical climates, alludes to the prevalence of cholera near Trincomalee, on the east coast of Ceylon, in 1804.

In 1808, according to the Bengal reports, quoted by Macnamara,† a few cases occurred among the English troops at Merut, just below Hurdwar, above Delhi; in Delhi; at Muttra, below Delhi; and at Calcutta.

In 1809, '11, '12, and '13 many cases occurred at Chunar, a military post, just above the holy city of Benares.

In 1814 cases occurred at Cawnpore, above the holy city of Allahabad; at Nagpore, in Central India, on the road from Allahabad to Bombay; at the holy city of Benares; again at Meerut, below sacred Hurdwar; and at Dinapore, near Patna; and at the holy city of Gaya, just below Patna.

In 1814 it also appeared in a crowded barrack in Fort William, near Calcutta, in the east, among recruits just arrived from England; and was epidemic in Jaulnah, toward Bombay, in the west. As regards the outbreak at Jaulnah in 1814, Dr. Cruikshanks entered the cases in the hospital-returns as bowel-complaints, because the matters ejected by vomit and stool were watery or mucilaginous, containing no bile. Dr. Scott, guided by an accidental remark of Dr. Duncan, was enabled to refer to Dr. Cruikshanks and develop this point, and then remarks: Although cholera very rarely appears in the sick-returns of former times, it is by no means to be inferred that it did not then prevail from time to time among the troops as well as the natives.

In 1815 and 1816 no cases were reported among the white troops. In 1817 only two cases occurred among the garrison at Benares, although the disease was raging throughout the whole of Bengal; showing that statistics, drawn from Europeans only, cannot be relied upon as a criterion of the prevalence of the cholera in India. (See map.)

The English population of Hindostan is, and always has been, very much smaller than is generally supposed. In 1874 there were only one hundred and sixty thousand, in all, scattered among two hundred and forty millions of natives. Before the rebellion of 1857 we find never more than thirty thousand English troops in India at one time, and even now there are only about seventy thousand. As late as 1847 there were more than six hundred thousand natives in Calcutta, and only about two thousand Europeans, apart from the troops. Benares, with three hundred thousand inhabitants, had scarcely one hundred and fifty foreign residents. In Delhi, of half a million inhabitants, only one hundred were English. Bombay, with two hundred and fifty thousand souls, had only several hundred resident Europeans.

To account for the origin of cholera in 1817, it is claimed that the rainy season of 1815 was excessive, while the hot season of 1816 was distinguished for drought and intense heat. Throughout 1816 low fevers predominated, and Bengal was visited by various pestilent diseases, especially by malignant sore-throat, a contagious disease previously unknown, according to the Bengal report, except by name, in

* The Influence of Tropical Climates on European Constitutions. Philadelphia, 1821.
† A Treatise on Asiatic Cholera. London, 1870.

that portion of the globe. In the upper provinces bilious remittent fever raged epidemically, and occasioned a mortality which surpassed anything on record in the medical annals of Bengal. The military stations wore a gloom hardly to be imagined. In many of the native villages the whole population was ill, and numerous shops were closed; the banks of the rivers were crowded by the dead and dying, and many bodies were left unburied. The cattle were diseased and their carcasses strewn in vast numbers in the pastures.

In 1817 it rained much in February and March, and on March 30 a case of cholera, fatal in thirty-six hours, occurred in an English soldier of the Fifty-ninth regiment, at Fort Williams, Calcutta. The regular rains commenced May 25, fifteen or twenty days earlier than usual, and poured almost incessantly during June and July, putting a stop to cholera, until the dry season in August. This year, 1817, was also the year for the great twelfth yearly festivals or pilgrimages. These festivals are held every year in all parts of India, and increase in sanctity every third, sixth, and ninth year, and still more every twelfth and sixtieth year. This will account far better than the monsoon theory for the greater prevalence of cholera in India every third or fourth year, and its immense spread every twelfth year.

The cholera of 1817, according to the Bengal report, evidently arose about May or June, after seasons remarkable for their irregularity and distinguished for epidemic sickness and mortality; and also after the great pilgrimages in March and April. It did not spring up in Jessore nor originate in any one town alone; but seemed to arise simultaneously, in different districts, and then diverged in all directions. It prevailed in the province of Nuddea and other districts, to the north of Calcutta and west of Jessore, as early as May and June, 1817. In the middle of July, it commenced in the province of Bahar, near Patna, and in the sacred city of Gaya; and was also in the great city of Dacca, on the Brahmapootra, northeast of Jessore and Calcutta. It is distinctly stated to have broken out in Patna, three hundred miles northwest of Calcutta, on July 11, from whence it extended a little north of Dinapore and to the adjacent villages early in August.

In May and June it was in Kishnagur, north of Jessore, and in the province of Mymensing, north of Dacca. In July it was in eight divisions of the province of Kishnagur, and also at Sunergong, in the Dacca district, toward the mouth of the Brahmapootra. It was at Sylhet, far above Jessore and Dacca, to the northeast, by the 17th of August. Another account says it appeared in July at Sunergong, on the great river Megna, which joins the Ganges and Brahmapootra, and thence proceeded up the river, visiting the ghauts, public ferries, and grain-markets, up to Dacca and its neighborhood. It was also at Backergunge, at the mouth of the real Ganges and Bramapootra, at a very early period; and was even carried over to Chittagong, on the east coast of the Bay of Bengal, before it appeared in Jessore. It was also in Calcutta in the first week in August, before it broke out in Jessore. In Calcutta, where all the facilities for information were comparatively abundant, it was long supposed that the cholera of 1817 was brought down from Jessore; but subsequent investigation proved that there was very little doubt it had visited some spots in the so-called Black Town, or suburbs of Calcutta, as early as the beginning of August; that it daily gained ground, and before the end of the month had widely spread its ravages in a manner threatening to sweep off a large portion of the native population; and that, in the early part of September, even the English portion of the com-

munity was no longer secure from the concentrated activity of the poison, as thirty-six thousand native cases had occurred in three months. It is quite as likely as not that the disease was brought to Calcutta from Juggernaut, and that the outbreak was delayed by the excessive rains, and recommenced, as is usual, in the dry and hot season; or that it commenced in the neighborhood of Patna; or that it came to Calcutta from Dacca, which has always had a great celebrity, not less than that of Calcutta, for the origin of cholera. Nothing is more certain than that it prevailed to the north, south, east, and west of Jessore, for hundreds of miles in each direction, before it appeared in Jessore. Dr. James Johnson* says: "It is clear to demonstration that it did not originate in Jessore; on the contrary, there is better reason to suppose that it was carried to Jessore than that it first broke out there. The Bengal report says it is certain that nothing can be more erroneous than the notion of the local origin of the epidemic at Jessore, for there are facts more than sufficient to shown the fallacy of every theory which attempts to derive the disease from any one spot as the only center from which it was emitted to the surrounding countries. The facts prove, without any possibility of dispute, that it broke out in remote places at such short intervals of time that its general diffusion must be referable to some unknown causes of more general operation than infection or contagion proceeding from one spot alone." From March to August probably millions of pilgrims were traveling to and from Juggernaut, the mouths of the Ganges and Brahmapootra, from Gaya, Benares, Dacca, and other holy places, and thus distributed the disorder.

Macnamara* says, (page 12:) "Early in September Balasore and Cuttack, near Juggernaut, and Ganjam, were affected." On page 28: "In the district of Ganjam, near Juggernaut, cholera, *as usual*, sprang up with renewed energy during the months of March and April, and spread southward" and doubtless northward toward Calcutta. On page 79: "The civil surgeon at Gaya reports that cholera had, *as usual*, re-appeared at that station, confirming Dr. Woodburn's statement as to the disease being *endemic* in those parts; a fact to which most surgeons, marching along the trunk road from Calcutta to Benares in charge of troops, will bear witness; for it is hardly possible to pass through this part of the country without some of the men being seized with the disease," (cholera.) However this may be, the first clear accounts of cholera came from Jessore. Dr. Tytler was called to a case there on August 19, 1817, and soon saw many others. As the disease was spreading rapidly, the natives fled from the town, the judge closed his court and reported at Calcutta. The medical board at Calcutta declared the pestilence to be the usual epidemic of this period of the year, aggravated by the peculiarities of the season and certain local causes. It was understood that, in certain quarters of Calcutta, a similar epidemic was also prevailing with more than ordinary fatality. So distinct was the European part of Calcutta from the native town, and so rare was cholera among the foreign residents, that neither of the physicians who had been connected, one for five and the other for ten years, with the general hospital for Europeans had seen a case previous to this outbreak.

Dr. Barnes, resident at Jessore from 1810 to 1823, who had been familiar with ordinary Indian cholera for all that period, said the sources of the disease were too extensive to be brought under human control. Putrid exhalations from the constant and rapid decomposition of animal and vegetable matter, and *the use of unwholesome water*, were the sole

Op. cit.

causes. In two months it swept off ten thousand of the inhabitants of Jessore, which has since been erroneously styled the "cradle" of cholera. The province of Jessore is situated in the center of the Delta of the Ganges, surrounded by the districts of Backergunge on the south, Dacca on the northeast, Rajeshahye in the northwest, Calcutta on the southwest, and Punneah on the north. All these districts were affected nearly simultaneously, and most of them before Jessore. But it is also rightly claimed that the inhabitants of Jessore, astonished and terrified at the pestilence, fled in crowds to the country, and spread it rapidly through the adjoining villages. It has been supposed that Jessore was more filthy and unhealthy than other towns. This is not the case, although it is seated on an almost stagnant arm of the river, which is often transformed into a fetid swamp, along which are rows of low, mean huts, surrounded by many trees which afford shade but obstruct ventilation.

Calcutta stands upon an almost perfect level of alluvial and marshy ground, which was formerly covered with stagnant pools. About four and a half miles east of the city is a large but shallow lagoon of salt water, from which a canal is cut pretty nearly to the town, and toward which all the drainings of the city flow. Many of the natives cannot approach the "bad water" without attacks of nausea and headache. The English portion of the town is a city of palaces, but the Black Town is filled with wretched houses and miserable huts, which are clustered around large and filthy tanks, in irregular groups, and are connected by narrow, winding, unpaved streets. The air of the Black Town is offensive to the smell from the presence of decomposing refuse and filthy water. And as if it were not bad enough the Brahmins are often stopped by the common people, and asked to bless their supply of drinking-water by dipping their feet in it.

The story of the spread of cholera in and from Bengal in 1817, has been told so often that it may be given very succinctly here; and will be easily understood by reference to the map. It extended up the Ganges northwest as far as Allahabad; up the Brahmapootra River from Dacca northeast to Ringpore, and the borders of Thibet and Southwestern China; around the Bay of Bengal to Burmah and Siam; and down from Calcutta and Juggernaut toward Madras.

Early in 1818 it progressed up the Ganges and Jumna Rivers to Cawnpore, Agra, and Delhi, toward holy Hurdwar; from which a new stream of the disease was coming down. Jameson traced it to Shahjehanpore, only twenty miles from Hurdwar, where it appeared in July, and is reported to have killed five thousand persons. It was also carried still farther to the northwest. On July 23, a body of European and native troops marched from Delhi through Meerut to Hansi, cholera being then at its height in Delhi. On the 31st, the epidemic appeared among these soldiers, and on August 6 they joined the forces at Hansi, when almost immediately afterward the disease broke out among the entire brigade, and accompanied it farther north toward Lahore. It was the general belief among the medical officers that the troops from Delhi brought the cholera with them, and then distributed it farther north. Other similar instances are noted. In May, 1820, Moorcraft incidentally mentions the existence of cholera to the northwest of Lahore; and Sir Richard Temple affirms that the Punjaub, toward Peshawur, the extreme northwest border-town, was visited severely by the disease in 1820. But we have no accounts that it reached Persia from this direction, as it did in 1827, 1828, and 1829.

Early in November, 1817, the disease broke out in Mirzapore, just below Allahabad. Macnamara (page 296) says that he will have several

occasions to record the progress of cholera during one season as far to the west and northwest as Allahabad and Cawnpore; while subseqently the whole of the northwest and the Punjaub came under its influence. It seems to him that these facts are best explained as follows: When the monsoon sets in over Bengal, the river Ganges becomes the great high-road of traffic between the home of epidemic cholera and the northwestern provinces. In April and May large fleets of native boats start on their journey from Calcutta, Dacca, and other centers of trade for Patna, Benares, Allahabad, Mirzapore, and Cawnpore; which latter place they reach about August. A few of these boats sail up the river Jumna as far as Agra and Delhi, bringing a few scattering cases of cholera along with them. They return to Lower Bengal before the Ganges subsides in September. The influence of the pilgrimages to Gaya, Patna, Benares, and Allahabad in increasing and spreading cholera up and down the Ganges is well known; but Mirzapore is regarded as probably second in importance to no place in India, being the chief commercial depot for merchandise passing to and from Bengal, and to and from Central India and the northwest provinces. It is to Mirzapore that the majority of the country boats from Dacca and Calcutta in the south proceed. Here they disembark their cargoes and the goods are carried all over the neighboring districts. The merchants flock to Mirzapore in large numbers, and from thence scatter themselves all over India.

In subsequent years numerous outbreaks of cholera occurred in fleets of country boats, and stuck to them for long journeys, viz, from Calcutta up stream to Patna; and from Cawnpore down river to Calcutta. Macnamara thinks "if we could trace their history, this must frequently be the case with a great number of the large fleets of country trading-vessels proceeding up the Ganges and Jumna Rivers every year. We believe that it is by this means and also by the land journey that cholera has been carried up to Mirzapore and the intermediate country on so many occasions." It was supposed that in three months from the commencement of the great outbreak in 1817, nearly the whole presidency of Bengal, including some one hundred and ninety-six thousand square miles, was overrun with the disease. But there were some remarkable exceptions to this rule, as, for instance, in the great city of Moorshedabad, half way between Calcutta and Patna, which was entirely free from the disease during the year 1817, although cholera prevailed in many directions around it. This is easily explained by its situation; for it is placed eight miles west of the Ganges, so that infected boats do not stop there; at the same time the great trunk road from Calcutta to Benares passes far to the west of it, and thus trade and travel sweep by the ancient and almost deserted capital of Bengal.

In the autumn of 1817, the Marquis of Hastings, with ten thousand white troops and eighty thousand natives, was in the Bundlecund province, just below Allahabad, the force being in three divisions, at the towns of Saugor, Jubbelpore, and Mundlah, just below the infected cities of Benares, Allahabad, and Mirzapore. After creeping about for some time among the lower classes of camp-followers, it suddenly burst forth with irresistible violence in every direction. The natives deserted in great numbers, and the highways and the fields for many miles around were strewn with their bodies. The line of march of the white troops soon presented a most deplorable spectacle. The greater part of the sick were left behind, although the baggage and ammunition were thrown away, and the carts taken to swell the number of ambulances. Many who left the carts, pressed by the sudden calls of the disease, were un-

able to rise again, and were necessarily abandoned. Hundreds dropped down in every day's advance and more were left behind at every night's halt. The roads were covered with the dead and dying. The places of encampment and the lines of march presented the appearance of a battle-field and the track of an army retreating under every circumstance of defeat and discomfiture. In less than two weeks nine thousand men had succumbed to the pestilence. The Marquis, apprehensive of the disastrous effect of his own possible death upon his troops, gave instructions, should this occur, that his body should be secretly buried in his own tent. But the army was moved from its previous position on low and marshy ground, into the streams of which the natives had thrown their dead, so long as they were able to carry them there, on November 19, to the high and rocky place of Gwalior, to the northwest, from which time the disease became less virulent, and speedily disappeared. Macnamara suggests (page 429) "that the water on the low ground, from repeated contamination, kept the disease in constant activity, but, by moving away from the infected locality, getting rid of the camp-followers, and encamping on the banks of another and more rapid river, the health of the troops rapidly improved." The sudden attack of Colonel Pearse's army, in 1781, near Juggernaut, and of Colonel Crockett's force, near the same place, in 1790, have been explained in the same way.

It will be noticed on the map that Gwalior and the River Sinde are north of the Vindhya or central range of mountains; hence, the epidemic traveled west to Jeypore and Ajmere, and southwest to Kotah and Oodipoor, and south to Saugor, Bhopal, Oojein, Indore, and to the great military station of Mhow, twelve miles south of Indore, and to Baroda on the west coast, all north of the Vindhya Mountains. It also progressed to the west, but south of the mountains, by way of Rewah, Pannah, Jubbelpore, and Mundlah down to Nagpore, in the most central part of India. It will also be noticed that the great sandy desert to the west of Ajmere was left free; also, the district between the Bay of Bengal on the east and Nagpore in the center of India. The latter, although sparsely inhabited, is not a desert, but its rivers are but little navigated, and there are few or no roads; hence, cholera advanced slowly, or not at all, across it. If blown by the winds, it would have reached Nagpore very rapidly from Juggernaut and the Bay of Bengal.

From Nagpore, the great high-road southwest to Bombay by way of Nair, Jaulnah, Aurungabad, Ahmednugger, and Poonah was soon involved, in spite of a strong southwest monsoon which was blowing from the Indian Ocean. From Poonah it spread south to Punderpoor, at the time of the great festival there, and was carried at once in all directions by the pilgrims; the number of deaths in a few days being estimated at three thousand. From there it went down the west coast to Kolapoor, Bejapoor, Goa, Mysore, Calicut, Cochin, and Quilon, towards Cape Comorin, at the extreme southern end of Hindostan.

From the central point, Nagpore, it was also carried due south toward Hyderabad. A considerable body of Bengal and Madras troops had been engaged throughout the early part of the year 1818 in the siege of Chundah, seventy miles south of Nagpore. They escaped cholera, notwithstanding the excessive heat, many privations, and the fatigue attending their arduous operations. But when Chundah was taken they marched for Nagpore, and when nine miles below it, they had scarcely learned that the epidemic was in their vicinity, when many were attacked while loitering for water on the neighboring rivulets. Of seventy cases admitted the first day, about twenty died the first night.

Jaulnah, near Nair, southwest of Nagpore, became affected. About one thousand men arrived at Jaulnah on July 4, 1818, in good health, but before they arrived at Aurungabad, toward Bombay, many were seized, and it began to prevail in Aurungabad soon after their arrival. Then the Russell brigade left Jaulnah for Hyderabad on July 5, and a few days after it attacked them and produced great mortality. It broke out at Hyderabad toward the end of July, was carried due south to Gootry, and to Bellary, just above the holy city of Bijjinugger, and to Bangalore. In November it was at Seringapatam, that sink of nastiness, and so down to the southern end of Hindostan, through Central India.

In March, 1818, it was generated, as usual, at Ganjam, on the east coast, near Juggernaut; in May, it was at Vizagapatam; in July, at Masulipatam, at the mouth of the river Godavery; in August, at Nellore; in October at Madras. From Madras it went south to Pondicherry, Tanjore, Madura, Tinevelly, and Palmacottah, near Cape Comorin. It was also at the holy island of Ramwieseram, between India and Ceylon, and was carried over to Ceylon.

One of the modes of conveyance of the disease to the island of Ceylon is well told by Dr. Knot, of the Sixth Dragoons. He says the cholera of 1817 traveled down the east coast of India, frequently in opposition to a strong current of wind, in the track of human footsteps and commercial intercourse, till in the beginning of the year 1819, when it reached that part of the Coramandel, or east coast, which is opposite to Ceylon, whence it was conveyed across to the island; possibly also by pilgrims to and fro from the holy island of Ramwieseram, situated in the strait between Hindostan and Ceylon. It made its appearance at Jaffna, the nearest town to the coast of Hindostan, and the capital of a large and thickly-inhabited commercial district. From Jaffna it spread southward to Colombo, the present capital; where it was at its height in April, 1819. From Colombo it went eastward to Kandy, the old capital of Ceylon, showing itself only where human intercourse was constant and frequent. From Jaffna it was also carried across to Trincomalee, about the same time that it arrived there by sea, with the ships Leander and Topaze.

Its introduction into the Mauritius from Ceylon is described by surgeon James Foy, of the frigate Topaze. The Topaze arrived at Trincomalee, Ceylon, on September 5, 1819, with seventy-two sick, mostly of dysentery. A sail-maker died on board, of cholera, on the 16th, and a marine and a seaman on the 20th; others recovered. The Topaze sailed for the island of Mauritius toward Africa October 9, and soon after cholera broke out again, with seventeen cases, and four deaths. She arrived at the Mauritius October 29. Six out of fifteen cases sent to the military hospital died; among them, four of the sequelæ of cholera, also four more who were sent to Tonnelier Island; all of them having only partially recovered from cholera and subsequent dysentery. Sixteen cases convalescent from cholera were landed. The first fatal case was in the hospital, and the second did not occur till November 19, and then in the person of a negro employed on the quay. In about three weeks after the arrival of the Topaze fifty or sixty deaths were occurring daily, and soon afterward it appeared in other parts of the island with equal fury. It was said that no case occurred on board the Topaze after her arrival at Mauritius, although almost all the merchant-ships in the harbor lost some of their men; but a visiting physician saw one, and others may have been overlooked. The larger portion of the French physicians and the inhabitants thought the disease infectious and introduced by the Topaze, while the English authorities were unanimous in the opinion that it was not. The governor of the neighboring

island of Bourbon, under the strong conviction that the affection was communicable in some unknown way, forbade all intercourse between the two islands; but notwithstanding two small slave-vessels, in December, slipped in with the disease on board, and after the usual interval the 1819, pestilence broke out in such a manner as to leave no doubt of an infection traceable to the slaves; as the first eight victims were slaves who had arrived in her. The governor, with great promptitude and energy, instituted a thorough police-cordon against the town of Saint Denis, where the vessel had landed, conveyed all the sick to the hospital, and stamped out the disease, with less than two hundred deaths. In the Mauritius, where these precautions were neglected, it spread to a calamitous degree, causing seven thousand deaths.

From the Mauritius cholera was carried to Madagascar, and thence, according to Haeser and Drasche, to the east coast of Africa, especially to Zanzibar; from whence it was also taken up to Muscat, at the foot of the Persian Gulf.

As this epidemic originated on the east coast of Hindostan, and the commerce with China and the immediate countries and islands was very great, it was natural, if the disease was at all transportable, that it should be carried East toward China. It was at Arracan, coming probably both by sea and land, in 1818, and raged severely. The Burmese war carried English troops and cholera into Burmah. In July, 1819, it was at Bankok, the capital of Siam, having been introduced by English ships, and ultimately caused forty thousand deaths.

In October, 1820, it reached Canton and Whampoa, in China, and penetrated into the interior of China. It visited Ningpo and Nankin, and passed along the Yangtse-Kiang River into Central China. In 1821 it was at Pekin, where it was reproduced in 1822 and 1823, and formed the focus of the disease in Northern Asia. According to Livingstone and Drasche, it penetrated Chinese Tartary from Pekin, and traveled southward from Chinese Tartary and was then lost to sight.

From Arracan it is also said to have spread to Pegu, Rangoon, and Singapore in 1819. At the city of Malacca four hundred died in a few days. It appeared at the island of Penang and at Atcheen, in Sumatra, in 1819.

In Java, the first cases were noticed at Samarang in April, 1819, from whence it seems to have spread south to Japara, and north to Batavia, in May. It reached its height in Java in 1820 and 1821, and one hundred and fifty thousand persons died of it. In Java it first appeared after the arrival of trading-junks at Samarang.

It arrived in Borneo in 1820, and reached the Celebes Islands, and the Moluccas, and Amboina in latitude 5° south and longitude 130° east from Greenwich. The Moluccas suffered after infected Dutch vessels from Calcutta had arrived. The Philippine Islands were reached in 1820, (especially Manilla on October 5, 1820,) by vessels from Bengal. At Manilla it is said to have appeared after the arrival of vessels from infected places, and many ship-captains preserved their crews by forbidding all intercourse with the land. From Manilla it is reported to have been carried over to Canton and China.

At Bankok it was supposed that cholera arose from an evil spirit in the shape of a huge fish which had entered the Gulf of Siam; for the disease seemed to come both by ships from the sea and vessels down the great river Memam. A great religious solemnity was held on the coast to exorcise this devil, but the disease broke out with redoubled fury among the credulous masses, and killed seven thousand persons in a short time.

In the island of Sumatra the epidemic was so violent at the capital,

Atcheen, that the King went into camp at the mouth of the river; but it followed or accompanied them, and soon numbered its victims at the rate of sixty per day.

At Manilla the springs and fountains were supposed to have been poisoned, and the terror and rage of the populace were so great that an insurrection was caused in which many Europeans and a great number of natives were killed. At Pekin the pestilence was imagined to arise with a great yellow fog from the Yellow Sea.

We have already had hints how cholera arrived at Bombay on August 10, 1818. We will now trace it back to Nagpore, in Central India, more carefully. The first case in Bombay came from Panwell, half-way between Poonah and Bombay, where it was prevailing. The progress of the pestilence from Nagpore, in Central India, down to Bombay, had been carefully watched, and they were enabled to trace it from city to city, and creeping along from village to village, by the arrival of persons from places where it was known to prevail; some places escaped for months where this sort of communication did not take place. It seemed capable of transportation from place to place. (See Report of Bombay Medical Board.)

In the European barracks in Bombay nine cases occurred in six days, in one ward, which was badly ventilated and too much crowded with men. This was immediately emptied, scoured, and fumigated, and no more cases occurred.

In some instances it was confined to particular houses or isolated spots, affecting whole families; in others only one case occurred.

In Bombay it was almost restricted to the poorer classes; not many of the higher orders suffered and very few Europeans were attacked.

Of the native troops, newly raised corps, which were more drilled and possessed fewer comforts than the old Sepoys, suffered most, especially if deficient in clothing to protect themselves against rain and cold. None of Ogilvey's hospital attendants were attacked.

Dr. Taylor's (president of the Bombay Medical Board) first case was a man who had just returned from Poonah, where the disease was prevailing, through Panwell, where it also existed. His wife was the next victim, and then the wife of a neighbor; then it spread through the lane where they dwelt.

The next fatal case was near the jail, in a populous district, and soon after numbers were attacked, but only a few died; and a distinction began to be made between fatal and non-fatal cases. In the end it was supposed that only twenty-five hundred persons died out of nearly fifteen thousand attacked.

Dr. Taylor was in doubt whether it was contagious, but fully believed that it was portable; for it traveled against the powerful monsoon winds, and was traced moving along the high road, from place to place. He repeats that its introduction into Bombay was clearly proved. He often saw three or four of a family sick at once, but only three of his forty-four assistants suffered, owing, perhaps, to their better food, accommodations, good ventilation, and cleanliness. The poorest classes suffered most, those who inhabited wretched huts, and slept, without a bed, on the mud-floor, with scarcely a cloth to spread under them.

It will be noticed that the road from Bombay first runs southeast to Poonah, in order to get through the western hills or ghauts, and then turns sharply to the northeast. At Seroor, just above Poonah, Dr. Burrel had almost every one of his thirty attendants in hospital affected in six days. There was, doubtless, some defect in the arrangements.

Dr. Jukes repeats that cholera traveled along the high road from Nag-

pore to Bombay, and that he had not heard of any village near Bombay that received the disease without previous intercourse with affected places.

The first case in Poonah was a soldier belonging to a detachment which left Seroor while the disease was very general there. Several soldiers fell ill on the march, and were sent into Poonah. The same troops went on to Panwell and Bombay. Neither Dr. Jukes, his assistants, or hospital attendants were attacked. Nor did it run through many European families. Although it seemed portable, it did not act like a common contagion. It crept from village to village, prevailed for a time, say from two to six weeks, and then declined.

Surgeon Coats went with twelve hundred men from Poonah, in June, to Ahmednugger, and to Toka, twenty-five miles southwest, a place much resorted to by pilgrims, where he learned that cholera was prevailing at Aurungabad, to which it had been brought from Nagpore and Jaulnah; for its progress through the villages, and along the post-road from Nagpore, could be distinctly traced. He found cholera in Colonel McDowell's camp, into which it had been introduced from Jaulnah. From there he fell back to Nassick, where cholera was also raging severely, three hundred having already died, and was informed that the disease had been brought by some individuals from Ahmednugger. About one in forty of his men were attacked on their various marches. He was led to consider it infectious, but only under some peculiarities of constitution. If it was occasioned by some general distemperature of the air, he thought it would have spread over the country with more regularity, but it seemed only to travel over the roads; and where the population was scanty, and the intercourse slight, its progress was slow.

Surgeon Daw, of Aurungabad, says: "Bowel complaints were much fewer in number, and cholera took their place. In a body of troops who determined to live temperately, and avoid the night air, only one in a hundred were affected. A reckless part of the same regiment lost one-tenth of their whole number."

Surgeon Wylie, of Nagpore, says: "It commenced there in May, 1818, coming from the northeast, and advancing gradually in a southwestern direction to Nagpore, committing terrible ravages; it seemed limited to certain tracts, and did not spread by any general atmospheric cause."

At Kandeish, many families of Sepoys on their road from Jaulnah died of cholera, and those who arrived were the first that suffered.

In other places persons going over the ground of these marches found cholera prevailing in every village; having commenced soon after the passage of the affected troops, and the inhabitants were sure they had got it from these afflicted detachments.

Surgeon Kellies, of Jaulnah, says cholera prevailed in Nagpore during May; when they heard of the march of Captain Doveton, from Nagpore, with a detachment in which the disease existed, they were curious to see if the sick men would bring it with them. He says the troops arrived toward the end of June, and cholera commenced among us on July 3.

Palmer's party of twelve hundred men arrived at Jaulnah on July 4, and marched on the 6th, without sickness; but before they reached Aurungabad many of them were attacked. The disease began in Aurungabad soon after their arrival.

Jaulnah is between Aurungabad and Nagpore, and has a fort and cantonment for English troops. Surgeon Kellie had hospital patients seized with cholera after some sick with the disease had been admitted. The Sepoy attendants were attacked, and others had to be forced to their

duty. When a family was invaded, several others were apt to be seized. He regarded the affection as a specific morbid poison, which was regenerated in the body and given to others in some way unknown, but not by apparently direct contagion.

We have been thus particular in describing the conveyance of cholera from the banks of the Ganges through Nagpore to Bombay, in order to elucidate some of the peculiarities of the disease. Sometimes it seemed infectious, at others not. Sir Gilbert Blaine summed up the whole difficulty admirably, when he stated "that it was capable of being transported from one place to another; and to possess the power of propagating itself, by the acquisition of fresh material with which to assimilate; but subject to particular laws, with which we might never become acquainted." In Bengal the advance of the disease seemed very irregular and incomprehensible. Its mode of falling upon a place and its career in particular districts being singularly capricious. Sometimes it would make a complete circuit around a village, and, leaving it untouched, pass on. Then, after the lapse of days or weeks, it would suddenly return; and, scarcely reappearing in the towns which had already undergone its ravages, as if they had been rendered pestilence-proof by one attack, would nearly depopulate the spot that had so lately congratulated itself on its escape. Sometimes, after running a long course on one side of a river, it would take a rapid sweep across it, and lay waste the opposite bank. This very capriciousness of its march was easily accounted for on the supposition that it was communicated by human intercourse; for nothing is more complex, varied, and uncertain than human travel. The persons who quit an infected spot go where they please; may not remain at the nearest village, but often journey to a distant one. Some travelers go from place to place, how and when they like, and as fast or slowly as suits their convenience. Their wills are unfettered and the modes of transport are ever at hand, and they often sow a scattering fire of the disease in various directions. Then comes the slow, steady transport of commerce, with an average daily progress by water, by boats or ships; or by land, with horse, camel, or bullock. The eccentricity is followed by a slow, relentless progress along highways. Although it skips about, at first, like fleas or skirmishers, it finally stalks from district to district, and from kingdom to kingdom, with the regularity of mail-service. It may be assumed that not more than one case in three or four of cholera is fatal, and not more than the same proportionate number are productive of other cases. Hence the fatal attacks will be separated by several which are overlooked, and by as many more which seem barren.

The presidency of Bengal contains much more than half of the population of the whole of India; and far more than the presidencies of Madras and Bombay. The valley of the Ganges is the most populous perhaps in the world, with a greater number of cities, large towns, and villages, than any other, except China. The pilgrimages to many and distant parts of it are numerous and almost incessant. Hence the progress of cholera along it seemed confused and undeterminate. But as soon as the disease reached Central India, where the population was sparser and the roads fewer, and every objective point was watched by intelligent and responsible army surgeons, the regular and progressive advance of the disease was at once noted. The reason why some places escaped and others were attacked became clear, and a better knowledge of the travels of the pestilence was obtained than in after years, when the novelty of the examination had worn off and carelessness of observation prevailed.

Numberless instances, like that of the frigate Topaze, have since oc-

curred, in which the disease died out at sea; but convalescent patients, soiled clothing, and perhaps contaminated bilge-water, introduced the disorder into other cities and harbors.

ARABIA AND PERSIA.

In 1821, cholera first extended to the WEST beyond the confines of Hisdostan, viz, to the islands of Kishme and Ormuz and to the city of Muscat, on the Arabian side of the foot of the Persian Gulf. It was said to have been brought to Kishme by a convoy of English troops from Bombay to Muscat, both by slave-ships from Zanzibar and vessels from Bombay.

Cholera recurred in the Bombay Presidency and City in 1819, 1820, and 1821, over one hundred and fifty thousand country and town people having died of it. Whole villages were depopulated, and the terror was so great in Bombay that the crews of many vessels loaded with cotton deserted and fled in the night. Cannons were fired to shock away the supposed aerial pestilence, although the southwest monsoon had been blowing against the disease for months from the Indian Ocean and Arabian Sea. Tar and sulphur were burnt in the streets, in place of thorough cleansing, ventilation, and disinfection of persons, clothing, and houses.

Then in 1821 eight hundred British troops, under Captain Thompson, went to the island of Kishme, at the entrance of the Persian Gulf, and from there were sent to the north and rear of Muscat to co-operate with the Iman of that place against the Wahabees from Central Arabia. Next, three thousand more troops were forwarded from Bombay, under Sir Lionel Smith, to the island of Ormuz, near Kishme, and cholera broke out on both islands before June, 1821, having first appeared in the English garrison. Slave-ships from Zanzibar, which had lost many by cholera, now began to arrive at Muscat, just below the Persian Gulf.

The usual disputes about the origin of the disease of course occurred, although cholera had been raging in Bombay from September, 1820, to May, 1821. In February, 1821, it was prevailing at Surat and along the borders of the river Indus, and about one hundred and twenty British ships and seven hundred and thirty country vessels were going annually from the infected ports to Muscat; so that opportunities for the conveyance of the disease existed in such abundance that, if transportable at all, it had to arrive *per force* at Muscat. And it is distinctly stated that in July, 1821, through the intercourse maintained by ships trading between Bombay and Muscat, the infection was transported to the latter. Besides, the harbor of Muscat is so completely inclosed by rocks and mountains that persons unacquainted with its location may easily sail by it, without ever suspecting its existence; so that it is very difficult for the winds to blow cholera into the harbor. By July 8, 1821, the epidemic had cost the Iman of Muscat at least ten thousand of his subjects; and Muscat had by no means suffered the most, as it had extended over the great part of the Arabian province of Oman, and had utterly destroyed several tribes and races of Arabs toward the interior. In July it was raging at the island of Kishme, and Mr. Fraser's party and many of the inhabitants fled to Gomberoon and to Menab, just below it, to find the disease still fiercer in those localities. By this time it was at Bunder Abbassee, on the north side of the Persian Gulf, and Bahrein, on the south side, where thousands of pearl-fishers congregate. On August 20, 1821, it prevailed in Bushire, the only Persian port of any importance on the Persian Gulf. Bushire, in addition to being very dirty, has many low wells along its streets and suburbs,

so that it is difficult to avoid them when riding at all quickly on horseback. By the 29th it was in Kazeroon, on the caravan route to Shiraz. From the frequent communication between these places it was said by many writers to have been transported by travelers. At Shiraz it raged with great violence. The Prince Royal lost many of his family, including both his mother and son, and it is supposed that six thousand died out of a population ofthirty-five thousand, the rest having fled.

Ispahan refused to admit caravans and travelers from Shiraz, and escaped the disease this year. These were forced to go east to Yedz, where the pestilence broke out in September, died out in the winter, and went on next spring by caravans to Nain, Kashan, and Koom.

In the mean time the epidemic had also broken out in Bassorah, at the head of the Persian Gulf, distinctly stated to have been brought up by English ships. This town has much trade with India, especially with Bombay and Surat. Eighteen thousand are said to have died in this dirty and unhealthy town. From there it went up the river Euphrates to Hillah, and to the two great holy towns, Meschid Ali and Meschid Hossein, near by. Also up the Tigris by boats to Bagdad which became infected together with the surrounding country. At this time a Persian army menaced Bagdad and defeated the Turkish force collected before it for its defense. But a few days after the Prince Royal of Persia saw his troops devastated by this new enemy and recoiled from it. After he had lost two thousand men by cholera, he fell back to Hamadan, losing from thirty to forty men per day, and did not stop his retreat until he reached Tabriz or Tauris, to which another column of the infection was coming up by way of Kasbin, Zengan, and Maraga. From these towns it was carried to Reshdt, the principal port, at the foot of the Caspian Sea; and from there back east to Balfrush toward Astrabad.

From Bagdad and Hillah it was carried up, by pilgrims and travelers from Meschid Hossein and Ali, to Mosul, Diarbekir, Orfu, to Aleppo, and to Antioch and Alexandretta or Iskanderoon on the Mediterranean Sea, and from there down to Tripoli, toward Damascus, where it died out in 1823. We have the authority of the French consul (the celebrated Lesseps) that the irruption of cholera was coincident with the arrival of the Bagdad caravans at Aleppo, and that the intermediate towns of Merdin, Mosul, Diarbekir, Orfu, Bir, and Arbil had already been infected by them.

From Tabriz or Tauris, where forty-eight hundred persons are said to have died in twenty-five days, it was carried west to Erzeroum, near the Black Sea, and north to Tiflis and Astrakan in September, 1823. There it also died out in 1823, in the winter, not to re-appear for six years. Then it was again brought up by the same route in 1829.

There is but one pass through the Caucasus Mountains above Tiflis, and it was particularly noted that it crossed this defile with groups of merchants and travelers. They were contagionists in Astrakan in 1823, and the disease was stamped out. They were not in 1829, when the infection again arrived, and it not only became epidemic, but was carried up into Russia. All along the borders of the Mediterranean, the most vigorous measures against contagion and infection were taken in 1823, and the disease was prevented from reaching Europe in that direction. The French government was particularly active in recommending this course.

We have thus minutely described the progress of cholera along THE PERSIAN GULF ROUTE, because many succeeding epidemics followed the same course, affected the same places, and, with greater facilities of travel, and larger numbers of travelers and pilgrims, have often reached Russia and Europe.

CHAPTER III.

THE EPIDEMIC OF 1826 AND 1827 IN INDIA, WHICH REACHED RUSSIA IN 1829, ENGLAND IN 1831, AND THE UNITED STATES IN 1832.

The epidemic which reached Orenburg and Astrakan in Russia, in 1829, was of course preceded by repeated outbreaks in India.

According to Scott's Madras Reports, "the year 1822 was marked by an almost absolute rest from cholera in India. The great epidemic which had arisen in 1817, and well-nigh covered Asia during the next six years, had now subsided."

It had been present in June, 1821, at Juggernaut to such an extent that the car of the idols could not be dragged about. In 1823 Cuttack and Balasore, near Juggernaut, suffered severely again. In 1824 it was in Central India, especially at the cantonment of Mhow, near the crowded and filthy cities of Oojein and Indore. During the early months of 1825 we have a repetition of the old story. "The pilgrims at Juggernaut suffering severely; cholera again at Calcutta; also it is again at Mhow; the rest of India comparatively free." Early in 1826, it was evidently on the increase throughout the whole of the lower Bengal. By May 13 two or three hundred cases a day were carried off in the holy city of Benares, half way up the Ganges. In November, 1826, it was high up the rivers Ganges and Jumna, at the large cities of Delhi, Muttra, and Agra. In May, 1827, it prevailed in an epidemic form in all the villages for miles around Agra, and an immense number fell victims. In June it was again in and around Delhi to an epidemic extent. It was then found to have been present at Hurdwar in the spring. In June it was at Nahin, in the Himalayas, 3,000 feet above the sea; and at Sabathoo, also in the mountains, by the 18th. It was prevalent through the whole Punjaub, or extreme northwest province of India, in 1827; especially at Lahore, northwest of Hurdwar. Suddenly it was heard of at Teheran, near the Caspian Sea, in 1829. The Government Calcutta Gazette says: "We regret to state that the greatest consternation prevails at Teheran, the capital of Persia, in consequence of the appearance of cholera, which has gradually advanced from Herat in the east, through the province of Khorassan to Teheran, the Persian capital," "only seventy miles south of the Caspian Sea." At Herat, King Mahomed and Prince Koursan, the last member of the royal family in Affghanistan, have fallen victims. His Majesty, the Shah of Persia, has left Teheran and retired to the mountains. The princes and nobles are following his example; the lower orders are flying to escape the pestilence." There is no doubt that the pestilence was in Herat in 1828 and 1829, for Lieutenant Connolly, in his Journey to the North of India, from England, through Russia, Persia, and Affghanistan, in 1830, vol. 2, p. 5, says: "The year before our coming to Herat, (*i. e.*, in 1829,) cholera had swept away many thousands of persons from the city and provinces around." Drasche, p. 19, says, "In 1827, cholera was in Lahore, Cabul, and even at Cashgar, in Central Asia. In 1828, it was at Herat and Bokhara, and is even said to have reached Khiva, at the foot of the Sea of Aral."

While this was going on it was again carried east from India to China, especially to Pekin, in 1826. By December, 1826, it had crossed the

Chinese wall and was spreading through Mongolia to the west. It even reached Kiachta—50° north latitude and 110° east longitude—to which all the great Russian caravans come for tea and Chinese goods, and then return by way of Irkutsk, Tomsk, and Omsk to Orenburg and Moscow in Russia, but especially to the great fairs at Nijni-Novgorod. Hence Russia was threatened in three directions, viz, by way of China, Central Asia, and Persia.

On August 26, 1829, the first fatal case occurred in Orenburg, but as it was not until the 10th of September that its true nature was divined, the usual disputes of course arose about its origin. The question was for a long time a difficult one. Orenburg lies high, on a dry, sandy loam; there are no woods, marshes, or putrid water about it; the streets are straight, and rather broad and cleanly; all the necessaries of life, viz, wheat, fish, and meat, were cheap; and there was nothing peculiar in the weather. But it must have had some sanitary defect, as it was subject to epidemics among the cattle, which annually destroyed a great number. The stables, barn-yards, and, doubtless, privies may have been very foul. Six thousand of its inhabitants were soldiers, a large portion of whom spent their lives on outpost duty, toward Central Asia. It was next learned that the Khan of Khiva had commenced a campaign on the frontiers of the Persian province of Khorassan, and had been compelled to retire on account of a virulent outbreak of cholera, which swept away a large portion of his army. He set out in May and was driven back before the Bokhara caravan arrived. Next Major-General Dolgoruki, then in Persia, sent intelligence to St. Petersburg that cholera had repeatedly made its appearance in Persia, especially in Khorassan. Then the Kirghis tribes, which live due southeast of Orenburg, toward Khiva, reluctantly supplied clear and convincing evidence of cholera having shown itself among some of their hordes on the rivers Ilek and Embo. The former river empties into the Ural, just below Orenburg; and the latter into the Caspian Sea, east of the mouth of the Ural; but both of them lie southeast of Orenburg, in a direct line to Khiva. The constant distrust of the Russians by the Kirghises, and their jealous reserve, greatly impeded the procuring of distinct proof for a long time; although they carried on a continual barter along the whole line of the province of Orenburg, especially in the summer and harvest, for sheep, camels, felt, skins, &c.

For a long time the exemption of the fortresses of Orsk and Trortsk was regarded as sufficient evidence that cholera was not introduced by the caravans; but both of these places lie to the northeast of Orenburg, toward Siberia, and cholera was brought from the southeast, from the direction of the Sea of Aral.

The first victim in Orenburg was a soldier; the second, the wife of a military officer; the third fatal case, a week after, was a carpenter, a serf of the military governor; the fourth, on the next day, viz, September 9, 1829, a soldier from the same battalion as the first victim. The outbreak now commenced causing seven hundred and forty-seven deaths by the 21st of October, or nearly one-fifteenth of the whole population. It was proved that the first fatal case occurred thirty-five days after the arrival of the caravan that came by way of Troitsk and Orsk, and this is doubtless true. But six or eight caravans arrive every spring and summer from Bokhara, some of them going north of the sea of Aral, and others south; yet the southern caravans were overlooked, except one from Khiva, which arrived seventy five days before. When there was but little fruit cholera prevailed with violence; when unripe or spoiled water-melons were freely used, it did not appear at all. The rye-crop was spoiled, and the

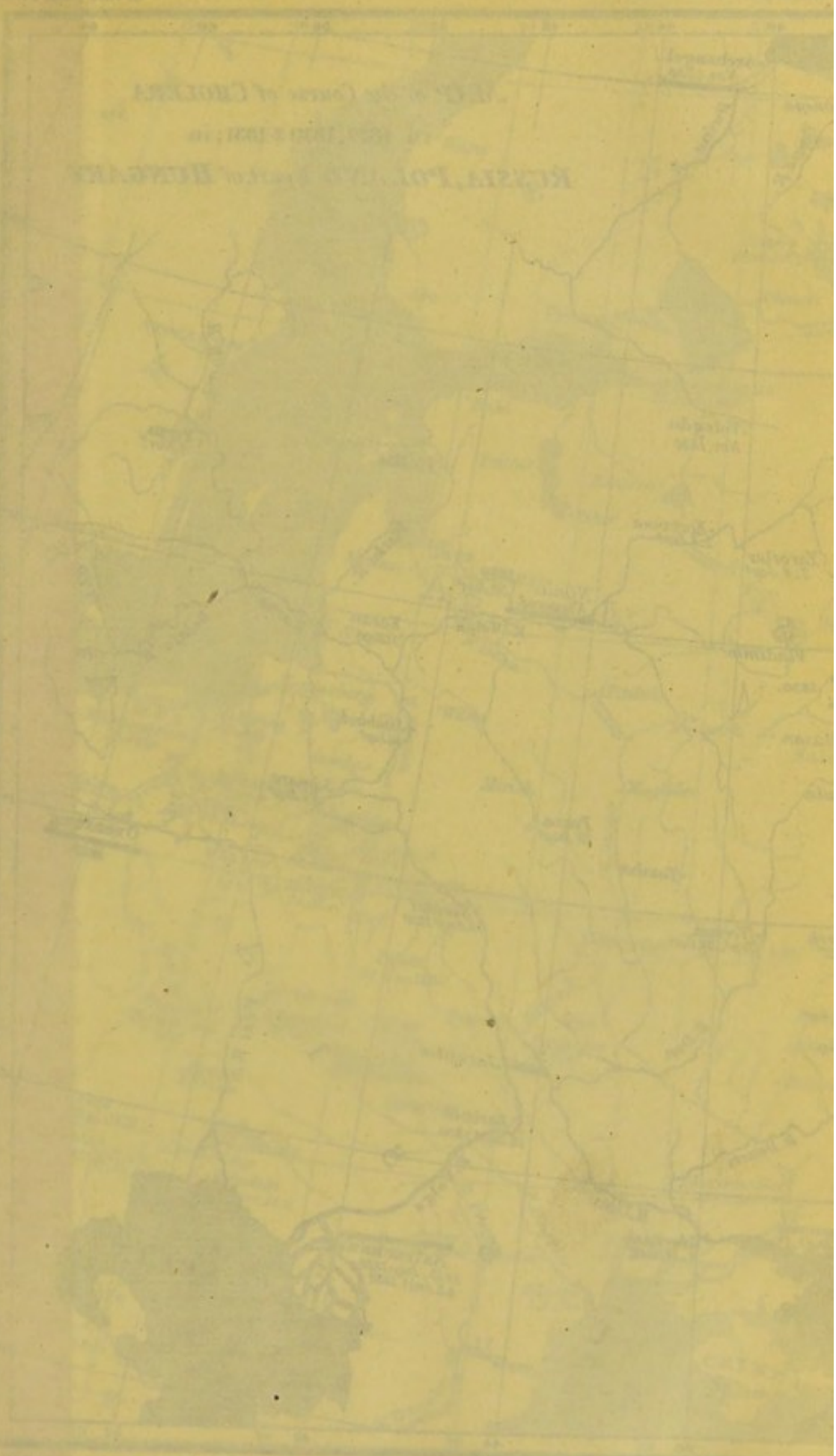
Tartars, who used it, were among the first attacked. At first it was supposed not to be infectious; but it was soon noticed that it was inclined to spread in families; that it frequently broke out in various towns where a single person sick with cholera arrived, or died; that in many places close to where it was prevailing, it did not appear, because no one had arrived in them affected with it. Few whole familes were exterminated. Generally in a family of ten individuals only one, two, or three were attacked. It usually seized one or two persons in a house, passing successively to others, with intervals between each; but never to many or all at one time. This is explained by the fact that there was no chance for general water-poisoning, for all used the bright, fresh, clear, and pure waters of the large, broad, and rapid river Ural. The only wells were those belonging to the hospital, engineers, and artillery. On October 10th, a month after the commencement of the disease, and when it had begun to break out in neighboring villages, a military cordon was established around Orenburg and its suburbs, and all travelers were detained seven days. But it was found that some were attacked fourteen days after exposure. By the middle of October, the medical board of Orenburg obtained information from travelers, and officially from the government, that cholera had been and was still prevailing in the central regions of Asia, especially at Khiva and Bokhara, with which Orenburg has commercial intercourse every summer; and that the first spreading of the disease did not occur till after the renewal of this intercourse, both with their nearest neighbors, the Kirghises, and with other distant fixed tribes of Southeastern Asia. Finally, it was concluded that the mode in which the disease most probably spread was by the arrival in an uninfected place of a person who had contracted a tendency to the disorder in the place where it was prevailing—then becoming ill and communicating in some way a diseased condition to the atmosphere of his new residence. Then it seemed to increase and spread, seizing those only who were predisposed to it. Eight instances of direct conveyance were ascertained judicially by magistrates and physicians who were watching the course of the epidemic. The extension of the affection from Orenburg was also decided to have depended on the migration of the inhabitants from infected to healthy places, which often happened before it was detected in the former and before the enactments of the board relative to quarantine were or could be put in force. According to the observations first made in Orenburg, it was inferred that it did not communicate itself by direct intercourse with the sick; but in the subsequent progress of the epidemic the magistrates and physicians became convinced that it really passed from one person to another in some obscure way, and was thus conveyed from place to place. Its infection seemed peculiar. It was not as unequivocal as in the most infectious diseases, and its power did not develop itself in all who were in direct intercourse with the sick, especially at the beginning of the epidemic. Nor was it communicated by the winds, for it appeared now here, now there, skipping over many villages, and leaving large tracts of country untouched. It followed the highways, attacking in its course along them those towns first which, though more distant than others, were, on account of their size or commerce, more likely to be the resting-places of travelers; then returning, as it were, on its path to villages previously passed over; going from them to other neighboring villages not on the great highways, and remaining generally longest in the most populous towns. In this way, in the course of six weeks it was traced in three several directions along the great highways on which there was most travel, viz, towards Uralsk, in the northeast, Ufa, in the

north, and Kazan, in the northwest. Thus at Sterlitanaka, on the Ufa road, one hundred and fifty miles north of Orenburg, during the annual fair of the town in October, many Tartars arrived from Kargala, where the cholera was raging with fury, and before it had been put under quarantine. The Tartars of the town were the first victims. The first suspected case was admitted into the hospital, but was dismissed in twenty-four hours, as it did not seem to be cholera; but in four days more it was brought back with a fully-developed attack, and three days after others were brought from the same house. The importation of the disease into Iletsk, forty-three miles southwest of Orenburg, was also fully proven.

By July 21, 1829, the Russian authorities had news of the prevalence of cholera in Cabul, Bucharia, Tashkent, and latterly in Khiva. It was carefully stated that the caravans which arrived at Orsk, due east and north of Orenburg, were healthy; but those which came from the southeast, direct from Khiva, were not examined. The clothing and baggage of the travelers were not looked into, but the Russian authorities ordered the Buchareans to take out some cotton from the middle of every bale and chew it, and to pass it from one to another for that purpose. The Tartars, laughing at the fears of the Russians, pulled out the cotton indiscriminately, without precaution, chewing it readily and tossing it to one another. Hence it was concluded that merchandise did not convey cholera; but clothing and baggage were allowed to slip into Orenburg. Only October 23 were they satisfied from private letters that cholera had broken out that year in Bokhara, and that it had been rapid in its effects and spread. Although some of the Orenburg caravans arrived healthy, others did not.

The first case in Orenburg was reported late in August; but in July a tradesman went with his brother to barter with the Bucharean merchants of another caravan. After being a whole day with these people, he was seized with violent vomiting and diarrhœa. In reply to inquiries whether any of the Buchareans were ill of a similar complaint, he asserted that some of them certainly were. The disease was not checked in Orenburg till prohibition of intercourse between the diseased and healthy houses, separation of the sick from the sound, institution of cholera-hospitals, and, finally, complete purification of the places which had been attacked, had been enforced.

In a Mohammedan village near Orenburg it raged for sometime before the government was informed, as the inhabitants endeavored to conceal it; but one of their people, going to a neighboring village, died of the disease, followed by forty-one others. At the first intelligence of the arrival of the pestilence at the above place, the Russian peasants of a hamlet only eighty yards distant shut off all communication and entirely escaped. It was carried to one village eighty miles from Orenburg by October 14, and to still another, eighty miles farther, by November 7, then turned back and attacked a third, thirty miles nearer Orenburg on December 5. The first place affected from Orenburg was on September 28, at the Fortress Rasypna, sixty-six miles to the northwest, to which the Tenth Cossack Horse Artillery was sent. A tavern servant also died there the day after his arrival from Orenburg, but no other cases could be traced directly to the latter. It seemed rather unaccountable that places near Orenburg, and in constant communication with it, continued completely healthy. In the middle of October it appeared at two fortresses between Rasypna; while another, only twelve miles from the city, remained free till January 19, 1830. October 8, it reached Iletsk, a fort forty miles southwest of Orenburg. October 5, it



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broke out at a village twelve miles from Orenburg, on the high road to Kazan; passing over Berdsk, seven miles nearer, until the 18th. On the same day it was heard of in places sixty and one hundred and twenty miles farther off, toward Kazan, on the River Volga; while it did not appear till a great deal later in four or five small towns, on the same highway, only twenty or thirty miles from Orenburg. By the beginning of November it was two hundred miles northwest on its way to Kazan, with a body of recruits from Orenburg, at the same time that it had reached towns seventy and one hundred and twenty miles due north, toward Ufa and Perm. This is an important point, as a great dispute arose subsequently about the origin of cholera in Perm. Two persons were the first attacked in one town, after they had undergone fourteen days quarantine this side of Ufa. It was afterward proved by other cases that seclusion for fourteen days was not a sufficient interval between exposure and seizure in every instance. But it was nowhere proved that the cholera passed directly from the introducing parties to the first persons who were in communication with them immediately on their arrival. There appeared to be some intermediate process required in many instances, as some persons seemed to have no predisposition for it, while, in other cases, it tended to spread in families. In eight or ten towns and villages the first persons attacked had just come from Orenburg. In others no connection could easily be traced by the superficial examinations which were then, and are still, made.

We have been thus circumstantial about the origin of cholera in Orenburg, in order to save repetition, as similar difficulties and obscurities will be met with in many, if not in most, large towns in which the disease subsequently occurred.

On its first appearance, the Orenburg physicians, although warned of its probably infectious nature, by a proclamation from the supreme board of St. Petersburg, universally believed it, from their first experience, to be incapable of communicating itself, either directly or indirectly, from person to person. But ere long a considerable majority were led to change their opinion. While they were looking for the disease from the northeast, it slipped in from the southeast. The lowest classes, particularly those residing in damp, confined, and dirty apartments were most subject to the disease, and did not come early under the observation of physicians or magistrates. In the majority of instances only one fatal case occurred in a family, and the non-fatal ones were overlooked; although in not a few instances after attacking one or two persons in a house, particularly the servants, it passed successively to others, with intervals between each, showing that it was regenerated in some way in the affected dwellings. The deaths among the caravan people were not the first which attracted attention, and the patients did not always tell the truth promptly and frankly, nor did the health-officers. The first fatal cases were few and far between, and did not seem directly connected with each other by an unbroken line of lethal attacks. Debility and strength appeared to have less to do with the predisposition to the complaint than some obscure exposure, or unknown state of the system; for the propagation of the disease by the stools and infected water was unsuspected.

While this was going on in the north at Orenburg, Astrakan, at the foot of the Caspian Sea, became affected for the second time; having escaped since 1823. The teachings of that epidemic had been forgotten, and theories about spontaneous origin and latent germs began to prevail. In 1822 it had been noticed to have proceeded regularly and steadily northward from Persia toward the Caspian and Black Seas. It then first

reached Reshd, a large and populous place, and the principal port of commercial intercourse between the Persian Gulf and Caspian Sea. It was next very prevalent and fatal, successively, at Enzellee, Kisliar, and Lenkoran, on the west coast of the Caspian Sea. Then at Salian, at the mouth of the river Kur, going up its southern branch, the Aras River, to Khor, Erivan, and Kars, to which places it was also coming by land from Tabreez. Then up the northern branch of the river Kur to Elizabethpol and Tiflis; to which cities it was also coming by land. Tabreez suffered very much in 1823, again in 1828 and 1829, and afterward in 1830, when it lost five thousand of its inhabitants. Erivan, which is large and populous, but very dirty, suffered in 1822 and 1823, and again in 1828 and 1829. In Tiflis it prevailed in a frightful degree in 1822 and 1823, and was brought to it again on August 8, 1830.

Above Lenkoran, on the Caspian Sea, Baku, the chief port on the west coast, had the disease in 1822 and 1829. North of Baku, Derbent was severely affected in 1822, and more so in 1829. Then comes Astrakan, at the mouth of the Volga, the chief commercial emporium between Asia and Europe, and between Persia and Russia. In 1823 it was believed to have been imported into Astrakan from Baku, Salian, and Lenkoran, where it was then prevailing. For thirty-four vessels arrived at Astrakan from these infected ports, and on one of them eight persons had died of cholera, to which the civil authorities paid no regard, in the unfortunate belief that cholera could not be imported. An infected sloop-of-war, the Baku, from Baku, was detained at the quarantine, sixty miles below Astrakan, in 1829, by the military authorities, on July 15, but no restrictions were placed upon merchant-vessels. All was tranquil till August 1, the disease being confined to the quarantine station. But Drasche, p. 20, says isolated cases had occurred in Astrakan in the previous fall and winter. Then four persons sickened in Astrakan close to one of the outlets of the Volga, and from there spread imperceptibly through the city. It increased slowly, appearing during the first days in a small number of persons only, and was concealed. Then it was proven that cases had occurred before August 1, but of which the magistrate had not been made aware. It was only when a person who had been an overseer of a cholera-hospital in 1823 was attacked, and had his case reported to the police, that the town was awakened. It was then found that a man had died in the same quarter the evening before and been interred privately. In all there were twelve hundred and twenty-nine attacks and about five hundred deaths in Astrakan, including the chief magistrate and many of the police. By August 8, villages from two to four miles distant began to be involved, to which many families had fled from the city. By the 10th it was on the high road overland to Moscow, in the persons of those who sickened on the road and perished, after handing over the disease to others. Many gardens and farms near Astrakan, which had cut off all intercourse, remained exempt, also many villages, while the disease raged all around. The Tartars immediately abandoned those attacked and sought other encampments, but still carried the disease with them in the form of diarrhœal cases. Dr. Rehman inferred that it was infectious, because it did not spread regularly in masses, but by leaps, sparing places where it was to be expected, if it came by the atmosphere, and attacking others in which its arrival could only be explained by the coming of infected persons. Still, the majority of the physicians regarded it as void of contagion. At Krasnoijar, which lies to the east of Astrakan, the wind blew directly from the northeast and southeast all the time; while only westerly winds could bring it. But on August 6, an infected soldier and girl arrived from Astra-

kan, and the outbreak commenced. Comparisons were instituted between the infectiousness of plague and cholera, in which it was assumed that five out of ten exposed to the former disease might take it, while of cholera only two out of ten might contract it, unless under conditions peculiarly favorable. Thus in places where multitudes lived extremely compacted, in miserable abodes, the infection and malignity of the disease obtained its highest degree; while in other places, with fewer persons in more spacious dwellings, it seemed scarcely to make headway. The bed and body clothes of the sick and dying were observed to spread the disorder at times, clean merchandise did not. It showed itself in no person from the quarantine-ground, but in remote inhabitants of the town. Also it appeared severely in various districts of the city in persons who had no acknowledged intercourse with each other. No tainted persons could be traced to the ship of war Baku, but the crews of thirty vessels, all from infected ports, and some with cholera on board, had been let loose all over the city. At first, physicians and hospital attendants escaped, but finally three doctors died, some hospital attendants, and a majority of the female nurses; doubtless because the privies and the ventilation were not well attended to. Finally 8,000 out of 60,000 inhabitants died in Astrakan. Then it went step by step up the river Volga to Zaritzyn, August 16, and Saratov on the 18th. By August 12, one hundred persons were attacked daily in Astrakan, and 3,000 died in Saratov. On September 8, it was at Simbirsk. On the 27th at Kazan, near the junction of the Kama river with the Volga, to which it had come both from Orenburg and Astrakan, both by land and water, with 2,000 cases. From Saratov it also struck overland to Penza, toward Moscow, by August 29.

Toward the end of August it was at the great fair at Nijni Novgorod, among the boatmen employed on the Volga; but as the market merely lasts during July and August, only one thousand and sixty-eight persons were attacked up to October 15.

By August 23 the Emperor of Russia, through his medical advisers, had announced his fullest conviction of the propagation of cholera by a species of infection, then first called contingent contagion, and had ordered isolation of infected persons and places, and a quarantine of fourteen days against persons proceeding from infected towns; and that their clothes should be washed with chlorine or other disinfectants, but goods and merchandise could pass free.

From Kazan it was carried far to the northeast, to Perm, by a party of prisoners assembled there from different parts of the empire. They were conveyed to the jail beyond the town by a detour so as not to pass through the city of Perm at all. A few days after the cholera broke out among them and spread to other prisoners, fifteen of whom died, and two soldiers. It is supposed that it was also brought up from Orenburg by way of Oufa, and this accounted for some of the mystery which at one time attended the outbreak.

From Penza it was carried overland northwest to Riazan, toward Moscow. But long before this, near Taritzin on the Volga, it turned off toward the river Don, which is there quite near, and traveled down toward the Sea of Azof and the Black Sea, attacking Rostoff, near Tcherkask, by September 10, 1830; and Taganrog and the town of Azof soon after. From thence it went to the Crimea, especially to Kertch and Sebastopol by ships, some of which were also attacked on the open sea, and carried the disorder over to Odessa by the middle of October, just after all quarantine regulations had been abolished, as the season seemed too far advanced for the pestilence to arrive. It is also authoritatively

stated that Sebastopol and Odessa became infected shortly after the arrival of Russian ships of war, which had touched at Kertch, near the straits of Kertch and other infected ports.

In the mean time cholera had been traveling up the river Don, as well as down it, and again toward Moscow, by way of Voronetz and Toula. It also traveled up the river Donetz, which empties low down into the Don, and went on to Moscow by way of Kharkof and Koursk. Then it was carried by land across the top of the Sea of Azof and Black Sea, reaching Ekaterinoslav, on the Dnieper, Cherson at its mouth, and Odessa on the Dniester. It will be noticed that it reached Odessa both by sea and land.

By this time Moscow had become completely surrounded by the epidemic, for cholera had reached the province of Tver, to the northwest; those of Vladimir, Jaroslav, and Kostroma, to the northeast; of Nijni Novgorod, to the east; of Penza and Riazan, to the southeast; and finally of Kalouga and Koursk, to the south. If the province of Smolensk to the west had been involved, Moscow would have been surrounded by the pestilence on every side; for the province of Moscow is impacted between those of Tver, Vladimir, Riazan, Toula, Kalouga and Smolensk.

Many preparations were made in Moscow. Twenty cholera hospitals were provided, viz, one for each district of the city; and police inspectors and district physicians, with a magistrate and spiritual overseer for each section. The disease could steal in, in so many ways that no exact information was ever obtained of the precise period at which it first appeared in Moscow. It was never known which were the first cases, nor in what part of the city they occurred; which proves that no very bright or intelligent watch had been kept by the twenty magistrates, or twenty sets of police-officers and district physicians, and that no accurate or trustworthy reports were made. By the 18th of September it had already commenced its ravages. From the 24th to the 28th it was called sporadic; and after the pestilence had fairly formed a lodgment in the city, then all the means of preventing its entrance were immediately put in the most rigorous execution. The city was surrounded by a military cordon. All the public establishments were shut. The markets and all places of business and amusement were closed. The twenty different districts were separated from each other by barriers and strong military posts. Up to the middle of September the health of the city was so favorable that the mortality was smaller than it used to be at this period. But as soon as the first cases were reported an inexpressible panic ensued; and in order to shut the wolf up in the stable, all high-roads and by-roads were obstructed, vehicles were destroyed, and the bridges carried away. The military posts around the city were doubled, with loaded cannon everywhere, and no one was allowed to enter Moscow without undergoing fourteen days' quarantine. No attempt was made to stamp out the infection which had already gained headway, but all eyes were turned toward preventing persons absolutely sick with the disease from entering. Of course these violent and inconsiderate measures did not prevent the outbreak. Drasche (p. 21) says: "It was first introduced from the (makorjewschen) fairs of Nijni Novgorod, Moghilev, and Voronetz. At first almost all the Moscow physicians were contagionists; but when chlorine and chloride of lime failed utterly as a means of disinfection, their belief was shaken, and free ventilation, which would give ready access to the air-borne poison, (if there were any such,) and washings, and sprinklings with vinegar and other acids, were found more efficient. Some little approach toward estimating the power or weakness of the infection was made. In one

district, in one hundred and one houses, only one case each occurred; in thirty-three houses, two cases each; in fifteen houses, three cases each; in nine houses, four cases each; in six houses, five cases each; in the district hospital, six attendants; in one house each there were seven, eight, nine, ten, thirteen, twenty-one, and twenty-two cases; and in the police mansion twenty-eight cases, including the district medical officer, and twenty-seven policemen and soldiers. The greatest mortality took place in confined apartments in which were lodged twenty-five or thirty servants, addicted to debauchery of every kind, drunkenness, and filth. But as these places were generally located in low, wet, dirty, and marshy spots, the greater prevalence of the disease was attributed to marsh miasm, aided by getting drunk, and eating pears, cabbage, cucumbers.

Numerous instances had been adduced in which the disease had seemed to be induced by soiled clothing and bedding; but in Dr. Zoubker's hospital the man who received the clothes of the cholera patients when they were admitted, another who distributed them to the laundresses, and the doctor who counted the pieces still soiled with choleraic discharges, all escaped with severe diarrhœas without dying. An enormous amount of exposure seemed not to cause the disease, but Dr. Zoubker and his assistant washed their faces and hands frequently with vinegar, rinsed their mouth with vinegar; were careful not to swallow their saliva, and breathed through sponges soaked with vinegar in the vicinity of bad or dying patents. He also placed much stress on the fact that his clothes sometimes touched the beds of the sick and dying; that his cloak was occasionally taken away by the same soldiers who had carried the sick and dying, or was left in an ante-room; and that the nurses and assistant surgeon sometimes touched him.

The outbreak of cholera caused such an alarm that fifty thousand workmen and many of the better classes fled the city before any sanitary measures were adopted. The disease continued to appear till March, 1831, when 8,576 cases had occurred, more than half of which had died. On October 11th, the Emperor himself repaired to Moscow, to see that everything was being done that could be done, and, on his return to St. Petersburg, subjected himself to fourteen days' quarantine. This distinguised example elevated the spirits of the inhabitants and led to numerous instances of generous and fatal devotion. Moscow was now perfectly secluded, and St. Petersburg was protected by a double military cordon.

No account of the number of doctors who died was given, but ninety-three of the clergy fell victims, being a much larger proportion than ought to have been. This was explained by the fact that no Russian dies without the services of a clergyman.

The progress of the disease toward St. Petersburg, according to Drs. Russell and Bury, is as follows. It first showed itself in several houses and villages high up the Volga, above Moscow and Tver. All supplies of provisions and goods from the interior being brought by water, short inspections were established at these places and subsequently at Novgorod. Crews and passengers were supposed to be slightly fumigated; but it soon become known that this trifling precaution was often omitted or evaded, as it had been kept up for a long time and a false security was established. But in the mean time the cholera was slipping along from Jaroslav by water to Tischwin, which is at the head of navigation of one of the streams leading to the east side of Lake Lodoga, to which place the confluents from Lake Ilma in the south and Lake Onega in the northeast also lead, and to which all the boats congregate near St. Petersburg. Lake Onega is in the rear of St. Peters-

burg, and a merchant who came per boat from Wytegra on that lake was the first case recognized, on June 26, 1831, in St. Petersburg. The next two cases were residents near the boats. The fourth case was a man from Jaroslav. Of course no direct personal communication could be traced between any two of the first five or six fatal cases. Next, many were taken ill on board the boats, both coming from Novgorod to the south and from Lake Onega on the northeast.* By July 6, six hundred and fifteen cases and two hundred and eighty-seven deaths had occurred, and all St. Petersburg was in the midst of a solemn fast, with great religious and some riotous gatherings and processions. The churches were filled all day. By July 16, it was spreading with considerable rapidity, but not with the violence described in other cities, in which the origin of the outbreak had been less carefully watched. Three-grain doses of bismuth and rubbings with aromatic ammonia was the favorite treatment. Violent excitement arose against all foreigners, especially physicians, who were accused of having poisoned the food and water, and of giving poisonous medicines. In two days one German physician was killed; two narrowly escaped the same fate; and six others were severely beaten. This outbreak was only suppressed by the personal appearance and harangues of the Emperor. Fifteen hospital-physicians were attacked, and six died very early in the epidemic. In some hospitals none were attacked, and in others many; probably in proportion to the amount of cleanliness and ventilation. Twenty thousand serfs broke the quarantine, and spread over the country. They beat the physicians and police at the barriers, and were aided by the neighboring villagers, who believed that attempts were being made to shut up and poison them. The epidemic soon broke out in these villages. In the mean time the pestilence was also being brought up from Riga, in the northwest where it had previously occurred, toward St. Petersburg; and Narva and Cronstadt, between the two places, became affected by arrivals from both. It was generally admitted that its appearance was usually, if not always, preceded by the coming of persons or things, or vessels, or all, from infected places. Some instances of long incubation of from seven to twelve days were noticed. Also that typhoid cases were common after reaction, with greenish, dark, and bilious passages, which did not occasion typhoid fever in the attendants, but genuine, cold, blue cholera; and the fear was expressed that persons apparently suffering with fevers, but who were really and truly cases of cholera, would be landed in England and other places. In the majority of prisons and asylums the introduction of the disease was traced; in others it could not be. The conveyance down to Cronstadt from St. Petersburg was clearly made out. Ships with the disease from Dantzic also began to arrive at Cronstadt. In the naval hospital, with two hundred and eighty cases, all the attendants, forty-two in number, escaped; and in the general military hospital, with two thousand cases, the same was noticed; while in many instances only one case occurred in a large family. Thirty grave-diggers escaped and ten men employed in carrying the sick. English and American ships were attacked on their arrival at Cronstadt; but it was noticed as curious, that of those seamen who had passed the summer there and become habituated to the disorder, none were attacked anew.

The Russian Baltic provinces of Courland, Riga, Livonia, and Esthonia, up to the Bay of Finland, toward Cronstadt and St. Petersburg, became affected, in the west as early as March, 1831, before it broke out in St. Petersburg; so that, when it appeared in that city on June 16

* There is complete water communication from Jaroslav to Lake Onega, and from Tver to Novgorod and St. Petersburg. Hundreds of market and other boats were passing daily.

it had long been closely surrounded by the disease in the east, south, and west. The Emperor and household, ten thousand in number, retreated to Peterhoff and Zarskoeselo, on the Moscow road, shut themselves up with strict quarantine, and turned all the travel to the east and west of them, and all escaped, while the new roads of approach to St. Petersburg became affected.

While this was going on in the north, the disease had been progressing up the river Dnieper to the holy city of Khiev. From Cherson, up the river Bog toward Poland; and from Odessa, up the Dniester, also toward Poland. Also overland from Odessa, due west to Jassy, toward Vienna; and from Odessa down to Galatz, at the mouth of the Danube; and by ships with cholera cases on board down to Constantinople.

In the mean time the Polish revolution of November, 1830, had broken out in Warsaw, and masses of Russian troops were sent from Moscow, where the disease lingered till March, 1831; and from the infected provinces of Novgorod, Tver, Smolensk, and Kalouga, (lying to the north and west of Moscow,) to the provinces of Mohilev, Minsk, Grodno, and Wilna, to the north and east of Warsaw. The provinces of Podolia and Volhynia, to the south and east, also furnished their quotas of infected troops. Thus Poland was surrounded by cholera in every Russian province on its borders. Battles took place at the towns of Ostrolenka in the north; Bialystok in the northwest; Siedlec and Iganie to the east of Warsaw. The Poles were generally successful, and often occupied the grounds previously held by the Russians; took many prisoners, and captured their arms and clothing which they wore. The battle of Iganie took place on the 10th of April, and by the 12th the Poles commenced to be affected, as supposed, from drinking water fouled by the sick Russians. This transference of the disease from the Russian to the Polish soldiers took place at least three times. Then the Poles fell back toward Warsaw, and cholera obtained a lodgment in Praga, on the right bank of the Vistula, which is connected with Warsaw by bridges. The crowds of persons passing over these, aided by the evacuation of Praga, where the disease was already prevailing, introduced it into Warsaw by the 19th of April, 1831. By a strange fatality the Austrian cordon of troops, toward Poland, was withdrawn before the evacuation of Warsaw, and large bodies of the Polish troops retreated into Austria, where they laid down their arms; and cholera soon broke out with extraordinary intensity in Galicia; so that although the Austrian government had now been led to regard cholera as a purely epidemic disease, it felt obliged to restore the quarantine after the mischief was done. (Drasche, p. 25.)

From Warsaw it was sent down to Cracow, to which it was also already approaching by way of Lemberg in the southeast. It also went directly west to Posen, the border town of Prussia, by the 16th of July, and it had previously been noticed at Plock and Thorn, on the Vistula, toward Dantzic and Konigsberg. Brierre de Boismont, sent by the Academy of Medicine in Paris, in March, 1831, to observe cholera in Poland, passed through Posen across hedges of Prussian bayonets which extended for eight hundred miles from the northernmost point of East Prussia, from Memel on the Baltic to the southernmost end of Silesia. Travelers were stopped every instant; the most active watch was kept, and Poles were hunted back to their own country like wild beasts; but all without avail, for fugitives and smugglers were crossing all the time, not only by stealth, but openly by day. All night the soldiers were heard firing on the smugglers, who never ceased to cross in defiance of the sanitary

lines; and very few were shot or captured. De Boismont says the Prussian cordon was not established till the disease had been three weeks on the frontiers of Poland, and above ten days in Warsaw. Cholera showed its wonted capriciousness. In the old and filthy part of Warsaw it seemed to be contagious, or at least infectious; the sick became the foci of emanation, infectious even to the robust. While nearly fifteen hundred of the poorer people died, very few of the better classes were attacked. De Boismont and other physicians lived at the Hotel del'Europe, frequented by hundreds of people, without changing his clothes in which he visited the hospitals; yet neither he nor any of his friends contracted the disorder. Drs. Janechen, Foy, Pinel, and Verat, of Paris, inoculated themselves with the blood, and tasted the discharges of cholera-patients, yet none suffered any inconvenience. Physicians and hospital-attendants were rarely attacked; so that in another large class of cases it did not seem infectious at all. But the physicians soon found out that they would rather live and sleep in a well-ventilated and clean hospital, than stay a few hours in dirty and crowded cholera-houses.

The disease had also slipped up the river Vistula in May, to Dantzic; and after it had already commenced there, it was hoped that its progress might be stayed by the establishment of a new double cordon of troops, to keep it out, when it was already in. By June 28, 1831, it became epidemic in Dantzic, and by the 22d in Konigsberg on the Baltic.

From Thorn, on the Vistula, it was carried west to Bromberg, and by canal over to the river Oder, after which it soon appeared at Stettin, at its mouth.

From Warsaw it was carried due west to Posen and Kalisch, by retreating Polish troops, who took refuge in Posen and Silesia. From Posen it also dropped down the river Wartha to the Oder, into which it empties. From Kalisch it was also carried to Breslau, high up on the Oder, and commenced to drop down that river to Frankfort on the Oder, near which there is another canal, connecting it with the river Spree, and thus it reached Berlin, while it was also coming overland from Posen. The first case in Berlin occurred August 29, 1831, in a man on a turf-boat. The epidemic lasted twenty-two weeks, with two thousand three hundred cases and one thousand four hundred deaths. From Berlin it dropped down the Spree to the Elbe, into which it empties, and appeared at Hamburg, at its mouth, on October 6th, having already been carried west to Magdeburg, on the Elbe, from which fresh infection had already been conveyed down to Hamburg and from there to Altona.

From Dr. Hamett's official report, (see Edinburgh Medical and Surgical Journal, vol. 39, 1833, p. 443,) we read, notwithstanding the watch that was apparently kept, "it is entirely unknown by what means cholera arose in Dantzic. The first cases appeared May 27, 1831, among the laborers in the mud-barges in the harbor of Dantzic," as if it had floated or been carried down the river Oder. But some light is cast upon the manner in which it was conveyed to distant places, as the first case was taken to his home, fourteen miles away; the second, third, and fourth cases, from four to eleven miles. The fifth case was a driver of horses to the mud-barges, who was carried to his home in town. Other cases occurred on these barges in June, when work was stopped. On May 30 the ship Monna, direct from Riga, arrived with cholera on board, and on the same day other cases occurred in town and in a suburb. It spread irregularly, without any marked order, especially among the poor, and finally extended to the villages, ravines, and valleys in and near Dantzic. The higher and middle classes generally escaped. From

May 28 to July 23, eight hundred and thirty-five cases occurred, of which one hundred and ninety-five recovered. During these eight weeks two thousand people were shut up in the dwellings of the sick, but well supplied with food and medical attendance. One hundred and eighty-nine persons fell sick in eighty-two of these houses, only fifty-nine of whom had been in direct contact with the disease. In sixty-three houses there were more than one case. The whole mortality was placed at one thousand and twenty-eight out of one thousand three hundred and eighty-seven cases, but not all the attacks were reported. In forty-six houses, one case each occurred. In fifty houses, two cases each. In ten houses, three cases each. Four cases in two, and five cases in one. Dr. Hamett counted double and triple cases occurring at the same time as single attacks, strangely enough. He thought in seven hundred and seventy-six cases no evidence of infection could be traced, and that fewer attacks occurred in those thus shut up and well supplied with food, than among the poor outside of them, who had bad food and hard living, with but little medical attendance.

The comparatively slight effects of the Dantzic confinement system were reversed at Opatow, just above Cracow, where cholera commenced May 30, 1831, with peculiar fury and unusual virulence. The whole adjacent country had risen up in arms to prevent intercourse with the town. No one was allowed to go in or out; all communication was forbidden, and all supplies of food interrupted. In the towns the shops were shut; a fearful silence prevailed everywhere. There was scarcely a house without sick, dead, or dying, and the horrors of famine were being added. A commission from Warsaw boldly declared that the disease was not contagious, and only infectious in some peculiar way. Confidence was restored, the markets supplied, and a remarkable abatement of the epidemic soon occurred. In Dantzic food was furnished, and medical and police attendance enforced cleanliness and order; the shut-up people were living in ease and comfort, with no anxieties except those consequent upon the disease; while the Opatow populace were deprived of all comforts and assistance.

ENGLAND AND IRELAND, 1831.

It has generally been assumed that Asiatic cholera made its first appearance in England in October, 1831, at Sunderland, near Newcastle. But in the Edinburgh Medical and Surgical Journal, vol. 37, 1832, p. 295, we find an account of an outbreak on board the ships of war lying in ordinary on the river Medway, below London, during the summer and autumn of 1831, by Dr. James Hall, R. N. Nearly seven hundred persons of all ages and sexes were on board these vessels; but owing to cleanliness and excellent ventilation, there was but little sickness until an unusual epidemic suddenly broke out, coincident with the arrival of vessels from places where Asiatic cholera was prevailing. "In a creek of the Medway, ships from infected foreign ports performed quarantine. In the month of June, 1831, numerous vessels arrived from Riga, where cholera was then raging." Early in July two cases occurred on board the English men-of-war. Then again in August a woman and her infant, and soon after the husband, were attacked. The ships that had arrived were said to have no sickness on board, although several of them had suffered by it at Riga. Hence the first five cases were regarded as bowel complaints. The next day several other cases showed themselves. In all, the attacks were sudden, with watery evacuations, cramps, cold sweats, and suppression of urine. Some had the signs of fatal blue cholera. It next became

epidemic on board various ships, attacking infants, children, and adults of every age and rank, and at all hours, by day and night. Sometimes whole families were involved, in others several members in succession. Persons who arrived in perfect health from distant places were attacked in from sixteen hours to two days or one week. From the 7th to the 9th of August thirty sudden cases of cholera occurred, and from then to October one hundred and twenty persons were seized. From October to the middle of January several more cases of cholera occurred at intervals. No similar disease had been noticed in the Medway at this station before. No case occurred on board the ships of war until full three weeks after the merchant-vessels from Riga, had arrived in the river and been put in quarantine. Hence Dr. Hall concluded that it was more than probable that "the cause was a miasm radiating from the ships that had been affected with cholera; for the most violently affected ships of war were those that lay nearest to these vessels." Confinement to bed, and emetics of ipecac., hot oatmeal porridge, with opium, are said to have acted like a charm. Calomel was not given, nor the lancet used. The vessels involved were His Majesty's ships Temeraire, Æolus, Poictiers, Devonshire, Russell, Clyde, and Redoubtable. In Sheerness, near by, and Chatham, and other ports, there were only a few sporadic cases. Dr. Hall had seen cholera in India in 1804 and 1805, and again in 1821, when he used venesection, opium, and calomel, and would have shrunk with horror at the bare mention of employing an emetic in this disease. But as he now regarded the evacuations made by the stomach and bowels as attempts of nature to free the system from an offending cause, he gave ipecac. to produce free and full vomiting, so as to discharge the vitiated secretions, and mild rhubarb cathartics for the same reason; then opium to remove spasms, &c.

Sunderland, it is generally claimed, was the first place in the British Isles in which malignant cholera seemed to appear in an epidemic form. Like Jessore in 1817, it made most noise, and was credited with being the cradle of cholera in England. It had about twenty thousand inhabitants, and its staple of commerce was coal; it is twelve miles below Newcastle, and then employed seven hundred ships of from two to four hundred tons each, with five thousand three hundred sailors. The previous season was healthy, the summer more than usually mild and genial; the only peculiarity being immense flocks of young toads. Long before October (Ed. Med. Surg. Journal, vol. 38, 1832, p. 96) several cases had taken place sporadically, to which every one that saw them agreed in assigning true choleraic characters. Dr. Dixon saw one on August 5; Dr. Brown another nearly two miles up the river above Sunderland; the third case was a pilot on August 13, in Sunderland; the fourth a shipwright on August 27. Then several more cases of extraordinary severity occurred before September and continued to appear during that month, with rapid sinking, coldness, severe vomiting, purging and blueness. Nevertheless it was generally maintained that these were merely aggravated cases of indigenous disease or common cholera. The first case that made an effectual impression occurred October 5; the next October 17, in a girl aged twelve years, in a respectable and much frequented public house on the river. The next three cases were a father, son, and daughter living near the first case, workers on keel-boats, which bring down coal. The next was a nurse in the infirmary to which the son had been taken, and who laid out his body. The next was a shoemaker; the next another keel-boat man. By November 1, five cases only had been publicly reported. Then much lightning took place, not followed by any new cases for two days. On November 6, there were

six new cases; on the 7th, two; on the 8th, none; on the 9th, seven cases, and then the disease became epidemic. Some days ten, eleven, and thirteen cases were reported; then only six or eight. It was extinct by January 22. The weather had no influence, but nineteen deaths in one day was the highest mortality. The disease lingered particularly in certain streets and lanes. It was not decided whether it arose spontaneously or was introduced. It was claimed truly that none of the seamen of the Hamburg vessels which had arrived in October had been affected. The only mode in which, if susceptible of importation, the disease could have been introduced was by the crews of vessels which trade to the Baltic, (p. 105,) and return in August or September, when the seamen are paid off and their clothes and bedding brought ashore. As cholera appeared fatally on board several English vessels at St. Petersburg, Cronstadt, Riga, Archangel, and other places, Drs. Hazlewood, Mordly, and Clanny thought this mode of introduction probable, from the admitted inadequacy of the quarantine at Sunderland. The current of observation and opinion seemed at first rather to have been not in favor of contagion. In twenty-one cases out of the first fifty-four, no connection could be traced. But in one instance a man not only fell into the filthy dock, but was taken into the nearest house, in which a person had died of cholera two days before. In ten other cases, the disease attacked persons residing in the same house with others previously invaded. In six more it occurred in persons who had frequent communication with the sick; one of them residing far off, in a healthy situation. One surgeon and the wife of another died. The mother of a surgeon, who was in constant attendance on cholera cases, and who never went out, took the disease (from her son, who remained well) and died. The person who washed the clothes of this case (p. 113) also took the disease. The principal nurse of the hospital died in eight hours, and another nurse and the porter were attacked. Of fifty-four cases, the first three were boatmen and relatives; one recovered. The sixth case was a cholera-nurse; the seventh case was the wife of a cholera-surgeon; the eighth case, a cholera-surgeon; the eleventh and twelfth, a sailor and his wife; the thirteenth, a fish-woman; the fourteenth was nearly drowned and taken into the house of No. 7, who was a sailor; the sixteenth was the grand-daughter of No. 5; the seventeenth, the wife of No. 7; the eighteenth, the daughter of No. 5 and aunt of No. 16, and had attended her father, case No. 5, a boatman. The twentieth was the wife of a custom-house officer. Numbers 15 and 21 were sailor's prostitutes from Sailor's alley; No. 22, a prostitute. No. 23 was the wife of a cholera-surgeon. No. 24 laid out body of No. 15 and died; her five children were attacked, but recovered; No. 25, a sailor's prostitute, who had been with No. 21; No. 26 sat up with No. 22; No. 28, a pilot, residing with No. 26; No. 29, a prostitute in Sailor's alley, with No. 21; No. 30 nursed No. 27; No. 31's house communicated with Nos. 21 and 29 of Sailor's alley. No. 32 was a sailor and a lodger going from Edinburgh to Manchester, who put up in a lodging-house in which some persons had previously died. Five persons in Sunderland poor-house, who used the sedan on which cholera-patients were carried, with four deaths, was counted as No. 33. No. 34 were two children and an aunt of No. 5, and related to Nos. 16 and 18; all three died. No. 35 a Sailor's alley keelman, and brother of No. 34; No. 36 a lodger in same house as No. 32. No. 37 was related to and communicated with Nos. 26 and 28. No. 38 washed the clothes of No. 23. No. 39 was father to No. 37 and related to Nos. 26 and 28. No. 40 was the brother-in-law of No. 39 and visited him. No. 41 was wife of No. 19, and laid out the body of another case. No. 42 assisted

No. 35. No. 43 was husband of No. 38. No. 44 nursed No. 41. No. 45 was head nurse of hospital. No. 46 lived in the house of No. 39 and was mother of No. 28. No. 47 was a pilot in same house as Nos. 39 and 46. No. 49 was a daughter of No. 51. No. 50 was a son of No. 51. No. 51 was the husband of No. 48 and father of Nos. 49 and 50. No. 53 was sister of No. 52. No. 54 was father of Nos. 52 and 53.

Dr. Gibson, who gives the above cases, had had several years' experience in India, and never saw there any proof of contagion, but many to the contrary. He changed his views in Sunderland. The surgeons, whose wife and mother died, did not have the disease in any marked or reported form themselves. Taking cholera from washing clothes was then considered incredible, as washing was regarded as the grand preservative against contagion; while the humid air, exposure to cold, laborious exertion, scanty fare, abuse of liquors, and living in small, confined apartments, were regarded as the causes of washerwoman's cholera. Ten of the cases, some of the earliest, were pilots, sailors, and coal-boat men; five were Sailor's alley prostitutes, and four others had been with them.

It was not until October 26, after a good deal of paper conflict, that cholera was acknowledged to be in Sunderland. A large body of medical men raised a violent opposition to the idea that the new disorder was malignant cholera, or was imported from abroad. The coal-owners, coal-merchants and other traders declared aloud that the physicians, some of whom had seen the disease in India, had formed a rash and erroneous judgment; that the first five cases were severe common cholera, and denied that it was by any chance imported. Singularly enough, none of the crews on vessels died; but doubtless some who had come on shore with their bedding and baggage. A committee of eighteen Sunderland physicians (Ed. Medical and Surgical Journal, vol. 37, 1832, p. 215) delivered their unanimous opinion that it was not the Indian disease. "The strong private interest of their wealthier patients warped their better judgments, and it required stronger nerves and more independence than most persons possess to act unbiased." The Marquis of Londonderry led the Sunderland merchants and coal-owners in their protests, ignorant that at almost every place on the Continent where it successively broke out, it followed exactly the same course pursued at Sunderland and Newcastle, viz, that an interval of four, seven, ten, or fourteen days always elapsed between the first fatal cases and its subsequent steady progress.

Sunderland was in constant intercourse with Hamburg and the Baltic, where cholera prevailed. The quarantine regulations were violated in the most flagrant manner, (p. 215.) The quarantine station was even placed so that suspected vessels had to pass through others lying in the harbor in order to reach it. The first reported cases occurred in the person and family of a keel-boat man, but at least one case of malignant cholera occurred days before in a person from Russia, without being reported to the authorities, although it was attended by a medical man. At the first breaking out of the epidemic no judicial investigation was made of its origin, and subsequent inquiry could scarcely lead to trustworthy results, as the victims were of the lowest class of boatmen, masters and crews of vessels, who had subjected themselves to penalty for violation of the laws, or were traders determined to pervert or conceal the truth, (p. 216.) But it was found that at the end of August, a captain of a ship had come to Newcastle from Riga, and per coach to Sunderland, where he had the disease, and was taken to Dr. Watson's office, who only reported the case long afterwards. In consequence of the dispute among the doctors, the first cases were reported as

diarrhœa, common cholera, and, finally, as malignant cholera; but, after a few weeks, diarrhœa was left out, and a few days later common cholera also fell from the reports.

Greville, secretary of the privy council of England, in his Memoirs, (vol. 2, p. 25,) says: "Dr. Russell, who was in St. Petersburg, was sent down to Sunderland from London to get information, which it is very difficult to procure." "The medical men" (p. 26) "and higher classes of Sunderland are split into parties, quarreling about the nature of the disease and perverting and concealing facts which militate against their respective theories. The people are taught to think there is no cholera at all, and that those who say so intend to plunder them. Dr. Dauer complains of the medical men who would send him no return of their cases. The consequence is that the government have put forward a strong order to compel medical men to give information." The Edinburgh Medical and Surgical Journal (vol. 37, 1832, p. 195) says: "For a long time the truth in Sunderland was quite unattainable. Falsehood was propagated with such zeal in every quarter that the daily and medical press were almost universally imposed upon."

Some of the physicians were undoubtedly sincere, and the whole history of cholera bears them out in part. Dr. Fyfe, of Gateshead, near Sunderland, saw sixty-seven cases in Gateshead, of which forty-four were single instances in families of various sizes, and only in a few examples did it attack in succession other inmates. He found it very frequently to invade only one person in a family, and, when several were seized, it was generally simultaneously, or in quick succession. When multiple cases happened in one family there was usually want of ventilation, filth, and absence of proper food. Thus, two Taylors died in a small, dirty, badly-ventilated house; two Wilsons in an ill-ventilated upper room; three Robsons in a low, crowded room, with windows never opened, and with a number of dogs, ferrets, &c., in it, and rarely cleaned. Three Coopers recovered in a large family room; and two Wallaces died in a very small, damp apartment. In short, cholera, with all its virulence, always has a strong tendency to die out or be safely diluted by a large quantity of fresh air, unless water-poisoning also be associated with it. In Gateshead there was water-poisoning. There had been but a few cases in the dark alleys or closes, in which the pumps are liable to contamination, and were proven to be impure; when, on Christmas, December 25, 1831, the inhabitants fell asleep in perfect security, void of panic, but before the sun rose on the 26th, fifty-five persons had been seized, thirty-two of whom were destined not to see it set. This was then supposed to be atmospherical; but fatal cases of cholera had occurred, and even the streets and alleys of these filthy people showed that choleraic diarrhœa was becoming very frequent. The wells and pumps were so placed in the streets that this filth not only could, but did get into them. The water had been noticed to become suddenly impure and foul.

Finally long after, in 1832, (see Med. Chir. Rev., April, 1832, p. 534,) the truth came out. Dr. Ogden, of Sunderland, writes: "There had been great intercourse between Sunderland and Riga, St. Petersburg, and Archangel during the existence of cholera at these places, and it was the mortality among the British sailors, several of whom were from Sunderland, which occasioned the institution, in Sunderland, of the first board of health in England. When the foreign voyages are over, the Sunderland ships return to the coasting trade, and there was a concentration or reunion in Sunderland of a great number of persons who had been at some period of the summer in unhealthy towns on the continent.

Every sailor brings home his chest of clothes for repairs and purification; some of these chests belonged to persons who had died abroad, (of cholera,) and which had not been opened since the clothes of the deceased had been placed in them. Robert Henry, pilot, died August 14; his cousin Margaret sickened and died December 11–15. John Parkin, a cousin, sickened December 12; Margaret Henry, a daughter, died December 13; Mrs. Parkins, a sister, died December 16–18; William Henry, alias Thompson, illegitimate son of Margaret, became ill December 17. Mrs. Parkins was in constant attendance on Margaret until John required attention. They were all related, and all with each other, and may have given it one to the other. Again, James Ellmore died November 6; Elizabeth Hopper, an elder sister, died November 17; Jane Johnson, another sister, died November 28; Thos. Ellmore, a brother, died December 25; and Ann, wife of Thomas, died December 27. To show how the disease springs up in distant and various places, it is only necessary to say that the first four all lived in separate houses, from one hundred yards to half a mile apart, and died in succession, after the usual intercourse which sick relatives have with each other.

A month after its appearance in Sunderland, on November 26, two cases occurred in Newcastle, and the mayor reported them to the privy council. The same hue and cry was raised in Newcastle by the merchants; but a physician experienced in cholera recommended a patient suspension of opinion for ten or fourteen days, which interval he had noticed had commonly been necessary for the epidemic to take a fair start after its first appearance. Accordingly, on the tenth day fresh cases occurred, and the disease was confessedly advancing, (p. 219.) By December 15, there had been fifteen new cases and ten deaths; and from November 26, sixty-one cases and twenty-three deaths. In North Shields, not far from Sunderland, and several villages around it and Newcastle, cases commenced to appear.

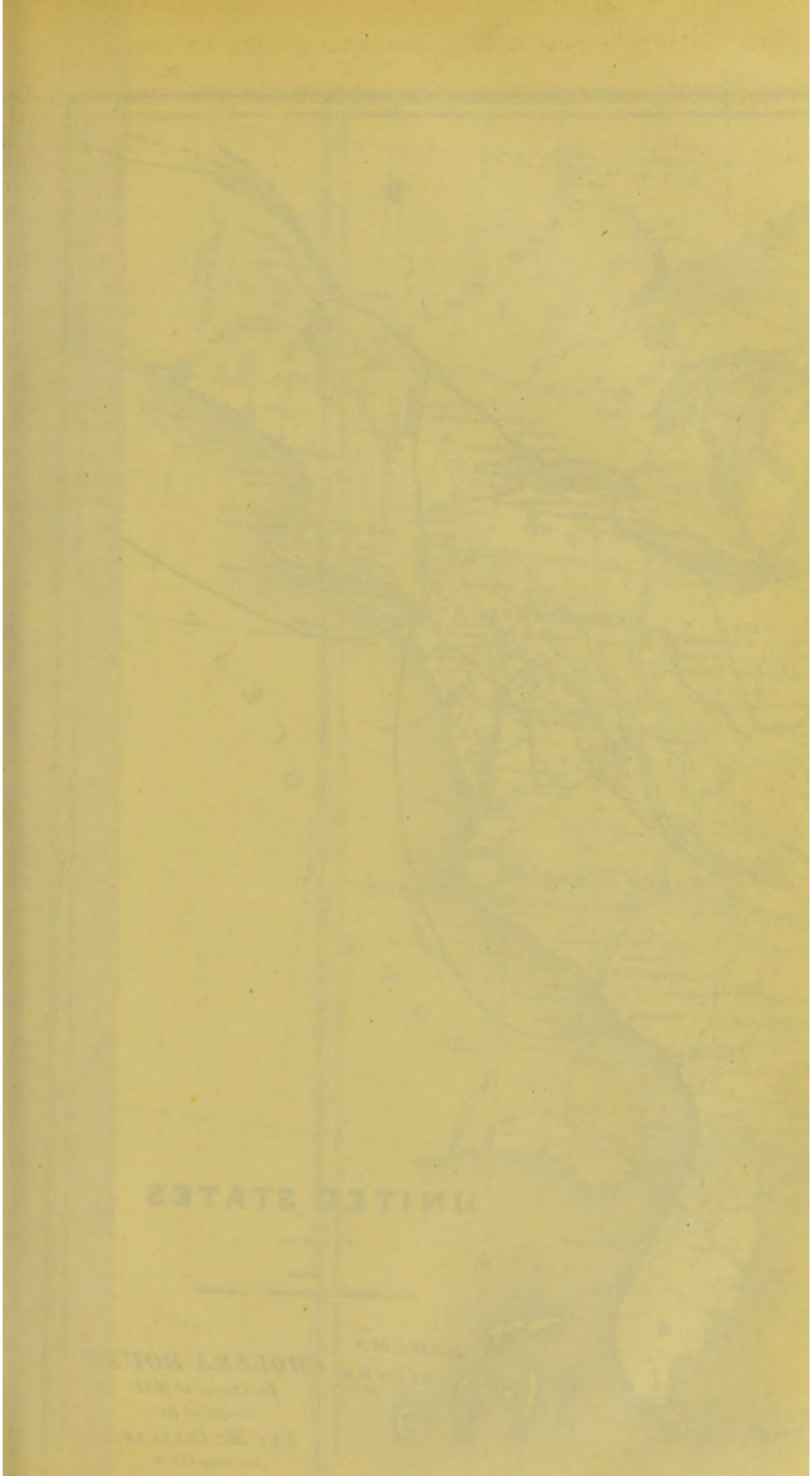
From Newcastle the disease was carried up to Edinburgh; from there, by the well-known canal, over to Glasgow, on the west coast of Scotland; from there, down and over to Belfast and Dublin, on the east coast of Ireland; and from these places and Cork and others over to Canada. It was in London before February, 1832. In November, 1831, only ninety-seven fatal cases had been reported in all England; in December, two hundred and eighty-two; in January, 1832, 614; in February, 708; in March, 1,519; and in April, 1,401. So that the disease persisted through the winter, and doubtless not one-half of the cases were made known.

The outbreak in the villages of Scotswood, three and a half miles above Newcastle, Leamington, a mile farther up, and Newburn, a mile higher still, are well detailed by Dr. David Craigie, a decided non-contagionist. A man died in Newcastle December 13; his widow went to his father's, in Leamington, and died December 22; then the father died December 28. The cases which afterward occurred were all in the vicinity of the house of the father. Choleraic diarrhœa commenced to prevail, and assumed the appearance of common cholera, and finally of malignant cholera. Next, three in one family died; then thirteen new cases happened in one day, with three deaths; then several single deaths, and three persons in one family; then more single fatal cases, and some doublets and triplets; then a widow who had nursed several; then a son of one who had died; then the son of another fatal case; then another child of a family in which three had already died; then a daughter of a fatal case; then two in one family. In Newburn, in one hundred and thirteen houses, with one hundred and forty-four families, and five hundred and fifty in-

habitants in all, forty-six persons had been attacked, and twenty-three died in ten days, with eight more in a dangerous condition. Then single, double, and triple cases were seen in some houses. The thirtieth case was the daughter of the first fatal case; the thirty-third case was the husband of the fourth case; the thirty-fourth case was the wife and mother of two fatal cases. Then a father, mother, and young daughter. The thirty-eighth and thirty-ninth cases were the father and mother of the seventh case. The forty-first case was the sister of the ninth case. Then a man and wife; then a brother and sister; then four in one family; then three in one family; then two in another; the fifty-seventh case was the grandmother of the seventh and the mother of the thirty-eighth and thirty-ninth; the fifty-eighth and fifty-ninth cases were son and wife of one who had died in Newcastle eleven days before; the sixtieth case was the son of one who died of cholera; then two cases in one family; the sixty-second case belonged to a family including the nineteenth, twenty-fourth, twenty-fifth, twenty-sixth, twenty-seventh, and twenty-eighth fatal cases; then two cases in one house. Of sixty-five cases, fifty-five had had communication one with another, but not in a continuous line; nineteen houses had multiple cases, from two to five. On January 16 there were fifty new cases, of which thirteen were confirmed cholera, and the rest choleraic diarrhœa. There were ninety-two cases and twenty-nine deaths in seven days. Many stout persons of both sexes were carried off. The inhabitants of Newburn had all the necessaries and comforts of life, were well clothed and fed, but most, if not all, the houses had earthen floors, which retained moisture from the discharges, although all had fires, with large chimneys. Some of the fatal cases had been preceded by diarrhœa for a week, and may thus have infected several or many places. In all, three hundred and thirty persons were attacked out of five hundred and fifty, two hundred having choleraic diarrhœa, and fifty-five died. On one night sixteen persons were attacked, twelve of whom were dead in thirty hours, probably from water-poisoning. There was no malaria at Newburn. It followed up the north side of the river Tyne, while the south side was scarcely affected at first. The fact that cholera is apt to vanish as rapidly and suddenly as it appears was noticed. In Gateshead the whole epidemic was over in three weeks; in Newburn in fifteen days. On January 18th it was scarcely noticed in Musselburgh, near Edinburgh. On the 19th it was apparent in various parts of the town and vicinity, and rapidly attained great virulence, especially in Fisherow, in houses in which there (p. 338) "were no windows or chimneys, and from which the smoke issued and the light and air were admitted by one and the same aperture in the roof. The floors were all earthen, wet and filthy to an extreme degree; a state of things which can hardly be credited within ten miles of Edinburgh."

Finally Dr. Craigie had to admit that cholera did run through some families, two, three, or four of which were often attacked, (p. 379, Ed. Med. Surg. Journal, vol. 37, 1832.) But he also noticed many instances in which the closest contact and the freest intercourse for some time was not followed by any outbreak. The medical men and nurses were generally exempt, only one of the former being seized. The wife and sister of the apothecary were first taken, and then he died. But Craigie noticed several cases in which nursing-infants were attacked after their mother sickened or died. Still Dr. Craigie's notions of contagion or infection were very peculiar. He notices the case of Mary Newton, the forty-first case, who attended her sister, Mrs. Veitch and her child, the ninth and tenth fatal cases. She was twenty-two years old, in the vigor of youth

and health, and attended her sister and child, who died. She was in distress and anxiety; the next day she was wan and blanched, skin cold, pulse gone; but was up and had made no complaint, although attacked with diarrhœa the previous afternoon, which continued through the night and morning, with cramps in her legs. She went home to her father's and died the following day. None of her father's family took the disease. Hence Dr. C. thinks it originated entirely in the epidemic constitution of the air hanging over the village, aided powerfully by her deep affliction at the death of her sister and a little niece of whom she had had charge. And all this in a village in which he says there was no malaria. But on page 382, he concludes, though cholera is not a disease originally contagious, he will not venture to say what may take place in a peculiarly dense, unclean, and indigent population. There is nothing impossible, he says, in supposing that a disease, not originally capable of producing its generative principles, may, in the crowded and filthy habitations of a very impoverished, relaxed, and immoral population, beget a disorder similar to itself, and become capable of spreading from one person to another. But if we admit malaria when it does not exist, he thinks we need not take refuge in this modified opinion.



HUDSONIA
LAKE SUPERIOR
UPPER CANADA
LOWER CANADA
NEW BRUNSWICK
WISCONSIN
LAKE MICHIGAN
MAINE
IOWA
ONTARIO
NEW YORK
ILLINOIS
OHIO
PENNSYLVANIA
INDIANA
MISSOURI
KENTUCKY
VIRGINIA
ATLANTIC OCEAN
ARKANSAS
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
ALABAMA
GEORGIA
LOUISIANA
FLORIDA
GULF OF MEXICO
BAHAMA ISLANDS
UNITED STATES
CHOLERA ROUTE
Epidemic of 1832.
Compiled by
ELY Mc. CLELLAN.
Asst Surg U.S.A
Longitude West from Washington

CHAPTER IV.

CHOLERA EPIDEMIC OF 1832, 1833, AND 1834, IN NORTH AMERICA.

In the majority of the published accounts of the cholera epidemic of 1832 in North America, the arrival of the ship Carricks at the Grosse Isle quarantine station on the Saint Lawrence upon the 3d day of June, has been taken as the date of the original arrival of epidemic cholera upon this continent.

It seems, however, to be pretty clearly demonstrated that the Carricks was but one of the first arrivals of infected vessels. It has been stated that the quarantine records show that on the 28th of April, the ship Constantia, from Limerick, arrived at Grosse Isle with one hundred and seventy emigrants, among whom twenty-nine cholera deaths had occurred during the voyage; that on the 14th of May the ship Robert, from Cork, arrived, having had ten cholera deaths on board; that on the 28th of May, the ship Elizabeth, from Dublin, arrived with two hundred emigrants, having lost twenty from cholera.

The brig Carricks, from Dublin, arrived at Grosse Isle on the 3d of June with one hundred and forty-five emigrants, among whom forty-two cholera-deaths had occurred.

It is thus shown that, prior to June 3, there had arrived four vessels, carrying at least three hundred and seventy emigrants, among whom fifty-nine cholera-deaths had occurred. This fact is established in the face of the many reports from committees composed of medical men from several States, who were especially sent to investigate the arrival of the dread disease.

Dr. Marsden further states that there existed at the time no proper system of quarantine; that no segregation of individuals from cholera-infected ships was attempted; that the only separation consisted in removing those who were actually sick from among those who continued apparently well, the latter being at once sent upon their journey. At the same time constant and uninterrupted intercourse was permitted between the quarantine station and the city by boats and steamers, and passenger-steamers were even permitted to proceed to Grosse Isle and take passengers direct to Quebec and Montreal. So rapidly was this transfer accomplished, that between the second and fifth days of June, seven thousand one hundred and fifty-one emigrants had arrived in the city of Quebec from the quarantine station.

It is thus shown that, prior to any known outbreak of cholera in Canada, during the year 1832, a large number of emigrants from cholera-infected quarters had arrived upon the Saint Lawrence, and had been distributed throughout the province. The Canadian government having offered extraordinary inducements to emigrants, nearly thirty thousand individuals arrived during the spring and early summer months. These emigrants were for the most part Irish, and arrived from the ports which have already been noted.

It is only practicable, at this late day, to commence a history of this epidemic from the arrival of the cases which caused the outbreak at the city of Quebec.

On the 7th day of June, the steamboat Voyageur, of Montreal, left the

quarantine station, with a large number of emigrants, for the city of Montreal. She touched at Quebec, and then proceeded upon her voyage; but, after making a few miles, was obliged, on account of a violent rain-storm and her overcrowded condition, to return to Quebec, where she landed a portion of her passengers, and then proceeded upon her trip. The disembarked passengers, wet and exhausted, took refuge at emigrant lodging-houses, and quite a number went to the house of a man named Roache, on Champlain street. At an early hour of the 8th a case of cholera occurred at this house in the person of one of the emigrants landed from the Voyageur. On the afternoon of the 9th a second case occurred in an emigrant from the same boat, who had obtained employment upon the wharf, and the same evening six other cases occurred at Roache's house. By 3 o'clock p. m. the next day fifteen cases had occurred, with fourteen deaths. From these cases the disease spread in Quebec, and during the first two weeks one thousand deaths are reported, fifty-six of which occurred at the Roache house.

At Quebec the disease lasted until September 2. A total of two thousand two hundred and eighteen deaths is reported.

June 12.—Cholera appeared at Point Levi, on the opposite bank of the Saint Lawrence; also at Beauport and Little River. At each of these points the disease only appeared after the arrival of emigrants.

Dr. Marsden states that "at the time it was reported that there had been several dead bodies thrown overbord from the Voyageur before she arrived at Montreal, but that the report lacked confirmation."

It is, however, recorded that before she (the Voyageur) reached Three Rivers, an emigrant named Kerr was taken with cholera, and on the evening of the same day (June 9) a man named McKee, also an emigrant, was attacked with the same disease.

As the vessel (the Voyageur) was passing Sorel, a bed belonging to a cholera patient was thrown overboard, and having been picked up by a man named Latour, was taken home as a prize. In twelve hours this man was dead from cholera, and in a few succeeding hours his entire family died.

MONTREAL.

June 9.—The Voyageur reached Montreal. Kerr, the emigrant who had been taken with cholera on the boat, was dead, and the second case, McKee, was in a state of profound collapse. McKee was carried to a tavern on the wharf, where in a few hours he died. All that night and all the succeeding day, the body of this man was exposed to the gaze of the public, and, actuated by motives of curiosity, many persons visited it. The same night (June 9) several other cases of the disease occurred in different portions of the city. Upon this point great stress has been laid, that the outbreak was not confined to any one locality; but it has been conclusively shown that a vast number of individuals from cholera-infected localities had been landed in that city, no portion of which could have been preserved from their presence. During the first two weeks eight hundred deaths occurred, and the epidemic lasted until September 1, with a total of one thousand eight hundred and forty-three deaths.

Among the persons who visited McKee before his death was a soldier of the Fifteenth Regiment of the line, then in garrison at Montreal. This soldier assisted in rubbing McKee. After the death of the patient the soldier returned to the barracks, where, in a few hours, he was ill with cholera, died, and the disease spread among the command. By the 19th forty-six men had died in garrison of cholera. The command

mand was then encamped on the island of Saint Helen's, a *cordon de santé* was established, and no other cases occurred, "although steamers freighted with dead and dying daily passed close to the island."

The Voyageur made the trip from Quebec to Montreal without stopping at any point upon the river; consequently, upon this trip, she did not spread the infection between the two cities; but Dr. Nelson states that a feather-bed which belonged to a cholera-infected emigrant was thrown overboard after the boat had passed Sorel; that this bed was taken by a farmer named Latour and carried to his house, when both the man Latour and his wife died of cholera.

Dr. Marsden notes that the town of Three Rivers, equidistant between Quebec and Montreal, where steamers touched daily from both cities, escaped the disease entirely in 1832. An absolute system of non-intercourse was adopted, and no passenger was permitted to land from the boats during the epidemic.

The same author relates an instance of a poor fisherman, who lived at the village of Contrecœur, a little below Montreal, who was out fishing in his canoe when a raft came floating past. The captain of the raft asked the old man to take one of his men ashore, who had died, and bury him. The fisherman had not heard of the cholera, took the body ashore and buried it. During the same night he took ill and died. His wife also took the disease, and people passing the house on Sunday morning, seeing it shut up, mentioned the fact to a nephew, whom they met at the parish church. This man went to the house, found his uncle dead and his aunt dying. After doing his duty to his relations, he went to his home, where he also died.

At both Quebec and Montreal numerous instances are recorded demonstrating the portability and infectiousness of the disease.

A plasterer left Quebec on account of cholera, went to Leeds, to work upon an unfinished house. He was taken with cholera and died. The woman who nursed him next died, and last the husband. The people of the town then burned down the house, and no other cases occurred.

A poor wanderer, sick with cholera, was taken into the house of a person named Mathieu at Ange Gardieu. During the night he died. The wife of Mathieu, then Mathieu himself, and, lastly, a neighbor who had coffined the bodies, died of the disease.

A drover left William Henry, where a few cases of cholera had occurred, to go to the eastern townships. His way led through unsettled forests of many miles. In the center of this forest was a tavern, the only house in the region. The drover arrived at midnight, rested, and took some refreshment, and in a short time left. The next day the man of the house and his wife both took cholera and died.

It was demonstrated by Dr. Marsden that those places, intermediate between Quebec and Montreal, where no passengers were permitted to land, were not attacked by the disease.

From Quebec and Montreal the epidemic spread, and followed closely the line of the great rivers, for they were the routes of transportation open to the thirty thousand and forty-nine emigrants who arrived on the Saint Lawrence between the 2d and 23d of June.

June 11.—At Lachine, cholera appeared among emigrants on their way to Upper Canada. The same day it broke out at La Prairie, also among emigrants. At this point twenty-four deaths occurred.

June 12.—The first case occurred at Saint John's, also in the person of an emigrant, and eleven deaths occurred.

June 13.—Three emigrants died of cholera at Fort Miller; they had left Quebec on the 8th, Montreal on the 9th; they were traveling on a

canal-boat; the party consisting of thirty-five individuals. The same day it is reported at the Cascades, in the person of a Montreal clergyman, who died of the disease at Côteau du Lac.

June 16.—Cholera broke out in Prescott, on the Ottawa River, among persons who had fled from Montreal.

June 19.—Berthier and La Chine, upon the Saint Lawrence, between Quebec and Montreal, were attacked by the disease.

June 20.—Brockville and Kingston, Upper Canada, were attacked; at the latter city the disease lasted to the 27th of June, with one hundred and sixty-five cases and fifty-two deaths; at Brockville, the first case was in the person of a boatman from Montreal; and at Kingston, in refugees from the same city.

June 21.—Cholera appeared at Cornwall, U. C., and several fatal cases occurred, the first case being in the person of a boatman just from Montreal.

June 24.—The cholera appeared at the mouth of the Chateaugay River; twelve deaths are reported. The same day it is reported as having appeared at Toronto, U. C., where the first case was a tailor named Filgiano, who had fled from Montreal.

June 26.—Cholera cases are reported at Port Hope, U. C.

June 27.—Cholera occurred at Coburg; June 28, at Bradford; June 29, at Chambly. At each place the initial case occurred either in the persons of emigrants, or in those who had come in contact with them.

New York-State.

From the Saint Lawrence the epidemic was carried into the State of New York. On June 13, an emigrant who had left Montreal on the 8th, died of cholera at Plattsburg. He had been exposed to wet and cold, was imprudent in diet. Several other cases occurred among residents of a filthy portion of the village; they were all persons of irregular habits.

June 13.—An emigrant, recently from Montreal, died of cholera at Burlington, and on the 18th a female, who was addicted to intemperance, died of the same disease; two other cases among residents are reported.

June 14.—A man who had been for two or three days in Montreal, where he had visited the cholera-hospitals, was taken with cholera on the steamboat Phœnix, on Lake Champlain, and died the next day at White Hall.

June 15.—At Fort Ann, on the Northern Canal, a case of cholera occurred among the emigrants who had already infected Fort Miller.

June 16.—At White Hall, the porter who conveyed baggage from the lake steamer died of cholera. One other case is reported. At White Hall, after the cases occurred which have been noted, a quarantine was established, at which several hundred emigrants were detained for a few days, and were then permitted to go where they pleased. Many of them took the road for New York, others scattered through the country.

June 18.—An emigrant was taken with cholera at Mechanicsville, Saratoga County, on the line of the Champlain Canal, and died after an illness of eighteen hours. He had left Montreal on the 11th.

June 18.—A village of Canadian-French, near Ogdensburgh, was attacked with cholera; many cases occurred.

June 21.—An emigrant recently from Quebec was taken with cholera at Rouse's Point, and died on the 22d.

June 22.—A vessel from Kingston, called the Massassauga Chief, arrived at Niagara, with emigrants on board, among whom cholera had broken out.

It has generally been received that the first case of the epidemic of 1832 that occurred in the city of New York was upon the 30th day of June, in the person of an emigrant who lodged at No. 15 James Slip, at which house many other individuals subsequently died.

We find from the report of Dr. L. C. Beck, however, that suspicious cases had appeared as early as the 24th, when an Irishman named Fitzgerald, who had been in the country about one year, two months of which had been spent in New York City, after a visit to Brooklyn, was taken sick with cholera, but recovered.

On the 26th of June, two children of Fitzgerald died of cholera.

On the 28th of June, Mrs. Fitzgerald was taken with the disease, and died the next day.

June 28th, an Irishman of bad habits, who had, while intoxicated the day before, fallen into the North River, died of cholera.

These cases comprise those that are known to have occurred prior to the 30th of June.

Epidemic cholera had developed upon the banks of the Saint Lawrence after the arrival of emigrant-laden vessels from cholera-infected ports; and by a bound that could only have been accomplished by atmospheric influences, developed itself in the city of New York, was the dogma which was enunciated, accepted, and obeyed.

New York has been, is, and always will be, the great port of entry to North America. Emigrants from all portions of Europe were, in 1832, constantly arriving on the coast of North America. They did arrive at and land upon the banks of the Saint Lawrence; but did none arrive at or land upon the shores of New York Harbor? Written history is almost silent upon this fact. Dr. Alonzo Clark, in his exhaustive series of lectures during 1866, states: "Dr. Vaché, however, states that the ship Henry IV arrived in New York Harbor, with cholera on board, in the latter part of June. He makes this statement in 1850, and says he has searched for the records of the date of that ship's arrival, but could not ascertain the precise day, the volume in which the entry was made having been mislaid or lost."

We have been informed by a gentleman of high sanitary and professional standing of the following fact:

During the year 1832 the late Dr. Westervelt was the health-officer of the port of New York. At that time the board of health was composed of the mayor of the city, the health-officer of the port, the health-commissioner, and the resident physician. During the epidemic of 1853 and 1854, Dr. Westervelt, while on a visit to the cholera-hospital at the quarantine station, informed Dr. Elisha Harris, now the most distinguished sanitarian of the United States, that in 1832 cholera had arrived at the port of New York in infected ships prior to its outbreak upon the Saint Lawrence, but that, for prudential motives, the facts were suppressed by the board of health. The sick were cared for in the quarantine hospital, and the *well* emigrants were shipped rapidly from the city. Upon this occasion Dr. Westervelt expressed his determination of preparing for publication, an article giving a detailed account of the introduction of the disease.

We have been informed that Dr. W. did some time prior to his death prepare a paper on the cholera-epidemic of 1832, but what disposition was made of it no member of his family has information, other than that it is thought that the manuscript was intrusted to the keeping of some friend for publication at a later date.

We have made every effort to arrive at full possession of all information which might throw light upon this subject. Through the courtesy

of his honor Mayor Wickham, we obtained access to a vast mass of early health-records of the city of New York, and many days were spent in a most laborious investigation of them, with but this result, *that while for preceding and for succeeding years the records are almost perfect, nothing could be found that related in any way to the months of the year* 1832 *in which cholera could have been imported by ships into New York harbor.* A circumstance which is pregnant with thought. The fact that cholera did arrive at New York in 1832, was suppressed so effectually that no records of arrivals at quarantine during the months of April, May, and June, 1832, can be found; while the records of preceding and succeeding months are perfect.

Cholera was undoubtedly imported into the city of New York early in the spring of 1832. The emigrants who were well enough to travel were dispatched rapidly upon their journey from that city, and thus upon the rapid diffusion of the disease over the Atlantic and Western States a new light is thrown.

At Albany the first cholera-record that can be obtained is on July 3. Two men, one of whom lived at Fish Slip and the other on South Market street, near the watering place, died of cholera; both were men of intemperate habits, and their homes were dirty and neglected. From these cases the disease spread. One thousand one hundred and four cases with three hundred and eighty-nine deaths are reported.

At Greenbush, opposite to Albany, cases occurred July 7. The first case was in the person of a canal-boat man.

July 12, an individual who had left Albany the day before died of cholera at Schenectady.

At Rochester two cases occurred July 12. They were both from New York City, both arrived sick, and both died.

July 15, cholera occurred at Buffalo. The first case was in the person of a boatman on the canal who had been engaged in rafting lumber for three days previous. Up to July 30 no cases occurred among emigrants.

July 17, cholera occurred among the convicts at Sing Sing; although the authorities denied that there had been any intercourse with points of infection, it has been shown that vessels from New York were constantly being loaded with marble at the prison; that upon one of these vessels, prior to the outbreak at the prison, a man had died of cholera. It was further stated that prior to July 17 a man had sickened and died of cholera at the prison, who, a few days before his attack, had been in New York City. It was also ascertained that convicts had been admitted from points at which the disease was epidemic.

July 17, cholera appeared at Syracuse in the person of a laboring man.

July 18, nine cases of cholera are reported at Brooklyn in persons from New York City.

July 19, cholera appeared in a family at Lockport, Niagara County.

July 22, cholera broke out on the canal-boat Western Barge, at Frankfort, eight miles east of Utica. The boat had left Albany on the 20th of July with fifty-six passengers, all emigrants. The first person attacked was the captain, who died; at Rochester, after their arrival, several other deaths occurred. The following instances of the portability of cholera are recorded by Dr. J. B. Elwood: A man who had nursed some cholera-sick at Rochester went home to Mendon, where he died of the disease the same night. Of six persons who attended him all had chol-

era, and four died; and this was followed by thirteen deaths in a population of one hundred and fifty.

A lady arrived from New York during the epidemic at that city. She took the disease within five days of her leaving New York and died. Her sister, who nursed her, died of same disease two days thereafter.

In Oneida County some Indians, who had been employed to bury a person who had died of cholera on a canal-boat from New York, took the disease and six died.

At Ancram, a woman from New York died of cholera, and four of those who nursed her took the disease and died.

The town of Nyack remained healthy until toward the last of July, when a Mrs. Leydecker arrived there from New York, and died of cholera the same night of her arrival. Immediately after her death her father-in-law took the disease and died. Mr., Mrs., and Miss Graham next fell victims in quick succession, and the disease spread rapidly.

Dr. Henry Bronson, of Albany, related the following circumstances:

"Stephen Miller, of Sand Lake, a town twelve miles east from Albany, came to Greenbush, opposite this city, on Sunday, the 5th of August. The cholera was then prevailing in Greenbush. Mr. Miller visited some of his friends who were ill of the disease, and returned home the same day. On Tuesday morning following he was taken down with cholera, and died in the afternoon. On Tuesday morning a negro who worked for Miller, and who had been about him during his illness, sickened in a similar way and died before night. On the same day the father-in-law and a daughter-in-law of Miller, living in the same house, were attacked. The former died the day following, and the latter recovered. On Sunday night succeeding, a son of Miller and a boy who lived with him were taken with the disease, but their cases were mild and they both recovered. The next day a man who worked for Miller at the time of his sickness and death, and had been with him, but who had fled from fright, was seized with the malady, and died in thirty hours."

Dr. Bronson remarks: "These facts show most conclusively that cholera *may* be contagious, in the ordinary acceptation of that word."

Cholera among the United States Troops.

While cholera was creeping along the routes of travel in New York State, and before the disease had advanced beyond the line of the North River, a body of troops, destined for the Black Hawk war, had been placed upon a steamboat at Buffalo, N. Y. Unfortunately, this boat had been engaged in the transportation of emigrants prior to her being chartered by the United States.

Through the kindness of the Adjutant-General of the Army we have been permitted access to the original reports of General Scott, commanding the Army of the Northwest, and from them are able to abstract a complete history of the distribution of cholera during the year throughout the northwestern portion of the United States.

July 1, the battalions of Lieut.-Col. D. E. Twiggs and Major Payne, consisting of three companies of artillery and four of recruits for the Fourth United States Infantry, embarked at Buffalo, N. Y., on the steamboat Henry Clay. This command had left New York City on the 23d of June, had passed through Albany on the 24th, and had continued the journey at once for Buffalo. The boat was, however, detained at Buffalo by unfavorable winds until the morning of the 3d, when she proceeded upon the voyage. The next day cholera occurred among the troops, and upon arrival in the Detroit River two fatal cases had occurred.

The authorities of Detroit ordered the steamer to proceed two miles up the river and to anchor off Hog Island. July 5, General Scott reports that he had ordered Surgeon Everett, with full supplies, to the aid of Assistant Surgeon Kerr, who had been, until then, the only medical officer on board the Henry Clay. The troops then on the Sheldon Thompson were General Scott and staff, six companies of artillery from Fortress Monroe, and two companies of the Second Infantry, commanded by Colonels Eustis, Crane, and Worth.

July 7, Colonel Twiggs reports that, on this the third day of the epidemic, he had lost four men; that eight were in a dying state, and that the disease, in a most malignant type, was spreading rapidly; that he had landed his command within a mile of Fort Gratiot, and that every effort was being made to prevent the disease from spreading.

July 8, Colonel Twiggs reports that the steamer Henry Clay had left that morning; *the crew refusing to do anything but to take the boat back.* "The deaths up to this time are nine, including two of the steamboatmen. Without some great change, this command, or a great portion of it, must be sacrificed."

July 9, Colonel Twiggs reports that nine fatal cases had occurred since his report the previous day, including the first officer who had been attacked, Lieutenant Clay, Fourth United States Infantry, and that Dr. Everett is now sick with cholera.

"When I landed here I had with me four companies of the finest-looking recruits I have seen for many years. The panic is so great among them that the desertions have reduced the number to sixty-eight. It is reported that many of them (deserters) are dying on the roads." On the same date General Twiggs reports that he had ordered sixteen cadets, who were with his command, to leave camp and to report at West Point on the 1st of September next; thus affording an opportunity to these gentlemen of spending nearly two months at their home.

These gentlemen, members of the class of 1832, at the Military Academy, were *five* from Pennsylvania; four from New York; two from Tennessee; two from Ohio; one from Kentucky; one from Virginia; one from North Carolina, and one from New Hampshire; none of them died of cholera; but there is no record to show that they did or did not suffer from the disease.

A few hours after signing the order quoted above, Colonal Twiggs was himself attaked with cholera, and the command devolved upon Maj. M. M. Payne, Fourth Artillery.

July 12, Major Payne reports Colonel Twiggs as convalescent, and that Dr. Everett had been violently attacked, and was not expected to recover; that the steamboat Superior had arrived and transferred her passengers to the William Penn; the latter steamer starting at once for Chicago. "A schooner, loaded with ordnance and ordnance stores, is in the stream opposite the camp, with the captain dead of cholera, and three of the crew dangerously ill. Of the two hundred and eight recruits for the Fourth Infantry, one hundred and thirty deserted, and of them a large number have died in the country."

July 16, Major Payne reports the death of Dr. Everett of cholera. This gentleman was medical director of General Scott's army. At this date thirty-nine cholera deaths had occurred.

The records of the Surgeon-General's Office contain two letters of Surgeon Everett. In the first, under date of July 7, he reports the fact of having been ordered on board of the Henry Clay, and that, by his advice, Colonel Twiggs had landed his command near Fort Gratiot. We quote the following:

"The troops and baggage, being landed in haste, were scarcely on the ground when one of the most appalling storms arose I have ever witnessed, which left neither person nor baggage dry in any part. The sick were left on board the boat, and their number has been much increased from the camp. The whole number of cases is fourteen; four deaths; no convalescents yet."

July 8, Dr. Everett writes: "There have been eleven cases since my last, and three deaths. Three cases, are, I think, convalescent."

A few hours later Dr. Everett was himself attacked.

July 9, Major A. W. Thompson, Second United States Infantry, commanding Fort Gratiot, reports that he had moved his command from the fort on account of the near proximity of General Twiggs's command, and had gone into camp on the Saint Clair, some thirteen miles below the fort. This command consisted of two companies of the Second Infantry, and two companies of artillery, the whole under orders to join General Scott at Chicago, by troop-ships, which were now hourly expected.

Upon the evening of the same day a passing steamer landed the garrison of Fort Niagara, under Lieutenant-Colonel Cummings, and took on board the two companies of artillery.

The command of Colonel Cummings was prostrated with cholera, and Major Thompson used every effort to avoid communication with this camp, and endeavored, unsuccessfully, to obtain transportation to enable him to march overland for Chicago.

July 11, Major Thompson reports no sickness in his command.

The artillery companies composing the garrison of Fort Niagara, under the command of Lieutenant-Colonel Cummings, arrived at Detroit on the 30th of June, and were quartered in the city awaiting transportation. No cholera had occurred at Niagara before their departure. Having reached Detroit, this command was inspected, and no man was upon the sick-list. The men were quartered in an old brick building on the banks of the river, in the most filthy part of the town, and surrounded by grop-shops. Assistant-Surgeon Stevenson, with the command, asserts that on the 4th day of July there were not ten sober men in the command.

July 6, two men who had been employed to communicate with the steamer Henry Clay were taken with cholera in Detroit and died quite close to the building occupied as the barracks. To the 20th of July Dr. Stevenson reports, in the command of seventy-eight men, forty-seven cholera cases, with twenty-one deaths. The town authorities having become alarmed, asked the removal of the command, and Colonel Cummings, taking the steamer William Penn, arrived at camp below Gratiot in condition previously reported.

A letter from Assistant Surgeon H. Stevenson, addressed to the Surgeon-General of the Army, dated Fort Niagara, August 1, 1832, vividly describes the condition of affairs at Detroit upon the explosion of the disease:

"On the morning of July 6 a case of Asiatic cholera occurred in our detachment, (garrison of Fort Niagara,) which terminated fatally in something less than six hours. During that day four additional cases occurred, and in the course of twenty-four hours eleven cases and four deaths marked the progress of that dreadful epidemic among us, which in malignancy and violence of attack no other epidemic which had hitherto come under my observation was in any respect to be compared with.

"The occurrence of this disease in the center of the city of Detroit (our

troops having been quartered in a large public store-house, immediately in the vicinity of the arsenal) soon attracted the attention of the civil authorities of the place. The panic and alarm which it created is beyond conception. A meeting of the city councils was immediately held, when it was determined that the troops should (*nolens volens* on the part of the command) be removed from this location as soon as was practicable. This information having been communicated to Colonel Cummings, he advised with me as to the propriety of an immediate removal, when it was determined to proceed to Fort Gratiot, or its vicinity, and there await the arrival of the vessel that was to convey us to Chicago."

Assistant Surgeon R. E. Kerr communicates to the honorable the Secretary of War the following, under date of July 16, 1832, from Fort Gratiot:

"On the afternoon of July 4 the first case (cholera) presented itself in one of seven companies of United States troops, under the charge of Colonel Twiggs, while on board the transport-steamer Henry Clay, between Buffalo and Detroit, and near the latter place. It was looked upon with suspicion, but there was great reluctance to consider it the Asiatic cholera. Every effort had been made to preserve health, and chloride of lime had been liberally used; but the boat was very inconveniently crowded, and the men were necessarily exposed to the heat of the day and the dews at night. A great portion of them were obliged to sleep on the upper and uncovered deck, there not being room elsewhere. Until then the troops were in fine health and condition, and a violent case of the disease, especially in a section of country where the cholera was known to be, was well calculated to arouse apprehensions.

"In this condition we arrived at Detroit and anchored off the city. Colonel Twiggs acquainted General Scott, who was then there, with the situation of things on board. Dr. Everett was ordered to the boat immediately, and while there, the second case occurred, which removed all doubt, and confirmed the suspicion of its being Asiatic cholera. The first case died that night, and in the morning General Scott directed the command to proceed onward, and, if necessary, to disembark on Bois Blanc, an island near Mackinaw. We proceeded immediately, with Dr. Everett with us; but the cases multiplied with such rapidity and severity, and the alarm on board was so great, that Colonel Twiggs directed as early a disembarkation as practicable, and the bluff of land immediately below Fort Gratiot was selected for the encampment. There is but little question that a longer continuance on board would have but added to our calamitous situation. For two or three days we had the most unfavorable weather. A daily and drenching rain brought the men down with awful rapidity. A large barn, an appendage to Fort Gratiot, was then selected as a hospital, and there was a general manifestation of zealous efforts and unremitting exertions to contribute to the comforts of the sick. Lieutenant Clay was taken down on the morning of the 8th, and died about 1 o'clock the next morning. Dr. Everett was severely attacked on the morning of the 9th, and died on the morning of the 14th. Colonel Twiggs has had the disease, but is now recovering. The number of deaths to this day is thirty-four. During the panic, which was so excessive that attendants could with the greatest difficulty be procured for the sick, many deserted to escape the disease. A detail for that duty was sure to occasion several to go off. The attempt to escape the disease, however, by that means, in a number of cases that came to our ears, proved futile, for they are reported to have died on the road."

FORT MACKINAW.

The only record of the epidemic at this point which can be found is contained in a letter of Assistant Surgeon R. McMillan, dated July 24, 1832, which reads as follows:

"On the evening of the 7th instant General Scott arrived here, on his way to Chicago. Four of the enlisted men of the detachment who came with him were brought into this hospital about 9 o'clock p. m. the same day. Three of them were violent, marked cases of spasmodic cholera; all of them died. The fourth case, being less violent, and under control of medicine, recovered. Some of the soldiers of this garrison were slightly attacked with cholera, but by timely application of medicines the disease was arrested. One of the command only died. Several cases of cholera and some deaths have occurred in the village."

From Chicago, Ill., under date of July 11 and 12, General Scott reports to the Secretary of War:

"I. That at the solicitation of the master of the steamer S. Thompson, to relieve the overcrowded condition of the boat, it being comparatively a small one, he had left two companies of artillery at Fort Gratiot, with orders to proceed upon the next boat.

"II. That before leaving Mackinaw four cases of sickness occurred on the Thompson, which resembled cholera, but as at the end of twenty-four hours they had not become serious, the hope was entertained that it and the sickness on the Henry Clay was not cholera. They were therefore landed at Fort Mackinaw, and orders were left for the commander of the troops on board the Henry Clay to leave his sick at the same point.

"July 8, the steamer S. Thompson, with General Scott and staff, with the four companies of artillery, left Mackinaw, all in high health and spirits. At daylight on the 9th six cases of cholera were reported on the Thompson; during the day fifteen other cases occurred; and by July 11 there had been a total of seventy-seven cholera-sick, and nineteen deaths. The Thompson reached Chicago during the night of July 10. The next morning the troops were landed, and Fort Dearborn was converted into a hospital, the garrison, under Major Whistler, having marched to camp two miles distant.

"July 12, General Scott reports that among the four companies of artillery there are not more men than are required to attend the sick and bury the dead. Assistant Surgeons De Camp and Macomb have displayed great zeal in their attendance upon the sick, and all the well officers and soldiers, from the first, have displayed the most admirable firmness, and have been unceasing in their attentions to the sick.

"The disease was not confined to the enlisted men; in proportion, the officers suffered the most severely, although to this date none had died. The night of arrival at Chicago six enlisted men died."

July 19, General Scott writes from Chicago:

"Major Whisler reports to-day sixty-three bayonets for duty; the battalion of artillery in the fort or hospital, eighty-one. Colonel Eustis hands me this paragraph: 'The health of the battalion of artillery is evidently improving, and the progress of the cholera is checked. In the last four days there have occurred eleven new cases and ten deaths. The sick report is reduced from seventy to fifty, of whom twenty-eight are decidedly convalescent. The new cases are more mild than those of previous occurrence. The four companies on leaving Detroit counted one hundred and ninety enlisted men; fifty-nine have died, four were

left sick at Mackinaw, fifty remain sick, and eighty-six enlisted men are on duty.'

"August 1, Colonel Eustis reports that cholera is subsiding at Chicago. No deaths had occurred in the last sixty hours and very few new cases.

"August 2, the Fort Niagara garrison and a number of the deserters from General Twiggs's command arrived at Chicago in command of Lieutenant and Adjutant Clitz; Colonel Cummings having been left sick fifty miles from Detroit."

The communication of Major-General Scott to the honorable the Secretary of War, under date of September 1, contains information so valuable in its character, that it is reproduced *in extenso*.

"HEADQUARTERS NORTHWESTERN ARMY,
"*Rock Island, September* 1, 1832.

"SIR: The great calamity of the times has come upon the troops on this island. The cholera has raged among them. Since the 26th ultimo one hundred and forty-six individuals have taken the infection; twenty-six have already died, twenty-two are convalescent, six have been cured, and ninety-two remain sick. Of the latter, more than sixty are slight cases. From a personal inspection of every individual who has been in hospital from the beginning down to sunset to-day, I am happy to say that the disease is evidently checked and mitigated. We shall probably lose twenty more. Among the deaths is that of Second Lieutenant Samuel Torrence, of the Fourth Infantry, a young officer of much merit.

"The foregoing only includes the sick and the dead in Fort Armstrong, garrisoned by two companies of the First Infantry, and the adjoining camp of the Fourth and Sixth Regiments of Infantry, making a total of four hundred and three enlisted men on the island. I shall, in the sequel, speak of the troops encamped in the neighborhood.

"The *manner* of the introduction of this disease among the troops which had been serving under the immediate orders of Brigadier-General Atkinson is to me an affecting speculation.

"I cannot doubt from much personal observation that spasmodic cholera is partly epidemic and partly contagious. The atmosphere prepares the human system for its reception, and then it is readily generated by intemperance or extraordinary exposure; and, when once generated, readily propagates from individual to individual, whose systems are more or less prepared for its reception. From all that I can learn, the population below as well as the troops in this quarter were many weeks since so prepared. To the systems so prepared, premature and fatal activity has been given, I believe, by importation from Chicago.

"I have already reported many of the measures adopted by me to prevent the spread of the disease from that place among the inhabitants of the country, volunteers, and United States Rangers; but I have not reported half of my care and solicitude on the subject, nor is it possible for me to do much more on the present occasion. I left Chicago on the morning of the 29th of July. The disease among the troops there, as we all thought, had nearly exhausted itself. In the forty minutes before mounting my horse, I had the honor to receive your letter of the 24th of the same month, and I hastily addressed a letter of instructions to Colonel Eustis, second in command, of which the following are extracts:

"'From a letter just received from the Secretary of War, I find it is his opinion, on account of cholera, that the movements of detachments

infected with that disease should not be precipitated. You are fully aware of my own policy to guard against the spread of the calamity. I shall therefore leave you the same discretion (to march or not to march) which I have heretofore exercised myself on that critical subject; but hope by the arrival of Lieutenant-Colonel Cummings's small detachment, if not before, it may be deemed safe, in respect to humanity and the good of the service, for you to take up the line of march.

"'You will, as long as new cases of cholera shall happen to occur here or on the march, take all proper measures to avoid a junction with Rangers or volunteers, but long before you reach the Mississippi I trust your battalion will cease to be suspected of cholera.

"'I have kept you up to this time so fully acquainted with my correspondence and views, with all authorities and on all subjects, and my confidence in your intelligence, zeal, and abilities is so great, that I deem it superfluous to say more to you at present. I know well that I leave the public interests in safe and able hands.'

"This was not an idle compliment. In merit it would be difficult to find a superior to Colonel Eustis in any service; and if he has erred in respect to cholera, it is because he has been from the first, personally, absolutely indifferent to it, and because he has been animated with an extreme desire to bring his fine troops in immediate contact with the enemy.

"By the misconduct of two express-riders (one of whom lost his dispatches) I did not hear from Colonel Eustis, after he left Turtle River, till the night of the 21st ultimo, when a part of his troops in boats were actually at the mouth of Rock River, three miles below. His letter was dated the 16th of that mouth, at Dixon's Ferry. He arrived himself by land, near the mouth of Rock River, the same night (with the remainder of his troops) that I received his letter. On the morning of that day I stated to you that 'a few old and lingering cases of cholera were on the boats.'

"This was founded on rumor, and was a mistake. On visiting his camp, on the 22d, I had the happiness to learn that there had not been a new or old case of cholera among his troops, after his passage of Turtle River on the 13th ultimo, one hundred and thirty or one hundred and forty miles from this. I, nevertheless, by order, confined his troops to an island in Rock River, and interdicted all communication, except by my special permission, between his camp and the other troops, or inhabitants of the neighborhood; that is, one family a mile above him, on another island, and one family on this side of Rock River. Neither of these families, as far as I have heard, has been infected, nor was there a single case of cholera in his camp down to last evening. Myself, an aid-de-camp, and one other officer were the only persons who had visited that camp from this island, and neither of us have been infected.

"On the 12th ultimo I caused a letter to be addressed to Colonel Eustis, (which he acknowledged at Dixon's Ferry on the 16th,) of which the following is an extract:

"'The general is very desirous that you should take great pains to avoid all communication, either with the inhabitants of the country or with other troops, should any new case of cholera have occurred on the march.'

"This was written when I knew that the volunteer militia would be returning home by Dixon's Ferry, and that certain companies of the United States Rangers might be expected there on their way to join me. I believe the volunteers returning home had all passed to the east before Colonel Eustis arrived, but he met or found there Captain Ford's com-

pany of United States Rangers, and it is known that some communication personally took place between the *officers* of the two bodies, if not between their *men*, as well while near Dixon's as afterward, on their march hither, Captain Ford following the trail of Colonel Eustis at a distance generally of eight or ten miles till the latter encamped on an island in Rock River, and then the former crossed a half mile above. These facts are by others deemed important as to the introduction of cholera here, but not by me, though they certainly show a neglect of my repeated instructions. Colonel Eustis, always a non-contagionist, had, on reaching the ferry, (Dixon's,) been three or four days without a case of the disease, either new or old, and, therefore, became too confident that his officers and men could not impart it to others.

"But Captain Ford's company, which has clearly infected this island, and through it will, I fear, infect the whole valley of the Mississippi, in all probability imbibed the contagion at Chicago. At that place, and on my way westward, I had filled the whole country, south and east, through newspapers, by innumerable letters, (four of which were to the four captains of Rangers on this side of the Mississippi,) through discharged volunteers on the Illinois and Rock Island Rivers, and other means, with admonitions to Rangers not to approach Chicago. I had sent the arms of the four companies to Danville and Dixon's Ferry in the same view, and informed each captain where to find his own, and to give like information, if he could, to the three others. These letters were all left unsealed, and indorsed with my rank and name to excite curiosity, and to induce postmasters and others to read them and give publicity to my admonitions. In short, I had erected a paper barrier around Chicago, which no company of Rangers, though ordered to report to me there, could ignorantly pass. In the mean time, and down to the arrival of Captains Boon and Ford here, I had not received a line for either of the captains, except Brown, who was recruiting at Danville.

"Captain Ford, on his march from the Ohio River, did not ignorantly pass the barrier I have mentioned. On his arrival at Captain Orr's camp on Hickory Creek, thirty-five miles from Chicago, he learned from the latter (an excellent officer) my solicitude on the subject of cholera. He had seen one of my published letters to the same effect. Nevertheless, with fourteen of his men, he went up to Chicago for provisions, and suffered himself, with some of his men, to be coaxed into Fort Dearborn. This was about the 10th ultimo. Twelve days afterward Captain Ford's company arrived here, and on the night of the 25th ultimo sent a sick man (Johnson) across into Fort Armstrong, who has proved to be a case of cholera, and is the first on this island. This man was one of those who went up to Chicago, and, if not into Fort Dearborn, was certainly at the entrance of the cholera hospital, then reeking with recent disease.

"The second case and first death was another man (Hall) of the same company. He was brought into the hospital here and died on the 26th.

"Here again I have had all my care and sagacity singularly defeated by accident or ignorance. I had visited Captain Ford's company camp, and, on seeing two of his men sick of fever, directed that cases requiring care in the treatment should be sent to the hospital in Fort Armstrong. I was then ignorant that any part of the company had been near Chicago or had any intercourse with Colonel Eustis's command at Dixon's Ferry. The day that Johnson was sent over to this island, Captain Ford told me that he had a third man sick of *common cholera*, whom he

wished to send to the hospital. Being about to leave the fort for Colonel Eustis's camp, I directed one of the surgeons here to keep watch for that man at the water's edge, in order to see if the case were not one of spasmodic cholera, and, if so, not to permit him to be landed. Dr. Coleman had never before seen a case of that sort, and received Johnson through a very natural ignorance. The disease not being early developed, I myself, on repeated inspections, doubted its character until after I had the honor of addressing you on the morning of the 26th, and therefore did not mention it. So afterwards, on the 26th, another ranger (Hall) was introduced. He was received by the other surgeon, Dr. Smith, after a similar caution from me, and died in a few hours of cholera. We had but one case, a man of the Fourth Infantry, on the 27th, who lay in the hospital (a case of debility) with Johnson on the night of the 25th. On the 30th the disease began to rage among all the troops on this island. Strange to say, that not another case occurred in the camp of rangers (on the west side of the Mississippi) from the 26th down to this morning. Two more are now reported, and I fear that the usual havoc will follow among the drunken and feeble. I must apologize for these tedious and distressing details. I am fully aware of the heavy responsibility that rests upon me for the spread of a dreadful malady among the troops under my orders, and through them prematurely among the population of this immense valley. I have never regarded myself as having been born to be a curse to my country. On the contrary, it has always been the first wish of my heart to serve her gloriously, but my care and foresight, amidst recent events, have been signally defeated. I have, without getting into battle myself, brought disease and death upon those who vanquished the public enemy. To the new danger I have freely and fearlessly exposed myself without utility. My heart is deeply humbled and afflicted. But if I cannot show that I have employed extraordinary care, and exercised even more than common sagacity to prevent the evils which I lament, I ask to be subjected to universal execration.

"SEPTEMBER 2.

"During the panic on the night of the 30th, seventeen men of the Sixth Infantry, who mostly have families at Jefferson Barracks, stole a boat and deserted. It is supposed they have gone thither. *Many of them will probably perish by the way and the remainder infect the barracks and Saint Louis.* On the morning of the 29th, at daylight, I sent off by water, under guard, seven prisoners, five of whom were principal chiefs or warriors of Black Hawk's band, to be confined as hostages at Jefferson Barracks during the pleasure of the President of the United States. This measure was taken on the night of the 28th, after consulting Governor Reynolds, (who was present,) and with his concurrence. I at the same time delivered up to Ke-o-kuck and other friendly chiefs then here all the old men, the women, and children who were under guard as prisoners of war, and sent the whole away.

"These precautions were taken in haste, before the cholera had spread beyond the third case, which happened on the 27th, and when we hoped that neither the guard of the hostages nor any Indian sent away had imbibed the disease. The rapid spread which commenced on the night of the 29th has given us great uneasiness on this point. We had remaining the three murderers of the Menomonees, the murderer of one of our citizens near the Yellow Banks, and some young men whose quality we had not ascertained. Two other warriors were brought up from the friendly villages below, on the 29th, after the hostages were gone. Of

these Indians, four were already reported as dead of the epidemic, and several others were sick.

* * * * * * *

"Boon and Ford's companies are in camp to get disinfected, as they might otherwise spread the infection through the whole line of their march through Illinois and Missouri to the Arkansas. Bacchus, Henry, and Brown's companies have not approached the infected region. In the twenty-four hours ending at meridian to day, there were but five new cases on this island. Surgeon Coleman is one of them, and there is but little hope of his recovery. I have just learned that there have been no new cases in Colonel Eustis's camp. Possibly it may not be re-infected as communications between it and the fort are interdicted. I am just from the hospital. Death has greatly thinned the wards. A few have recovered since yesterday, and many others will survive. The whole number sick at 12 o'clock, including slight cases, was seventy-four. I have just heard that Surgeon Coleman is dead. At any time this loss would be great; it is particularly so at this moment. We have now only Surgeon Finley and Assistant Surgeon Smith on this island, and Assistant Surgeon Macomb in Colonel Eustis's camp.

"I have the honor to be, sir, with great respect,

"Your most obedient servant,

"WINFIELD SCOTT.

"Hon. LEWIS CASS,

"*Secretary of War.*

"SEPTEMBER 2.

"P. S.—There have been but few deaths since the morning of the 3d, and no officers have died. Lieutenant Royster, of the Sixth, cannot live many hours."

On the night of August 31 a guard, under Second Lieutenant Gale, of the First Infantry, came down to Rock River with twelve prisoners from Black Hawk's band, who had been delivered up at Dixon's Ferry by the Rock River Winnebagoes. Colonel Eustis, happening to meet the canoes, took them to his camp, on account of the illness of Lieutenant Gale. That fine young officer expired of cholera the next morning. Only one other case followed in that camp. The man was sent up to the fort for bread, and took the disease here.

Under date of September 9, General Scott reports the subsidence of the cholera upon Rock Island; total deaths, four officers and fifty-two enlisted men. The disease had again broken out in the camps of the rangers, on the west side of the Mississippi River. In a postscript dated September 10 the General states: "I learn by return of express that the Sacs and Foxes have not had the cholera, though many of them left this on the morning of the 29th ultimo."

September 16, General Scott reports that cholera has entirely disappeared from the troops in the vicinity of Rock Island, and that it was fast subsiding in the camps of rangers.

JEFFERSON BARRACKS, MO.

"JEFFERSON BARRACKS, MO.,

"*September* 6, 1832.

"SIR: Lieutenant Cross, of the First Infantry, arrived this evening from Rock Island with a small guard, in charge of seven of the principal Hawk prisoners, whom he has delivered to me by order of Major-General Scott.

"Lieutenant Cross brings the disagreeable intelligence that the malignant cholera has made its appearance among the troops composing General Atkinson's command at Rock Island. Lieutenant Cross buried five of his command on their passage down, who died of the disease, but who were apparently in good health when they left Rock Island. One of the Indian prisoners is ill, and doubtless past recovery.

"Fifteen men of General Atkinson's command surrendered themselves to me at this post on the 4th instant as deserters, alleging that they had run from the *cholera* alone without any intention of quitting the service. They left Rock Island the day after Lieutenant Cross left there, and informed me that on that day eleven men were buried and a great many more were sick. Some cases of that disease have occurred in this garrison, but I trust rigid attention to police and good medical attendance will divest the disease of much of its fatal character.

"I have the honor to be, your obedient servant,

"H. SMITH,

"*Captain Sixth Regiment, Commanding.*

"The ADJUTANT-GENERAL OF THE ARMY."

Under date of September 10, 1832, Surgeon J. P. C. McMahon reports to the Surgeon-General of the Army "that cholera had become epidemic at Jefferson Barracks, Missouri." "Deserters are arriving here in boats and canoes from time to time. One of them was brought ashore the night before last in the last stage of collapse. He was sick before he and his comrades deserted from Rock Island. His is the only death I have as yet had occasion to record. The Sixth Regiment, or that portion of it that remains from death and desertions at Rock Island, is hourly expected here."

BATON ROUGE.

Lieutenant-Colonel Foster reports, November 8, that cholera is upon all sides of Baton Rouge, and upon every boat which passes up and down the river.

November 18, reports the arrival of the New Orleans command, driven out by cholera.

NEW ORLEANS.

Surgeon Thomas Lawson, late Surgeon-General United States Army, reports that cholera appeared at New Orleans near the close of October, "the city being the first point attacked, and the last position maintained by the enemy. Without pretending to determine the cause of this mysterious disease, or its mode of propagation, one fact is certain, viz, that no case of the disease manifested itself among us until after the arrival in port of the steamer Constitution, which had several cases on board, a number of her passengers having already fallen victims to the disease. So fearfully rapid was the pestilence in its progress, that in less than forty-eight hours it reached the lowest plantation on the Mississippi, desolating almost every spot inhabited by man.

"One of its peculiarities observed both above the city and in the lower country is, that it frequently passes over a village or plantation, while the destruction around is terrible; and this, too, without any manifest cause, either as regards the local circumstances or the habits and condition of the people. On the east bank of the Mississippi it advanced, after scourging New Orleans and the lower country, to within a few miles of Baton Rouge, and on the west side, some distance above that point.

"In New Orleans the effects of the epidemic were first manifested among the dissolute and the intemperate; those who were necessarily or accidentally exposed to the inclemency of the weather; those who were without the means of providing themselves with wholesome food and raiment, and the miserable occupants of the damp, filthy, and crowded hovels of the upper Fauxburg. It having desolated the suburbs, the disease invaded the heart of the city, striking down men, women, and children indiscriminately. Here again the disease exhibited some of its eccentricities, for in many instances a house was wholly exempt from its ravages, while those on every side were places of mourning and distress."

During the epidemic Surgeon Lawson and all the attendants of the post hospital were taken down with the disease. Six thousand deaths r said to have occurred at New Orleans.

Having traced the disease from the Saint Lawrence River to New Orleans, we will take up the consideration of the lines of infection, which radiated from the city of New York.

RHODE ISLAND.

Newport.—On the 17th of July the packet Hero left New York City for Newport, R. I., with a list of thirty-seven passengers. Arriving at Newport on the 18th, the vessel was quarantined by the city authorities, and all the passengers, with the exception of three ladies and one gentleman, were lodged at the United States barracks on Rose Island.

At sunrise on the 25th the quarantine was raised, and the passengers were allowed to proceed to the city. During the night of the 24th Miss D., one of the two ladies who had remained on the Hero, had been taken with cholera, but as her case was not reported to the authorities, she was carried to her home in the city, where she died after a few hours. On the 25th Miss P., the second lady, took cholera, and died the next day. At almost the same hour that Miss P. was attacked, the third lady, Miss C., and the gentleman who had remained with them on the Hero, also sickened, and both died.

July 30, a man who had assisted at the funeral of two of these ladies was attacked with *bilious colic*, from which he eventually recovered, but his wife and three children took the disease, from which the wife and two of the children died. The last cases occurred at the hospital early in August, and were followed by the death of two attendants.

Providence.—July 25, a Mr. J. Thurber, who had left New York City on the 11th with his family, was taken with cholera, from which he reacted, but relapsed and died. His wife was taken with the same disease July 31, and died the next day.

July 31, a young girl living in the same house as the Thurbers was taken with colera and died.

August 1, a sister of preceding case also died.

During August and September thirty-six cases of cholera occurred at Providence, of whom twenty-five died.

CONNECTICUT.

July 14, a Mrs. N. and her son arrived at New Haven from New York City. They both had diarrhœa when they arrived; in both was cholera developed, and both died. Within a few days the father and mother of Mrs. N., at whose house the preceding cases had occurred, both took the disease and died. July 18, a young child from New York

City died of cholera at same house. Twenty-seven cases are reported, with fourteen deaths.

Hartford.—July 19 and 20 two fatal cases of cholera occurred at Hartford, in the persons of refugees for New York City. Four other cases followed, of whom three died. The case of the 20th of July, a negro man, was taken with cholera, but recovered. His parents, however, (said to have been intemperate persons,) took the disease and died.

The Boston Medical and Surgical Journal, vol. VII, contains accounts of many house epidemics instituted in this State by refugees from New York City.

MASSACHUSETTS.

July 20, a fatal case of cholera occurred at North Brookfield, in the person of a gentleman who had just arrived from New York City, where he had had an attack of the disease, but from which he supposed himself recovered; but on reaching his home he relapsed and died. No other cases occurred.

Andover.—On August 18, an aged lady, after some imprudence in diet, died of cholera, after seventy-two hours' illness. Several other cases occurred, but none were fatal.

Haverhill.—August 25, a Mr. C. who had been in New York City, and who had visited Lowell during the time that he was suffering with diarrhœa, was taken with cholera, but recovered.

Dr. C. A. Lee reports the case of a gentleman who had been exposed to cholera in Buffalo, and returned to his home at Mount Washington, Mass., fifteen hundred feet above the sea, and there died of cholera. Of eight friends who nursed him, six were attacked with the disease and four died.

Boston.—On Sunday, August 5, about thirty convicts at the State prison in Charlestown were suddenly attacked, at an early hour of the morning, with violent diarrhœa; and before the evening of the 6th, one hundred and eighteen cases had occurred. No cause for the attack could be traced to food. All these cases were promptly treated, and none were fatal.

On Sunday, August 5, at about 2 o'clock a. m., a number of the inmates of House of Industry, South Boston, were taken with diarrhœa and vomiting, and during the next twelve hours fifteen other cases curred; none were fatal. On the succeeding day cases of a similar nature occurred in Charlestown and in Boston, but were not malignant in character.

August 15, Miss. E. L., aged twenty-five years, who had been attending sick friends who suffered from the prevailing disorder, died of cholera; and the same day, Mrs. F., a lady thirty-five years of age, who had been, with Miss L., taking care of several sick persons, also was attacked, and died.

Twenty-nine fatal cases are reported as having occurred.

The Boston Medical and Surgical Journal for July 25, 1832, reports: "A man died last week, after an illness of a few hours, on his passage from New York to Boston, on board the new steamboat Chelsea. It was supposed to be a case of cholera. There were only five or six persons on board, and as yet no other case has appeared among them, although they are all detained at quarantine and the boat has been fumigated."

An interesting incident is recorded as having occurred in the State of Maine.

During December, 1832, a chest of clothing that had belonged to a

sailor, who had died of cholera at a Baltic port, arrived at his home in a small village near Bangor, Me. The chest was opened, the clothing was distributed to his friends, and all who received the garments were taken with cholera and died.

NEW JERSEY.

July 7 a lady died at Newark. She was from New York, where she resided in an infected locality, but did not leave her home until she was herself taken sick, when she took refuge at Newark. Following this case nine deaths occurred.

Dr. Stevens states that during the epidemic at Newark an aged man went from that city to Hanover, fourteen miles distant and across a range of mountains, where he had cholera, but, reacting, was sent to his son's house, at Morristown. The son would not receive him, and the patient was carried to the county poor-house, where he relapsed and died. Within forty-eight hours, the man at whose house he first stopped died of cholera, and four other cases followed in the same house. On the road, and within less than a mile, there were over twenty cases and ten deaths.

The brother of the first case at Hanover came from his home at Chatham to attend the funeral, and, returning home, died.

At New Brunswick fatal cases occurred July 14, and cases are reported about the same time at Elizabethtown, Trenton, Paterson, Princeton, Burlington, and Camden, but Jersey City was not infected until July 26.

At Plainfield a sick stranger was taken into the house of a gentleman, and died of cholera. Four members of this family died of the same disease, and all the others were seriously ill.

On the New Jersey Canal, at section 40, seven miles from Princeton, an epidemic of cholera was caused, on the 26th of July, by the arrival of a peddler from New York City, who died of cholera. Fourteen cases, with thirteen deaths, occurred.

PHILADELPHIA.

According to the late Prof. Samuel Jackson, the first case of cholera in the city of Philadelphia, in the epidemic of 1832, occurred July 5, in an individual who resided in the western part of the city, near the Schuylkill. "No possible circumstances to account for the disease by communication existed. The second case took place in the Northern Liberties, distant from the location of the first at least a mile and a half, on the 9th of July. The next cases were on the 14th of July, two in the Northern Liberties and one in Kensington, the first distant from the second case about a mile; the last about two miles. A few other scattered cases presented themselves at intervals, all in remote unconnected points, until the 27th and 28th of July, when the epidemic influence acquired its full sway, and cases were daily developed. The epidemic attained its acme on the 5th, 6th, and 7th of August, from which time it rapidly declined."

No other records treating of the introduction of the epidemic of 1832 into the city of Philadelphia can be discovered. The theory of the local or malarial development of the disease, having been determined upon, seems to have been almost universally assented to, and the attention of the medical men was turned exclusively to the consideration of the pathology and treatment of the disease.

Philadelphia, however, is a port of entry; emigrants arrived during the spring and summer months, and they belonged to the same classes as have been shown to have arrived cholera-infected at other ports

The rapid scattering of individuals at New-York from cholera-infected vessels undoubtedly had its influence in the development of the disease at other cities; and it is submitted that the early cases in Philadelphia occurred in the localities that would be frequented by such persons, especially those who might have made the trip overland from New York.

In the early part of August, a laborer who had been discharged from the prison at Philadelphia, made his appearance at Plymouth Locks in quest of work. Shortly after his arrival, he was seized with cholera, and died in a few hours. Among twenty laborers at these locks, fifteen cases of cholera, with nine deaths, occurred.

Delaware.

During the latter part of July two or three cases of cholera were landed at New Castle, Del., from vessels on the Delaware River. The first case among the inhabitants occurred August 6. The disease continued, with an intermission of from August 17 to 29, until September 5.

Prior to the outbreak an oyster-boat arrived with the dead body of a man who had died of cholera. All who ate the oysters had the disease. Fifteen deaths occurred.

In August a lady left Philadelphia to escape the disease, and went to the farm of her father-in-law, in a secluded portion of the State of Delaware. The day she arrived she was taken with cholera, and died. Many other fatal cases followed at this place.

Maryland.

During the spring of 1832 it was every now and then rumored that cases of cholera had occurred in the city of Baltimore. Of them, however, no cognizance had been taken by the health department.

On the 7th of June the ship Brenda arrived from Liverpool with one hundred and twenty-three emigrants on board. The captain reported that during the voyage nineteen deaths had occurred, fourteen of which he admitted had been cholera, but the disease had disappeared before the arrival of the vessel.

What became of the passengers of this ship Brenda, the record left by Dr. Jameson does not show; but we are informed that Baltimore vigilantly and faithfully enforced quarantine regulations against cholera, *when the mayor, board of health, health-officer, and consulting physician were decidedly non-contagionists.*

The record of cases, however, begins on the 4th of August, although it is more than probable that the record should have commenced at a much earlier date.

On the 30th of July cholera was announced at Annapolis.

At Hagerstown, Port Tobacco, Govanstown, the importation of the disease is clearly proven by Dr. B. M. Byrne, United States Army.

During the month of August a Captain Dodson returned from Baltimore to his home at Saint Michael's, a small town on the eastern shore of Maryland, and died of cholera. From this case twenty cases occurred, half of whom terminated fatally.

District of Columbia.

From Dr. J. M. Toner, of Washington, who has placed at our disposal a cholera note-book, containing clippings from the National Intelligencer, we are able to present the following outline of the cholera-outbreak at Washington City in 1832:

"Several thousand laborers were employed during July and August,

1832, in macamadizing Pennsylvania avenue, and upon the improvement and extension of the canal. These laborers were mostly emigrants but a short time in the country, and were so miserably provided for that the Intelligencer of August 8 calls upon the city council to exercise some supervision over them.

"August 8, a colored female servant of Mr. Amos Kendall, living on Twelfth street, between G and H, was suddenly attacked with what was called "malignant typhus fever," from which she died on the 10th.

"August 9, a colored female servant of Postmaster-General Barry, who resided on Eleventh street, between F and G, was attacked with "malignant typhus fever," from which she died on the 11th. The same day a negro man, also a servant of Mr. Barry, and husband of the last-named woman, took the same disease, but on the 14th was reported to be still alive.

"August 12, an intemperate white man, twenty-one years old, who had suffered from a diarrhœa of some weeks' standing, was suddenly taken ill and died in five hours. This case was pronounced to be cholera."

We copy from the Intelligencer of September 12:

"The epidemic broke out August 8, and continued very nearly until October 8. The physicians who were here through the period of the malady, and are still surviving in this city, all concur in fixing the number of cases at a thousand, of which five hundred were fatal. It raged with great fury early in September, was at the height of its intensity toward the middle, and began to assuage its violence in the latter half of the month. The population of Washington at this time was in round numbers 24,000."

Dr. Thomas Sewell, of Washington, in a letter to Dr. F. B. Page, of Louisiana, reported, October 24, 1832: "That the cholera was most prevalent among the hundreds of laborers engaged upon the public works, of whom a large proportion were foreigners recently arrived in the country, neither speaking our language nor accustomed to our habits and mode of living; many were intemperate, extremely uncleanly, and messed together in the rudest manner. The disease prevailed with great severity also among the colored population."

From Washington the disease was carried to the neighboring towns of Georgetown and Alexandria, and into the adjacent country districts.

VIRGINIA.

Norfolk.—Tuesday, July 24, cases of cholera are reported.

Richmond.—The epidemic reached this point July 6.

Cholera was introduced into Charles County, in the person of a man named Gibson, who was the captain of a vessel from Georgetown, who landed at the plantation of Mr. Philip Stewart, where he died of cholera. From this case a number of others occurred, the majority of which were fatal.

At Colchester, the disease was introduced by a man from Georgetown, and many fatal cases occurred.

SOUTH CAROLINA.

From an article from the pen of the late Professor Warren Stone we learn of the introduction of cholera in 1832 into the city of Charleston, S. C.:

"I left Troy for New York, and in the latter part of October embarked for New Orleans in the brig Amelia. The vessel was overcrowded with passengers, and there were a few cases of cholera in New York when the ship sailed. For the first four days there was a calm, and everything was healthy; but a terrible storm came, and it was found necessary to fasten down the hatches, and stifle over a hundred human beings in the space between a small ship's decks. They were all attacked, of course, with sickness; and their excrements, together with the decaying provisions and heated air, were enough to destroy life without the assistance of an epidemic poison. I expected serious consequences. The captain, who was willing to do whatever was proper, said that the hatches could not be raised without imminent danger of sinking the ship—a fact which was subsequently verified. On the third day of the storm there was a cry that there was a dead man below. The weather having moderated a little, the captain ordered the hatch to be raised, and I went below, where I found a deplorable state of things. All seemed stupified from foul air, and about twenty-five seemed to be in the second stage of cholera. Eight bodies were thrown overboard on the first day, but every one that had strength was sent on deck, and the disease soon subsided, leaving no case of cholera except convalescents.

"At this period in our voyage the brig was run on Folly Island in distress. There had been no cholera in South Carolina, and, I think, none either in Georgia or North Carolina; neither was the disease prevalent for two years afterward. A sea-island planter, who had suffered with what is called the country fever, was on the island, but as soon as he learned that cholera had existed aboard the ship, he fled to Charleston, S. C., leaving behind two superannuated negroes and two young ones. The city authorities at once ordered down an ample guard to prevent the entrance of any one into the city, but at the same time provided bountifully for all the wants of the passengers. The value of the cargo was considerable, and quite a company of wreckers came down for the purpose of securing it, and the city guard joined with them. Within three days fourteen of them died; whereupon the city authorities ordered the ship and everything belonging to it to be burned. The fact is, the stench engendered in the vessel below deck by all the causes combined was unbearable, and the wreckers cut a hole through the ship's side, but this did not exempt them from the effects of the poison. The boats being lost, the surviving passengers had to be taken ashore through the surf, and consequently were wet. Exposure at this time to a cold northeast wind caused a few new cases, and many of the passengers, visiting the filthy ship for liquor and plunder, renewed to some extent the disease; but as soon as the ship was destroyed and the passengers were made comfortable, the disease disappeared, showing that it could not be perpetuated in a pure atmosphere. The two old and the two young negroes were constantly among the crew and passengers for the purpose of selling vegetables, and from their well-known cupidity, it is presumed that they managed to get to the ship. However, three of them died one night. In passing their tent one morning, I observed one of the young negroes sitting in the doorway crying, and on inquiring the cause, I received in reply the answer that 'they would not get up to get his breakfast.' I looked into the hut, and saw on the floor the three dead bodies, presenting all the marks of cholera. The survivor had strong premonitions of the disease, but with care they soon subsided, and he was sent to the city. These are substantial facts, entirely distinct from coincidences.

"One of the party of wreckers returned to Charleston, and died at his home, on Elliot street, of cholera. A few days later the nurse who at-

tended this man died of the same disease. As an instance of the strange spirit of exaggeration that possessed the non-contagionists of the day, it is stated that the case on Elliot street '*was visited by hundreds of people, none of whom took the disease*,' and yet the attendant died of cholera. No other cases occurred in the city."

Having traced the disease along the Atlantic coast, it is proper to take up the lines of infection as they advanced to the headwaters of the Ohio River.

PENNSYLVANIA.

On the 26th of June a woman died at Erie of cholera. She had just arrived from Quebec. This woman was an emigrant, whose husband had died of cholera on the passage to this country. She arrived at Erie on the 22d; on the 23d she washed the clothing of her dead husband; on the 25th she was taken with cholera, and died on the 26th.

July 2, cholera was reported at Pittsburgh. The first case was in the person of an Irish woman, who lived at a house frequented by emigrants. Subsequently cases occurred among emigrants who arrived from New York.

OHIO.

The following announcement was made by the Cleveland Board of Health:

"CLEVELAND, OHIO, *July* 10, 1832—9 o'clock a. m.

"The board of health have the unpleasant duty to report that the steamboat Henry Clay arrived last evening in our piers from Detroit with three of her men sick, and, as the board of health have no doubt, with the cholera. * * * Two of the crew died of cholera above Detroit."

After much opposition on the part of the citizens of Cleveland, the crew of the Henry Clay were allowed to land upon a point of land, where they were placed in close quarantine. Several of the men died of cholera at that point, but the disease did not spread.

July 22, a woman was landed at Cleveland from a passing boat. She was suffering from diarrhœa when she arrived; cholera was soon developed, and she died. From this case the disease spread and became epidemic.

Cincinnati.—October 9. The steamboat Sylph arrived at Cincinnati with a passenger on board sick with cholera. He was an emigrant, who had left Kingston, Upper Canada, nine days before, crossed the State of Ohio from Cleveland to Portsmouth, one hundred and twenty miles above Cincinnati. At Portsmouth he took the steamer Sylph for Cincinnati. After the arrival of this man and his death, the disease became epidemic in the city.

Up to this time the existence of the disease at Cincinnati had been denied by the board of health; but it is shown by Dr. Drake that twenty-one fatal cases had already occurred, the first on the 30th of September.

The first case, that of September 30, was the driver of an express-wagon, who was employed wherever he could obtain work, and who was attacked after exposure to a violent storm of rain. The same night a man, whose occupation is not given, but who lived within but three blocks of the river, died after a few hours' illness.

The same day the cook of the steamboat Huntsman was taken sick, and died, collapsed, October 1. This boat was a regular packet between

Cincinnati and Louisville. No cholera had occurred at the latter city, (but from the nature of his employment he was thrown in contact with men from other river-steamers, and those employed on the levee of Cincinnati.)

September 30. A negro woman, living quite close to the second case, was taken with cholera and died in twelve hours; and in the same house, on October 2, the fifth case occurred, which was also fatal.

October 1. In a house almost adjoining that at which the two last died occurred the sixth fatal case.

October 4. A man died of cholera at his home some ten miles from Covington, Ky. He had spent the four previous days in Cincinnati.

October 5. A negro laborer died of cholera; the record does not show his exact employment, or whether he had been in contact with the previous negro cases. But his home was within the square from their point of death.

October 5. A negro deck-hand of a river-steamboat died at the house of one Anderson, of cholera. Anderson lived *near to* the first case of this date. It is recorded that this second case, George Price, had been at the house at which he died two days before he was taken with the disease.

Two other cases occurred in the same portion of the city, that terminated fatally on the 5th.

October 6. A negro man, occupation not given, died of cholera near the center of the city. The same day a gentleman died of the disease at Covington. He had been in Cincinnati the previous day, and became wet with rain as he returned home.

October 7. Five cases occurred in the portion of the city infected; all were fatal.

October 9. The first steamboat *known to be infected* arrived at the city.

The steamboat referred to as conveying cholera-patients to Cincinnati was the William Parsons, from Saint Louis, Mo.

During the prevalence of cholera at Cincinnati, a party of twenty-four German emigrants arrived at Dayton, Ohio, (June 23.) When they landed, one of their number was dead with cholera, and eight were dangerously ill; of the latter, seven died. The remaining sixteen were all attacked, but recovered with the exception of one infant. Two of the nurses employed to care for these people died of the disease. One was ill but recovered; there was no extension of the epidemic.

KENTUCKY.

The report of Dr. Drake shows that, on the 4th of October, a man died of cholera at his home some ten or twelve miles south of Covington, having contracted the disease in Cincinnati; and that, on the 6th, a gentleman died of the same disease in the city of Covington, having contracted the disease also in Cincinnati.

The importation of the disease into the State is thus established, although the records in the Transylvania Journal of 1832 and 1833 are confined almost exclusively to the establishment of the malarial theory.

On or about the 4th day of October, cholera appeared at Louisville, Ky., five days later than we are informed by Dr. Drake that Cincinnati was infected. At this point, the disease was confined to the banks of the Ohio and to Beargrass Creek, which empties into the Ohio at that point. The mortality never became great; seven deaths per day was the average reported while the disease was at its height.

Lexington.—November 6. A negro died of cholera at Lexington, and during the next forty-eight hours five deaths occurred. All the cases

occurred in one quarter of the city near to the margin of a small stream which runs through the city, into which all the sewers empty, and along which the railroad runs. Two of the cases reported were railroad-employés—one an engineer.

It will be noted that the first case did not occur until thirty-two days after the cholera-death recorded by Dr. Drake as having occurred ten or twelve miles south of Covington. We have been informed by old residents of the State that the disease advanced gradually along the line of public travel, which was at the time slow and tedious.

Frankfort.—November 6. Cholera appeared at Frankfort, which city was connected with Lexington by a railroad, and during the first two days five deaths occurred, when the disease abated.

It has been most conclusively shown that the cholera-epidemic of 1832 reached North America, not upon any atmospheric wave which was wafted from cholera-infected Europe, but by means of vessels laden with cholera-infected emigrants, who landed upon the Saint Lawrence, at New York, Baltimore, and perhaps Philadelphia; that from the Grosse Isle quarantine-station the infection spread along the chain of the lakes, carried in infected boats, until the city of Chicago was reached; that from Chicago it was conveyed across the State of Illinois to Rock Island upon the Mississippi River, from which point the entire valley, as far south as New Orleans, received the infection; and that by means of infected steamboats the infection was carried up the Ohio River to meet and to intensify the same infection that was being conveyed down that stream.

It has been shown that the infection was carried from the Saint Lawrence, along the routes of travel, into New York State, to meet the line of infection advancing northward from New York City. It has been shown that the infection was carried from the Saint Lawrence into the States of Pennsylvania and Ohio, in which States it was carried southward to join the line of travel along the Ohio.

From New York City, it has been shown that the disease was carried into adjoining towns and States.

Although the exhibit has not been as full as it was hoped, when the task was contemplated, yet sufficient has been shown to prove that the epidemic cholera of 1832 was a portable disease; and, in the face of the facts that have been presented, it is impossible, with any reason, to deny the method of its diffusion over the United States.

In 1833, cholera reached the United States by an entirely different route. The general course of the epidemic of 1832 was reversed; while in that year the disease had been carried down the waters of the Mississippi, in this the disease was conveyed northward, over the same great highway of travel.

In February, 1833, cholera was carried into the island of Cuba, and became epidemic at the cities of Havana and Matanzas, and for several months the disease raged with intense severity; the deaths at Havana being over ten thousand in a population of less than one hundred thousand. During the months of April, May, June, and July, the disease was carried in all directions from Cuba. A fatal case of sporadic cholera occurred during April at New Orleans. During the month of June, the disease became epidemic at Tampico, Campeachy, and Vera Cruz. In August, it reached the city of Mexico. At Tampico, it is stated that nearly one-half of the inhabitants perished of the disease—nine hundred died in seventeen days. In May, Surgeon McMahon of the Army reported that cholera was epidemic at New Orleans, and at that city the

disease was most disastrous. About the same time it appeared at Mobile, Apalachicola, and at Amelia Island on the coast of Florida.

The steamboats in the Mississippi trade were again infected, and the disease was carried northward.

New Orleans, Vicksburgh, Memphis, Saint Louis, Quincy, Louisville, Cincinnati, Maysville, Wheeling, and Pittsburgh, all in order suffered, and each in turn became points from which the disease radiated from the river, while the interior cities, receiving the infection, in turn imported it to their dependencies.

It is a point of singular interest to know that a map of the cholera-epidemic of 1833 in the United States is almost identical with the map of the epidemic of 1873.

From the line of the Ohio River, the States of Illinois, Indiana, and Ohio were devastated upon the north, while upon the south the State of Kentucky was overrun with the disease, whose lines of infection extended into the State of Tennessee, met the lines of infection from the Mississippi, and culminated in the explosion at Nashville. Upon the east, the State of Virginia was infected from the Ohio, Wheeling receiving the first blow, and in turn transmitting the disease to Shepherdstown, Fredericksburgh, and Charlestown. Lastly, Pittsburgh was infected, and Allegheny, Brownsville, and Claysville followed.

The medical journals of 1832 and 1833, although filled with cholera-items, contain surprisingly few attempts to trace the disease. It seemed to be almost universally accepted that the diffusion through the United States was influenced by atmospheric causes; and beyond the paper of Dr. Beck, which has already been noted, no attempt seems to have been made to note the travels of the disease, with the incidents attending its diffusion. At a later date, Dr. Marsden collected many facts of value.

The journals of these years abound in articles upon pathology and treatment of the disease, but very little can be found which throws any light upon the travels.

From Dr. Elsworth Eliot, of New York, we have received several clippings from various publications of the years in question, some of which clearly show the mode of introduction of the disease. The instances demonstrating the portability of cholera are fragmentary, and from necessity must be presented in a disconnected shape. A New Haven paper republishes the report of the Cincinnati board of health for July 19: "It was discovered that the cholera was indeed in the midst of us; two individuals died this day and one the day following. We deem it proper to say, that of the individuals above named one had just entered the institution, (Lane Seminary,) having recently arrived from Natchez, and that he had for twenty-four hours neglected the premonitory symptoms. Another had been for several years an invalid, whose constitution was impaired by a chronic affection. He came here for the benefit which he hoped to derive from associating manual labor with study, and was known among us as a feeble man. Concerning the other, we are sorry to say that his death is chargeable to his own presumption. Notwithstanding the reiterated request and entreaty of the board, he neglected a diarrhœa till so late a stage of the disease that no remedies could avail."

During the epidemic, the inhabitants of the State of Kentucky suffered most severely. Lexington was again attacked after the disease had appeared at Maysville, Flemingsburgh, Georgetown, Cynthiana, Millersburgh, and Paris. From Lexington, the disease was distributed to Versailles, Lawrenceburgh, Frankfort, Lancaster, Danville, and towns of lesser note, and from each of the localities named the lines of infection

radiated, until nearly the entire area of Eastern and Middle Kentucky became infected.

It was reported that up to the 12th day of July, over four hundred deaths had occurred at Lexington; that the mortality was increasing; and that it was difficult to get rough boxes made fast enough to put the dead away.

In the elaborate papers of Drs. L. P. Yandell, sr., Benj. W. Dudley, and John E. Cooke, upon the epidemic at Lexington, Ky., a total absence of all attempts to trace the cause of the epidemic and its progress is most strikingly evident. It seems to have been accepted as an unanswerable fact "*that cholera arises in the very same circumstances in which fever and dysentery arise*," and no note is made of the connection between cases, which must have occurred.

That cholera was distributed from Lexington to the surrounding country is shown by the following incidents:

On the 18th day of June, 1833, late in the evening, a wagon laden with merchandise for the store of William Cooke, who was at that time the principal merchant of the place, arrived at Lancaster. These goods had been loaded upon the wagon at Lexington, which was unloaded the evening of its arrival, and the goods unpacked and placed upon the shelves in Mr. Cooke's store. Before noon the next day, Mr. Cooke, two or three men who had assisted in handling the goods, and the wagoner were dead from cholera; and from the 19th of June to the 8th of July one hundred and sixteen deaths occurred. From Lancaster the disease was carried to the surrounding country.

We have been informed by our friend Dr. J. D. Jackson, of Danville, Ky., that the first cases of cholera that occurred in Boyle County, in 1833, were in the persons of five negroes, employed as teamsters in transporting goods from Louisville and Lexington to that town.

By Dr. W. M. Tomilson, of Mercer County, we are informed that the first case of the disease at or near Harrodsburgh was in the person of a man just returned from Lexington.

At Lebanon, Ky., a stranger arrived from Lexington during the epidemic at that city. He put up at the hotel, and during the night he was taken with cholera and died the next day. The negro who waited upon him was next attacked, and from him the disease spread to his fellow-servants. These cases occurred in the practice of Dr. M. J. Shuck, who is still a practitioner of Marion County.

From Lebanon the disease was carried into the surrounding country. The first case that occurred at the town of Springfield was in the person of a man from Lebanon, and the same thing may be said of other towns.

A Mrs. H. died at Maysville of cholera. Her body was taken to Flemingsburgh, where it remained unburied one day. The next day nine deaths occurred among those who had visited the corpse, and the disease spread rapidly.

At Summerset, a village of about 1,200 inhabitants, in Pulaski County, Ky., cholera first occurred in the person of a refugee from Lancaster, and in seven days thirty-four deaths occurred.

At Maysville, Ky., the city is represented as having exhibited a scene that finds no parallel in its previous history. The disease occurred on the 3d of July, and up to the 12th forty-one deaths occurred.

We have been informed by Judge R. Hawes, of Paris, Ky., through Dr. J. D. Jackson, of Danville, that the first cholera-deaths in Bourbon County, during this epidemic, occurred in the persons of two men, named Johnson and Kennardy, who arrived at their homes from Maysville during the epidemic at that city.

Dr. Z. T. Robards recorded in the Transylvania Journal of Medicine, for July, August, and September, 1834, that during the epidemic of 1833, a young man arrived at Shepherdsville from Louisville, and proceeded to the house of his father, two miles east of the town; that he had had diarrhœa for some time before his arrival. The evening of his arrival he was taken with cholera, and died after ten hours; all the inmates of his house had diarrhœa; in two, cholera was fully developed; one case died.

The sister-in-law of the first case and her husband, living at a different location, took the disease and died.

During the same epidemic, a negro woman, from an infected locality, returned to her master's house at Shepherdsville. She was taken with cholera, but recovered. Her mistress, who cared for her most attentively, took the disease and died. The brother of this lady lost his daughter, six years old, and a number of his negroes.

Dr. Robards relates three other instances of the portability of the disease, and offers the following remark: "Those who argue it is not contagious or communicable in any way from one to another, use an argument in favor of their position which are not deemed just, that persons go where the disease is without taking it. Because a man may go into battle and return without being shot, is it fair to say that there is no danger in bullets?"

To this record the following note is appended, which is reproduced as affording an exact index to the professional mind of the period: "The very fact, however, of the appearance of cholera at those places is evidence of insalubrity. We think it is easy to account for all the facts contained in the above history without a resort to the doctrine of contagion, which the vast body of evidence presented by the progress of cholera has, in our view, forever overthrown.—ED."

Dr. Robards wrote the only account of the epidemic of 1833 in Kentucky in which facts were given; while his professional brethren would overwhelm him with theories and no facts, he alone attempted to give a plain history of the early cases that occurred.

From the New Haven paper before noted we read, that early in July, out of a party of German emigrants *upon the Mississippi River*, on their way to Saint Louis, sixteen out of a company of one hundred and fifty, had died of cholera.

Early in July the disease was reported at Palmyra, Mo., and before 10 o'clock p. m. of the day of explosion ten deaths occurred.

The instances given by Dr. M. H. Houston as having occurred during the epidemic of 1833 at Wheeling, Va., are certainly strong evidence in favor of the infectiousness of cholera. The village of Bridgeport, now a ward of the city of Wheeling, is located upon a small island in the Ohio, but half a mile from the city of Wheeling. The village was in a filthy condition, and contained two or three hundred inhabitants. Cholera was epidemic at Wheeling on the 15th of May, but the disease did not occur in Bridgeport until the last week in June. The village was near enough to the city to be subjected to the same atmospheric influences, if cholera is originated by them; was dirty enough to have cholera, if filth generates the disease; but more than a month passed, and the village escaped. But when it did occur, within the first thirty-six hours twenty-two of the inhabitants died. The solution of this problem is most easy. Although communication between Bridgeport and Wheeling was of necessity kept up, *it was very much restricted through fear of cholera.* No person infected with the disease arrived on the island until late in June; but the infection once arriving, its reproduction

was rapidly advanced by the filth of the village, and when the cholera-explosion did occur its consequences were frightful. Dr. Houston makes no note of special cases. The initial case was unnoticed. The same argument accounts for the isolated outbreak that Dr. Houston notes as having occurred five miles from Wheeling.

In 1834, epidemic cholera again appeared in North America, and for the second time its advent was upon Grosse Isle, on the Saint Lawrence. Dr. Marsden records that, on the 4th day of July, 1834, the brig John, from Dublin, arrived at the quarantine-station with two hundred and sixteen emigrants on board, having lost a large number from cholera on the passage out. On the 6th day of July, the John arrived at the port of Quebec (having passed quarantine without opposition) and landed her passengers. The next day cases of cholera were reported in the city. Four days after the outbreak a public excursion was organized to visit *the quarantine-station*. The commander-in-chief and his staff, a large number of ladies and gentlemen, and a few strangers, with the band of the thirty-second regiment, participated. Dr. Marsden remarks: *Quem Deus vult perdere prius dementat.* The disease spread rapidly from that time, and again advanced along the line of the Saint Lawrence.

As a case strongly illustrating the infectiousness of cholera, Dr. Marsden relates the instance of three gentlemen who had gone to Lake Beauport, some twelve miles from Quebec, on a shooting party. As they returned to town they called at the house of a farmer to rest, and were shown into a room which, until the moment of their entering, was closed. While in his room the party drank some brandy and started to complete their walk to the city. Within two days two of these gentlemen were dead from cholera; the third had the disease, but recovered. It was subsequently ascertained that the wife of the farmer had died of cholera in the room occupied by these gentlemen, and that the room had not been entered since her dead body had been removed.

It will be remembered that the town of Three Rivers, situated midway between Quebec and Montreal, had established a *cordon de santé* in 1832, and thus escaped the disease; but in 1834, influenced no doubt by the theory of non-contagion that had rapidly gained notoriety during the two preceding years, this precaution *was not adopted*, passengers from Quebec were permitted to land, and a devastating pestilence ensued.

Montreal was again infected from Quebec, and from that city the disease spread into Upper Canada and the United States.

During the epidemic of 1832, Nova Scotia had entirely escaped the disease, but in this year cholera was carried into the port of Halifax, spread through the province, and extended to Saint John's.

Dr. Vaché states that the village of Galt, in Upper Canada, was almost depopulated.

Following largely the route of the former epidemic, the towns and villages upon the lakes were infected.

From the lakes, by means of Lake Champlain and the North River, the State of New York was again infected, the disease reaching New York City on the 9th of August.

The query now becomes pertinent: Was not New York City in 1834 infected in the same way that she was infected in 1832?

Dr. C. A. Lee stated that about the 1st of July bowel-complaints began to prevail very extensively, especially among the poor residing in crowded, ill-ventilated apartments, and occasionally a case occurred with the same symptoms as attended the cholera of 1832. "On the 14th of July, a few days after its appearance in Canada, I attended a patient

who had been employed in rafting and had been much exposed to wet and fatigue; an intemperate man, and living in a filthy habitation. I found him with violent cramps, cold, shriveled skin, rice-water dejections, and almost imperceptible pulse, and the other symptoms characterizing this stage of cholera. He recovered."

In New York City, the total deaths from cholera during this epidemic were eight hundred and twenty-seven to September 20, when the disease disappeared.

New Jersey, Pennsylvania, Maryland, the District of Columbia, Virginia, Georgia, Florida, and Texas, upon the sea-coast; and Ohio, Michigan, Kentucky, Tennessee, and Mississppi, in the interior became infected with the disease.

It was admitted universally that Pensacola was infected with the disease after the arrival of the United States ship Falmouth with cases of cholera on board.

In 1835, cholera was again introduced into the United States from Cuba, where the disease was especially virulent at Santa Iago, Havana, and the south side of the island.

New Orleans and Charleston, the latter city, for the first time, especially, suffered from the disease.

An unanswerable argument against the theory of the atmospheric or telluric origin of cholera is found in the facts demonstrated by the epidemics of 1832, 1833, 1834, and 1835, that cholera was developed upon the North American continent:

I. After the disease had become epidemic in foreign territory with which the North American continent was in constant communication.

II. That epidemic cholera occurred in North America only after the arrival of vessels from such infected countries, and after the arrival of vessels that, during the voyage to American ports, had become infected with the disease, in the persons of passengers.

III. That in no instance during either epidemic did the disease appear in the interior of the continent until a sufficient time had elapsed for the conveyance of the infection from the foci established upon the seaboard, in the persons of individuals.

CHAPTER V.

EPIDEMIC WHICH REACHED THE UNITED STATES IN 1848.

Resuming, now, (says Macnamara, p. 77,) the history of cholera in India, we find that the outbreak in 1826 and 1827 had almost subsided in 1829. In 1830, there was but little cholera in India. In 1831 and 1832, it raged principally near the holy city of Gaya, near Patna, and appeared at Patna, Purneah, and other places near by, just as it did before breaking out at Jessore in 1817. In 1833, it was farther up the Ganges, at Allahabad; and in 1834, the lower northwest provinces were again under the influence of invading cholera. In 1833 and 1834, it was most severe at Bellary, in the Madras presidency, coming, doubtless, from the holy city of Bigginuggar, which now began to attract attention, as the high table-lands near it, although 1,600 feet above the sea, were found to be the home of cholera to a greater extent than any other portion of Madras. The central provinces, from Nagpore along the whole valley of the river Nerbudda, almost to Surat on the Arabian Sea, were also suffering from a wide-spread epidemic. The river Nerbudda is regarded by the pilgrims almost as holy as the Ganges.

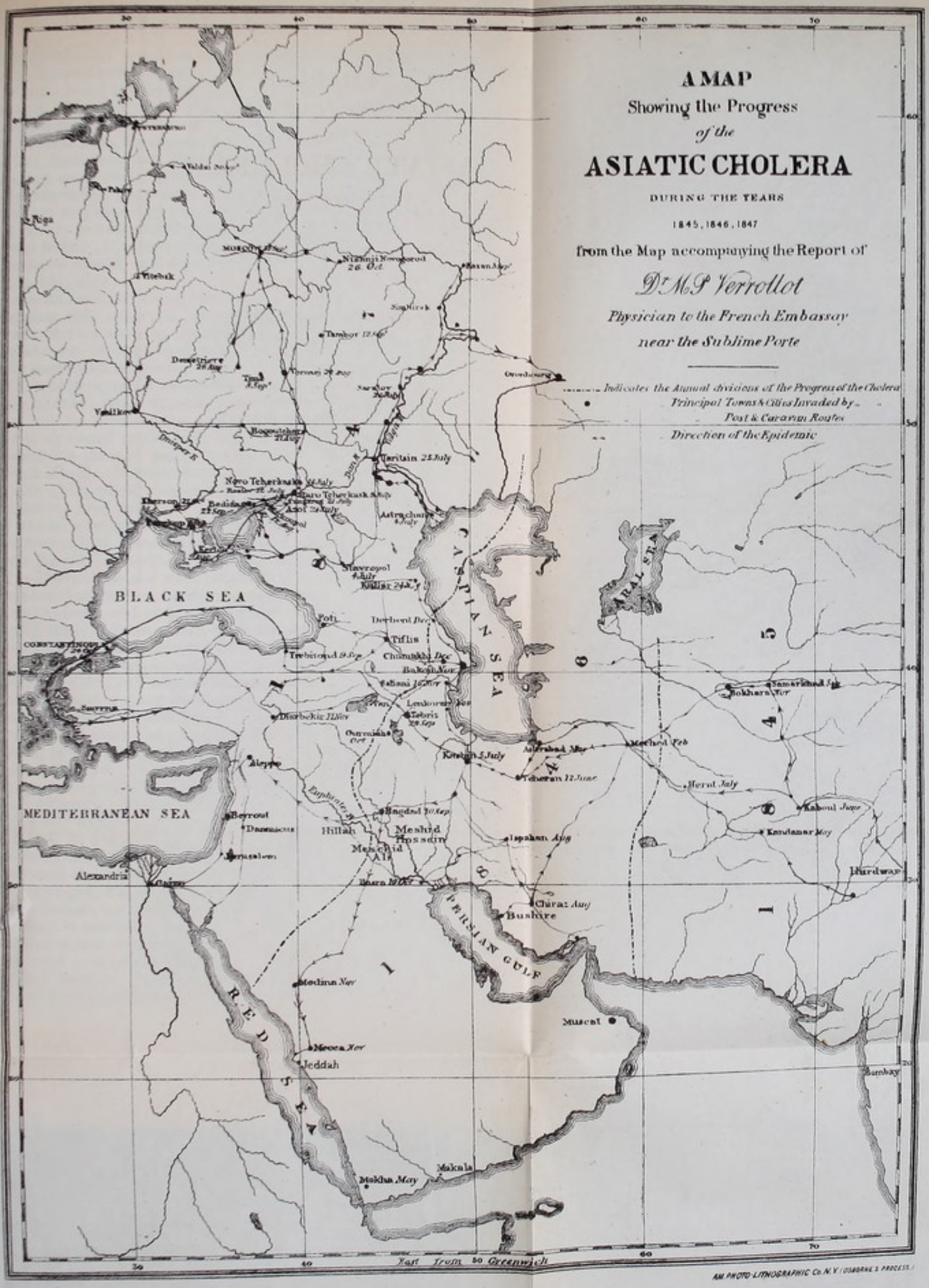
In Bombay, on the west coast, among the European troops, there were only thirty-five deaths in 1831, one hundred and thirteen in 1832, and two hundred and sixty-three in 1834. This epidemic reached Arabia and the basin of the Mediterranean in 1836 and 1837, and was added to the remains there of the outbreak of 1831 and 1832.

In 1835, cholera was at a very low ebb throughout Bengal; and 1836 was another year of rest. In 1837, it was very prevalent, and it began to be assumed that there might be a repetition of the same phenomena which had occurred in 1817, 1826, and 1833, viz, a vast outburst of the disease occurring throughout the whole of Bengal in the east, gradually advancing to the west and northwest as far as 78° east longitude; then halting for the cold season, but throwing forward its feelers into the provinces beyond the invaded area. (*Ibid.*, p. 89.)

In 1839, it had got over the borders of India into Cabul, toward Persia. The British troops entered Affghanistan in 1838, and found cholera raging near Cabul, but did not then seem to spread into Persia.

In 1840, the government of India dispatched a combined European and native army to China in the interests of the opium-trade. It carried cholera with it, which not only reached Pekin a second time in the north of China, but probably followed the route of the caravans as far as the Russian station of Kiachtha, from whence it is known that it afterward passed west through Siberia toward Russia. Cholera was also sent westward from the neighborhood of Canton in the south of China, and reached the north of Burmah in 1842; and is supposed to have continued through Thibet to Cabul. In 1841, 1842, and 1843, the entire seaboard and much of the interior of China was under the influence of cholera, from whence it was spreading westward towards Central Asia.

In 1841, it was again prevalent at Juggernaut; also in 1842. In 1843, it was fearfully epidemic at Agra, above Allahabad. In 1844, it had again shrunk back to its epidemic area in Lower Bengal, when it was suddenly reported as breaking out in Cabul. The governor-general's agent announced that it had advanced steadily from Bokhara, in



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Central Asia, southward to Cabul, and from there down to Peshawur, the northwest border town of India. The singular spectacle was now presented of India being invaded by cholera from Central Asia, to which it is supposed to have come from China. Thus, Dr. Arnott, inspector-general, reported that at the end of the hot season of 1844 Balk and Bokhara, in Central Asia, lost upward of 25,000 of their inhabitants; Samarcand and Koondooz, not far off, also suffered to a frightful extent. Traveling south and west, it reached Cabul in the middle of October. By November 8, it was lower down at Jellalabad, and, at the end of the month, at Peshawur. In May, 1845, it was at Lahore, where it carried off twenty-two thousand people, and continued its course down toward Central India. It also went down the river Indus to Tatta and Kurrachee, near its mouth, and escaped out towards the Persian Gulf. Macnamara, p. 107, says:

"From a careful study of these facts, we can arrive at no other conclusion than that this outbreak was a continuation of the epidemic which had been carried east by British troops to China in 1840; that it then traveled west through that populous country, reaching Burmah in 1842. If it continued its course north of the Himalaya Mountains at the usual rate of progress, it would have reached Bokhara in the very center of Asia in 1844; from whence it thrust down its branches into Affghanistan and Northern India, while other offshoots spread to the west, so that it appeared in the holy city of Meshed in the northeast of Persia toward the close of 1845, brought there by pilgrims coming from Cabul and Herat. It burst forth in Meshed again with renewed violence in June, 1846, quickly extending to Teheran near the foot of the Caspian Sea, killing nine thousand persons in four months. Before the end of 1846 it had advanced by land from Teheran to Tabreez, where from two hundred to four hundred persons died per day; and was again on its way into Russia. It had also been carried from Reshdt, by water, as far north as Derbent on the west coast of the Caspian Sea, having previously appeared at Salian, Leukoran, and Baku. In April, 1847, it re-appeared at Derbent, and was transmitted to Kizliar by a detachment of invalid Russian troops, and spread over the Steppes as far as the Volga, reaching Astrakan for the third time on July 30, 1847.

From Teheran and Tabreez it had also reached Tiflis, and spread from there due west, via Gori, to Poti on the Black Sea. From Teheran and Tabreez it was also carried along the regular caravan route through Erzeroum to Trebizonde on the Black Sea by September, 1847. Drasche, p. 43, places great stress upon the presence of a very large Russian army in the Caucasus, as spreading the disease. A great military road had been made from Moscow directly down to Tiflis, and cholera followed this new path, crossing the Caucasus Mountains to a height of six thousand feet, and affecting villages at the foot of the mountains on both sides along this only available pathway. This point had again been particularly watched, in order to see whether the disease was brought by people or blown by the winds. There was no doubt that it was conveyed to and carried over the mountains by soldiers. The great road ran from Tiflis north to Staropol, Taganrog, Vorenetz, and Toula to Moscow; and all these places became involved in succession.

From Astrakan it ascended the river Volga, as in 1830, affecting the same places, but again avoiding Sarepta, where a strict quarantine, with isolation and great cleanliness, was enforced by the Moravians. When it reached Saratov, Pensa, Simbirsk, and Kazan, high up on the Volga, it turned east to Orenburg, which it reached in October, 1847,

and towards which another column of the disease was advancing from China, through Southern Siberia, by way of Tobolsk.

From Kazan it also went west to Nijni Novgorod, threatening Moscow from the east as well as the south, and finally arrived at it on September 18, 1847.

In the mean time, cholera had been carried from Trebizond on the southeast coast of the Black Sea to Constantinople, from whence it was sent down to Smyrna, and back into Asia Minor toward Persia. It had also been carried from Taganrog and Azof westward to Odessa, and then advanced up the river Dnieper toward the holy city of Kiev, in the direction of Poland.

It broke out in Constantinople on October 24, 1847, and early in the next spring was carried both from there and Odessa to the mouth of the Danube and up into Austria, to which it was also moving overland from Odessa to Jassy towards Pesth. It attacked a Russian army heavily that had advanced into Moldavia, and also a Turkish force on the banks of the Danube. It re-appeared in tremendous force early in 1848, when the Kossuth war broke out, and large Hungarian, Russian, and Austrian armies, amounting to at least 800,000 men, marched into the field. It followed them in all their marches, involving Hungary and Austria very severely and extensively. It was also carried down into Italy by Austrian troops during the disturbances of 1848.

It had advanced upon Poland and the Baltic provinces both from St. Petersburg and Moscow; from the latter place by way of Smolensk and Minsk; while it had also been coming from the southeast, viz, from Odessa and Kiev to Lemberg and Lublin, just southeast of Warsaw.

It was at Riga, on the Baltic, in the winter of 1847, and proceeded from Poland into Silesia and Posen west toward Berlin, and also north along the Vistula to Königsberg and Dantzic, and up the Oder to Stettin. It was in Breslau early in 1848; in Berlin in July, 1848, where the epidemic lasted eighteen weeks, with two thousand four hundred cases. The greatest number of attacks as usual were among the boatmen, and in the streets near the river Spree. It was carried along the Elbe to Hamburg by September 1, 1848, and was in Bremen on September 7; and appeared in London in the beginning of October.

The celebrated Dr. Parkes was selected to inquire into the origin of the cases that occurred in London. The first fatal case was a seaman named Harnold, who arrived on the 18th of September in a steamer from Hamburg; the next was a man who slept in the same room with Harnold. The second engineer died from cholera on the passage, and Macnamara says, "It was known that the disease was prevalent at Hamburg some time before the vessel started."

It was brought to Edinburgh from Cronstadt, and to Hull and Sunderland from Hamburg.

The first instance reported in Ireland was in a man who arrived at Belfast on December 2 from Edinburgh, which was already infected. He was sent to the workhouse and died there. Cholera soon spread to the inmates and from thence to the town.

It did not reach Paris till March, 1849; but by the end of June there had been over thirty-three thousand cases.

During this epidemic the belief in the absolute and unconditional contagion of cholera had faded almost away; but its portability was very generally admitted. Its regeneration and communicability in some way, in connection with its diarrhœal commencement and spread, was beginning to gain believers. The celebrated Drs. Simpson and

Christison, of Edinburgh; Von Gietl, of Munich; Kirk, of Greenock, Scotland, and Professor William Wagner, of Berlin,* were particularly active in propagating this theory. Dr. White, of Gateshead, noticed wherever cholera occurred that premonitory symptoms would frequently arise among those engaged about the patient, or in their immediate neighborhood. He often witnessed a diarrhœa with dark-brown or blackish stools, gradually becoming less feculent for several days, until they assumed the appearance of dirty water; all attended with slight cramps, giddiness, and nausea. At the end of six days the patient would sometimes recover spontaneously, or with little aid from treatment, but might suddenly go into collapse; or some of his friends and relatives would contract cholera in a mysterious way. Dr. McIntyre, of Newcastle, thought the infective diarrhœa continued from one to seven days, (and in the mean time many persons might be involved in strange attacks.) Drs. Frost and Clark, of Newcastle, noticed a preceding diarrhœa of from one to twelve days' duration, in nearly five hundred cases; and in some few instances beyond this period, (during all which time the patients were doubtless sowing the disease broadcast.) Dr. Dawson, of Newcastle, noticed that diarrhœa generally preceded spasmodic cholera for some days. Dr. Brady, of Gateshead, found a foregoing diarrhœa lasting from one to six days; Dr. Knaggs, from one to ten days. Professor John Lizars, of Edinburgh, was particularly enthusiastic and earnest in adopting this view. Dr. Cunningham, of Tranent, Scotland, found the antecedent diarrhœa continued from a few hours to seven or eight days; Dr. Campbell, of Edinburgh, from one to ten days; Dr. Steele, for fourteen days, before serious symptoms came on; Dr. Dunbar, of Musselburgh, noticed previous diarrhœa for several days, or even weeks. Finally, Dr. John Fyfe, of Newcastle, distinctly put forth the propositions that the period of the incubation of the morbific germ of cholera seemed to vary from four hours to eight days; and that the effluvia from the excretions of an individual having diarrhœa-choleraica might communicate to another predisposed individual the most fully-developed form of the disease.†

Thus, instead of looking to a general distemperature of the air for the cause of cholera, a large class of astute and painstaking physicians began to watch for a local regeneration and multiplication of the disorder proceeding in some way from the bodies or evacuations of the sick. But the subject was fraught with many contradictions and difficulties; and Dr. Fyfe could not fully grasp the importance of his own observations, although Drs. Simpson, Wagner, and Von Gietl did. He was much perplexed when he found in sixty-seven cases that forty-four were single individuals, in families varying from three to eight persons, many of them sleeping in the same bed with the infected, and among whom there was unlimited intercourse; for it was impossible to separate the diseased from the healthy. He also noticed that when several members of a family suffered, they were often attacked simultaneously, or in such quick succession as to apparently preclude the possibility of their being affected by contagion or infection.

It struck attention that those who lived in houses secluded from the light, and colliers who were exposed to the influence of cholera evacuations down in the close mines, were very subject to attacks. The discharges seemed to receive a peculiar potency in these confined and badly-ventilated places; or the drinking-water in the mines may have

* The Extension of Cholera in Prussia, Berlin. 1832, p. 145.

† Practical Observations on Cholera Asphyxia, by James B. Kirk, M. D., of Greenock, 1832, p. 72.

become contamined. Then it began to be noticed that successive attacks were apt to recur in the same houses at long intervals, as if the dried excretæ were more dangerous than the fresh moist ones. It also became apparent that if all the causes of ordinary summer, or septic diarrhœa, had prevailed in a place for weeks or months before the advent of cholera, the epidemic was apt to prove very decided and virulent. Likewise it began to be suspected that the dried or moist evacuations might be conveyed into the systems of others in some way; either by inhalation, which seemed rarely to take place, or by swallowing particles of them in food or drink; the former being soiled by the unwashed hands of the patients or their attendants, and the latter fouled by the carelessness with which the discharges were thrown out of doors, near wells and pumps. At St. Petersburg, the people, almost wiser than some of their doctors, ascribed the appalling number of deaths that occurred in every part of the city to a poisoning of the water; not from their own filth and carelessness, but by some concealed enemies.

It was also noticed that the disease did not die out entirely in some places. At Moscow, in 1847, as winter approached, the number of attacks became so small that hopes were entertained that it was altogether subsiding. A very significant fact, however, was stated by Dr. Adair Crawford, viz, that occasional cases continued to occur throughout the winter, affording too much ground for apprehension that the malady was only suspended by the cold, dry state of the atmosphere, and that it would break out again in the spring,* redeveloped and swarming from the cases that had lingered over; just as plants and insects burst out in the early months of the year.

In England, most unfortunately, not one case in ten was reported to the boards of health, (*Ibid.*, p. 10,) so that a close watch over the rise and progress of the disease could not be kept. During the winter of 1848, in London, although the deaths never exceeded five per week, and sometimes sunk so low as *one*, the disease never entirely disappeared. There was no single week without at least one death; a most significant fact when taken in connection with what had been previously observed during the suspension of the epidemic in Moscow. In the month of May, 1849, the total number of deaths from cholera in London did not exceed thirteen; but by the last week in June there had been one hundred and twenty-four. From that period the pestilence went on rapidly, and uninterruptedly increasing. (*Ibid.*, p. 12.)

A succession of new cases, both of diarrhœa and cholera, soon developed out of those which had wintered over. Another very important fact was acknowledged, viz, that the epidemics never broke out suddenly, but that single cases of the disease occurred a considerable time before the actual presence of the pestilence was admitted. The first cases were either overlooked, concealed, or recorded under an erroneous or false name, on the ground that they were doubtful, and that at all events it was unwise to excite alarm. It was finally found that cases of cholera had been imported, not only into London, but into Hull, by vessels direct from Hamburg, and also into Edinburgh. In London, Hull, Edinburgh, Glasgow, Plymouth, Manchester, Dundee, Bristol, Liverpool, and every town in Great Britain in which the initial cases were actually detected, its invasion was similar. There was a slow uprising of the pest by means of isolated attacks, occurring at considerable distances as to place, and intervals as to time, which must be regarded as one of the laws of the disease. The popular notion that cholera is sudden in its invasion of a place or district proved to be as unfounded as the formerly

* Report of the General Board of Health of England for 1848 and 1849, p. 7.

prevalent opinion that it is always sudden in its attack of the individual person. Experience refuted both of these suppositions and established the very opposite, viz, that cholera is gradual and even slow in its development in every place and person, (*ibid.*, p. 17,) unless water-contamination quickly occurs. "These isolated cases began to be regarded as warnings not to be mistaken, and often as unequivocal and certain signs that an outbreak was impending. They generally demanded the immediate and energetic adoption of preventive measures," because from them other cases, both diarrhœal and choleraic, were sure to arise. The sudden outbreak in Paris, March, 1832, was now discredited. That city had been in communication with Germany, Holland, and England, in which the disease was prevailing for more than a year. Then, according to M. Gendrin, on the third day after the first case was publicly reported, he received sufferers from every district of Paris into the Hôtel Dieu. The patients' distant residences and opposite professions seemed to preclude the probability of their having derived their complaint from human contact alone. Within a week after the first alarm the mortality reached five hundred per diem, and the cases four times that number. In eighteen days no less than seven thousand persons had died. It may safely be assumed that all the first steps and initial cases in this tremendous outbreak were overlooked in Paris. The water-supply was notoriously bad before the great artesian wells were completed in 1841, and the privy-arrangements were worse, so that a quick outburst might be expected.

The theory of the long dormancy of germs now began to arise. As was anticipated and predicted, cholera in 1848 returned to the same dirty cities and towns, and in a few instances to the same streets, houses, and even filthy rooms, which it had ravaged in 1832. In very rare cases it re-appeared on the very spot in which it first broke out sixteen years before. The first case that occurred in Leith, in 1848, took place in the same house, and within a few feet of the very spot from whence the epidemic of 1832 commenced its course. On its re-appearance in Pollock-shaws, it snatched its first victim from the same room and the very same old bed in which it broke out in 1832. Its first appearance in Bermondsey was close to the same ditch near which the earliest fatal cases occurred in 1832. At Oxford, in 1849, as in 1832, the initial case occurred in the county jail. At Groningen, in Holland, the outbreak in 1832 attacked only two dwellings in the better part of the city, and the epidemic in that part of the town commenced in these two identical houses in the visitation of 1848, (p. 18.) Some of these cases, if true, are hard to explain; but they are so few compared to the millions of opposing facts that they are mere curiosities of experience. Others are easily brought about by drain-connections, underground water-courses, &c.

It was also found that the seats of cholera had often been the usual haunts of other epidemics, especially of typhus and typhoid fevers. In a notorious fever-haunt in Old Nichols street, London, in twenty-three houses fifty persons were attacked with cholera, of whom thirty-three died, besides developing nine cases approaching to cholera, and one hundred and ninety-seven cases of choleraic diarrhœa. Hence, two hundred and six cases were left alive to spread the disorder. New Nichols street closely adjoins it, and there twenty-one persons perished of cholera; thirty more were attacked, but recovered, besides two cases approaching to cholera, and one hundred and thirty-five cases of diarrhœa; leaving one hundred and sixty-seven persons to scatter abroad the complaint. In Swineburne's Yard, containing eleven houses and thirty-five inhabitants, and but one privy for the accommodation of all, fifteen died of cholera, (p. 21,) leaving twenty to infect others.

In England, during 1848 and 1849, cholera often attacked definite spots in the district which it invaded, confining its ravages to particular streets, the adjoining ones escaping; or even to one side of a street, scarcely a single case occurring on the opposite border; as if the cause had been dropped like tares, by an enemy in the night, or by wandering diarrhœal cases.

At Rotherhithe, in a street where numerous deaths occurred, the attacks were almost entirely confined to one side of the street, occupied by respectable private families, and appeared in only one house on the other side. At Bedford, two streets are named as having each suffered on one side severely, the other nearly escaping. At Bristol, and in several other towns, the same curious fact was observed, and it had also been noticed in St. Petersburg and some other foreign cities. In this respect cholera was supposed to bear a marked resemblance to typhus, yellow fever, and plague, (p. 23.) We may infer that the house-drains were continuous on the affected side of the street, but did not extend to the other; or that the water-supply was divided, and different pumps were used; or that old underground streams carried on the products of the disorder. In other cases "the pestilence passed right through and across several streets like a cannon-ball," following perhaps the course of foul drains and old water-courses. But the observers of these facts contented themselves with wondering over them, or attributing them to malaria.

Sometimes places were attacked in groups; that is, it seized on a certain number of courts, alleys, or streets, decimated their inhabitants, then ceased, and again broke out in a similar manner, often at the opposite extremity of the town. In this way six, eight, or even more deaths not uncommonly occurred in one house, (p. 23.) In all these instances it had doubtless been introduced by diarrhœal cases.

It had been noticed in several countries that it did not, as usual, advance by a strictly progressive and uninterrupted pathway, but that, at one time, it sprang at a single bound over a large tract of land or sea, while, at another season, it absolutely turned back on its steps in a retrograde direction, just as travelers take long journeys in varied and opposite directions. Its progress through a city was similar, there being in general no regular continuity in its course, for its advance was made up of a succession of local and often distant outbreaks, best explained by the moving to and fro of infected people, and clothes, and the contamination of particular water-sources, drains, or privies by ambulating and unsuspected diarrhœal cases; or by the arrival of the latter in overcrowded and filthy places. The mysterious, tremendous, and so-called sudden outbreak in Kurrachee on June 14, 1846, near the mouth of the Indus, was now satisfactorily explained. In that year three European regiments were stationed there. Cholera commenced in November, 1845, with several isolated cases in the camp, town, and vicinity during the cold, hot, and dry seasons. What was wanting for a great explosion was supplied about the beginning of June, 1846, when the southwest monsoon commenced and the air was not only laden with moisture, but the streams began to overflow. Then an appalling tropical storm occurred. The tents were blown down, the men were exposed, the streams were defiled, and four hundred and ten cases and two hundred and thirty-eight deaths took place, in the three regiments, between the 11th and 25th of June, and over eight hundred cases in a few days more.

The partisans of the many hypotheses, or rather notions, as to the

cause and progress of cholera were in constant collision with each other and with facts.

The first supposition, that it advanced like a great morbific wave, rolling slowly and steadily westward, enveloping place after place, and country after country, with a certain, steady progress, at nearly regular intervals, was fast losing ground, for it notoriously had advanced eastward, northward, and southward, as well as westward.

As it often seemed to come with ships, and the commerce of the world was then carried on by sailing-vessels, it was next supposed to be blown about by the winds; and that the same gales that brought the craft also wafted the disease to and fro in every direction. This view was strongly supported by the fact that the first reported fatal cases did not always happen among new arrivals, but often in old residents. But land-travelers frequently brought the pestilence in spite of and in the face and teeth of the winds. Then the ships were supposed to bring it in their holds, and well travelers in their soiled clothes, especially in those which had been boxed up.

Some believed that a great and almost universal epidemic distemperature of the surface of the earth and of the air, like that which seems to cause malarial diseases, cholera infantum, summer diarrhœa, and dysentery, prevailed in every country and caused a disorder like the Asiatic pestilence, powerfully aided by the heat of summer, filth, overcrowding, bad food, and worse water.

One adventurous person, at least, firmly believed that cholera was caused by great subterranean vapors, which burst forth like volcanoes, wherever they got access to the surface; this was only a little more absurd than the malarial and ground-water hypotheses.

It was very long before it was seen that there was a better theory of the outbreaks of Asiatic cholera: one founded on the arrival of the *infection* of the disease, either in the confined air or bilge-water of vessels, or in the persons and soiled clothing of those suffering either with the diarrhœal or fully developed form of the complaint, and the addition thereof to any or all the causes which produce similar disorders in the country to which it was brought, especially to filth, overcrowding, bad ventilation, miserable drainage, poor water, indigestible or soiled food, and bad habits of all kinds. Thus could be explained its march along the great traveled roads; its keeping time with the movements of travel and never outstepping them; its following the lines of commerce, and bringing the disorder in tarnished clothing, when it did not come visibly in sick persons; its attaching itself to armies, and following them over large districts of country, attacking certain towns and villages and avoiding others; also, to caravans of pilgrims and merchants; its never being found outside the lines of travel and commerce; and in no instance of supposed spontaneous origin bearing the test of close examination, but always and everywhere commencing after the arrival of persons or things from previously affected places. Still the direct sequence of these events could not always be made out without some trouble and much previous knowledge.

These differences of opinion arose mainly from the conflicting and contradictory behavior of the disorder, not always from want of earnestness or intelligence in the investigation. As the real causes could not invariably be detected and grasped, the accessory agents and exciting causes were carefully studied, and often seemed to outweigh in importance the actual infection of the disorder. These were supposed to localize and precipitate, if not generate it. In order to determine its precipitation upon and development in any given place, the localizing

conditions and predisposing causes of cholera received great attention in 1848. Among these, overcrowding was considered the principal; for health and strength cannot be maintained in a breathing-space of less than 700 or 800 cubic feet, and to live and sleep in a measure of less than 400 or 500 cubic feet is not compatible with safety to life during the prevalence of an epidemic on the spot. A certain large amount of animal matter of a highly putrescent nature always passes from the lungs, is deposited on the walls of living and sleeping rooms, and clings to articles of clothing, bedding, and other furniture, and causes fatal disease, while it is the source of the nauseous smell perceived on entering dirty and crowded dormitories, living-rooms, school-houses, &c. In June, 1849, a sudden and violent outbreak of cholera befell the workhouse of the town of Taunton. The ceilings were less than 9 feet high, and the ventilation extremely defective. In the girls' room sixty-seven children had only 68 cubic feet of air each. Within forty-eight hours from the first attack forty-two cases and nineteen deaths had taken place; and in one week sixty of the inmates had been swept away. The boys suffered less, because they could not be kept from breaking the windows; while the girls never shattered one. Doubtless the water-supply, privy-arrangements, and drains were in the same state of neglect. Still the chaplain stated his firm belief that it was to the better ventilation which the broken windows maintained, that the boys, in some measure, owed their lives, (p. 38.)

At Maidstone, fourteen hop-pickers slept in a room containing 700 cubic feet of air; each person having only 50 cubic feet, and one thousand more were accommodated in a similar way. Within four days there were ninety-seven cases of developed cholera, forty-seven deaths, and two hundred cases of diarrhœa. As the importation of the disease could not be traced without more trouble than can usually be taken in such outbreaks, we conclude it was probably introduced by an ambulating diarrhœal case. Among the pauper children at Tooting, each boy had 150 cubic feet of air, and each girl only 133. The windows in the girls' dormitory were small and few, being closed at night, while the doors were also shut, and the chimney-places boarded up. Out of one thousand inmates, three hundred were seized with cholera, and one hundred and eighty died, (p. 38.) The water, food, drains, privies, &c., were doubtless managed in the same nefarious manner. These children were dispersed in various directions, and carried the pestilence to several places. Finally Mr. Grainger stated as a general result of many examinations, that the force of the disease was in the ratio of the overcrowding, all other circumstances being equal; showing that cholera was reproduced in some way by the persons who conveyed it into these crowded places. If it were an air-borne disorder, free ventilation, instead of being the best, would be the most dangerous expedient; for it would be continually letting in the disease.

Foul-air diarrhœa received much attention in 1848. A manufactory of artificial manure at Spitalfields, in which bullocks' blood and night-soil were desiccated by the heat of the sun, and by the dry heat of a kiln, caused a most powerful stench. In December, 1848, sixty children out of four hundred, in the workhouse, only a few yards off, were suddenly seized with violent diarrhœa; the establishment was closed and the children regained their ordinary health. As cholera had not yet been introduced into the building, none was produced, and no one died. Five months after, the works were recommenced, and on the night following, forty-five of the boys, whose dormitories directly faced the factory, were again suddenly seized with severe bowel-complaint, while

the girls, whose sleeping-rooms were in a more distant part and faced in another direction, escaped. The factory was again closed, and there was no return of the diarrhœa, yet no cholera was produced. A similar factory in St. George, Southwark, produced the same effects, but no cholera. Diarrhœa and dysentery were traced by Dr. Baly in the Millbank penitentiary to noxious animal effluvia wafted across the Thames from bone-boiling establishments, but no cholera, showing that an additional cause is required to produce the latter disease.

At the prison in Brest, France, however, the water-closets communicated with a drain which opened into the harbor. At low water, the southwest winds blowing up the unguarded drain forced back the mephitic vapors into the wards. After cholera was introduced, one hundred and eighty-nine cases happened among the prisoners; while only three cases occurred in parts of the building exempt from this nuisance. Although it was assumed that malaria was driven up the drains, it was doubtless the noxious exhalations from cholera evacuations which were blown back, for the same had occurred in 1832, but not afterwards until 1848; while malaria should have operated choleraically at every conjunction of low tides with southwest winds. The mud in the bottom of a canal near Cardiff, Wales, seemed to originate cholera. The water had been drawn off, leaving a large surface of black, putrescent, and very offensive sediment. Nineteen houses near by were affected, and only four escaped. Of one hundred and seventeen persons living in them, forty-three had diarrhœa; and thirty-three developed cholera, with thirteen deaths. Cholera evacuations had doubtless got into the mud, if this was the only cause of the disease; for it was recollected that at Dantzic, in 1831, forty-one vessels from Riga were lying in the port, and that the men working in the mud-scows were among the first victims. Still other fatal cases had occurred previously, but were not reported till long afterward. Dantzic was then a base of supplies for the Russian armies operating against Poland, which accounted for the large number of ships of that nation which congregated there, notwithstanding the rigid land quarantine which was enforced against Russia and Poland.

At Hamburg, in those streets which immediately faced the spot where the numerous canals that have traversed the city, and become loaded with the excreta of one hundred and seventy-five thousand people, concentrate to pour their foul contents into the Elbe, the cholera raged violently. The accumulated poison from all the town cases was flooded down there. The same happened in Berlin, where the numerous branches of the river Spree unite loaded with all the filth from the drains and *débris* of the houses; so that the Spree is said to enter Berlin pure as a swan and to leave it as foul as a hog. But these causes never produce cholera until it is abroad in the land, or else it would recur every year. It is always introduced into these places in some way either manifest or occult.

Dr. Sutherland called attention to the fact that the higher stories or flats of the houses in the larger towns of Scotland were the most unhealthy. A great deal of epidemic and choleraic disease prevailed in the upper stories of the loftiest tenement-houses, where a comparatively pure atmosphere should surround the dwellings. Houses with eight or ten successive nests of families piled one above another, in as many stories, are by no means uncommon in Edinburgh and Glasgow. Many of the stairs and passages or entries which branch off from the different stories, or flats are dark and noisome; and from the absence of all water-supply, water-closets and domestic conveniences, they became the depositories of much filth of the most disgusting kind. The air

in them was most impure and extremely offensive. The absence of out-door privies and conveniences led to a most abominable condition of the closes or court-yards and alleys. There were no means provided by which the solid and fluid excreta of the households could be removed, except by the laborious process of carrying them down. There were neither closets, sinks, nor dust-shoots, so that all the offensive refuse had to be retained within the inhabited rooms and in immediate proximity to the scanty water-supply; whereby the water was rendered unwholesome by absorbing foul exhalations. The practical result was that the house refuse was thrown out of the windows into the alleys below, where the pumps were often situated. When a case of cholera was introduced into the top stories of such houses, the result may easily be imagined.

In a court-yard in Bristol forty-four deaths from cholera occurred. The drains were lower than the sewers; the privies became choked; there was not a drop of water on the premises fit to drink, that supplied by the only pump being wholly unsuitable from its privy-tainted nature.

A Bristol burying-ground, eighty feet long and fifty broad, was surrounded by houses in which forty-seven cases and thirty-three deaths from cholera occurred; among them a most distinguished surgeon, M. Key, whose valuable life fell a sacrifice. His back windows looked directly into the grave-yard. He had complained several times, shortly before his attack, of the offensive smell proceeding from the burial-ground, in which some cholera corpses had been interred. In one house there were eleven cases, and in several from five to six each, (p. 59.)

Dr. Sutherland reported that during the epidemic of 1848 and 1849 much additional evidence was elicited, proving the influence of *impure water* in predisposing to cholera. "There has scarcely been a town in the British Kingdom, in which cholera prevailed, that did not afford an instance of it; and where the water was contaminated by the contents of the sewers or privies, or by drainage of grave-yards, the seizures have been more sudden and violent, and the proportion of deaths to attacks greater even than from overcrowding." At Hackney a cess-pool was placed within one yard of the only well that supplied water to twelve houses with eighty-five inhabitants. Of these, twenty-two did not use the water and remained healthy; of the remaining sixty-three, forty-six were attacked with severe diarrhœa and cholera. In five houses in Windmill Square, with twenty-two people, supplied by a well into which refuse and the contents of cess-pools percolated, eleven, or one-half of the whole number, died of cholera, (p. 60.) In Manchester, a sudden and violent outburst of cholera supervened in Hope street. The people used water from a pump-well near which a sewer passed within nine inches. The sewer became choked and leaked into the well, and in thirty houses there were nineteen attacks of diarrhœa and twenty-six cases of cholera, with twenty-five deaths. The inhabitants of sixty houses in the immediate neighborhood, who used other water, had eleven cases of diarrhœa, but no cholera, and no death, (p. 62.) Thus is explained, perhaps, the apparently marvelous class of cases in which certain rows of houses or parts of streets are affected and others are not.

A cargo of plums from Hamburg was declared to have spread the disease in Hull. The fruit had not only been exposed to the epidemic influence, but was probably handled by persons sick with choleraic diarrhœa; or it had been stored in foul places. It now began to be suspected that dried fish, pork, bacon, vegetables, and fruits handled by dirty, contaminated people, were more active in causing cholera than fresh, ripe, clean fruits and vegetables, or nicely-kept salted or smoked meats.

Many deaths occurred in England in 1848 among nurses, medical men, and clergymen, zealously devoted to their arduous duties, and who lost their lives from continuing their labors too unremittingly, (p. 66.) But it was fatigue, not the infection of cholera, which was said to have destroyed them.

In the Metropolitan buildings, with five hundred inmates, well drained, clean, with an abundant and constant supply of pure water, with water-closets, and a dust-shaft for the immediate removal of refuse, no case of cholera occurred. In a row of houses a few yards off, without these advantages, the disease was very prevalent and mortal; diarrhœa was also severe and common, and twenty fatal cases of cholera showed themselves in a space 200 feet in length, (p. 70.)

On board the ship American Eagle, from Liverpool, with two hundred and fifty steerage-passengers, a large proportion were attacked with diarrhœa, and twenty-one with developed cholera, causing thirteen deaths. In the large, commodious, clean, and well-ventilated cabins there was not even a case of diarrhœa, (p. 70.)

Saint Bartholomew's Hospital expended $10,000 in improving its drainage and water-supply. It admitted four hundred and ninety-eight cases of cholera in detached wards. The average number of other patients was five hundred, with one hundred nurses. In this multitude not a single case of cholera occurred, (p. 73.)

The premonitory diarrhœa received great attention. Over the whole of Europe, and in every town and village in England, wherever cholera broke out, it was often accompanied by an enormous amount of diarrhœa. Dr. Sutherland says: "Diarrhœa often suddenly swept over the entire area of a city or district. At times in the depth of winter, when diarrhœa is usually extremely rare, it was preceded and accompanied by fatal and violent outbursts of cholera;" and asks, "If the diarrhœa be not a part of the epidemic, what is it?" (P. 91.) Yet in counting up the fatal cases, because each could not be directly connected with another calamitous death, but only with cases of cholerine or diarrhœa, the whole disease was often pronounced not infectious or communicable, nor even portable and reproductive. The complaint always commenced with bilious or feculent diarrhœa, and the rice-water discharges followed in a few days or hours. In forty-nine cases of bilious purging, without vomiting or cramps, there were no deaths. In forty-three cases of bilious vomiting and purging, with cramps, there were three deaths. In two hundred and eighty cases with watery stools, without vomiting or cramps, there were twelve deaths. In one hundred and eight cases with rice-water stools, and vomiting, there were forty-two deaths. In two hundred and eighty-one cases with rice-water discharges and cramps, there were one hundred and forty-nine deaths. Thus the unity of the disease and its progressive danger was considered proven. If we admit this, then, in the above seven hundred and sixty-one cases, there were only two hundred and six deaths. Yet Dr. Sutherland denied the infectiousness of the disease, because many fatal cases could not be traced directly to another death from the same cause. The lethal attacks were generally linked together by three or four non-fatal cases.

House-to-house visitation by medical officers was established throughout England, in order to discover and check incipient cases. The general and uniform results of this investigation were:

I. The discovery of a number of bodies of persons dead of cholera without having received any medical assistance whatever.

II. The finding of many cases of cholera, in various stages of development, proceeding with different degrees of rapidity to a fatal ter-

mination, not only without having been reported, as by law directed, and lacking medical assistance, but also without the slightest apprehension of any danger on the part either of the sufferers or their friends.

III. The detection of a large number of cases of premonitory diarrhœa, some of them exhibiting the first stage of cholera; others already with rice-water purging; some advanced to the further stage of serous discharges, without any care on the part of the patients, or alteration in diet, or thought of sickness, much less any apprehension of the actual commencement of a mortal ailment; all without any medicine having been taken or any physician consulted, (p. 102.)

It began to be suspected that the earliest diarrhœal stage, when occurring in those with foul breaths, and an offensive condition of their digestive organs, either from bad food or drink, was more infectious than the clear rice-water and serous discharges; as were also the colored and offensive evacuations in the later typhoid stage.

The epidemic was thought to have been stamped out in Dumfries in nine days by house-to-house visitation, the early detection and treatment of every diarrhœal case, and by thorough cleansing and disinfection. In Paisley twenty-three deaths were occurring daily, but in four days after this system was put in operation the deaths fell to three per day, and in a short time the pestilence ceased.

In Glasgow, thirteen thousand cases of so-called premonitory diarrhœa were brought under observation, of which nearly one thousand had advanced to the rice-water stage; yet the disorder was stamped out in a few days.

In Dundee, ten thousand seven hundred and ninety-two hypothetical premonitory cases were detected, of which seven hundred and five were thought to be on the verge of cholera.

In Manchester, three thousand eight hundred foreshadowing cases were brought to light by the visitors, of which two hundred and sixty-one were nearly developed cholera.

Hull had been lulled into a false security, and as its emigrant trade was large, the deplorable consequences of the neglect of the authorities in delaying the adoption of preventive measures soon became painfully evident. At first there was an enormous preponderance of assumed premonitory over the developed cases; when the regulations came in full operation, the melancholy spectacle was seen of the better classes, and industrious artisans who were in the receipt of good wages, perishing in large numbers, while the very poorest people, to whom only the visitors went, were placed by preventive measures in comparative security.

In London, in August, 1849, eleven months after the appearance of cholera, when one thousand two hundred deaths were occurring weekly, house-to-house visitation was finally adopted. Forty-three thousand cases of simple and possibly premonitory diarrhœa were detected, with seven hundred and eighty cases of developed cholera, and nine hundred and seventy-eight verging toward it; none of which had yet been reported.

The cases of premonitory diarrhœa were estimated to be to those of developed cholera nearly as sixty to one. Twenty-seven cholera-corpses were discovered on the first visitation, in which death had taken place without any medical attendance whatever; and fifty-two cases, which quickly passed into cholera.

In fifteen towns, one hundred and thirty thousand non-positive premonitory cases were discovered, of which six thousand were passing into developed cholera, (p. 118.)

In twelve places in England the cholera widows and orphans were

calculated to have added £121,576 to the poor-rates, most of which might have been saved by house-to-house visitation, at an expense of only a few thousand dollars.

This epidemic was destined to throw a flood of light, also of confusion, upon the conveyance of cholera. In the words of Professor Alonzo Clark, "England is separated from the continent by waters too broad to permit the winds to carry the poisonous principle from shore to shore. As a matter of fact, (it had passed by Denmark, which was protected by a most careful quarantine,) and was brought by trading-vessels from Riga and Hamburg to Sunderland, Hull, and Edinburgh, where the North Sea is of the greatest width." The points where it had as yet made its attack in every epidemic in England had been on the eastern coast, and in each instance the first cases occurred after the arrival of infected vessels. The same is true of its appearance in Belfast and Dublin, in Ireland. The ship Swanton left Havre on October 31, 1848, for New Orleans, with German emigrants. Havre was declared at that time free from cholera, and the Swanton sailed with a clean bill of health; but a portion of her passengers had left infected places in Germany, some of them from as far off as Pesth, in Hungary. The Swanton had been at sea twenty-seven days, when the first case occurred on the 26th of November. Previous to the outbreak, it was visited by a very hot southeast wind, such as the captain had rarely felt before, and the passengers overhauled their baggage for suitable clothing. "It would be waste of breath to express the idea that any animal poison can traverse the ocean for more than a thousand miles upon the wind." It seemed to Dr. Clark far more probable that the poison was lurking in the baggage of these passengers, and that the emergency which required the opening of unventilated trunks and packages let loose the virus brought from the infected regions of Germany. In this way the portability and communicability, the rapid regeneration, and immense multiplication of the disorder was easily and correctly explained. The assumption that some of the epidemic air of Prague was shut up in these trunks and infolded in the clothing, as believed in by Dr. Nott and others, is not as satisfactory as the more natural and plausible opinion that some of the clothing was absolutely soiled by cholera-discharges, especially as the latter is a fact supported by many other well-authenticated instances.

After the cholera-visitations of 1832, 1833, 1834, and 1835, America enjoyed a cholera immunity of nearly thirteen years, during which the various portions of the continent were subjected to the same malarial influences that it had been during all preceding years. Cholera did not appear in America, from the simple reasons that those nations with whom the inhabitants of North America had commercial intercourse had no cholera to transmit. These years of exemption from cholera are, however, not without their lesson to the nation. During the epidemic of 1832, 1833, and 1834, the advocates of the malarial origin of the disease widely disseminated their doctrines. The medical journals teem with cholera-literature of the period, but the vast majority are but labored attempts to prove that malaria, improper food, excessive overcrowding in badly-ventilated apartments during warm weather, can and do produce the disease known as Asiatic cholera.

During these years of cholera-peace, war was declared between the United States and Mexico. Large bodies of unacclimated troops were rapidly hurried into the malarial regions of Louisiana, Texas, and Mexico. These troops advanced upon the city of Mexico, over the lines that in 1832 and 1833 had been traversed by cholera. The city of Mexico

was captured, and undoubtedly instances of the grossest individual imprudence were committed, but yet no cases of epidemic cholera occurred. The troops returning from Mexico were attacked with yellow fever but not with cholera, for the simple reason that to propagate cholera you must have cholera. Malaria and any attending circumstances will not suffice alone; but bring the specific poison of cholera into such a region, then disease and death run riot. How different was the fate of the armies in the Crimea Dr. Peters has shown.

In 1848, however, cholera had advanced to the western shores of Europe, and on the 2d day of December of that year the disease arrived at the port of New York.

The history of this importation, by Professor Alonzo Clark, in his exhaustive series of lectures delivered in 1866, could not be improved. "Two ships left Havre, one on the 31st of October, the other on the 9th of November, 1848. The latter ship, the New York, was bound for the city of New York. The former, the Swanton, was bound for New Orleans. The passengers of these two ships were of the same character, mostly German emigrants; they had been taken up in both instances at Havre, which port was at that time said to be free from cholera. They had come to Havre for the purpose of finding a ship for this country. One report states that a portion of them had left infected places in Germany. The ships came out with a clean bill of health. The New York had been at sea sixteen days when cholera appeared, that is, on the 25th of November. The Swanton had been at sea twenty-seven days when the first case occurred, it being on the 26th of November. They were one thousand miles apart. They were both off the coast of the United States, one in latitude 25° 47′, and the other in the parallel of 42°.

"The outbreak on the New York is by the captain of the vessel ascribed to the following fact: A very cold, chilly wind came up on the 24th, and the passengers found themselves in want of warm garments; in his own phrase, 'there was a general overhauling of baggage for warm clothing.' Then the next day became exceedingly hot, and on that day the first case of cholera occurred. It has been found, that on board the ship New York there was an emigrant who had clothing that had belonged to an individual who had died in Germany of cholera. During the day of intense cold, some articles of this clothing were taken from the chests and were worn by several of the passengers, and these passengers were the first taken on the ship. On board the Swanton this cold day was not experienced; but, says the captain, "previous to the sickness, for twenty-four hours, we were visited by a very hot southeast wind; such a one as I had never felt before; indeed, it was more like artificially-heated air than anything else." Now, the question comes, where was the poison that produced this disease? Was there a layer of cholera air stretching up and down the ocean, into which the vessels sailed about the same time? Such a supposition is unsupported by any other fact in the history of cholera, and is therefore in the highest degree impossible. The wind could have no agency in the transporting of poison; for, during the interval of twenty-four hours which elapsed between the occurrence of the first case on board the New York and the commencement of the sickness on board the Swanton, the wind was blowing from the southeast, or nearly in an opposite direction. Then it would be waste of breath to express the idea that any animal poison could traverse a thousand miles upon wind.

"It seems to me far more probable that the poison was lurking in the baggage of these passengers, and that the emergencies which required

the opening of unventilated trunks and packages let loose in each of these ships that poison brought from the infected regions of Germany. There is, however, another explanation which is urged by those who have paid much attention to the researches of Pettenkofer and the Bavarian commission. It is found in the period of incubation. This period, it is asserted, is long enough to admit the supposition that a person might receive the infection in Germany, then travel to Havre, embark, and be at sea sixteen days, and after that have disease declare itself in him. This would imply an incubation of above eighteen days, and it is claimed that it may be twenty-one or twenty-five. But even this maximum requires a little extension to meet the Swanton. Twenty-seven days at sea and two from Germany would make an incubation of twenty-nine days, a period longer than has yet been claimed.

"The two ships go on their voyage. One arrives in the harbor of New York in the 1st of December, six days after the outbreak, having lost seven of her passengers. The other goes into the Mississippi River and up to New Orleans, having lost several of her passengers, reaching the city December 11."

From this point the history of the two vessels should be separated.

The New York upon her arrival at quarantine sent eleven cholera patients to the quarantine hospital. The next day the number was increased to twenty, with eight deaths, and a local epidemic was instituted. Dr. Clark states that the first person not attached to the ship who was attacked was a man who went on board the New York, and within twenty-four hours was seized with cholera and died the next day.

The passengers from the New York were brought to the public dock store-houses, and when it was found that the disease was spreading, all convalescents at the quarantine hospital were discharged. One of the latter was taken with cholera at his lodgings on Wellington street in the city. This man, it is stated, was sent back to quarantine. His room-mate was also attacked with the same disease, and both died. How long the passengers of the New York were detained at quarantine is not stated. The New York carried a large number of these emigrants; the exact number is not recorded. These emigrants were scattered over the city of New York and over the United States, carrying with them in all directions the infection of cholera.

Up to the 28th of December, about one hundred cases had occurred at the quarantine, fifty of which were fatal. Other than the two cases noted, the disease did not spread in the city. Dr. Clark states that the disease seemed to have been checked by the severe cold on the 1st of January, when it ceased.

The Swanton reached the city of New Orleans on the 11th day of December, having lost, according to Dr. Marsden, thirteen passengers from cholera. She had been detained by no quarantine, but went at once to her wharf and proceeded to discharge her passengers and cargo. On the day of her arrival, one cholera case was sent to the charity hospital. The other passengers, of whom there was a large number, were lodged in the city. Two days after the arrival of the Swanton, the first case in the city was announced; this was also an emigrant from the Swanton, and the next day eight cases of the disease were admitted to the hospital from houses on the levee. During the month of December, four hundred cholera deaths were reported at New Orleans; in January, six hundred were reported, and the number increased each month until June, when the epidemic culminated in two thousand five hundred and odd deaths.

This is the generally-received report of the introduction of the cholera into the United States in 1848; but a doubt has always been thrown upon the origin of the disease by the opponents of its infectiousness and portability, in the statement of Dr. Fenner, that he had met with cases of the disease several days before the Swanton reached New Orleans.

Dr. Fenner, however, states the following facts in the Southern Medical Reports, volume 1:

I. That on December 6 the ship Gutenberg, from Hamburg, with two hundred and fifty emigrants, arrived, after a passage of fifty-five days, upon which six or seven cholera deaths had occurred. One of the early cases at New Orleans was a man from this vessel.

II. That on December 8 the bark Callao, from Bremen, with one hundred and fifty-two German emigrants arrived, after a passage of forty-eight days, during which she lost eighteen emigrants from cholera. The Callao was kept at Slaughter-house Point, opposite to New Orleans, until January 4, when she was brought over to the city and unloaded.

It will thus be seen that prior to the arrival of the Swanton two vessels, the Gutenberg, from Hamburg, and the Callao, from Bremen, had arrived at New Orleans with an aggregate of four hundred and two emigrants, who had lost twenty-five of their comrades on the voyage.

Prior to the departure of these vessels Hamburg and Bremen were infected with cholera, and the majority of the emigrants came from localities previously involved in the epidemic, and yet almost universally the outbreak at New Orleans in December, 1848, has been ascribed to the arrival of the Swanton, and it has been denied that importation had anything to do with the outbreak, from the fact that the first case in the city occurred the first or second day after her arrival.

December 20, the steamboat Convoy, from New Orleans, arrived at Memphis, Tenn., after a trip of four days, with two or three cases of cholera among the deck-passengers and crew. For several days other boats going up the river had reported deaths from cholera before they reached Memphis, but none had landed at the city.

Previous to December 22, Dr. Shanks states that there had been *no tendency to bowel affections;* but on that day a boy who frequented the wharf where boats landed took the disease and died. No other cases occurred until the 26th, when a man and his wife living on a flat-boat took the disease. Both died.

For the first twenty days the disease was confined to the landing-place and to persons communicating with infected vessels; after that it began to spread to other portions of the city.

On the 27th of December, the steamer Caroline Watkins, from New Orleans, arrived at Nashville, Tenn., with one dead body from cholera on board. During the voyage, which occupied a period of about ten days, she had lost eight others from the same disease. Dr. A. H. Buchanan reports "that these deaths occurred among deck-passengers and firemen, most of whom were foreigners, and, as represented, very imprudent under treatment. One or two of the deaths were among colored persons."

No cases of the disease, however, occurred at Nashville until the 20th of January, twenty-five days after the arrival of the Watkins, and several days after the arrival of other boats, on board of which there were cholera, the first case occurred. The next day, a second case occurred in the same house; the third case occurred in the same house; all three cases died. The house at which these cases occurred was in a most

miserable condition, and was nearly surrounded with water. From these cases the epidemic originated.

December 22, the steamboat Peytona arrived at Louisville, Ky., from New Orleans, with a list of four hundred passengers, having had upon the voyage fifty deaths on board from cholera. A number of these passengers died subsequently of cholera at the marine hospital.

December 24, the steamboat Savannah arrived at Louisville, Ky., from New Orleans, with three cases of cholera on board, having lost four of her passengers from the same disease upon the trip. From these arrivals a mild epidemic affected the city.

On the 25th of December, a case of cholera was admitted to the Cincinnati hospital from a steamboat just arrived from New Orleans. His case was soon followed by others from the same source, and in a few days cases occurred among the other inmates of the hospital. Within a short time cases of the disease occurred in the city among persons having connection with the shipping.

On the 18th of May a man from Cincinnati, Ohio, put up at the Farmers and Mechanics' Hotel at Dayton, Ohio. That night he died of cholera, and the disease spread in the hotel. A gentleman from an adjoining town, while the body of the first case was in the house, ate his dinner at the hotel; he died at his home from cholera within twenty-four hours, and from his case the disease spread.

By steamboats the disease was carried to Wheeling, W. Va., and Pittsburgh, Pa., and it is recorded that deaths occurred among emigrants traveling on foot upon the national road beyond Wheeling.

December 27, boats arrived at Saint Louis with cholera on board. On the 28th the Amaranth, with thirty cases on board. The editor of the Saint Louis Medical Journal states: "Of the cases that occurred at Saint Louis, at least one-half were persons who contracted the disease in New Orleans, or on their way from that city, *and were landed here in an almost dying condition.* In one of the earliest instances, five deaths occurred in one family."

In face of such facts, the late Dr. Condie, in his report to the American Medical Association, after admitting the introduction of the disease to various cities by infected steamboats, with a strange inconsistency notes of Saint Louis, "The disease is said to have been of local origin."

The cholera at the quarantine of New York Harbor, which had abated on the 1st of January, 1849, did not re-appear until in the first week of April.

Prior to its re-appearance, several ships having cholera on board had come into the harbor, and their sick had been transferred to the hospital.

On the 11th of May, the first case of the season occurred in New York City at a lodging-house on Orange street. Six other cases occurred in the same house, and the disease spread rapidly, and continued until the last of September, with a total of five thousand and seventeen deaths.

According to Dr. Sayre, the first cases were emigrants who had escaped from quarantine.

Dr. Vaché remarks: "The nearest vicinity of the pestilence was the quarantine, between which and the city there was constant intercourse by the residents of each place; and, in most instances, the passengers from sickly vessels were permitted to disembark at the wharves with their unventilated baggage. If the infection was not ascribable to these causes, it could not be traced to any other."

At Brooklyn, the disease occurred May 26, and at Williamsburgh on the 29th, at Jamaica June 4, and about the same date at Newark, N. J.

Dr. Auerbach states: "The first cholera case at Rockaway, L. I., occurred August 30, in the person of the captain of a small vessel that plied between that town and New York City. He brought to Rockaway the household-furniture belonging to a man *whose wife had died* shortly before in New York, and the body was brought to the same place for interment. Other cases then followed.

May 22, eight cases occurred at Philadelphia. Three of these persons were upon a very dirty canal-boat just arrived. Another case was in the person of an Irish emigrant who had been in the city but a few days. The same day, May 22, three cases of cholera occurred at Baltimore, Md.

It is shown in the report of Dr. James Wynne of the cholera outbreak at the Baltimore almshouse in 1849, of which so much has been argued by those favoring the malaria theory of the origin of cholera, that the first death at that institution was a man who took the disease in the city; the second case was a man who slept in the attic, but who had been exposed to *malaria, i. e., a foul overflowed privy and drainage from wash-house and dead-house.*

Professor N. R. Smith stated that a poor English traveler, Alexander West, called at his office for medical aid. He seemed extremely ill, and threw himself or fell upon a lounge in the office and vomited rice-water-like stuff. Dr. Smith believed he was in the collapse of cholera and had him removed to the almshouse, where he died two days afterward, on July 7. The whole house and grounds, with nearly seven hundred inmates, seemed in splendid condition. On July 7 an old inmate was attacked by cholera and died. On the 11th a woman on the female side of the house followed. On the 17th there was one case on the male and another on the female side, which were separated by a central building 200 feet long. On the 13th another man was attacked and died, and on the 14th the outbreak commenced with ten cases in the men's wards and three in the women's. After July 18 the cholera-patients were assigned to the upper story of the black people's hospital. On the 19th Dr. Buckler, finding no local cause within the walls of the inclosure, for the first time surveyed the premises outside the *north* wall. The whole building was 800 feet long, and looked to the south. The east wing was occupied by male paupers and the west by the female, while the main building on the middle was the dwelling of the officers and attendants. An inclosure of four and a half acres, surrounded by a wall, adjoined the building on its north side. Within this inclosure, on the female side, there was a building running north and south for 70 feet, and four stories high. The basement and second story were occupied by lunatics, the third story by foundlings and nurses, and the fourth by aged females. Each of these stories had windows looking out to the east and west. In the lower story a door opened to the north, but all the other stories had neither door nor window to the north. In close proximity to this north door was the cess-pool for this building. Along the northern wall, starting from this point, was the wash-house, where a large amount of dirty linen was washed; next, the dead-house and the men's privy. All this is called pure and simple malaria by Drs. Wynne, Buckler, and Bell. Also, a large pig-pen and a cess-pool adjoining the east wall, in the rear of the men's wing, where the black people's hospital was placed; also a ravine in the rear of the north wall, which was the outlet for all the waste water and filth of the whole establishment. Dr. Buckler discovered the source of the pure and simple malaria, which caused cholera, in the cess-pool connected with the black people's hospital, which

overflowed and was in a very filthy condition. Near it the drainage from the extensive pig-sty also covered a large surface of rank grass and rotten weeds, and then found its way to a filthy pool, the contents of which seemed to be in a state of actual fermentation. Yet all was regarded as pure and simple malaria. The next object which met Dr. Buckler's attention was a large surface covered with the overflowing contents of the men's privy, and a short distance from this a similar one of greater depth, containing the washings of the dead-house, and still further on, a much larger place, 30 feet wide and 3 feet deep, leading from the wash-house, and communicating with a similar one charged with the contents of the cess-pool attached to the ward for insane females. In short, the whole space included between the ravine and the wall upon its north side, was one putrid and pestilential mass, capable of generating, under the ardent rays of a midsummer sun, the most poisonous and deadly exhalations. It doubtless had caused many an obscure case of typhoid fever, which was mistaken for malarious bilious remittent, and many cases of diarrhœa and dysentery; but it had never caused cholera until a case or cases were introduced into the almshouse in June or July, 1849. Then, of 632 inmates, 53 were discharged; 62 eloped; 99 died of cholera; 13 died of other diseases, and 405 were left.

The weather was remarkably fine and seasonable, but a gentle breeze from the north swept over the whole mass of filth, which was now also tainted with cholera-discharges, and carrying the poisonous, so-called malarious exhalations up the drains, and through the doors and windows over the house. In the lower story, in which a door opened upon the filth, there were seventeen lunatics, exposed to the exhalations every time this door was opened, and all were attacked and all died of cholera. On the three upper stories there was neither door nor window looking to the north, and all the inmates escaped. The female wing was protected from the north by three rows of trees, and, although the women outnumbered the men, the number of attacks was considerably less, which was also supposed to prove the pure vegeto-malarial, not the animal or septic malarial origin of the most of the cases.

The first case of cholera was that of an old man, who slept in the attic, but spent most of his day in the yard; the manager, who slept in the third story, looking to the north, suffered; but his family, whose rooms were not thus exposed, escaped. Of eight medical students living in the second story of the main building, four living in the north rooms were attacked, and the rest, sleeping in south rooms, escaped. Those paupers who slept in places exposed then to the north wind were generally seized. After the removal of the cholera-patients to the ward *above* the black hospital, where the influence of exhalations from pig-sties and privies, which is termed simple miasm, was entirely unobstructed, the severity of the attacks increased, and the chances of cure diminished.

On July 23 the foul pools were drained into the ravine, into which a mill-stream was turned; then the bottoms were covered with lime, and over that a deep layer of clean earth was placed. The men who drained the pools were attacked with choleraic diarrhœa, but recovered, and did not spread the disease in the town, proving, doubtless, that the disease was caused by the patients in the building in some way, and that the foul outdoor exhalations only intensified real attacks and caused diarrhœal attacks only.

It is claimed that those who fled, or were removed from the almshouse, did not carry the disease to others, although attacked them-

selves. But as none of them died outside of the almshouse, perhaps they only had septic or fœcal diarrhœa, not real cholera.

As the foulness outside of the house was regarded as sufficient to account for all the disease inside of it, no inquiry was made as to how the disease was handed from one case to another, and persons who can mistake the exhalations from privies, dead and wash houses, for pure vegetable malaria might not carry on a very rigid investigation.

May 30 the disease was reported at Norfolk, Va., and the same day at Richmond, Va.

June 4 three cases are reported at Boston, two of them on the bark Argyle, just arrived from Scotland, and the disease spread to other New England towns and villages. Providence, Woonsocket, Pawtucket, and other towns of Rhode Island suffered from cholera.

From New York City the disease was carried to the towns of the North River and to Albany and Troy, and along the line of the Erie Canal.

At Albany the first case occurred in the person of a stranger at the Northern Hotel, but its subject was the second death, the first being in a man who lived within thirty feet of the person first sick with cholera symptoms.

Buffalo, N. Y., was, however, infected from another direction. The first case of cholera occurred May 30 in the person of a traveler on steamboat from Chicago. This case was taken to a hotel in the city.

June 1 the second case occurred, in a man from Cincinnati who arrived by steamboat from Sandusky.

June 4 the third case occurred, in a female, having no connection with either of the preceding cases. The same day another steamboat brought an infected female from Chicago. Eight hundred and fifty-eight deaths occurred from May 30 to September 7.

The first case of the disease occurred in Canada this year at Kingston, in the person of an individual from New York City, who arrived April 28 or 29 via the New York Central Railroad.

The disease, however, did not reach Montreal until the 15th of June; Quebec until the 4th of July; Hamilton until the 18th of July, and Lachine on the 28th of the same month.

Dr. Marsden states that the first case at Quebec occurred in the person of a man named McGill, "whose business was chiefly among strangers, lumbermen, and travelers. He died after a few hours' illness, during which he was visited by one of the water-police, a friend of his, who went home, took the disease, and died the next day."

To Dr. Marsden we are further indebted for an account of the cholera occurrences at Quebec in 1849. July 6, a vocalist of some celebrity arrived at Quebec from New York City. At the time of his arrival he was suffering from a diarrhœa, which, however, did not prevent his joining a fishing-excursion on the 8th, from which, however, he was obliged to return, and at 1 o'clock a. m. of the 9th he was dead from cholera.

"The proprietor of the hotel at which this gentleman died was advised to destroy all the clothing both of the patient and of the bed upon which he had died. The clothing was given to a hotel-waiter named Roberts to destroy, but he, from motives of cupidity, carried them to the jail, where his son was a turnkey, and hung them up to dry in a large room, which was in the use of the officers of the jail and their families. The next day Roberts had a diarrhœa, but thinking nothing of it, he visited a friend; on his return to the jail he was taken with cholera, and died that night. His death was followed by the death of the man whom he had visited, the wife of the man, and many cases at the jail. The mattress upon which the first death had occurred was not destroyed, but was ulti-

mately given to a man to clean, but who died of cholera in the attempt During the same epidemic a man was employed by the board of health at Quebec to destroy some cholera-infected clothing. Among the articles he found a coat too good to destroy; he put it on, went home in it, and died soon after of cholera.

"A lady died during this epidemic at Quebec from cholera; the bed upon which she died, with its clothing, and the clothing that had been upon her person, were thrown into an unoccupied lot, and a number of children belonging to poor persons were seen playing upon and with the articles, when they were driven away; within thirty hours four of these children were dead of cholera."

As if to make the warning more impressive, these were not solitary instances, but during the same epidemic each of those which have been narrated were duplicated.

We return to the epidemic in the South and West. It has been shown that cholera was epidemic in New Orleans in December, 1848, and in January, February, and the succeeding months of 1849.

Early in the epidemic the disease spread to the plantations of Louisiana, in the majority of which the conveyance of the infection could be distinctly traced. A plantation in the Bayou Tèche became infected in January, and the disease spread to the adjoining localities. Saint Mary's and La Fourche suffered severely.

In January, 1849, the disease was carried to Mobile, and until June it lasted with but one hundred and twenty-nine deaths. Mobile undoubtedly enjoys her immunity from cholera from the pure drinking-water with which the city is supplied.

On the 1st o December, the Eighth United States Infantry arrived at New Orleans, on its way to Texas. The regiment was placed in the barracks, four miles below the city, and there remained until the 12th, when they embarked upon the steamers Telegraph and New Orleans. On the 18th they reached Port Lavacca, but the men were not landed until the 20th. On the night of the 21st a case of cholera occurred in camp, when one battalion, under Major Gates, marched twelve miles into the country. The other battalion, under Major Morrison, remained in Lavaca; during the night a cold storm came on, and by daylight there were four deaths from cholera among the troops in town, and many new cases. The same night the disease broke out in Major Gates's camp, and during the epidemic one hundred and twenty-eight men of the regiment died of the disease. Many women and children belonging to the regiment died of the disease.

These were not unacclimated troops. The regiment had served during the Mexican war; had reached Saint Louis on its way to New Mexico, when, from unexpected orders, its route was changed, and it again descended the Mississippi. For these facts we are indebted to General T. G. Pitcher, United States Army, then the regimental adjutant.

The above is the only recorded account of the importation of the disease into the State of Texas. Dr. Fenner states that the epidemic prevailed to a considerable extent at Houston, while Galveston escaped. The Eighth Infantry undoubtedly were efficient agents in the introduction of the disease into the State.

In a report of Surgeon J. J. B. Wright, United States Army, in Fenner's, Medical Reports, it is stated that "The disease made its entry at San Antonio about the middle of April, approaching from an easterly direction, by the Lavacca road. Its advent was heralded by its victims among the California emigrants on their way to join the Government train, which was expected to leave for El Paso del Norte." Dr.

Wright's report is one of the most valuable accounts of the epidemic that has been published.

We append a letter from this gentleman, now the senior surgeon of the Army.

"SAN ANTONIO, *May* 7, 1849.

"DOCTOR: I have to announce what will be most painful intelligence, the death of General Worth. He died to-day of spasmodic cholera.

"The general's health has been deranged for several weeks, though not to an extent which precluded attention to his official duties. He arrived last Tuesday from New Orleans, whither he had gone to meet his family. The disease of which he died developed itself about six o'clock yesterday evening, and hastened to a fatal termination, *uninfluenced by medication.*

"I have had a very considerable experience in the treatment of the epidemic, and feel deep humiliation in saying that no plan of treatment, much less any individual article of medicine, has commended itself to my confidence, or even to my preference. When fully formed, and sometimes even in its initiative stage, it bids defiance to the *armamentarium* of physic.

"This town suffered in an extraordinary degree from the cholera which prevailed in 1833. Its ravages are fresh in the recollection of the Mexican portion of the population, a great majority of whom fled from the place at its approach. A large proportion of those whose courage permitted them to remain, or whose inability prevented their leaving, have become victims of the epidemic.

"The disease has been prevailing in this place and vicinity since the middle of April, but no case had occurred in the military encampments in the neighborhood of San Antonio until the 4th instant, when it made its appearance in Camp Salado, the station of the Third Infantry. Some fifteen cases have occurred, of which six have been fatal; the remainder are pending.

"I am, sir, very respectfully, your obedient servant,

"J. J. B. WRIGHT,
"*Surgeon United States Army.*

"TH. LAWSON, M. D.,
"*Bvt. Brigadier-General and Surgeon-General of the Army.*

"P. S. *May* 11, *evening.*—The express left me unexpectedly on the afternoon of the 7th, and I failed to procure admission for this letter. The disease continues to prevail, and many of the cases are more rapidly fatal than those preceding them. The Third Infantry has lost twenty men, while the epidemic is still progressive in the camp. The Eighth Infantry and the squadron of dragoons, three miles from town, have excellent health up to this date."

A report of the late Surgeon N. S. Jarvis, United States Army, published also in Fenner's Medical Reports for 1849, demonstrates that cholera was diffused through Texas by the movements of troops and emigrants, and into Mexico by the arrival of refugees from Texas.

From New Orleans the cholera was carried by emigrants to Chagres and to Panama, and the steam-transportation on the Pacific thus became infected.

As the epidemic became pronounced in New Orleans, the steamboats leaving that city were crowded with emigrants and passengers, of all classes, flying from the disease. Every steamboat upon the river became a moving pest-house, and during the early months of 1849 the disease had been universally diffused over the valley of the Mississippi. Al-

though the city of Saint Louis was considered free from cholera during February, 1849, still, as the spring advanced, constant arrivals took place. As an instance of the mortality upon the river steamboats, it is recorded that before reaching Cairo, on March 22, seven cholera-deaths occurred upon the *Bride* and three on the *Uncle Sam*. On the 23d, eight cases had occurred on the *Belle Key;* the *General Washington*, one death and several cases; the *Seraph*, eight cases and two deaths; the *Gladiator*, eight cases and three deaths. On the 24th, the *Tennessee*, three cases; and on the *Yorktown*, ten deaths.

At Saint Louis, early in April, the disease was again epidemic, and during May and June the mortality was excessive. Seventeen physicians died.

On the 21st of April, the steamer Sacramento arrived at St. Joseph, Missouri, with a large number of California emigrants, who were then rendezvousing at that city preparatory to the march across the plains. On the Sacramento, before her arrival, one cholera-death had occurred. Other infected steamboats followed; on one of which, the Mary, over fifty deaths had occurred. By these emigrants cholera was carried westward over the Platte route, and being taken up by succeeding emigrants, the disease reached Sacramento in October, 1850, at almost the same time that it was brought into San Francisco by the steamer Carolina from Panama.

On the 7th of September it was reported at Saint Louis; but cholera was raging among the northwestern Indians to an alarming extent. It had disappeared from among the southern tribes and those on the South Arkansas River. The Indians along the Missouri River continued greatly incensed against the whites for introducing the epidemic among them, and committed daily murders upon the unoffending inhabitants out of revenge.

From Saint Louis this disease was carried to the headwaters of the Mississippi and Missouri Rivers. At Galena, the first cases occurred about the middle of April, in a family from Saint Louis, and four cases were fatal.

On the 20th of April the Illinois and Michigan Canal was opened, so that boats could pass through, and the line of water-communication was complete between Saint Louis and Chicago. On the 29th of April, the emigrant canal-boat John Drew arrived at Chicago from Saint Louis with a number of passengers, who were emigrants, and direct from New Orleans. A few hours after her arrival her captain died of cholera, and soon after some of the passengers. The epidemic prevailed until August 28, with three hundred and fourteen deaths.

About the 5th of July, thirteen emigrants from Sweden, direct from New York, via Buffalo, arrived at Chicago, and went to the house of a man named Arns. On their arrival they unpacked their chests of clothing. On the 7th one died of cholera, when the rest of the emigrants were turned out of the house. Four cases occurred in Arns's family, with two deaths; and from this house the disease spread.

Dr. Evans relates that at Summit, twelve miles southwest of Chicago, on the 17th of June, a man from Chicago arrived, to remain a few days upon business, but was taken with cholera at the house of a Mr. Heacock, and died the next day. The next day Mrs. Heacock, her son, and a servant girl died. Two other members of this family had the disease, but recovered. A Mr. Webster, who lived with a Mr. Brown, assisted in nursing the Heacock family, and was taken with cholera on the 20th, and died. The next day Mr. Brown took the disease, and died on the 28th. The next day Mrs. Brown, who had gone to Chicago, as

soon as her husband died, was taken at the house of her father, Mr. Guthrie, with cholera, and died. Mr. Guthrie and a friend took Mrs. Brown's body back to Summit. On the road they were taken with cholera; one died, the other recovered. Four other deaths occurred among persons who had been in contact with this group.

At Aurora, forty miles west of Chicago, the first case occurred in the person of a peddler who was direct from Chicago. He stopped at the house of a Mr. Sanfords, about five miles from Aurora, and died of cholera. The next day Mr. S. took the disease, but recovered. July 22, a farmer, living three miles north of Aurora, returned home from Chicago, and died of cholera the same night. His wife died of the disease in eighteen hours. One other case occurred.

July 24, a Mr. Leech returned to his home, five miles from Aurora, after a visit to Chicago, and died the same day.

At Flagg's Creek, twenty miles from Chicago, a lady from Chicago died of cholera; five cases of the disease followed, with two recoveries.

At Doty's Tavern, Buck Horn, Naperville, Cazenovia, the Pre-emption House, and other localities, the disease occurred. At all, the infection was caused by the arrival of sick from Chicago.

On September 24, a fresh arrival of cholera-infected emigrants caused another epidemic, which continued until late into October, the total cholera deaths being six hundred and seventy-eight.

At Chicago, the steam-transporation upon the lakes became infected, and points as far east as Buffalo, N. Y., felt the effects of the epidemic.

By infected steamboats the disease was constantly carried up the waters of the Ohio. Louisville, Cincinnati, Wheeling, and all other towns upon the river became infected.

At Louisville, on the 2d of May, three deaths occurred from cholera on Fifth street, between Main and Water, and one in the alley in the vicinity. May 4, several new cases were reported in the same locality. From the 4th of May to the 7th, four deaths occurred, one a gentleman from St. Louis, who arrived with the premonitory symptoms of the disease. The explosion of the disease occurred in a dirty, overcrowded tenement-house, in a low, damp location on the Bear Grass Creek. This house was frequented by emigrants. The disease spread to other locations, but at no time did the city suffer as severely as other towns in the Ohio Valley. When the occupants were removed from this house at which the disease originally broke out, the epidemic at that point subsided. Dr. Bell states that the survivors were taken to a new house containing two rooms 12 by 14 feet in size. A woman died at this house of cholera the day of arrival, and the eight other members of the party slept in the room adjoining to that which contained the dead body; seven of these people were dead of cholera by the second day; the survivor had the disease, but was removed to hospital, where he recovered.

On the 23d of July the disease broke out on Market street, between Tenth and Eleventh streets, in a row of tenement-houses in a miserable portion of the city, and fifty cases, with thirty deaths, occurred in a few hours. The survivors were removed, premises disinfected, and no new cases occurred. Many persons from this block died of cholera in different portions of the city.

From Louisville the disease was carried into the interior of the State. A man from that city died among the mountains of Rockcastle County of cholera, and nine deaths occurred among those who were with him during his last moments.

A man from Louisville died at a village hotel in Lincoln County, of

cholera. The negroes who waited on him took the disease, and, transmitting it to their wives, an epidemic ensued.

At the city of New Orleans the epidemic subsided during July, and in August but four deaths were reported. September had but one case, yet in October the epidemic was revived in the following manner:

October 15, the ship Cromwell arrived at New Orleans, having sailed from Havre on the 10th of September with two hundred and four steerage passengers. Cholera was prevailing at Havre when she left, but the passengers had been inspected by a physician before starting and pronounced healthy. The first day out a fatal case of cholera occurred. Twelve deaths took place from the disease during the voyage. The passengers remained at New Orleans a few days, and *then went on up the river.*

The same day, October 15, the steamboat General Lane arrived from the Upper Mississippi and Ohio, having lost three or four passengers from cholera. One case occurred after the boat reached New Orleans.

October 23 the ship Berlin, from Liverpool, arrived with two hundred and six emigrants, mostly English and Scotch. There was cholera reported at Liverpool when she left. On the tenth day of the voyage cholera broke out, and forty-one deaths occurred. *The vessel was ordered to the other side of the river, where the emigrants remained on board a day or two and then went up the river to the western country.*

During the month of November the epidemic prevailed to an alarming extent. On the 26th the ship Gipsey, from Liverpool, arrived with three hundred and nine emigrants, having lost nineteen from cholera. On the 27th the ship Fingal, from Liverpool, arrived with three hundred and twenty-two emigrants, having lost thirty-seven cases of cholera. These six hundred and thirty-one emigrants went to swell the sum of cholera-infected individuals. The disease remained in the city during the succeeding months.

During the months from January to July, 1850, cholera existed in New Orleans, fed by constant arrivals, but in none of these months did it assume the proportions of an epidemic. On the 24th of September the steamship Falcon arrived from Chagres and Havana, having lost twenty-five passengers from cholera, the disease being epidemic at both ports touched by the steamer. During October the disease increased in the city, one hundred and seven deaths occurring. During December the disease disappeared.

During 1850 cholera was confined to localities situated on or near the Mississippi and Ohio Rivers, the steamboats to and from New Orleans still being infected, and still being engaged in carrying the infection to and from that city. East of the Alleghany Mountains the disease did not extend.

At Saint Louis, according to Dr. W. M. McPheeters, prior to May, 1850, the causes of cholera were not of local origin, but from May to August the disease settled in certain localities of that city. The total deaths were nine hundred and fifty-three.

At Cincinnati, the disease, according to Dr. George Mendenhall, was chiefly among the floating population and emigrants, the first cases again occurring in persons from New Orleans. One thousand four hundred cholera deaths occurred.

At Sandusky, the disease appeared July 8, in the persons of emigrants, and eighteen per cent. of the inhabitants died.

At Columbus, Ohio; Louisville, Ky.; Burlington and Keokuk, Iowa; Chicago, Ill.; Kalamazoo, Mich.; Buffalo, N. Y., the disease occurred during the year.

In 1849, by emigrant trains from both Texas and Missouri, cholera was carried out upon the plains, then known as the great American desert. So great was the mortality that whole parties were decimated. The property of the dead, infected by their discharges, was abandoned upon the roadside, to impart the infection to other travelers upon these highways.

From New Orleans the disease had been carried to Cuba, and to the isthmus of Panama. Chagres upon the east and Panama upon the west, as also Acapulco in Mexico, were infected by the disease. The steamships upon both the Atlantic and Pacific were overcrowded with passengers, and made stops at each of the points named; but it was not until the last of September, or about the first of October, that the disease arrived at San Francisco on board the steamer Carolina. Following the arrival of this vessel a few cases occurred in the city; but it was not until the first week in November that the explosion occurred, and this only after fresh arrivals from Panama. The epidemic lasted until about Christmas, when it disappeared. The total number of deaths was about two hundred and fifty.

In November cholera was carried from San Francisco to San Jose, fifty miles to the southeast, where its ravages were confined to the natives.

About the time that the Carolina arrived at San Francisco, reports reached that city that cholera had broken out at Carson Valley, some hundred miles distant in the interior, where it occurred in the persons of overland emigrants.

On the 18th of October the disease appeared at Sacramento, in the persons of overland emigrants, and rapidly spread. Consternation seized the inhabitants, and all who could do so fled from the city. Out of a population of eight thousand less than four thousand remained, and of these before December, when the disease subsided, over one thousand had died.

During 1850 no other portion of the country was infected.

In the conclusion of the most interesting report of James Wynne, M. D., on epidemic cholera, as it prevailed in the United States in 1849 and 1850, Appendix C to the Report of the General Board of Health on Epidemic Cholera of 1848 and 1849, London, 1852, it is stated: "It appears, therefore, upon a careful and minute examination of all the circumstances connected with the spread of cholera from place to place, that in no single instance is there any evidence furnished by first cases, when the disease could be most easily traced, to show its introduction by direct contagion or personal communication; but, on the contrary, all these circumstances tend to establish the existence of some other and more potent morbific agency."

The report referred to has probably done more toward misleading and establishing erroneous theories upon this all-important subject than any other effort that has appeared in the English language; the reasonings are so conclusive, the facts advanced so seemingly uncontrovertible, that it served to clinch the malarial chain; but a careful reading of the report will convince even a prejudiced observer that the evidence, upon which the assertion quoted is based, is deficient in two essential points.

I. No account is taken of the extensive scattering of emigrants from infected districts of Europe over the entire North American continent.

II. At each point of infection the history of the outbreak commences with the first fatal case, and no attempt was made to trace any cases that might have been instrumental in the introduction of the disease,

although their cases may not have terminated until many days after the first fatal case had occurred.

It is also a point of the utmost significance that at each of the malarial localities that produced the disease in North America, according to Dr. Wynne, at none was this malarial influence exercised or apparent until after the arrival of individuals from districts previously infected by cholera.

CHAPTER VI.

THE EPIDEMIC WHICH REACHED NORTH AMERICA IN 1854.

The origin of this epidemic had been very clear for years, when Dr. Tholozan nearly threw all its records into confusion in 1871, in a pamphlet entitled "*Origine nouvelle du choléra asiatique, ou debut et développement en Europe d'une grande épidémie cholérique.*" He assumes that it arose spontaneously in Poland in 1851, and spread from thence, according to the usual way of cholera, in every direction, north, south, east, and west, especially down through Russia, by way of the holy city of Kiev, to the Black Sea, and from there east to Persia, and back to Arabia and India. But, according to Drasche and all the other reliable historians of cholera, the epidemic of 1830 lasted eight years in various parts of Europe and America; that of 1847 for twelve years, aided by fresh importations from India, Persia, and Arabia, and we may add, by the decreasing belief in its infectiousness and the resultant carelessness about importation. From 1847 to 1859 it was always present in some portions of Europe, both in winter and summer. The great doctrines of the portability and consequent communicability in some way, and the necessity for stamping out the pestilence in its incipiency by disinfection, did not fully arise till 1854. The increased facilities of travel served to spread it, and Denmark, Switzerland, and Greece, which had previously protected themselves for over twenty years by quarantine, were overrun by the disease.

In 1850 it had almost died out in Europe, but wintered over at Halberstadt, twenty-nine miles southwest of Magdeburg. It commenced again in both these cities in February, 1851; and reached Berlin, which had twelve hundred cases. It was carried to Hamburg; obtained a footing in Denmark; also in Stettin, and other Baltic cities; and found its way to Coblentz, on the Rhine, in the west, and to Posen, towards Poland, in the east. It had, besides, wintered over in Prague, with one thousand five hundred and sixty cases; was at Vienna in June, 1851, with one thousand nine hundred and eighty cases; crossed the Soemmering Alps, attacking six hundred out of eight thousand railroad laborers, and effected a lodgment in Northern Italy. It broke out in Pesth, Hungary, and Trieste; was at Marseilles and Malta, with two thousand one hundred and fifty-eight cases; and was coming up from Egypt for the third time, with two thousand five hundred cases at Cairo. It had also been at Mecca and Medina, brought up from Bombay, where there had been two thousand three hundred deaths in 1849, four thousand eight hundred in 1850, and four thousand and twenty in 1851. Macnamara, page 137, says: The northwest provinces of India had also been affected, and the disease was traveling on toward Meshed and the Caspian Sea, (by the North-Persian route.) It went up the Persian Gulf to Bassora and Bagdad in 1851, and reached Tabreez and the Caucasus, toward Southern Russia, in 1852.

In 1851 it wintered in Bohemia, attacking Prague for the fifth time in the course of two and a half years; entered Silesia in August; but the rest of Germany, together with Belgium, Holland, and France, were free from it. It persisted in various parts of Russia from 1847 to 1852, aided

by fresh importations from Poland. There were over eleven thousand cases in Warsaw, from whence it again spread north, along the river Vistula, with Polish raftsmen, to the Baltic; was carried back west again to Berlin, and southwest to Breslau and other places, so that Prussia had sixty-eight thousand five hundred cases from July 3, 1852, to April 28, 1853. Importation of the disorder was recognized everywhere and almost every time.

In 1853 there was a tremendous outbreak in Russia, of which St. Petersburg seemed the center. Moscow was infected from St. Petersburg, and the disease traveled east towards Orenburg and Central Asia. Warsaw was again attacked and helped to infect Russia southward towards Kiev and down towards Odessa, to which it was also coming by way of the Black Sea. Again it was conveyed west to Prussia from Poland by the old, often-traveled routes of the rivers Vistula and Oder, both of which are connected by canals with the Dnieper, upon which Kiev is placed. Memel, Dantzic, Stettin, and Konigsberg were once more involved. It broke out anew in Berlin August 7, with fourteen hundred cases in six weeks; and was carried up the Elbe to Hamburg and Bremen by emigrants. Holland, Belgium, and France were now drawn into the vortex. From Hamburg it was carried to Havre, and from there to Paris. In 1853 there were nine hundred and sixty-two cases in Paris, where it persisted slightly during the winter, to erupt severely in 1854. England was invaded toward the end of 1853 by arrivals from Germany, Sweden, and Norway. From July 7, 1853, to December there were one thousand two hundred and sixty-five cases in London. Manchester, Edinburgh, and Liverpool were attacked severely, and it lingered in all of them during the winter. Copenhagen was affected in June, 1853, with seventy-two hundred cases before the epidemic ceased, and formed a center from which cholera was sent in various directions; not only over Denmark, but also again to Sweden; where, however, only five doctors died out of three hundred; and one hundred and twenty-seven nurses out of three thousand. Twenty-eight infected vessels sailed for the United States from England, Holland, France, Hamburg, and Bremen with one thousand one hundred and forty-one deaths on their voyages.

It re-appeared in Persia in May and June, 1853, and lingered through the winter, with fifteen thousand deaths at Teheran. Paris was again visited in the spring of 1853, and it spread over France with one hundred and twenty-five thousand seven hundred and twenty-five deaths in fourteen months. It arose in Spain and Italy by importation and multiplication; with five thousand three hundred and eighteen cases in Genoa, forty-five thousand attacks in Sardinia, twelve thousand six hundred in Naples, and twenty thousand in Messina. It again appeared in Malta, probably coming both from Egypt and Europe. In Venice it lasted from the fall through the winter, to April, 1855. Switzerland was now attacked for the first time. It reached Munich at the time of the great exposition, and continued from July, 1854, through the winter to April, 1855, with four thousand eight hundred cases. Munich was the new center from which it spread in all directions over Bavaria, with sixteen thousand eight hundred cases. Forty-eight Bavarian physicians out of seventy-six thought it arose from miasmatic infection, twenty-eight were contagionists, while sixty-six were convinced that it was both imported and portable and communicable in some way. It appeared again in Vienna with a few attacks in June; more, but scattered cases in July; and then it progressed so slowly that it was not acknowl-

edged by the government until September; after which it lasted up to February, 1855, with five thousand two hundred cases.

It was carried east to the Crimea by the French armies and fleets in 1854, as the whole of France and Algeria, from whence the troops came, was infected. Also it was taken by the British fleet to the Baltic, which helped to spread it again into Russia. London had three thousand deaths from diarrhœa and ten thousand seven hundred and eighty-five from cholera in 1854.

Persia was again the abode of Asiatic cholera in 1854, the mortality at Teheran being very great.

In 1855 it obtained a still greater extension in Italy, especially at Genoa, Nice, Turin, and in Sardinia; while Parma and Piacenza had thirteen thousand five hundred cases; Florence, five thousand. From Venice it spread up into the Tyrol, and eastwards to the coast of the Adriatic, towards Turkey.

In 1855 cases occurred through the whole winter in Prague, Pesth, Galicia, and Venice; and by May, Bohemia, Moravia, Galicia, and Hungary were again involved. In Venitia there were seventy-two thousand cases; in Lombardy, sixty-four thousand; in Vienna, six thousand six hundred and eighty-five; in Bohemia, fifteen thousand; Galicia, one hundred and twenty-eight thousand; and in Pesth, thirty-seven thousand. In the whole of Austria, two hundred and seventy thousand nine hundred. From Austria once more it spread north toward Prussia, and came out again from Poland down the river Vistula, to Dantzic, Konigsberg, and other Baltic towns. It reached Berlin in July, with two thousand one hundred and seventy-two cases in all. In Paris the first case occurred in February, and there were only sixty reported in August, when another outburst commenced. It re-appeared in Marseilles, Holland, Spain, Portugal, and Turkey. Sweden had one thousand three hundred cases, and Russia three hundred and twenty-four thousand; while Poland, Africa, Egypt, Asia Minor, Syria, Arabia, and Mecca were all again afflicted. Europe was the great acknowledged seat of cholera from 1852 to 1855, probably because other places, especially Persia, could not make their distresses known. But nothing is farther from the truth than the assumption of Tholozan that it arose spontaneously anywhere.

In 1856 Spain, Portugal, Russia, Sweden, and North Germany had cholera. It showed itself in Lubeck for the seventh time. In 1857 it had almost disappeared, except in Sweden, from whence it was again carried over to North Germany, especially to Altona, Hamburg, Konigsberg, and Dantzic. It broke out afresh in Persia, particularly at Meshed. In 1858 there were sixteen thousand deaths among sixty thousand pilgrims at Mecca. During 1859 it again raised its head in Russia, at Astrakan, Moscow, and Saint Petersburg, from whence it was conveyed to Rostock in Prussia by steamboats. Dantzic had a fresh outbreak. Hamburg had two thousand four hundred cases, and forwarded it to Denmark and Holland. It again appeared at Mecca and Damascus. Macnamara, p. 182, says: "Cholera again showed itself in the northeast of Persia, in connection with the extension of the pestilence over the northwest of India and the Punjaub in 1856, and from 1851 until 1861 it reappeared in Persia year after year in various localities. It was on the Persian Gulf and at Bagdad in 1851; at Teheran and the shores of the Caspian Sea, and simultaneously in the principal towns on the Persian Gulf in 1853. In 1855 the north of Persia was again under the influence of invading cholera. The Persian caravan going down to Mecca was also attacked. In 1856 the north of Persia and the

entire course of the river Euphrates were infected. In 1857 there was a fresh outburst in the northeast of Persia, and also in the south at Kerbela, Bagdad, Meshed Ali, Bassora, and other places on or near the Persian Gulf. In the Persian province of Fars, the outbreak in 1857 was the most virulent that had happened in twenty years; and not only the inhabitants of the Gulf coast, but those of the interior of Persia, came under its influence. In 1860 and 1861 it again invaded Persia; but from 1861 to 1865 there was no further epidemics in that country." (*Ibid.*, p. 183.) "The great twelve-year pilgrimages of 1865 and 1867 in India were about to take place, previous to which the ordinary annual gatherings sink to the lowest numbers, often leading to the innocent belief that the interest in these religious dissipations is dying out. Hence cholera seems to sink down everywhere just previous to its greatest outbreaks."

The principal facts which seemed proved during this epidemic were:

I. The capability for the disease to linger along, with a few cases, all winter.

II. The renewed outbursts from these hibernating cases during the next warm season.

III. The conveyance of the disorder in every direction, north, east, south, and west; just as the pressure of commerce, travel, or war propelled it.

IV. The involvement of Denmark, Switzerland, and Greece, always previously protected by quarantines, which were now forced or abandoned. Greece was attacked for the first time, during the Crimean war, when both Odessa and the countries near the mouth of the Danube had been infected from Poland and Russia. Early in 1854 it attacked the Russian and Turkish forces on either bank of the Danube; but it did not reach Greece from that direction.

In the early part of June, vessels from Marseilles, bringing French troops from infected places and with deaths on the voyages, landed the disease at Varna. From the time these troops landed, cholera spread progressively through the town and allied forces, attacking the French and Turks almost simultaneously and afterward the English soldiers. The troops in the Piræus, Greece, were all perfectly healthy until the early part of July, 1854, when a French steamer arrived from Marseilles with cholera on board; cases were carried to the hospital; cholera appeared and spread rapidly, and the disease began to crop out in various parts of the town. Greece, from her peculiar situation, relations, and small commerce, had been able to isolate herself from the rest of the world in the epidemics of 1832 and 1849, and had always been absolutely free from cholera; for no winds from Egypt, Malta, Italy, Asia Minor, or Turkey had ever blown it to her. In 1854, being occupied by foreign forces, over which she had no control, the disease effected an entrance into the country, by well-known importation, in many troop-ships. In 1865, being again her own mistress, she entirely protected herself, while the disease was raging all around her. (*Ibid.*, p. 147.) It was introduced into Gallipoli also by a French troop-vessel from Marseilles, and in nine days it reached the British hospital, in the direct track of communication between the French camp and the town. A distant hospital entirely escaped. Dr. Marroin, chief physician of the French fleet, stated that cholera was carried into the Black Sea with the French ships Primaugult and Magellan from Marseilles and Gallipoli. When free communication was opened between the fleet and General Bosquet's division the disease broke out with extreme violence. In the English fleet it first appeared in the Diamond, ten days after the arrival, near her, of a French steamer from

Toulon, with cholera on board. Of twelve thousand five hundred and seventy-two British sailors, seven hundred and ten were attacked; 91 per cent. of whom were supplied with water from springs at Baltchick, where French troops had not only been quartered while suffering from cholera, but had covered the ground for a great distance with their excreta, and washed their foul clothes at the springs. The English vessels which were supplied with distilled water had not a case. At a later period the Baltchick water seemed to cause severe diarrhœa only.

By strict quarantine Denmark was saved from cholera until 1850; although Russia, Prussia, Sweden, Norway, England, and Holland had been affected repeatedly and severely all around it. Then there was a slight outbreak of twenty-eight cases and fifteen deaths from a Lubeck vessel, which had slipped in with a clean bill of health. In 1852, after the example of England, all quarantine restrictions were removed; and in 1853, the first great Danish epidemic commenced at Copenhagen, which culminated in seven thousand cases and four thousand seven hundred and thirty-seven deaths. The first case was a ship's carpenter; the next a ship's laborer. They were taken to the marine hospital, where an epidemic soon occurred. Hamburg, Lubeck, St. Petersburg, and various Finnish ports were affected, and ships from them with cholera on board were then lying in the harbor of Copenhogen. A few days after three cholera-patients were taken to a civic hospital, where another outbreak took place. From Copenhagen the disorder spread all over Denmark, and the authorities were reconverted to their old views about contagion. Denmark was again protected until 1857, when cholera was re-introduced. The most energetic measures were instantly taken to stamp it out, and only two hundred and eighty-six deaths occurred. In 1859 there was a small outbreak with one hundred and sixty deaths in all Denmark. It has remained free till the present time. The Danish physicians all now are contagionists. (See Küchenmeisters Zeitshrcft für Epidemiologie vol. 2, p. 70, report of Dr. Schleissner delegate to the cholera conference, for Denmark.)

In England Dr. R. Dundas Thomson found many vibrios in the atmosphere of wards filled with cholera-patients, fewer in wards one-half filled, and none in empty wards; also in the air of sewers, which was alkaline. The greatest mortality often happened in houses near offensive gully gratings. In three hundred and seventy-three cases, nine deaths occurred on the kitchen floor, sixty on the ground floor, one hundred on the first floor, one hundred and fourteen on the second floor, and seventy-three on the third floor. Ninety-six houses had one death each, forty-six had two each, twenty-two had three, seven had four, eight had five, two had six, three had eight, and one house eleven deaths. There were no less than twenty-one instances of husband and wife dying within a few days of each other. Vibriones were noticed in great abundance in the rice-water discharges; and in the drinking-water of affected places, also in the blood of cholera-patients. Although occasionally found in other disorders, they were vastly more frequent and abundant in cholera. Hassall found that three circumstances were necessary to the development of vibriones, viz:

I. An alkaline fluid;

II. Organic matter in a state of decomposition; and,

III. Warmth.

He also discovered that when once introduced into the alimentary canal of cholera-patients, vibriones are brought into relation with conditions highly favorable to their development. Their multiplication took place with almost inconceivable rapidity in twenty-five cases, seemingly because the rice-water discharges are always alkaline, offensive, and the

bowels warm. In other diseases he found few vibriones, but as he found some, he did not draw the broad conclusions he might have done. He thought their occurrence in such vast numbers, in the rice-water discharges, of interest, if not importance; and turned marked attention to the fact that the fluid thrown out into the intestinal canal in cholera, is more than usually prone to decomposition, and is more than commonly alkaline. He even went so far as to suggest that the existence of these large numbers of vibriones in the evacuations might explain, in some degree, the success of sulphuric acid in checking the diarrhœa; for this and other acids, when freely administered, destroy the conditions essential to the development of vibriones, and thus annihilate the vibriones themselves. It checks the tendency to decomposition and neutralizes the alkalinity of the fluid. Vibrios were also found in the urine; and on the soiled clothing of cholera-subjects they abounded and were alive and active. Hassall again mildly drew the conclusion that, if these vibriones possess any influence in the production of cholera, washing soiled clothes might in some cases give rise to the disease. He repeats, "the only organic productions met with in the examination of cholera-linen are vibriones." To test the matter still further, several cholera-patients were made to breathe repeatedly into a Wolf's apparatus charged with recently-distilled water, when numerous sporules of fungi and vibriones were seen by the third day. Hassell repeated the experiment on himself for three days, but no fungi or vibriones were found. The fluid part of the mucus in the bronchial tubes of cholera-patients abounded in vibriones, and the rice-water discharges, even when still retained in the small intestines, swarmed with them. The conclusions became irresistible that these bodies were more abundant in cholera than most other diseases, and might become injurious from their very numbers; or at least they mark a peculiar state of the body, which allows them to multiply with excessive rapidity, or, as Haskell cautiously says, although they may not be the cause, they may still have some influence in explaining and aggravating the symptoms.

It has been suggested and almost proven that the wet discharges are not as dangerous as the dried. Hassall unwittingly threw some light on this point also. He found that vibriones did not escape from fluids during their evaporation. By carefully distilling, at a low temperature, a portion of rice-water discharge, which absolutely seemed alive with vibriones, and which was opaque from the numbers present in it, he found that the distilled fluid came off as clear and transparent as water; and no vibriones were discovered in it on the strictest scrutiny with the microscope. But when the discharges become dry, vibriones may be blown about by draughts of air, or in sweeping, dusting, &c. It seems absurd to assume because a few vibriones are not harmful that many may not prove so. A few drops of laudanum or any other poison may do no harm, but many assuredly will. (See appendix to Report to the Medical Council of England, of the Committee for Scientific Inquiries in Relation to the Cholera Epidemic of 1854.)

In the same report some light is thrown on the origin of cholera in Newcastle and other places. The tide of the river Tyne carries up the sewage of Newcastle as far as Elswick. During a drought the water-company supplying Newcastle pumped directly from the river at Elswick, so that the inhabitants of Newcastle began to drink water contaminated with the filth of their own dirty city, at a time when nearly two-thirds of the population were without privies, and the human filth accumulated in their streets was washed into the river by every rain. This impure water was consumed from May to the end of August,

1854, without causing cholera, although diarrhœa, typhoid fevers, and dysentery abounded. As soon as the first cases of cholera occurred the authorities of Newcastle betook themselves vigorously to washing out and flushing all the drains and dirty holes in the place. On August 29th a woman came by steamer to Newcastle with cholera. On September 1 three sudden deaths occurred, and by the 9th the disease was declared epidemic; for on the 12th there were fifty-nine deaths, and on the 15th no less than one hundred and forty. The scandalous proceedings of the water-company were discovered and stopped on the 15th. On the 25th the deaths had fallen to seventy-five a day, and on the 30th to sixteen, after which not more than four deaths occurred in any one day.*

Something, doubtless, of this kind, happened in Paris in 1832, while in that year cholera upheaved very slowly in Newcastle, and consisted in a succession of local outbreaks proceeding from individual cases, and the contamination of isolated pumps and wells.

In 1854, the well-known splendid investigations of Drs. Snow and Budd cleared up many of the mysteries connected with the spread of cholera and typhoid fever by contaminated water, and led to the most important and beneficent sanitary reforms. The water-supply of almost every city, town, and many villages in England, was examined chemically and microscopically; drainage and cleansing were studied more particularly and carefully, and the endeavor was made to make every living being and place cleaner and sweeter savored; the air and water of the whole land purer; the food and clothing more wholesome and fresh. Every cellar, sink, drain, gully, gutter, privy, alley, street, and court was to be cleansed and brightened; every nuisance was to be abated; every house rendered fragrant by fresh air, pure water, and prompt removal of all offense and refuse; in short, as pure as snow.

At the same time Pettenkoffer, in Munich, began to look from five to fifty feet under the surface of the earth for underground water, which he supposed had first to be efficiently infected by the cholera-evacuations before food, clothing, beds, floors, hands, plates, cups, glasses, sinks, privies, gutters, and drains could become actively contaminated by them. From personal observation in 1842 and 1857, the writer can corroborate the following account: "From time immemorial, Munich has had the reputation of being an exceptionally unhealthy place; and the stories of an ignorant defiance of sanitary laws are especially numerous in its records. It should be free from cholera and typhoid fever, for it stands upon a high, barren plain, 1,600 feet above the level of the sea, open to the purifying effects of the full power of the sun in summer, while its atmosphere is swept the whole year by storms that accumulate upon the neighboring mountains. Its soil consists of loose gravel to the depth of many feet, allowing all the fluid refuse deposited on the surface to leach away, and the Iser, "rolling rapidly," furnishes a convenient water-way for the removal of sewage. But the introduction of sewers is very recent, even in the best and broadest streets; and, owing to a want of knowledge in their construction, there is not sufficient declivity given to them to carry away their contents. Nor is there any system of water-flushing to drive out the foul sediments and cleanse the pipes. Of the 75,000 tons of refuse matter furnished by the inhabitants, about one-third is carried out of the city by the market-gardeners who spread it upon the neighboring fields, to send back its polluted smells with every wind that blows. There is a disagreeable odor

*Report on the Epidemic Cholera of 1866, in England, p. 32.

ascending at all times from the sewer and gully gratings in the streets. Many of the privies in private dwellings extend like huge chimney-shafts from the tops of the houses with openings on every floor down into the cellars where they end, without any sewer-connection or water-flushing. The air of the houses is always bad, especially at night, and when the discharges from typhoid fever, cholera, or other infectious disease get into the privies disaster is almost sure to follow, especially as the Munichers, with great dread of colds and catarrhs, make all close when they go to bed. The ground below Munich is full of springs; there is a well in the court-yard of almost every house, in close proximity to the outdoor vaults, refuse-pits and drains, and of course is filled from that bugbear of the Munich theorists, "the ground-water." The most ignorant citizen knows that the well-water, owing to the mistakes of ages, is not fit to drink, and avoids it as a beverage when he can; strangers are warned against using it; and in numerous instances bowel complaints and typhoid fever have been directly traced to its poison. Within a few years spring-water from Thalkirchen, a few miles out of the city, has been supplied to about one-third of the inhabitants; and in the last outbreak of cholera, 28 per cent. only of those attacked, while using it, died; while 72 per cent. of those relying upon other fouler water succumbed. Small shops are kept on the ground-floors of many dwelling-houses, and the dairy-woman keeps her milk in the cellar; the green-grocer makes the air of his underground shop damp and bitter with heaps of neglected vegetables; the butcher has the right to keep living calves, pigs, and sheep in his, and slaughter them there. The streets have long reached up to the old cemetery, and the new one laid out only a few years ago was placed within one block of the nearest houses. Whole generations of families have been buried in graves, deep at first; but coffin has been placed on top of coffin, till the last one has often come within a few feet of the surface. The air of the vicinity is laden with the smell of death; and the underground water is polluted. One of the favorite myths of Munich is that "an enormous dragon, which lived in the ground beneath the city, poisoned all the wells with his venomous breath, until, being at last lured to the surface by seeing his reflection in a mirror held above a certain spring, a brave knight slew him, and saved the people from further destruction."

Pettenkofer has been looking deep under ground for the mythical dragon, which lay right under his eyes and nose. What Munich needed was pure water for the people to drink, and cook with; plenty of water for them to wash and bathe in; sewer connection with their vaults and drains, and water to cleanse them; and an abundance of water for a constant daily flushing of the sewers. As far back as 1822, an inexhaustible source was pointed out from which water could be obtained, sufficient to obviate the necessity of any hydraulic works for its elevation. Not far away in the mountains is a lake of remarkably pure water, situated above the level of the tops of the highest houses. The estimated cost of bringing this water to the city was only two million of dollars; but the principal scientific medical object has seemed to be not to supply Munich with abundance of pure water, or to sewer or cleanse it, but to substantiate the useless proposition that the variations in the sanitary condition of the city might or might not be closely connected with the rising and falling of the underground water. The broadest and most beautiful streets have been laid out, but no sewers put in them. Magnificent buildings for religious purposes and those of art have been erected; but the surface-filth has not been properly removed.

The few physicians who declared that bad water and bad drainage

are the principal causes of its everlasting typhus and its frequent epidemics, were denounced as the enemies of the fair fame and prosperity of a beautiful-looking pest-city and its dirty inhabitants. Munich has always been a religious place, but it has never learned that cleanliness always comes next to godliness, and, in times of pestilence, before it. Those who defy pestilence, by excess in eating and drinking and in riotous living, are scarcely less severely punished than those who fly, on the first symptoms of the disease, to the cold, damp churches, and waste in prayer the few precious hours, which, spent in a warm, clean bed and room, might have insured the preservation of their temporal life, and perhaps the better salvation of their souls. Such are the results which exist to this day, after a twenty years' search for the underground water-dragon of pestilence. The English plan was to stop all importation of cholera; to cleanse every place and body; to furnish good food and pure water to every one; and thus remove the distemperature of the air and noxious quality of the underground water, which are thus brought entirely under human control; for surface and local filth are the great causes of both.

Pettenkofer rendered immense services to more practical men by proving the frequency of occult importations of cholera, the long period of incubation that it might occasionally sustain, and by his endeavors, according to the plan of Von Gietl, to destroy and disinfect the cholera-discharges before they could get into the dangerous underground water. But he led the more dreamy part of scientific men into geological and hydrographical studies, rather than toward plain sanitary exertions.

In 1854, also, Thiersch made his first well-known experiments in the reproduction of cholera on mice, and laid the foundation of the prevalent doctrine of infection.

All the difficulties and ordinary results of an investigation into the causes and course of an outbreak of cholera in a large city are well portrayed in the celebrated Dr. H. W. Acland's memoir on the cholera at Oxford, England, in 1854, (London, 1856, 4th,) p. 172.

Three hundred and seventeen cases of cholera and choleraic diarrhœa, with one hundred and ninety-four deaths, occurred from August 6 to October 30, 1854. The first reported cases were among residents; and the earliest deaths among butchers' wives and cartmen's daughters. The localities of the first thirty fatal cases are given unfortunately with the omission of the choleraic cases, and an attempt was made to show that there was not always direct communication or connection in all the mortal attacks. The first deadly case occurred at the north end of the town; the second to the twelfth attacks happened on one block in Gas street, in close contact with each other, almost at the extreme southern end of the city; but in the mean time the disease had commenced in the county jail. The thirteenth case was at the extreme east of the town; the sixteenth, close to cases Nos. 9 and 12; the seventeenth, in the great group in Gas street; the eighteenth, in the highest and most central part of the place; the nineteenth was a countryman, who had been about the city near the eighteenth case; the twentieth, a surgeon, who had visited cases; the twenty-second, also in the block on Gas street; the twenty-third was the first which occurred near the initial case; the twenty-fourth, twenty-seventh, twenty-eighth, and thirtieth were grouped together; and the twenty-sixth and twenty-ninth were near the great focus in Gas street. Hence the scattered cases were few. There were only three deaths in the first fifteen cases, and among the first thirty cases there were no less than fifteen recoveries. Of course the first fifteen deaths were separated by the fifteen recoveries, and there was no perfectly visible connection in

all the fatal cases. The thirtieth death was in reality the forty-sixth case, and twenty-three localities had already become affected instead of six, as we are led to suppose. The first and ninth cases were in a butcher's wife and daughter, occurring in the first and second affected localities, at great distances from each other. The first and fifteenth cases were charwomen in different places; the third, fifth, eighth, and thirty-second cases were prisoners in the county jail; the fourth and seventh were a carter's son and daughter; the sixth, twenty-eighth, and twenty-ninth were tailors; the eleventh, sixteenth, and thirty-eighth were laborers; the fourteenth, thirty-third, thirty-fifth, thirty-seventh, and forty-sixth were laborers' wives and daughters; the twelfth, a railway porter; the thirteenth was a shoemaker's son; the nineteenth and twenty-first, a shoemaker and daughter; the thirty-first and thirty-sixth were washerwomen; and the thirtieth a laundress's son. Then there were grooms, fishmongers, milkmen, carpenters, boatmen, policemen and their wives, coal merchants, and waiters. All these were among a class of people who moved about in every direction, often with diarrhœa upon them, and cholera had been in England for many months. Dr. Acland's supposition, p. 21, that cholera arose in many of these persons without communication on the part of those attacked is very far from proven, although it seemed so on casual examination; while his admission that it did spread under some circumstances and in some localities from person to person is fully corroborated. In the first three weeks only three cases of cholera were recognized; in the second period of three weeks there were eighty-three. In the first four weeks only the north and south sides of the town were touched; but in the fifth week the north, south, east, west, center, and outskirts were involved. Hence it arose very slowly and seemed to spread from infected localities and persons rather than from a general atmospheric distemperature. Besides, the population was twenty-six thousand five hundred, and only three hundred and seventeen actual cases occurred; showing that the disorder attacked a few people rather than the whole inhabitants. One medical man died, one was in danger, and several had choleraic diarrhœa. The nurses were tolerably exempt, (only three being affected;) the washerwomen suffered much, (eighteen of them.) There were no cases in the city jail, near by the county jail, where the highest proportional number of cases and deaths occurred in the whole city. No cases were returned as cholera in which the evacuations were bilious, although many of them were severe, and attended with cramps, vomitings, and more or less collapse. Still, these diarrhœal cases appeared generally in the same localities, times, and intensity as the genuine cholera. In the first period of three weeks no record of the diarrhœal cases was kept, so that all clews were lost.

In the second period of three weeks there were one thousand three hundred and thirteen cases of diarrhœa; in the third, two thousand six hundred and three; in the fourth, when cholera was ceasing, there were only five hundred and twenty-seven. In all, at least six thousand and three hundred cases of diarrhœa were enumerated. In addition, during the first three weeks, one hundred and twenty-three cases of choleraic diarrhœa were reported, and it was stated as known that many more occurred; in the second period of three weeks, one hundred and sixty-five; in the third, sixty-one; with 11 per cent. of deaths. Hence, in tracing the connection of the fatal cases, at least three hundred and fifty facts were omitted, and, perhaps, six thousand six hundred and fifty. In ten places around Oxford the importation of the disease was not traced; in nine villages it was; and the proof had to be very clear and

simple to be admitted at all. A few plain occurrences were thought to afford excellent illustrations of cholera originating, to all appearances, spontaneously and then spreading by infection to persons in immediate contact with the first attacked. But when all the diarrhœal and choleraic cases are overlooked the transportation of the disease, of course, must often escape notice. Still some cases were very clear and striking. In Garsington, the man Ruffle, who was first attacked, had not been in Oxford, but had received into his house a person who had tended cholera cases, and his son, who had just partially recovered in Oxford. The latter, who was still weak, occupied his father's bed by day, and his father died; next his wife died; and a grandson was attacked, but recovered. The Ruffle's house was half of a double cottage, with five dwellings under the same roof; in it eleven cases of cholera, with four deaths, and many cases of bad diarrhœa occurred. Of thirteen neighbors and friends engaged about Ruffle and his wife, eleven contracted the disorder, and two out of the four men who carried Ruffle and his wife to their graves were affected. A cholera bed, occupied by two persons, reproduced the disease. Cholera clothes and bedding taken from Oxford started an epidemic in New Hinckney, and produced eight cases. Density of population alone did not produce this cholera, but increased it when introduced. Imperfect drainage (p. 50) unaided was not the cause, although the ground in some places was saturated with liquid ordure to an amount scarcely to be estimated. The wells were more or less impure; and the better class of tenants would not live in the worst places. The water-supply of Oxford was decided to be one mode, but not the only one, of conveying cholera. The city jail had escaped and the county jail was attacked in 1832, 1849, and 1854. The cause was in the water-supply. Many cases of choleraic diarrhœa and some of common cholera of special severity occurred early in the outbreak, in the latter building. The third reported case in the whole city happened in the county jail. Finally, thirty-seven out of ninety-five inmates were attacked, and four of the officers. The county jail was supplied with water by a stream running through one of the worst diarrhœal and cholera districts, Saint Thomas. The river was low; the water was ponded; the pool not only contained garbage, but a drain from the prison flowed into it; and within ten feet of the mouth of this running drain, the supply-pipe from the jail sucked up the contents of the polluted pool for the prison use. From this foul source the kitchen-coppers were supplied, and from this repulsive water the soup and gruel of the establishment was made. It need excite no surprise that the first fatal case had been in the prison for a month; and the third for several months. There had been three severe choleraic attacks and recoveries, and much diarrhœa in the county jail before the first fatal case in Saint Thomas district, from which the water-supply came. The earliest death in Saint Thomas parish occurred on September 6; the first in the jail on September 19. The water originally caused diarrhœa, then cholera. The foul supply-pipes were cut off, after twenty cases of choleraic diarrhœa and five of fatal cholera had occurred, and only five more new cases supervened. The disease was not blown from India to Oxford, for the winds were generally north and west. It was not caused by deficiency of ozone, as there was an excess of it, when cholera was at its height. The weather was unusually fine, dry, and clear, (p. 66;) and the air was not stagnant, for hospital tents were blown down by gales when the disease was at its acme.

Dr. Acland's final conclusions were: First. Diarrhœa always coexists with cholera. Second. Cholera may arise without the suspicion of con-

tagion, (especially when it is not carefully sought for;) although it may certainly be conveyed from place to place by human agency. Third. It can scarcely be doubted that cholera evacuations are capable of communicating the disease; but it is quite certain that in the majority of cases they remain innoxious. Fourth. It is quite certain that productive cholera may be imported; and it is equally certain that it is often not propagated in some localities apparently exceedingly prone to the development of the disease. Dr. Acland continues, p. 76: "No one doubts that in a cholera period: First. Persons die of diarrhœa and choleraic diarrhœa, without passing into true cholera. Second, such cases do oftentimes pass into cholera. The two diseases, diarrhœa and cholera, which seem so widely apart in their appearances and danger, so unlike in their relation to treatment, yet do at times pass one into the other." Dr. Acland assumes, very incorrectly, that all diarrhœas and choleraic diarrhœas are produced by atmospheric influence; but we know that they are often caused by bad food, polluted water, and foul exhalations, not from the general atmosphere, but from offensive privies, drains, sewers, and a tainted state of dwellings, kitchens, cellars, and of the surface of the earth around them, from the careless disposal of refuse, garbage, and filth of all kinds. He thinks diarrhœal and choleraic diarrhœal discharges are innoxious at first, but may become so altered in or outside of the human body as to develop a new specific poison which will act upon other persons, and thus produce cholera spontaneously. The only solution of this question lies in a simple statement of all the facts, viz, first, that there are numberless cases of diarrhœa, both in ordinary and cholera seasons, which have nothing whatever to do with infectious cholera; second, that there are also many cases of common diarrhœa so severe as scarcely to be distinguished from the milder cases of true cholera; third, that there are instances of cholera-morbus occurring every year from accidental causes, which closely resemble true cholera, but are not infectious; fourth, there are developments of true cholera, of so mild a type that they may easily be mistaken for mild or more severe diarrhœa, but which are infectious, like the milder cases of scarlatina; and, fifth, severe cases of cholera which are deadly and can be mistaken for no other disease, but which are so little infectious that they produce no multiple cases unless their products get into the drinking-water, milk, or food of the neighbors, visitors, or relatives. There will always be debatable cases and many intermediate occurrences, which are readily capable of different explanations, and which may perhaps never be distinguished from each other by any except the most widely read and experienced men. As long as different diseases act so similarly, there must always be diversity of opinions among the varied classes of learned and unlearned physicians, all appealing to apparently reliable facts. Dr. Acland, however, infers, p. 77, "that it is important beyond all power of expression to destroy with chemical agents the organic combination of all diarrhœa and cholera evacuations immediately after they have been passed, and to apply the same precaution to all evacuations in any way resembling them.

It is a matter of much doubt whether North America was ever free from cholera at any period from December, 1848, until after the subsidence of the epidemic of 1854.

Dr. Peters has shown that Asiatic cholera existed continuously in Europe from 1847 until 1859, and it seems pretty clearly indicated that the epidemic of 1848 in the United States received continual re-enforcements, if not of cholera-infected individuals, by cholera-infected fabrics. Dr. Fenner writes: "Cholera seems still to linger about New

Orleans and along the Mississippi River, occasionally amounting to a moderate epidemic in the city and on some of the plantations along the coast." Dr. Marsden records an epidemic at Quebec in 1851, the first case of which occurred on the person of a German recently arrived from the United States. This man was attacked with cholera while at a hotel, and died. The man who nursed this case was sent to order a coffin, but, on his way, stopped to see his wife, who lived upon a small street called Ancien Chantier. This woman died of cholera in two days. From these cases the disease spread, and two hundred and eighty deaths occurred.

Dr. Marsden also records an epidemic at Quebec in 1852, which occurred on the 25th of September, the initial case being in a man named McKnight, who had been working upon the ship Advance, from New York, upon which vessel a case of cholera had occurred on the voyage to Quebec. The disease communicated rapidly to six other persons, who lived in the same lodging-house, among whom were two sailors of the Advance. Of these seven cases, five died. The last case occurred November 9, there having been one hundred and forty-five deaths.

During 1851 one case of cholera was reported at Boston, Mass. During the same year the disease occurred at Saint Louis, Mo., among European immigrants who arrived directly from New Orleans. A considerable number arrived on the steamer Latona, from New Orleans, April 11.

About July 5, 1852, a woman arrived at Dayton, Ohio, from Sandusky, where cholera was said to be epidemic. When she arrived she had every symptom of the disease. She was taken to an Irish boarding-house, where, after a severe illness, she recovered. Six other cases occurred at this house; all died. The disease spread and about forty deaths occurred.

In 1852, during the month of August, cholera appeared among the laborers, many of whom were emigrants, on the Bellefontaine and Indiana Railroad. The majority of those attacked died. Very few citizens took the disease, with but one death.

In 1852 a slight epidemic occurred at Gilboa, Ohio. Thirteen deaths occurred.

In 1852, on the 12th day of July, cholera appeared at Chicago, and six hundred and thirty deaths are reported. During the year, reports from Michigan note the occurrence of isolated cases.

In 1852, cholera appeared at Saint Louis, again among emigrants and the lower German population, and spread to other counties of the State.

Enough has been shown to demonstrate that the disease was in the United States during 1852, and the same story might be told of the earlier months of 1853, as has been acknowledged of the latter months.

We quote again from Dr. A. Clark:

"In the autumn of 1853, ships from infected ports arrived in great numbers in the harbor of New York, bringing emigrants infected with this disease. Indeed, it is reported for this port alone, that on board of twenty-eight ships arriving in the month of November, one thousand one hundred and forty-one persons had died of cholera. In fact, ships bringing this unwelcome freight continued to arrive during the winter and spring. But the first appearance of cholera in the northern division of the United States was not in New York; it was not even on Staten Island, but it was in Chicago, in the latter part of April, 1854. It broke out there among the recently-arrived emigrants, continued to be mild until June, when it was declared epidemic. On the 16th of May, the same class of persons, recently-arrived emigrants, were seized with the

disease in Detroit; and still it was not in New York. During the whole month of May of this year, there was but one death from cholera in this city. The epidemic of that year dates from the 14th of June. Then, in Chicago and in Detroit the outbreak of the disease preceded its outbreak here; and why? Those places are in the principal line of emigrant travel; the emigrants passed through New York, to be sure, but they were in good health at that time. They passed on to those cities, and were there seized with the disease, although cholera had not visited either of the cities since 1849. Why should emigrants coming from the infected ports of Europe, in infected vessels, be attacked to the exclusion of other persons? Plainly, to my mind, because they carried about with them, in clothing or baggage, a poison capable of regenerating itself and spreading abroad an influence that in the warm months produced a general epidemic."

But these were not alone the arrivals that produced the epidemic of 1854 in North America; for we find recorded by Dr. Marsden: "The ship Glenmanna, from Liverpool, arrived at the quarantine station below Quebec on the 15th of June, having thrown forty-five passengers overboard on the voyage, who had died of Asiatic cholera. The John Howell, another passenger vessel from Liverpool, arrived at the station on the same day, having had no cholera on board. The passengers from the two vessels were landed at the same moment of time, in fact together; and being mostly Germans, Prussians, &c., they intermingled freely, and enjoyed uninterrupted intercourse with each other. During their stay at the quarantine station, one of the passengers of the Glenmanna died of cholera, and yet the passengers of both these vessels were discharged from quarantine, and allowed to proceed to Quebec without further detention. In five days after the landing of the passengers from the cholera-ship at the quarantine station, the first case of Asiatic cholera in Canada, in 1854, broke out at Quebec in the person of Lang Lorts, a German, who had been a passenger in the Glenmanna cholera-ship. He was removed to the marine and emigrant hospital, and on the same day, the 20th of June, nine other cases were admitted to the same establishment, all belonging to the ill-fated ship John Howell, which had crossed the ocean and arrived at the quarantine station in perfect health, there to be infected and scourged by the pestilence. Of these ten cases, the first ten admitted to hospital, or known to exist, eight died in periods varying from ten hours to thirteen days."

In Quebec the disease spread among the citizens, became epidemic, and the history of the former epidemics was repeated. These emigrants carried the disease along the water-courses. Dr. Rowand, of Quebec, on returning from a visit to the distant Red River country, reported that when far beyond the limits of civilization, where habitations were few and far between, where the stage-coach or wagon was the only means of transportation, he found the emigrants from these ill-fated ships suffering from cholera.

In December, 1853, a few cases of cholera occurred at the quarantine stations on the Mississippi below Saint Louis, but in January and February, 1854, when crowds of emigrants began to pour into the city, the disease became epidemic and continued during the year. The mortality among the emigrants again was excessive, and was most severe during the months of April and June. In this epidemic Saint Louis suffered more severely than any other city in the United States. The river steamboats becoming again infected, the disease was carried to the headwaters of the Mississippi, Missouri, and Ohio. From Saint Louis the disease was carried into Saint Charles, Gasconade, Boone, Cooper,

Chariton, Lafayette, Cape Girardeau, Washington, and Saint Genevieve counties.

In April cholera occurred among emigrants at Chicago, and the epidemic lasted through November, with a total of fourteen hundred and twenty-four deaths.

May 19, 1854, cholera occurred at Detroit among newly-arrived emigrants, the majority of whom had recently arrived from Holland. The total deaths amounted to about one thousand.

About the last of June, four emigrants were put off an emigrant train at Ann Arbor, Mich., sick with cholera; three of the four died. Two men, one from New York, the other from Chicago, and a young lady from Chicago died of the disease at this town; five deaths occurred among residents of the town.

It is well known that ships arrived at New Orleans, having lost passengers from cholera on the voyage, during the last months of 1853 and early in 1854, but the disease did not assume an epidemic form until the latter part of May, when, during the first week of the epidemic, over two hundred cholera deaths occurred. Cholera remained in New Orleans until all records were lost in the epidemic of yellow fever of that year.

On the 3d of June the disease was reported on a plantation near Memphis.

On the 20th of June, Nashville was infected. In April the disease occurred at New Albany, Ind., among persons recently arrived from Saint Louis; several of the attendants took the disease, but it did not spread.

On the 29th of May cholera appeared in New York. An editorial in the New York Journal of Medicine states: "Within the last few weeks there have arrived at quarantine, Staten Island, three ships, each of which lost passengers at sea, with a disease resembling, in all its characteristics, cholera. The first was the ship North America, twenty-seven days from Liverpool, with seven hundred and sixty-eight passengers, arrived the 16th of May. This ship lost seventeen passengers during the voyage, and on arrival at quarantine several others were sick. The sick were at once admitted into the hospital, and the well were bestowed in the United States store-house, their persons cleansed, their clothing dried, and all supplied with good, nutritious food. The period required for quarantine of passengers in good health is forty-eight hours. Within this period of detention cholera broke out among these passengers, and out of about one hundred and twenty or over, that were attacked, about seventy died. The second was the ship Progress, with seven hundred and fifteen passengers, thirty-two days from Liverpool, arrived the 18th day of May. She lost forty-four from the same cause, but her passengers were all healthy on arrival at quarantine. The third was the ship Charles Crocker, thirty days from Liverpool, with four hundred and fifteen passengers, arrived June 3, and lost thirty-six from the same cause. Her passengers were all subjected, after landing, to the same sanitary treatment, but no case of cholera occurred among them while at quarantine."

"In regard to the appearance of the disease in the city, it is believed that about one-half of the one hundred and twenty-eight deaths, which occurred during the four weeks commencing May 27 and ending June 24, have been among recently-arrived emigrants, who, regardless of all sanitary or hygienic regulations, have taken up their abodes in filthy, ill-ventilated, and already-crowded courts, alleys, or tenements."

Dr. H. E. Bartlett, health-officer of the port, referring to the arrival of cholera-infected ships, states:

"About the same time the ships *Chas. Hill*, *Plymouth*, *Robt. Parker*, *G. I. Patten*, and some others, arrived from Havre, all having a large number of cases of small-pox of a very malignant type. These were all placed in the small-pox hospital, situated in the northeast angle of the quarantine grounds, at least eighty rods from the hospital and grounds, where the sick and well from the cholera-ships were placed. * * * No cases of cholera were subsequently traced to them, but the convalescent patients in the shanty buildings began to die of cholera, and, in less than a week, 75 *per cent. of the patients in the small-pox hospital died of cholera.*

"On the 21st of May the *Dirigo* arrived from Glasgow with a small number of emigrants. On her passage she took from the wreck of a vessel from Liverpool about thirty passengers. There had been no cholera on the wrecked vessel, and the persons taken from her saved only the clothing upon their persons. The vessel, being healthy, all were allowed to go up to the city. Some of the first cases of cholera that occurred in the city were traced to these emigrants."

June 2, the disease broke out at Buffalo, N. Y., and again its occurrence can be traced to the arrival of emigrants. During this epidemic the county poor-house became infected, and a frightful mortality ensued. July 18, the disease occurred at the Suspension bridge, near Niagara Falls, where it was confined exclusively to a large number of emigrants engaged in the excavations and public works.

From New York City the disease was carried to New Haven, Conn., Providence, R. I., and Portland, Me., upon the east; to Albany, Troy, and Syracuse, on the north. It reached Philadelphia about the 17th of June, but at this city, during the two months of its presence, but eighty-eight deaths are recorded. The disease occurred in the lower portion of the city, and in tenement-houses occupied by emigrants and sailors.

During this year the disease was carried into Baltimore, Washington, and some points farther south.

Dr. Atlee, of Lancaster, Pa., records that a car-load of emigrants came from Philadelphia to Columbia, Pa. Two or three of these emigrants, who were ill of cholera, were put out on the platform at the railroad-station; some gentlemen, seeing them at the point of death, carried them to a shed and waited upon them; in forty-eight hours the emigrants and these gentlemen were dead, and the disease spread in the town.

Cholera was carried into Lancaster by an emigrant, and several deaths occurred. The train that left the cholera-cases at Columbia went on with the remainder of the emigrants to Pittsburgh, and from them cases occurred at the last-named city.

Dr. A. C. Smith, of Columbia, states, in relation to the early cases at Columbia, Pa.: "Among those who fell under my care, I recognized many whom I had noticed in the room with the German emigrants during their illness."

Dr. J. H. Jackson states that a gentleman of Bainbridge visited Columbia during the epidemic; on his return home he died of cholera. His family fled; a friend, who took care of him, contracted the disease, as did another who assisted at his burial. Neither of these two had been at Columbia or any other place where cholera was prevailing.

At Pittsburgh, early in July, a lady, who had just returned from a western journey, took cholera and died. Several members of the same family took the disease, and some died. From this time until Septem-

ber, occasional cases occurred among persons who had contracted the disease *down the river*. September 12, after a violent rain-storm, cholera became epidemic. Those who most suffered were Irish emigrants who had recently arrived in the country. The report of Drs. Gallaher, Pollock, and Draine is most exhaustive, and contains much illustrative matter.

Dr. C. H. Ohr reports that at Cumberland, Md., "the first case was in the person of a canal-boatman on the Chesapeake and Ohio Canal, about the middle of July. He had come from Williamsport, where the cholera was raging with considerable violence. He lay out on the "green," and died the next morning. The next case occurred about two weeks later, also imported. The subject was a boatman from Williamsport. He lay sick in a green grocery, kept by a man named Hall. He recovered. On the 6th of August, six or seven days from the time of this boatman's arrival, a little girl living with Hall died. Hall died on the 7th. On the same day a boat-builder named Cooter was taken with the disease, and died in nine hours. He had been at Hall's the day before. Meantime several deaths had occurred in the immediate neighborhood of Hall's grocery. On the 8th Kennedy and several of his family were attacked. They lived fifty yards from Hall's, and had been there. On the night of the 8th, Hazel Beall, a watchman, was seized. He had been at Hall's. On the 12th, Mrs. Beall was attacked. Beall's house was about a mile from Hall's, and near Cooter's. Four of Beall's children were attacked successively.

"Some of the children were taken to Mrs. Simpkins's, an adjoining house. Mrs. Simpkins and her child died. On the 10th or 11th Mrs. Nelson Beall went to the house of Hazel Beall, who was still living, and assisted in nursing. She was attacked, went home, and died on the 13th. Her husband and two children were attacked, and died on the 19th. Nelson Beall lived about a mile southeast of Hazel Beall, and out of town. No person in the neighborhood of Nelson Beall's entered his house, and none suffered from the disease. On the 18th Sullivan was attacked. He had been a day and night at Hazel Beall's. He lived three-quarters of a mile east of Hall's, and a greater distance southeast from Beall's. His mother and three children of his brother were attacked successively. No other persons in that neighborhood had the disease except two mulatto girls named Cole, who had assisted in taking care of this family. From the 6th to the 18th a number of deaths occurred along Green street, in which was Hall's grocery; some in the different parts of Mechanic street, in which Cooter and Hazel Beall lived; some in other places, said to have been from cholera morbus. On the 19th there were thirteen victims. The town became alarmed; many (three thousand) fled; and it became impossible to trace the communicable features of the disease further. Hall's grocery was a long, low, old one-story frame building, the base about three feet below the pavement. It was kept for the retail of cakes, candy, liquors, potatoes, cabbage, cod-fish, &c. Much of the cod-fish was rotten. It was a place for boatmen, loafers, white and black—of strong odors. It stood on the corner of Green street, where Will's Creek joins the Potomac—"as favorable a place for the incubation of pestilence as could be desired." The place had been healthy till the 1st of August, though the air had been dry, hot, and stagnant."

The epidemic of 1854 was not confined to the North American continent, for we find it recorded that, from May 14 to June 14, two thousand eight hundred and seven cholera deaths occurred on the island of Barbados.

In June it was reported that cholera was raging to a fearful extent on the island of Jamaica, and that the epidemic had reached the city of Mexico, there being at that city, in one day, over two hundred deaths, among others the celebrated prima donna, Madame Sontag.

Dr. Stephen Smith, in the editorial to which we have already referred, remarks: "Along all the great routes of travel, it (the cholera) appeared during the summer-months, but without any definite law of progression, being governed apparently by the temperature of the weather, the course of emigrants, and the condition of towns where they took up their residence.

"From the large cities, located upon the great thoroughfares, the epidemic spread widely in every direction, but it principally followed in the train of emigration, and thus reached the most remote settlements of the West."

CHAPTER VII.

EPIDEMIC WHICH REACHED NORTH AMERICA IN 1865 AND 1866.

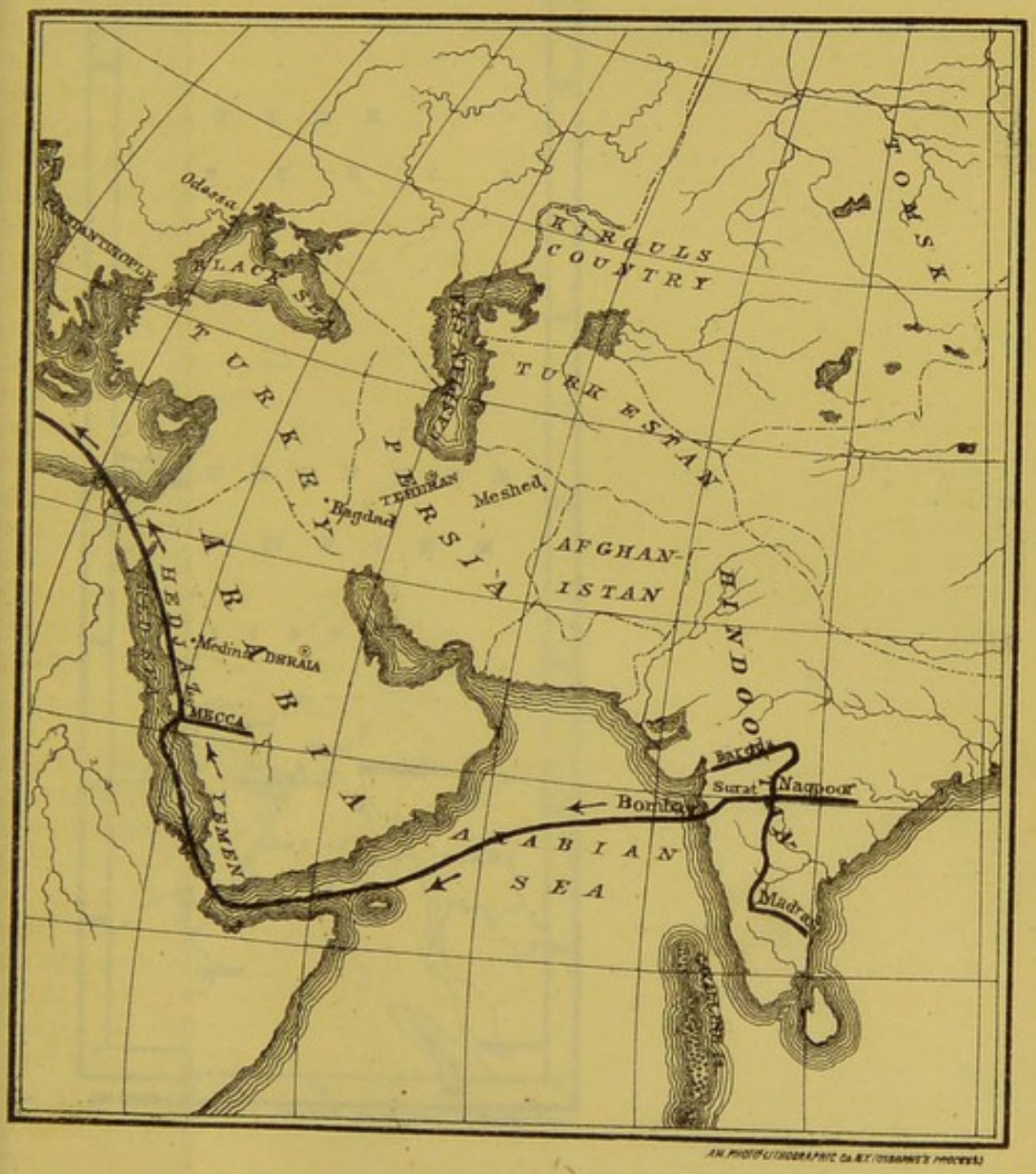
This epidemic came out from India by way of the Red Sea to the Mediterranean; and we have purposely delayed consideration of the *Red Sea route*, in order to give all its peculiarities in one view. The time of the feast of sacrifices at Mecca varies by eleven days each year, as the Mohammedan months are lunar, of twenty-eight days each; so that in the course of fifteen years the festival will have happened in every month in the year, and every season, viz, spring, summer, fall, and winter. If the Mecca festivals always occurred simultaneously with or shortly after the Hindoo fairs, cholera would be conveyed to Europe by way of the Red Sea almost every year. As it is, the disease is carried to Mecca only occasionally, while it never breaks out there spontaneously. In 1831 it showed itself in a few cases in the early days of the assemblage, and was declared by the Arabs to have been brought by pilgrims from India; but it was not until the whole multitude had gathered that it reached its height. Its virulence became at length so great that the numbers computed to have fallen victims were many thousands. The governors of Mecca and Jedda, the pasha who accompanied the Syrian caravan, and many other people of distinction, were swept away. The dead were buried in trenches or left without sepulcher. The disease followed the returning pilgrims up the Red Sea to Suez, and from there to Cairo and Alexandria. When it was carried into the Mediterranean, its results became so mixed up with those of the epidemic which had arrived by way of Russia, that its course has never been properly traced. Lieutenant Wellstadt, (see *Travels in Arabia: London*, 1838,) who spent five years in the Red Sea, about this time, in English government surveying-ships, found the stopping-places of the pilgrim-boats covered with dead bodies and graves.

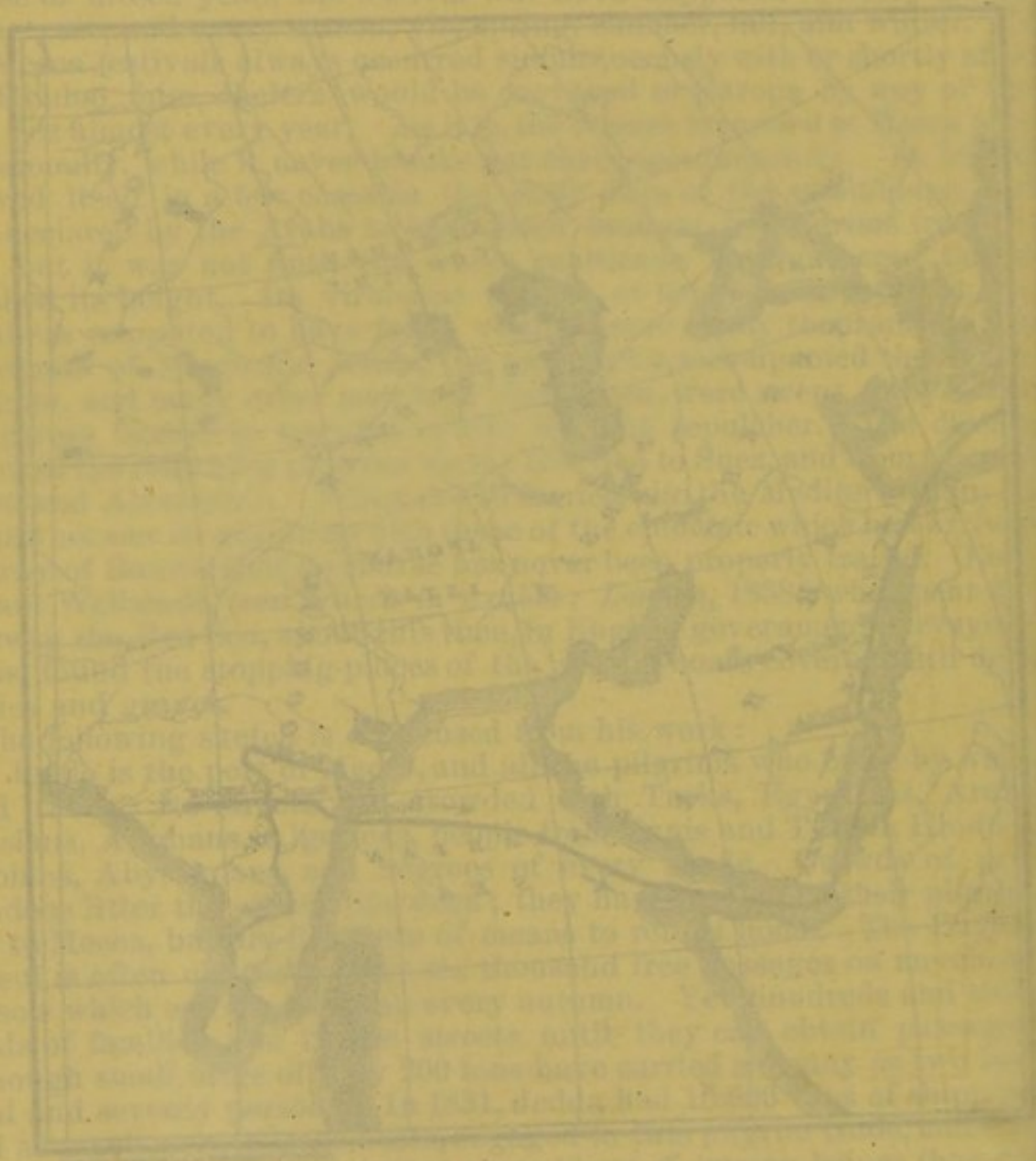
The following sketch is condensed from his work:

"Jedda is the port of Mecca, and all the pilgrims who come by water land there. Its streets are crowded with Turks, Egyptians, Arabs, Persians, Affghans, Algerines, people from Tunis and Tripoli, Hindoos, Nubians, Abyssinians, and negroes of every shade. Crowds of poor Hindoos litter the streets like dogs; they have performed their pilgrimage to Mecca, but are destitute of means to return home. The English consul is often obliged to give six thousand free passages on merchant-vessels which sail for Bombay every autumn. Yet hundreds and thousands of families live in the streets until they can obtain passages; although small brigs of only 200 tons have carried as many as two hundred and seventy persons. In 1831, Jedda had 10,000 tons of shipping, and as much more in large boats, engaged in this pilgrim trade, and soon collected together a more motley assemblage of human beings than can be found on any other spot on the globe. Twenty thousand came from Egypt alone; one hundred and twenty boats were employed in carrying those from Turkey and the Barbary States, through Suez to Jedda; the pilgrims from Abyssinia, Nubia, and the interior of Africa crossed the Red Sea, from the ports of Cossier, Suakin, and Massuah; four thousand came from the Persian Gulf, principally from Muscat, Bushire, and

(ASIA)

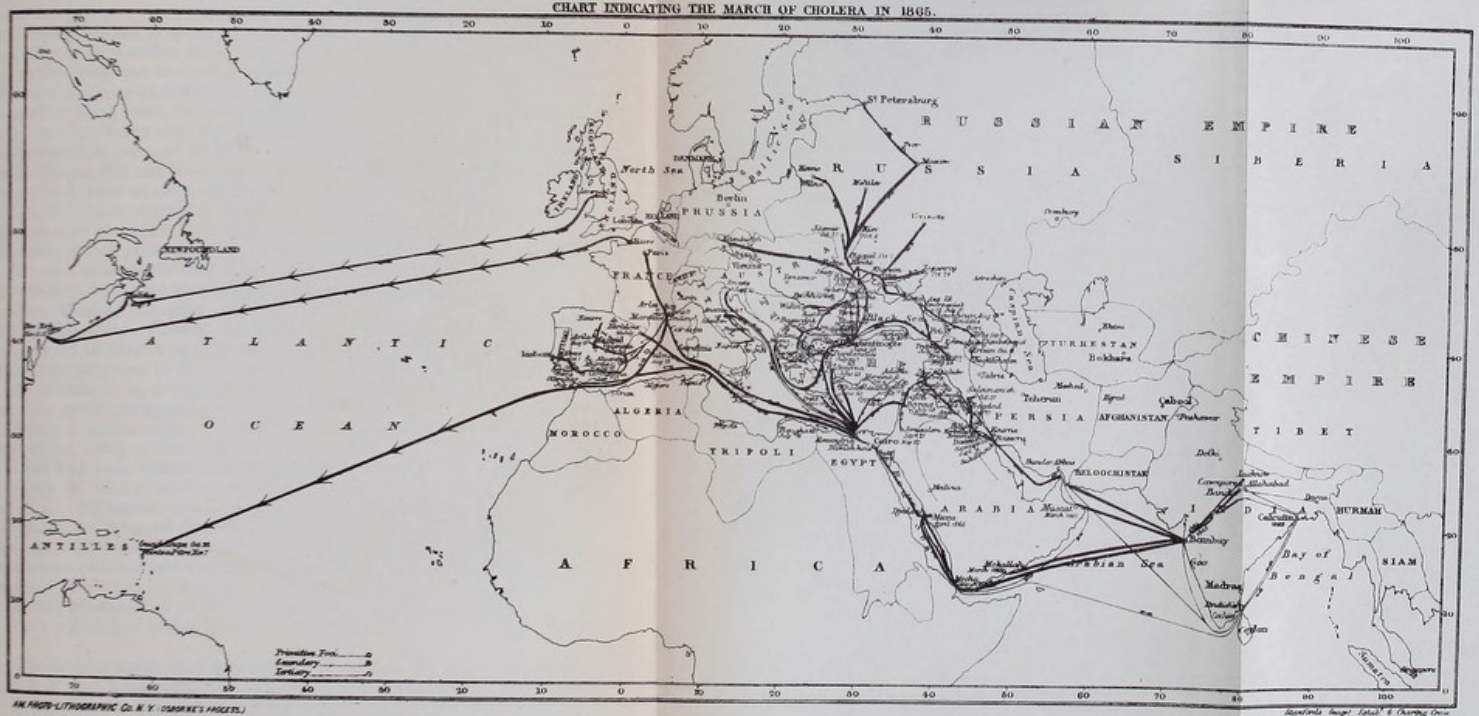
MAP by J. C. PETERS of the ***Red Sea Route,***
followed in several epidemics.





English Government Map

CHART INDICATING THE MARCH OF CHOLERA IN 1865.



AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

Bassorah; two thousand came from Malay; three thousand from Mocha and Southern Arabia. Besides all these, six great caravans arrived: one from Cairo and Suez; another from Damascus, Syria, and Asia Minor; a third from Bassorah; a fourth from Bushire, across the Persian Gulf to Bahrein, and thence through Central Arabia; a fifth from Muscat; and the sixth from Yemen. The cholera of 1829 was rightly supposed by the Arabs of Jedda to have been brought up by the Hindoos from India; but it was not until the whole multitude had assembled at Mecca that it reached its utmost violence. Over sixty thousand pilgrims died, and among them the governors of Mecca and Jedda, the pasha of the Persian caravan, and many people of distinction. The dead were thrown by hundreds into large pits, and the road from Mecca to Jedda was strewn with the dead and dying for weeks. The disease followed the pilgrims in their return passage up and down the Red Sea, and notably so to Yembo, Suez, and Cairo, which were attacked successively, as the pilgrims arrived at them."

In regard to the next epidemic, Macnamara, p. 10, quotes Rigler, who states that in May, 1846, cholera (which was carried over from Bombay) showed itself at Aden and Mocha, near the mouth of the Red Sea, and at Jedda which is the port of Mecca. Fortunately the celebration of the Courban Bairan did not then take place, or there can be little doubt that cholera would have at once spread to Mecca, as it did later in the year, when the devotees crowded there in November. Dr. Verollet states that it was also brought down from Persia in 1847 by the great Damascus caravan, which picked up the disease at Meshed Hossein and Meshed Ali. He also assures us that it had been carried south from Bolkhara in Central Asia to Great Meshed by pilgrims, and from there to Teheran, Damascus, Meshed Hossein and Ali, down to Mecca, occupying ten months in the trip. Fifteen thousand pilgrims died at Mecca in 1847. It re-appeared in Mecca and Medina in April, 1848, and was carried by the returning pilgrims to Egypt, and reached the fair at Tantah between Suez and Alexandria, quickly destroying three thousand there, besides committing great ravages over the whole country.

In Olympe Audouards, "*Les Mysteres de l'Egypte Devoiles*," 12th edition, Paris, 1866, p. 251, will be found a description of the most horrible of all festivals, which takes place at Tantah in June every year, at the tomb of Said el Bedoui, who had a great reputation for the cure of sterility. All barren women have the privilege of going to this assemblage, where from two to six hundred thousand persons are said to congregate. The scenes of licentiousness exceed all ordinary credence; and the cures effected are stated to be numberless. All the most obscene practices of the ancient heathen worship are there rivaled. The results of this outbreak of cholera were also united on the Mediterranean with those which had come by way of Russia, Turkey, and Germany, in 1848.

In 1850 cholera again broke out in Egypt and along the whole African coast of the Mediterranean. In 1852, Egypt, Malta, and the Ionian Islands were once more under its influence. In 1855 it was in Asia Minor and Egypt, carried down there from the west by the outbreak in the Crimea and other places, and the Damascus caravan was attacked on its way to Mecca. During 1858 many towns along the coast of the Red Sea were again subjected to the scourge. It also prevailed at Mecca, Lohea, Hodeida, Mocha, and Aden, and at or near the mouth of the Red Sea, to which it was continually brought by pilgrims. From these places it was, as usual, carried down the east coast of Africa to Zanzibar, from whence place pilgrims and slave-traders also came to Mecca. It also

crossed the Red Sea into Abyssinia, and was carried down to Central Africa by slave-traders and others. In 1859 it was reproduced at Mecca, and the havoc in the returning Damascus caravan was again very great. From 1851 to 1861, inclusive, there were twenty-one thousand acknowledged deaths from cholera in Bombay. Of these, four thousand occurred in 1851; three thousand three hundred in 1854; two thousand one hundred in 1856; two thousand three hundred in 1859; and all the other years had from one thousand one hundred to one thousand seven hundred each, except 1858, in which only one hundred and five were recorded. Macnamara says, p. 185, "We find in the history of the disease in Bombay evidence of a source quite sufficient to reproduce it in those places which are in constant communication with it." Frequently it was carried unobtrusively by the native boats and sailing-vessels, about which nobody cared, and rarely by the large well-equipped steamships, except at the time of the Mecca festivals. Hence Bombay long escaped the suspicion of exporting the disease.

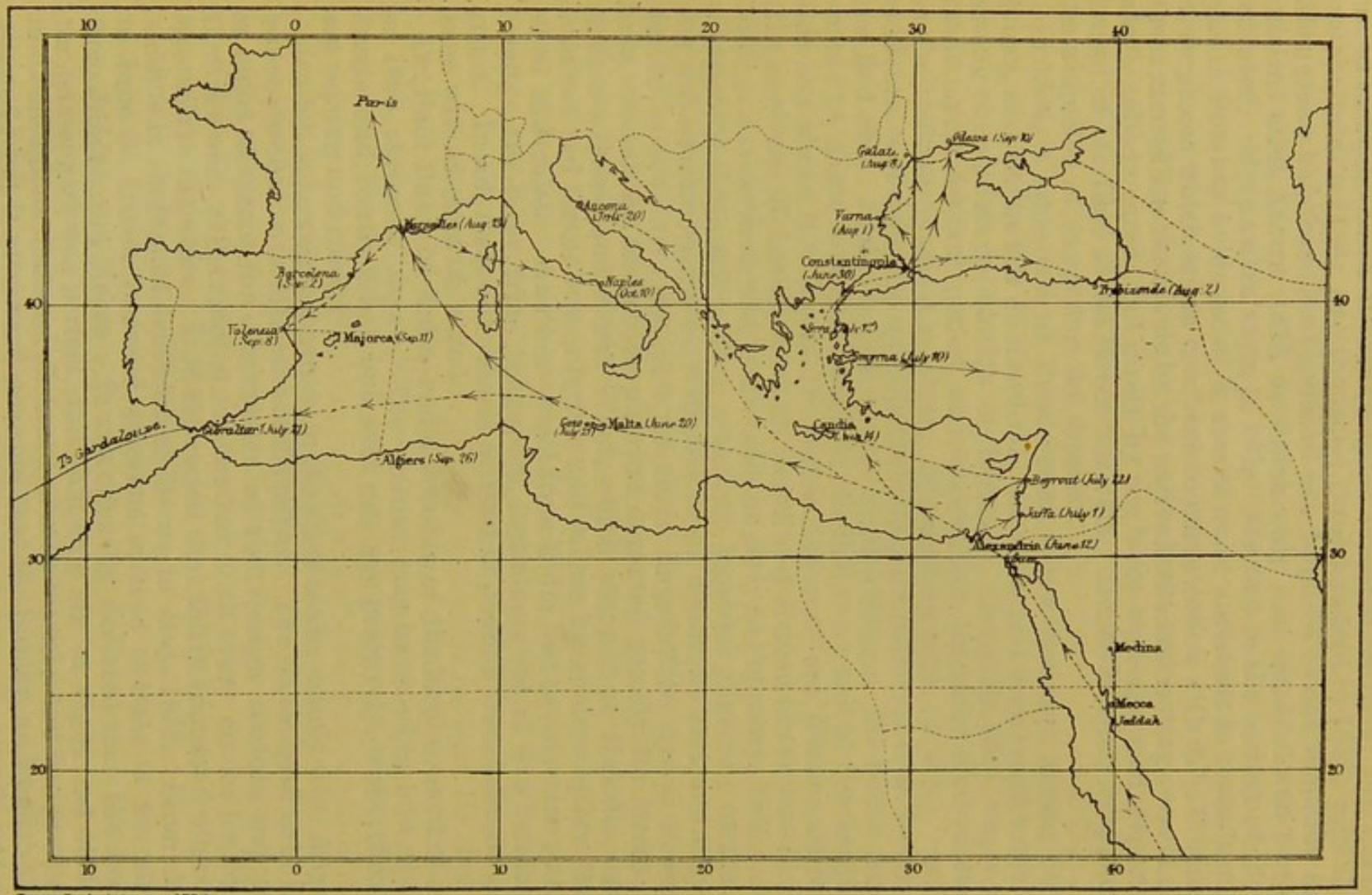
In 1864, it appeared at Punderpoor, below Bombay, among the pilgrims, and at the fair in Kandeish, above it, and soon became epidemic among the native population in Bombay. The year 1865 was a great twelfth-year festival period, and eighty-four thousand died of cholera in the Bombay presidency alone. Macnamara says, (p. 203,) "we have evidence of the disease quickly extending its influence from Bombay to the Red Sea. Early in 1865 it was at Makalla, on the South Arabian coast; at Aden, near the mouth of the Red Sea; and at Mocha, just inside and above it." From Dr. Buez's account—see *Mission au Hedjaz*, (the province of Arabia in which Mecca and Jeddah are situated,) Paris, 1873, p. 74—cholera was at Makalla as early as February, 1865. A vessel stopped there and sailed with four hundred pilgrims; on the sixth day out cholera appeared, with five or six deaths at first, and then fifty deaths in two days; but none for three days before arrival at Jeddah, from whence the rest of the pilgrims departed quickly for Mecca. The steamers Persia and North Wind, which stopped at Makalla, lost one hundred and forty-three pilgrims and sailors by cholera before they arrived at Jeddah. Another vessel from India lost twenty-nine; another twenty; the Ruby, from Singapore, lost ninety out of five hundred pilgrims. In all, forty-one vessels arrived at Jeddah from infected places, some with cholera on board.

Dr. Said Bukt, of India, and a member of the local council of Mecca in 1865, shrewdly says: "The disease may have come first with the Persia and North Wind, but who can say positively, when thousands are coming and going?"

Jeddah is largely concerned in the slave-trade, mainly with Abyssinia, but somewhat with Muscat and Zanzibar. The slaves have to be landed at night to escape the observation of the foreign consuls, and the authorities and ship-captains are familiar with every device for blinding inquisitive inquirers. It is estimated that thirty thousand pilgrims fell victims to cholera at Jeddah and Mecca in May, 1865. From May 19 to June 10, fifteen thousand pilgrims arrived at Suez in ten steamers from Jeddah and Mecca. It was officially declared that the health of the passengers was perfect, and that only six or eight had died, all of non-contagious diseases, on board of each vessel; and free pratique was allowed; but it afterward came out that the Sidney, an English steamer, had lost more than one hundred out of two thousand passengers. (Buez, p. 72.) On May 23, one of M. Lesseps's physicians observed cholera in a convoy of pilgrims from Suez to Alexandria. By the end of May, fifteen thousand pilgrims were encamped near Alexandria, and

English Government Map

Showing the Seaports in the Mediterranean Basin affected by Cholera *in 1865, as well as the course of the disease from Mecca to Alexandria and its radiation thence.*



Drawn by Asst Surgeon Welch

A.M. PHOTO-LITHOGRAPHIC CO. N.Y. (SEE DIRECTOR'S PRICE LIST)

he neighboring Arabs fraternized with them and contracted cholera. By June 1, the first case in Alexandria was reported, in the person of one who had lived in communication with the pilgrims. If any deaths occurred among the pilgrims they were concealed. From the 5th to the 11th of June the disease became decided, always among those who had been in contact with the pilgrims; but the physicians of the sanitary corps pronounced all the cases to be pernicious algid fever mixed with cholerine and sporadic cholera, (p. 73.) It was not until June 11 that the health-bills of vessels from Alexandria contained the fact that cholera was present there. In the course of two months it destroyed four thousand in Alexandria; and up to July 23, sixty thousand died in Egypt. A panic ensued in Alexandria, and thirty-five thousand persons fled from it to Beyrout, Cyprus, Malta, Smyrna, Constantinople, Trieste, Ancona, and Marseilles. The first infected vessel for Southampton, England, left Alexandria before cholera was acknowledged there, and it was not until after the lapse of seven years that Dr. Nettin Radcliff obtained indubitable evidence of its presence. It was claimed that it had been blown to Southampton by the winds, or sprang up from some occult epidemic influence before it broke out in Alexandria.

We have seen how cholera is brought to Alexandria from Mecca, in the East; we will now show how it is distributed along the Mediterranean to the West. Almost all the English, French, Austrian, and Italian steamships which sail on the Mediterranean carry pilgrims to Alexandria from Morocco, Algiers, Tunis, Tripoli, Malta, Turkey, Southern Russia, Asia Minor, &c., in time to partake in the festivities of the *Kurban Bairam* at Mecca; for this trade yields considerable profit at little cost. In 1863, as many as ten thousand pilgrims were conveyed in British ships alone between Alexandria and one or the other ports of Northern and Western Africa. We will record the experience of one steamer stopping at Tangier, opposite Gibraltar: "Crowds of the dusky tents of the Hadji, or pilgrims, were seen upon the beach. The next day, from dawn to sunset, large boat-loads were poured on board, with their bags of millet, cracked wheat, little cooking-stoves, charcoal, and their water-bags, to the number of two thousand persons. The night came on boisterously; the skies poured down torrents of rain; the burdened vessel plunged among the waves, shipping many heavy seas, until all were drenched and soaked, and their provisions damaged. Above the howlings of the storm arose the piteous cries of the pilgrims, as the great seas broke over them.

"It is a point of religion for these devotees to carry no change of raiment with them, and besides the filth of their wet and unchanged garments, there was soon added the ordure of two thousand men, women, and children kept closely packed together on deck for a fortnight, with nothing provided for their relief but an extemporized stage of planks projecting from the vessel's side, upon which few landsmen could venture, even in moderately calm weather. The constant wash of the rain and sea alone carried away much of the filth, which otherwise would have been unbearable. Small-pox broke out, and several deaths occurred before arrival at Malta, but passengers and sailors combined to deceive the captain, from fear that he would report it and have his ship quarantined. The deaths are comparatively few on the voyage east, but on the return-passage, when all are exhausted and worn out, as many as one-third have been known to die. Then their companions push them into the sea the moment they cease to breathe, if they can do so unobserved; or else cover over their bodies and sit upon them, like bags, until a convenient opportunity occurs.

"Every evening, when the weather permitted, prayers were said, and short passages from the Koran recited. First, the pilgrims stood unshod, bowing together, then dropping upon their knees, pressed their foreheads upon the deck in such lowly attitudes that it was difficult to resist the impression that every creature of them was most reverently humbling himself in the dust before his Creator. Finally, one evening, when the sun was set, every face was found intently turned in one direction, and the heavens were searched by keenly peering eyes; soon, a slight thread-like arc of faintest silvery light marked the appearance of the new moon, with the arrival of which the '*Kurban Bairam*,' or *feast of sacrifices*, begins. Shouts, clapping of hands, and the gleaming brightness of every eye announced that all had seen the sight, which marks the anniversary of the time when Abraham attempted to offer up Isaac, or, as the Mahomedans believe, his first-born, Ishmael, their great progenitor; and when a ram was miraculously supplied and sacrificed in his stead. It is the commemoration of this event which draws such crowds to Mecca every year, and notably every twelfth year; for at Mecca is situated the well Zem Zem, which Hagar and Ishmael found when fainting with thirst in the wilderness, and thus saved the lives of the founders of the Arab and Mahomedan races. Abraham, it is also claimed, paid annual visits to Hagar at Mecca, on this anniversary, up to the time of her death, notwithstanding the reluctance and jealousy of Sarah."

Cholera was brought to Marseilles about June 11, 1865, by some of these pilgrim-steamers, and acknowledged in Paris, with sixteen deaths in June, thirty in July, one hundred and twenty-five in August, two hundred in September, four thousand four hundred and sixty-six in October, one thousand two hundred and eighteen in November, and seven hundred and sixty-eight in December, 1865. The Atalanta steamed from Havre on October 12, with fifty-two cabin and five hundred and fifty-two steerage passengers, all of whom had been in Paris, where cholera prevailed. Some cases had also occurred at the Havre emigrant-hotels, but were either unknown or suppressed by the authorities. The Atalanta had one hundred and two cases and twenty-three deaths before arrival at New York, and the Herrman arrived November 16, with several cases. From the quarantine-ship Falcon it was carried up to Ward's Island by a nurse, and in eleven days thirty-one attacks and eighteen deaths occurred. Thus by steamer and rail cholera was carried from Bombay to Ward's Island within nine months by an unbroken chain of connection.

Singularly enough, strong corroboration of the correctness of the above account is supplied by Dr. John Parkin in his work on Epidemiology, (London, 1873,) the whole of which seems to have been written for the express purpose of disproving it. On page 187 we read: "That cholera was not imported into Mecca, but arose there spontaneously, may be inferred from the following facts: The ceremonies do not last many (eight) days; and the principal one, the Kurban Bairam, or feast of sacrifice, took place on the 4th of May." But the cholera had appeared as early as February and March at Makalla, a port, not on the Red Sea, but on the south coast of Arabia, from whence it could not only easily, but actually was carried up to Jeddah and Mecca by many vessels.

"It was here (Makalla) that some pilgrims from Singapore were attacked on their arrival in two sailing [steam] vessels, the Persia and North Wind." But Buez (p. 75) writes: "The consul-general of Holland at Singapore says cholera raged at Java and Singapore in 1864. The Moeris and Ruby from Singapore (p. 70) arrived at Makalla before the Persia and North Wind, the first having lost twenty-nine, the latter

ninety, by cholera on the trips. Of course we can believe (Parkin, p. 188) "that the disease broke out on the Persia and North Wind after touching at Makalla. The disease was prevailing at the same time at Hodeida, another port in the Red Sea," but not on the Arabian Sea, like Makalla. Dr. Parkin seems to have known nothing then of the eighty-four thousand deaths in the presidency of Bombay, nor of the arrival of vessels at Makalla from Bombay, as well as Singapore, with cholera before the arrival of the Persia and North Wind, but triumphantly, although erroneously, asserts: "We thus have proof that the cause productive of the epidemic cholera was in operation in this part of the world before the arrival of any pilgrims. That cause was in operation in other and adjacent towns, and the probability is that Mecca was brought under the influence of the same malign agency, although it might not manifest" [which it did not until there was an abundance of time and opportunity for it to be conveyed there] "its effects until a later period. If so, there can be no difficuly in accounting for the outbreak" at [Mecca.] "The disease arose there spontaneously, [?] the same as in other places, and the pilgrims were attacked in common with the other inhabitants, possibly before, being more predisposed than the latter for a variety of reasons. The pilgrims fled when the disease broke out, (at Mecca,) and, as a matter of course, many of them took the seeds [!] of it with them. The mortality was great among the pilgrims on the road from Mecca to Jeddah. The survivors arrived at Jeddah on May 10, but the epidemic was already prevailing there, many of the European sailors and lascars having died previously, and also some of the Turkish soldiers in garrison. The disease, consequently, was not carried into Jeddah by the pilgrims [from Mecca, simply because they had brought it there before they went to Mecca.] "The same result, no doubt, occurred on other roads taken by the pilgrims, but no account has been transmitted to us (Dr. Parkin) of these occurrences." [But every other student of the conveyance of cholera is familiar with them.] "The first ship, with one thousand five hundred passengers, arrived at Suez on May 19. The Egyptian government had taken the precaution (p. 189) to send medical men to Suez to examine the pilgrims on their arrival, and they reported that no indications of cholera existed among them. Some deaths had occurred on board during the voyage, but the cause was not known, [or rather was concealed.] "We (Dr. Parkin) only learned that the captain and his wife were both attacked, and died of cholera, [and these cases could not be denied.] After this, we (Dr. Parkin) hear nothing more of the pilgrims, not a single case having been reported among the thousands that arrived in Egypt. Had there been any, we (Dr. Parkin) would most assuredly have been informed of the fact. [?] On June 2 there was a (fatal) case of cholera in a resident of Alexandria. By the end of the month (June) nearly all the towns in the delta of the Nile, [upon which twelve thousand pilgrims from Mecca had been precipitated,] had been attacked, viz, Cairo, Rosetta, Damietta, &c. As the epidemic thus broke out in Egypt *so soon* after the arrival of the pilgrims, the contagionists of course affirmed that the germs of the disease were brought there by them."

But Dr. Parkin forgets that he has already proved that the pestilence was at Jeddah, Hodeida, Mocha, Aden, Loheia, and other places on the Red Sea, before the return of the pilgrims from Mecca; brought there, not only by the steamships, (not sailing-vessels,) Persia and North Wind, but by forty other boats. Hence it could have been conveyed from Jeddah and these other and many more places, on the route from Bombay upward to Suez, before the return of the pilgrims; for the ordinary commerce of

the world did not stop, but was rather increased in consequence of the wants and tastes of the pilgrims. Many traders and idlers besides the slave-merchants go no farther than Jeddah, and the nearest market for their wares. They go for lucre and pleasure, and care little for the mummeries of the Mahomedan zealots. Dr. Parkin does not allude to the conveyance of cholera from Persia in various other ways. The so-called Syrian caravan starts from Constantinople, passes down through Asia Minor to Damascus, and from there to Medina and Mecca. The principal Persian caravan comes from Teheran, Koom, &c., to Bagdad, Hillah, and thence also down to Medina and Mecca. While only fifty thousand come by boats and the sea, nearly one hundred and fifty thousand come by land to Mecca, with the Egyptian, Syrian, Bagdad, and other caravans. On page 191 he says: "The epidemic only pursued in 1865 the route it has invariably followed, namely, from south to north. We (Dr. Parkin) never hear of its following the opposite course!" It would be impossible to express a more erroneous view of the travels of cholera than is conveyed in these few words. Dr. P. continues: "Malta was attacked June 20, quarantine having been established on the 14th." But he has admitted that the first cases occurred in Alexandria on the 2d; and adds, "Previously to this, however, between June 1 and 14, thirteen steamships arrived at Malta from Alexandria, the majority laden with pilgrims for other places while a certain large number landed at Malta;" showing that the disease was imported before quarantine was established. P. 192: "The epidemic commenced at Marseilles in the beginning of June, and was ascribed to the arrival of the Stella, with sixty-five pilgrims bound for Algiers. The infection, (p. 193,) therefore, could not have been conveyed to Marseilles by the pilgrims!! It spread through the south of France, and was acknowledged at Paris October 13," *i. e.*, several months after its actual outbreak.

P. 194: The first place attacked in Spain was Valencia, July 3, on the east coast; "which town could have had no direct communication with Alexandria, or other infected port!" But Macnamara (p. 212) and the Constantinople report say: "The first case was a Frenchman, who arrived at Valencia from Alexandria via Marseilles. It next spread to the inmates of the house in which he died; and, from this and other cases, did not cease until eleven thousand inhabitants were attacked, of whom five thousand one hundred died." Dr. P. also says "it could not have been conveyed to Toulon," although so near Marseilles; but the first case was in an arrival from that place.

Dr. Parkin's account of the outbreak in Southampton is equally erroneous. On page 196 he says: "There were no cases of cholera on board the regular steamers at the time of their arrival at Southampton, and it does not appear that any one landed suffering from diarrhœa." Even Dr. Wiblin, the health-officer, was deceived, and asserted, "from the most careful inquiries, he was unable to ascertain that any cases of cholera or diarrhœa were landed at the port of Southampton." However, Professor Parkes, who was sent by the English government, states "that, during June, July, August, and September, there can be little doubt that steamers ran into Southampton after having had cases of cholera on two occasions, and of diarrhœa in three, on board during the voyage from Alexandria. The crews of these vessels dispersed over Southampton and its neghborhood. Dr. Miller, the surgeon of the Ellora, had thirty-one cases of acknowledged choleraic diarrhœa on board; and as many more were afterward found to have concealed their condition in order to escape detention at quarantine. One of them died of cholera in his own house in Southampton, but only after his

little son, to whom he had given it, had succumbed. Hence, although the disease was imported, the first fatal case occurred in a resident. The third fatal case was a laborer employed on the mud-engine, but who lived in a house with three sets of lodgers; the only privy being also common to seamen, the frequenters of the theatre and brothels only a few yards off. Choleraic diarrhœa prevailed largely in Southampton, and several of the earliest cases of fatal cholera were in the wives of the men who had worked in the repair-yard where eleven Alexandria vessels, among them the Ellora, had been overhauled July 11th. There was also an outbreak of severe diarrhœa at this yard, which lasted till the middle of October. No such extended outburst had ever before been known during the seventeen years that the yard had been open. (Mr. Simon's report for 1865, p. 428.) In Southampton the fatal cases were only distantly connected together by long lines of choleraic diarrhœa. Some time afterward it was discovered that the ship Poonah had arrived, June 10, having lost a man from cholera the previous day. As the disease was not yet reported at Alexandria, the crew and passengers were landed without detention. It is stated that twenty-three Alexandria vessels arrived before cholera fairly broke out in Southampton.

Much light was thrown on choleraic diarrhœa at Malta during the epidemic of 1865 by Drs. Adams and Welch, (*British Army Medical Reports, vol.* 6.) There had been no prevalence of bowel-complaints till after the arrival of the pilgrim-ships from Alexandria. Then three forms commenced to prevail:

1st. What appeared to be the common, ordinary summer diarrhœa, marked by pains in the bowels, foul tongue, and numerous bilious stools. This seemed to be caused by the hot weather, imprudence in diet, spoiled fruit, and bad habits, but was easily controlled.

2d. A new form of diarrhœa, with painless, watery purging and vomiting with exhaustion. It occurred in every form of intensity, and when severe was clearly choleraic diarrhœa. It could not be checked by treatment, but never passed a certain point, or became fatal or malignant.

3d. There was another form, which merely seemed an intensification of the second variety, but so completely intractable that in sixty-one cases where every possible attempt was made to check it, in none did it succeed. It was invariably followed by the full development of cholera.

The second variety showed no tendency to run into fatal cholera, with collapse, while the third form could not be prevented from so doing. Drs. Adams and Welch say it may be fairly questioned whether a single case of it was prevented from developing itself into cholera by treatment.

Dr. Parkin says: "With the exception of Paris and Southampton, this seems to have been the boundary of cholera northwards in 1865, with one reservation. The disease broke out at Altenburg, about twenty-four miles from Leipsic, but did not extend beyond. (?) Perhaps the contagionists will be kind enough to inform us [Dr. Parkin] why so infectious a disease was confined to this single spot, the inhabitants not having been placed in quarantine, and no wall having been built around the town." The answer is very easy. It did extend beyond Altenburg, and very promptly; and formed a zone of cholera through which the Prussian armies had to pass the next year on their way down towards Austria, with the most disastrous consequences; for the disease followed them into Bohemia and Bavaria, and returned with them, after their wonderful six-weeks' campaign, into Northern Germany, to which

it had also come, over the well-known and oft-traveled route from Odessa to Kief, and Poland, and along the Vistula and Oder to the Baltic. The whole story is a thrice-told tale, but has to be repeated for the sake, not only of Dr. Parkin, but of many other polemists. On June 28, 1865, when neither cholera nor premonitory diarrhœa existed at Constantinople, an Ottoman frigate, the *Muchbiri Surur*, arrived in that port, having left Alexandria on the 21st. She landed twenty-one men suffering from cholera, and the outbreak soon commenced. From Constantinople it was carried due east across the Black Sea to Trebizond, in the southeast corner, down to Erzeroum, by a party of laborers arriving from Constantinople, and then was impelled towards Persia, in the line of the pilgrims to Damascus, Bagdad, and Mecca.

No cholera existed in Odessa before the middle of July, when cases were taken into the lazaretto from the ship Concentrino and* vessels arriving from Constantinople, and its development was observed with great exactness, which had not often been previously the case at Odessa. A custom-house agent, Gonline, serving in the lazaretto was attacked, carried home, and from there to the hospital, where he died. His wife, son, and servant were next attacked. A similar train of consequences followed in another case. The wife of a German workman left Odessa on August 16 for Altenburg, in Saxony, with her child suffering from diarrhœa. In nine days the child became worse; the mother being in perfect health on the 27th, when she was attacked, and died on the 29th. Next the child died, and a sister-in-law on the 30th. Then an epidemic commenced, which killed 2 per cent. of the Altenburgers. The family of a workman, who had died at Altenburg on September 13, imported the disease into Werdau, and an outburst commenced in the heart of Europe. We believe we are in possession of a large majority of all the official reports which have been published on the epidemics of 1865, 1866, and 1867 in Germany. From Gunther's report (Leipsic, 1866,) we learn that cholera broke out in twenty-six places in Saxony in 1865. His conclusions are that cholera was first imported into Altenburg from Odessa, and that in the majority of towns in which the disease subsequently occurred, a communication between the initial cases and infected places and persons was proved. From L. Pfeiffer's reports, (Weimar, Munich, and Jena, 1868 and 1871,) we learn that in 1865 importation was proved in 60 per cent. of all the cases. In 1866, when cholera had been spread silently during the winter, it could only be traced in 36 per cent.; but that accounted for eighty-four towns and villages, and the individual cases amounted to hundreds. At the outbreak of the Austro-Prussian war, no cases of cholera had been reported in the Prussian army in Saxony up to June 4, 1866. The Saxons, with true patriotism, attributed their cholera, which had been in existence for nearly a year, from the Odessa-Altenburg importation in 1865, to the Prussians who came in 1866; declaring that the Prussians brought it down from Konigsberg, Stettin, and other places on the Baltic. But all accounts agree that the Prussian army became affected in Saxony, and carried the infection down into Bohemia and Bavaria, where they handed it over to the Austrians and Bavarians. It returned over the same infected places at the end of the short war, and then the disease assumed its largest proportions; extending from the borders of Russia to the Rhine, surging up to the Baltic again, involving Holland, and spreading to England. From Liverpool it was carried over to Dublin in such a visible way, and all the points in the chain of connec-

* Dr. Fr. Ilisch's Untersuchungen über Entstehung und Verbütung der Cholera. St. Petersburg, 1866.

tion were so clear back to India, that Dr. Houghton was obliged to exclaim, "If we possessed the requisite knowledge, the disease could always be traced backwards in lineal descent to its origin in some poor Hindoo on the banks of the Ganges, as certainly as the pedigree of a horse or dog of repute can be followed to his remote ancestors."

ODESSA-ALTENBURG EPIDEMIC OF 1865.

This small epidemic, which was destined to bear such terrible fruits in 1866, was confined to a space of thirty-eight square miles, in the most densely populated province of Saxony, near Leipsic. According to Gunther's official report, (Leipsic, 1866,) one death occurred in August, forty in September, one hundred and seventy-five in October, one hundred and sixty-eight in November, and eighty-four in December, when winter checked the outbreak. All the streams in the infected neighborhood finally empty in the river Elbe. The drinking-water of Altenburg was not good; it often became turbid, and was loaded with lime-salts. The town had thirteen hundred and fifty houses and eighteen thousand inhabitants. The dwellings of the poorer classes had small court-yards, with large dung-heaps, and the drainage from them generally ran under the houses. The privies were usually small boxes placed over one edge of the dung-heaps. The little creek which runs through the town was loaded with offensive impurities.

The first death in Altenburg was a woman who had traveled nine days and nights from Odessa, on August 29. The little creek, before spoken of, ran just before her house. The second case was in a scrubbing-woman living some distance off, on the bank of this offensive stream; the third, was a woman in the same house, whose two children were sent to a sister's at some distance, where one of them soon sickened and died. Then one of the sister's children was seized and died; next the sister and her husband, who both recovered. Then two more cases took place in the second infected house, but recovered. The succeeding two cases occurred near the railroad-bridge under which the foul creek flowed. Next, three cases were brought to the hospital from another house similarly situated. Finally there were seventy deaths in forty-five houses, viz, one each in twenty-eight houses, two each in eight houses, three in four, four in one, and five deaths each in three houses. At the end of the outbreak, twenty-nine cases and sixteen deaths also occurred in the almshouse. Soon after the commencement of the epidemic a very large number of mild diarrhœas were noticed, as if the lateness of the season, or other causes, or the small quantity of the poison which had been imported merely sufficed to produce choleraic diarrhœa, and only occasionally fully developed cholera. The next affected village, Rasephas, was near by, and the disease was introduced by a market-woman from Altenburg, who died September 13. In three days her husband was attacked and recovered; in six days more her daughter died in fourteen hours; two days after, the mother-in-law; then a son was seized and recovered; a daughter who had been sent away for safety was attacked and sent to the hospital, where she died on the 26th; on the 27th the woman who washed the bodies; on the same day, the nurse, who also acted as washerwoman; and on the 28th, the cowherd of the family. Six houses, out of the thirty in the village, were involved, with one death each; two in two, and five in one house. The next place where it appeared was Werdau, with seven hundred and seventy-four houses, and ten thousand five hundred inhabitants. The initial case, on September 17, was the infant of a man who had died of

cholera on September 12, in Altenburg. The second case was the washerwoman, living three doors off, who washed the soiled clothes of the dead man, which the widow had brought with her. The next two deaths occurred in a house to which other children of the widow were sent; and the following three were children of her sister-in-law. The next two cases could not be traced to exposure to the disease, but, as some of the fatal cases had succumbed without any medical help or report to the authorities, the disease may have been silently diffused in various ways. From the first three infected houses the disorder spread, until one hundred and fifty houses, with two hundred and sixty deaths, were involved, viz: one death each in ninety-six houses, two in twenty-five, three in eighteen, four in four, five in three, seven in two, and eight in one house only. Here in the heart of civilized Saxony, in a town with over ten thousand inhabitants, we find the widow of a man, lately dead of cholera, coming from Altenburg with her deceased husband's soiled clothing, which she hands over to a washerwoman, who dies; her one infant quickly succumbs without medical assistance or the knowledge of the authorities; her other infected children are sent to her neighbor's and sister's houses and there start epidemics. Seven deaths are immediately traced to this careless widow, yet she had not a vestige of the disease that was reported. At the next town, Zwickau, with one thousand two hundred houses and twenty-two thousand five hundred inhabitants, the so-called first case occurred in the person of a laborer's daughter, aged twelve years, on the outskirts of the town, near the railroad station, where no importation could be traced without more trouble and intelligence than was expended upon the matter. But it was soon discovered that her younger brother had died five days before of the same affection. The house was light, dry, and airy; the privy was a primitive board affair over the cattle dung-heap; but the most careful investigation elicited no exposure, except, doubtless, at the railroad, and no imprudence in diet or conduct was discovered. These cases were supposed to be, undoubtedly, spontaneous in their origin. In fact, the origin of none of the cases in the town was discovered; for, singularly enough, the initial cases all happened among children from nine to eleven years of age and upward, while their mothers and fathers became afterward affected. In the fifth place attacked, Marienthal, with one hundred and forty-six houses and one thousand and seven hundred inhabitants, near Zwickau and Werdau and in constant communication with them, the importation of the disease was not detected; but there were only five fatal cases, each in a separate house. The sixth town in order, Glauchau, with one thousand three hundred and seventy-five houses and nineteen thousand two hundred and ninety-six inhabitants, six miles from Zwickau, and ten from Altenburg, cholerine commenced in September, and was benign and tractable in October and November, but gradually increased in severity, until the first fatal case occurred, on November 27. Some weeks previously the sister of this patient had come sick from Altenburg, and had cholerine for two and a half days, when she went on to Dresden; and six days before his death he was also visited by a friend from infected Werdau. During the next three days three new cases occurred in distant parts of the town, not traced to importation. At this late period of the year, only twenty-seven infected houses, with thirty-two deaths, were recognized, among which there was one death each in twenty-two houses, and two in five houses. The seventh important place which was involved was Elsterberg, on the River Elster, which runs down to Leipzig. It had three hundred and five houses and three thousand five hundred and fifty-seven inhabitants. Cholerine, typhoid fever, and dysentery were preva-

lent up to November 25, when the first fatal case of cholera occurred; which could not be traced to importation. A woman living in the same house sent one of her children to a distant relative, where it also died; and moved herself with two more children to another distant house, where all three died. The corpse-washer who attended to them also died. Then two rooms in the poor-house were set aside for cholera-patients and the clothes of all were cleansed and disinfected there. The succeeding cases occurred in an adjoining house below it, followed by other cases in the originally affected dwellings. But the disease gained a footing in thirteen houses only, with twenty-eight deaths; with one death in each of five houses, two in six houses, five in one house, and six in another.

From these seven towns the disease spread to eighteen small villages. In the first, the only fatal case occurred on the banks of a little stream running down from Altenburg. In the second, it was imported from Altenburg, where a daughter had been attacked but recovered. Her mother, to whom she brought it, died. In the third village a little girl had been sent from Altenburg to her grandmother's, from a house in which six had died of cholera. She was attacked on October 3, removed home, and recovered; but her grandmother, to whom she had been sent, died. In the fourth hamlet the initial case was one from Altenburg. The fifth place was Leipzig, with eighty-five thousand inhabitants, in which the initial case was a washerwoman; but no connection with any other was traced. In the sixth village the first fatal case was the wife of a pack-carrier; but no importation was discovered. In the seventh village the first attacked was a railroad-laborer from Altenburg. His wife and two children sickened and recovered; while her babe was not afflicted. In the eighth hamlet the first fatal case was a girl from Werdau, followed by her mother. In the ninth village two fatal cases were imported from Werdau, and the corpse-woman who washed their bodies, was the first victim. The second case had shared the bed of a cholera-patient in Werdau until death. In the tenth village importation could not be proven. In the eleventh village a woman and her child came from a cholera-house in Werdau. They were both attacked and sent back; but their visit was followed by six cases in their house and the next one. In the twelfth village the initial case ate meat from an infected house in Werdau, and the corpse-woman also died. In the thirteenth village five cases occurred in the poor-house, in which refugees were received. The mother of three of the children who died, recovered. Importation was not proven; neither was it in the fourteenth village. In the fifteenth village the outbreak was preceded by cholerine, but the first fatal case was imported from Glauchau; in the sixteenth, from Elsterberg. In the seventeenth no connection was discovered. In the eighteenth there was importation from Glauchau. These were the twenty-three towns and villages near or through which the Prussian army had to pass next year, after cholera had recommenced in Altenburg, Zeitz, Weissenfels, Merseburg, Leipzig, and Halle; all in the immediate neighborhood of Leipzig. According to Pfeiffer's official report, (Jena, 1871,) in Halle, which is the nearest city to Prussia, there was diarrhœa during the winter, with choleraic diarrhœa and mild cholera. In May there were two deaths. In June and July there were sporadic cases in isolated parts of the city, and in August, over the whole town. But Halle attributed her cholera to the Prussians, who brought back many sick and wounded with them from Bohemia, among whom diarrhœa and cholerine were common. The number of medical men and nurses who were attacked in Halle was remarkable, as well as in the stationary Prussian garrison; while the wounded and returning troops suffered much less. Buildings

with bad privy-arrangements suffered most; next, badly-ventilated houses, and those which were new and damp. Halle is on the river Saale, below Merseburg and Leipzig, and seems to have been more affected than either of these cities, from which it receives much drainage, as well as from all the previously-mentioned places; so that water-pollution seems to have occurred. Three deaths occurred in sixty-six houses each, four in thirty-eight, five in eighteen, six in nine, eight in four, nine in two, and thirteen and sixteen fatal cases each in one house. The Halle prison had always suffered severely in every epidemic. The cholera-wards were over the privies, and after the first imported case occurred, the second, third, and fourth attacks happened among prisoners; the fifth, sixth, seventh, eighth, and ninth cases were in women who washed the soiled clothes; the tenth was an overseer of the laundry. Finally all discharges and clothes were disinfected and no more cases occurred in the wash-house. All the prison officials escaped. In September, when the disease had almost disappeared, the privies were emptied, and a new outbreak ensued. The water-closets of the officers were separate from those of the prisoners. One of the city sewers passed under the prison, and all the kitchen and privy drains emptied into it, so that the house was often filled with sewer odors. In the lunatic asylum the male wards were affected, but not the female; in 1850 the opposite had been the case. The drainage of the latter had been improved, and better drinking-water had been introduced. The orphan asylum again escaped, as it had in every previous epidemic. It is seated on a hill, all the privies are outside the building, The water is the best in Halle, and imported cases were not prolific. The contagiousness of the Halle cholera of 1866 is said to have been decided; eight physicians out of sixty-one were affected; three died. The nurses were attacked in numbers. The importation of the disease was accomplished by persons and clothes, especially when the latter had been laid aside for a few days. In Querfurt, near by, there were two hundred and sixteen deaths from cholera. In Naumburg, where the privies and dung-heaps were offensive, and the pump-water bad, the disease spread readily all over the town. The best houses escaped. Disinfection was carried out in the most thorough manner, but did not seem to neutralize the filth and bad water. In the whole of Saxony in 1866, there were six thousand seven hundred and twenty-four deaths from cholera, in three hundred and twenty-nine different places. In Leipzig there were twelve or fifteen massive importations of cholera before a decided outbreak occurred. On June 24 a Prussian troop came from Stettin on the Baltic, with cholera, and put forty sick with it into the hospital. Only one washerwoman and one tavern servant were affected, and then the disease ceased among the troops. The second importation came with Prussian soldiers from Stralsund and Kustrin, near the Baltic; many were put into the hospital, but only a few cases occurred among the towns-people. Several other times was it brought in July and August, but it was only in the middle of the latter month that the pestilence gained headway. Then, as all the well-appointed barracks were filled, a regiment of black hussars had to be quartered in dirty parts of the city. Several cases soon occurred among the hussars in one house, from which the disease seemed to spread. The effects of subsequent importations could not be traced among the inhabitants. From June 29 to November 21, one thousand seven hundred and eight deaths occurred. Of these twenty lived in cellars; two hundred and forty-three on the first floor; eight hundred and fifty-six on the second floor; three hundred and twenty-seven on the third; two hundred and eighty-one on the fourth;

one hundred and fifty-eight on the fifth; and fifteen on the sixth story. Of eight hundred and fifty infected houses, four hundred and ninety-four had only one death, one hundred and ninety-five had two each, thirty-eight had four, twenty-two had five, two had six, five had seven, three had nine, three had ten, two had eleven, two had fourteen, and one house each had twelve, fourteen, sixteen, eighteen, and twenty-eight deaths. One hundred and forty-six families had three hundred and forty-six deaths, or more than two each. Leipzig had generally escaped cholera; previously the disease had only reached it in 1849 and 1850, with three hundred and six, and three hundred and twenty deaths respectively. In 1866 cholera was exported from Leipzig to sixteen towns and villages; and sixty-one districts out of one hundred and four finally became involved. The outbreaks were often traced to diarrhœal cases which did not die.

Dresden had always escaped cholera, but in 1866 it was said by the citizens to have been imported by fort laborers from Berlin, and troops from Prussian Pomerania, and again, and more severely, on the return of these troops from Bohemia and Moravia. Notwithstanding the enormous masses of imported disease, no great outbreak occurred, and only fifty-seven deaths. In eight other towns single cases only happened; in three, none, although large numbers of affected troops marched through and quartered in them.

Erfurt, to the west, with forty thousand inhabitants, had had five epidemics, viz, in 1832, 1849, 1850, 1855, and 1857. In 1866 it had two thousand six hundred cases. The Erfurters claimed that the city was infected from Berlin and Leipzig, and also seventy-two places in the neighborhood. The first fatal case in Erfurt was a lady from a cholera-house in Berlin. The woman who waited on her died, and the servant who helped the latter. Narrow, dirty streets with many privies suffered most.

Gotha, like Weimar and Appolda, were attacked in 1866 for the first time. It was imported into Gotha from Erfurt. To Weimar it was brought from Berlin and Leipzig; but among fourteen thousand inhabitants there were only seventy-three deaths. In Appolda, with eight thousand inhabitants, two hundred deaths. On page 115, Pfeiffer gives a list of cases produced by soiled clothes in various places. In Leipzig sixty-two laundresses were attacked and twenty died. At various points in Saxony one thousand two hundred and three died on Sundays, one thousand three hundred and thirty-eight on Mondays, one thousand two hundred and sixty-seven on Tuesdays, one thousand two hundred and fifty-nine on Wednesdays, one thousand one hundred and ninety-three on Thursdays, one thousand two hundred and thirty-three on Fridays, and one thousand one hundred and thirty-six on Saturdays. September was the most fatal month.

This dispute between the Prussians and Saxons will doubtless never be settled. In the official report of Dr. Delbrück (Halle, 1867) we learn that there were choleraic diarrhœas for weeks and months before the Prussians reached Halle, and one fatal case in town and another in the prison in May. In July it was well established, and persisted until September 21, when it seemed about to cease, but again broke out and continued up to November. In July there were twelve deaths; in August, one thousand and eighteen; in September, three hundred and forty-six; in October, one hundred and eighteen, and in November, eleven. In the prison, among seven hundred persons, there were three hundred and thirty-three cases of diarrhœa, seventy-one of violent cholerine, eighty-nine of cholera, and thirty-three deaths. Dr. Delbrüch thinks that the disease was intensified by the Prussians, but not caused by them alone. On their first

march through they had no cholera, but on their return from Bohemia they had much diarrhœa, and some cholera. The returning troops seemed to be saturated, and proof against the infection, while the stationary garrison and the whole of the medical staff and nurses of the hospitals were heavily attacked. The garrison did guard-duty at the hospitals and prisons, and seemed to convey the disease from one to the other, and to infect the privies of both. Ground-water had no influence, but the parts of the city supplied with water from the river Saale, which was much polluted by drainage from the town, suffered most. One district had separate and better water, and almost escaped until October, when the pipes burst and water was supplied from the filthy river, in consequence of which a severe outbreak occurred. The orphan asylum had its own pure water, and escaped as it had in five previous epidemics. Men working in mud-scows near the foul water-works suffered heavily and continuously. One-twentieth of all the houses had eight-twentieths of all the deaths. In one hundred and thirty-nine houses there were five hundred and ten deaths; sixty-six houses had three deaths each, thirty-eight had four, nine had six, three had seven, one had eight, two had nine, one had thirteen, and one had sixteen deaths; the rest had two and one death each.

Stettin has been charged with sending cholera down with Prussian troops into Saxony, and in reality we find from Dr. Goeden's official report (Stettin, 1867) that the first fatal cases occurred on May 19, in the person of a railroad laborer and his daughter. Next, three soldiers were attacked. Up to October 9 there were two thousand three hundred and seventeen cases and one thousand six hundred and eleven deaths among sixty-five thousand civilians; and by November three hundred and eighty-seven cases and one hundred and forty-one deaths among the troops, numbering five thousand. In the suburbs, seven hundred and thirteen cases and four hundred and eighty-four deaths. Laborers and servants had nineteen hundred cases; hotel and liquor-shop people, forty-one; bakers, thirty-eight; butchers, eighteen; coachmen, thirty-nine; officials and policemen, one hundred and fifty-five; sailors, one hundred and thirty-four; leather-workers, one hundred; tailors, sixty-seven; and merchants, seventy-seven. These suffered most heavily. Up to 1866 Stettin had had twelve epidemics of cholera, and less information is afforded by it than any other city except Hamburg. Taking cold was regarded as the principal cause. The first epidemic commenced August 23, 1831, and lasted sixteen weeks, with three hundred and ninety-two cases and two hundred and seventy-five deaths. That of 1832 lasted from September 28 to November 10, with one hundred and fifteen deaths. That of 1837 commenced August 10 and lasted ten weeks, with three hundred and fifty deaths. That of 1848 lasted twelve weeks, from August 8, with one thousand one hundred and twenty-two cases and five hundred and ninety-five deaths. In 1849 there were one thousand one hundred and sixty-two cases, with six hundred and forty-three deaths, from June 14 to September 27. In 1850 there were sixty-nine cases in ten weeks, from August 30; in 1852, one hundred and eighteen cases in nine weeks, from September 12; in 1853, one thousand two hundred and fifty-one cases and nine hundred and forty-nine deaths, from July 13 to October 31; in 1855, in fourteen weeks, from July 21 to October 30, eight hundred and one cases and four hundred and seventy-eight deaths; in 1857 a few cases; in 1858, from October 19 to February 15, 1859, fifty-eight cases; in the second outbreak in 1858, from August 20 to February 15, 1859, two hundred and seventy-three cases. In these thirty-five years there were twelve epidemics in this dirty town, with nine thousand cases and six thousand

deaths. As the authorities had not the slightest idea of infection or disinfection, or water-pollution, the disease had its own way. The outbreaks of 1831, 1832, and 1837 were traced to importation; also those of 1853, 1858, and 1859. Those of 1855 and 1866 were supposed to have arisen spontaneously. Among the proofs of spontaneous origin the folowing instances are given, (p. 39:) "When there was no cholera in Stettin, a lady came from a neighboring place to her sister's house to recruit from the bodily and mental distress occasioned by witnessing the deaths, and nursing two of her sisters who had died of cholera. Five days after her arrival her sister was attacked; two days after, the servant-girl who waited upon her, and finally the refugee herself. All three died." Dr. Goeden believed that the disease originated with the sister living in Stettin; that next her maid developed it; and finally the sister who had come from nursing two fatal cases of cholera. Again, a cowherd came to Stettin from a place where cholera was prevailing. He sickened in three days, and asked to go back home, where he soon died of cholera. Three days after his departure, three persons who had slept in the same room with him in Stettin became ill, and all died of cholera. Dr. Goeden believes that the cowherd, coming from an infected place, contracted the disease spontaneously in Stettin, and his three room and bed-fellows also. Stettin will probably be affected to the end of time. It is sufficient to add that Stettin is situated at the mouth of the river Oder, to which the disease is flooded down from Poland; and that it is easily imported from Russia, Norway, Sweden, Denmark, all the Baltic towns, Hamburg, and Berlin, and other places.

Berlin was also charged with having sent down cholera into Saxony in 1866, when we have seen that it had been present in the latter since August, 1865. There had been no cholera in Berlin since 1855, (see official report by Dr. E. H. Müller, Berlin, 1867,) except eighteen cases in 1857, and seventy-two in 1859. There was one suspicious, though not fatal, case on May 7, 1866, but there had been numerous attacks in the neighboring province of Pomerania, (in which Stettin is situated,) on the river Oder, and on the Finow Canal, which connects the Oder with the river Ravel, which joins the river Spree at Berlin. Attacks and deaths began to prevail more and more upon the boats and barges arriving at Berlin. The first fatal case in Berlin occurred June 7, in a sailor coming from Oderburg, on the Oder, but it was not reported for some time. On June 14 there were two more deaths; then it gradually increased to July 18, when there were two hundred and fifty-one attacks in one day; and then slowly subsided to November 17, when the last case was reported. The first cases were generally, but not exclusively, imported ones. The second and third cases could not be traced to infection; the third was a child two and a half years old, on board an Oder boat; the fourth, the owner of another boat; the fifth was the father of the third case; the seventh a boatwoman; the eighth a lad working at the ship-yard; the ninth and tenth were boatmen. But a connection between these fatal cases, one with another, could not be traced, especially as the most of them were new importations.

There were eight thousand one hundred and eighty-six cases in 1866 in Berlin. One thousand one hundred and one took place on Sundays, one thousand two hundred and three on Mondays, one thousand one hundred and thirty-eight on Tuesdays, one thousand two hundred and forty on Wednesdays, one thousand two hundred and eighteen on Thursdays, one thousand one hundred and forty on Fridays, and one thousand one hundred and forty-six on Saturdays. Dr. Müller thinks that the excess of cases on Mondays arose from the fact that the Sunday-cases are not

reported promptly, and not from Sunday dissipations. In three thousand five hundred and thirty-nine cholera-houses, only one death each took place in one thousand seven hundred and eighty-four houses, two in seven hundred and ninety, three in three hundred and ninety-seven, four in two hundred and thirteen, five in one hundred and forty-three, six in seventy, seven in forty-two, eight in twenty-seven, nine in twenty-six, ten in seventeen, eleven in nine, twelve in six, thirteen in seven, fourteen in four, fifteen in two, sixteen, seventeen, eighteen, nineteen, twenty-one, twenty-eight, thirty-two, forty-three, and fifty-four deaths each in one house. Seven per cent. of the deaths took place in cellars, 22 per cent. on the ground-floors, 28 per cent. in the second stories, 22 per cent. on the third floor, 15 per cent. on the fourth, and 4 per cent. in garrets, owing to the smaller or larger number of inhabitants on each floor.

Königsberg and other Baltic towns were also charged with sending cholera down to Saxony. There had been no cholera in Königsberg since 1860. Saxony, France, Belgium, and Holland were infected in 1865, and the whole south of Russia. The first death in Stettin was on May 19; in Berlin and in Breslau on the Oder on June 14, in Leipzig on June 29. In Königsberg on June 22 the first case was in the person of a Polish Jew, and the third, also, on the 28th. The soldiers and Austrian prisoners were not attacked until July 4. Danzig was not involved before July 8. Of the first twenty-five cases, seventeen were fatal. Up to October 21, five thousand five hundred and forty-three cases and two thousand six hundred and seventy-one deaths occurred. On Mondays there were nine hundred and four *attacks*; on Wednesdays, eight hundred and fourteen; on Sundays, eight hundred and three; on Saturdays, seven hundred and eighty-six; on Tuesdays, seven hundred and seventy-six; on Fridays, seven hundred and forty-three; and on Thursdays, seven hundred and seventeen. On Tuesdays there were four hundred and thirty-seven *deaths*; on Sundays, three hundred and ninety; on Mondays, three hundred and eighty-eight; on Thursdays, three hundred and seventy-three; on Fridays, three hundred and seventy-two; on Wednesdays, three hundred and seventy-one; on Saturdays, three hundred and forty. Königsberg had had twelve epidemics of the disease, viz: in 1831, 1837, 1838, 1849, 1852, 1853, 1854, 1855, 1856, 1857, and 1859. In the outbreak of 1866 they finally discovered that high parts of the town, supplied with pure water, had generally escaped, while all the streets and places most frequently and severely attacked had a very impure supply. The place with the best water had one hundred and twenty-two attacks in every ten thousand inhabitants; that with the worst had seven hundred and seventy-seven. There were only two parts of the city with less than two hundred and fifty, three more with less than four hundred, two with under six hundred, three with less than seven hundred, and seven with over 700 cases in each 10,000 inhabitants. The foul water of the river Pregel and of the surface-wells was credited with the majority of deaths. Königsberg has generally succeeded in tracing her epidemics to importations from Poland, along the Vistula, and from Russia, both by land and sea. Still some of them, as usual in all large cities, were involved in obscurity. The first detected victims at times were residents, not strangers, but they had come in contact with choleraic diarrhœa in some form. Dr. William Budd threw much light upon this point and upon the capriciousness of outbreaks in hospitals. *

A work-house in an open country, on high ground, contained seven hun-

* Asiatic Cholera in Bristol in 1866. By William Budd, M. D.

dred and fifty paupers. A woman brought cholera to it from the city, three miles distant, where the disease was rife. She had choleraic diarrhœa on her admission, and died on the second day. The next day cases began to follow one after another, until, in little more than a week, there were over fifty patients on hand at one time. Within five weeks one hundred and forty-four had died of cholera. The disease was propagated mainly through the agency of ill-constructed privies, which became contaminated by the discharges from the sick, while they were daily resorted to by the healthy. A narrow passage separated two wards, each occupied by thirteen men. In one ward there were seven cases of cholera and six deaths; in the other there was only one case. The men had the same food and water, and breathed the same air, but the inmates of the stricken ward were healthy men, who frequented the tainted privy, while in the other, all were sick and confined to bed except one; the only one who was able to go to the privy was the only one who developed cholera. Early in the outbreak a room, with six sick women in it, was made a cholera-ward. Cholera was thus brought to the six women, and they all died of it. Of two hundred and forty-four women and children who used one privy, many fled; and of the rest, eighty-one, or more than one in three, had cholera, and seventy-four died. In a female surgical ward of nineteen women, six had cholera, and four died; four, who were confined to their beds, escaped; of the fifteen who were able to go to the privy, six took cholera. This seems to explain the curious fact that cholera cases are often strangely scattered over sick wards; those lying next to the sick escaping, while those in distant beds may suffer. In every room, in this work-house, a large proportion of the inmates took the disease; in many wards one-half were affected; in one all died. Now, within a few paces of the spot where the appalling mortality was occurring there were sixteen persons housed in a separate building, who all escaped. They were fed with the same food and drank the same water as their neighbors, who were dying by the score, yet not one had even diarrhœa. They had contagious forms of skin-disease; were closely confined to their rooms; and, in particular, were strictly debarred from resorting to the common privy. There was also almost complete exemption of sixty-six children who lived in another isolated building. They had a separate privy, devoted to their sole use, and which drained into a cess-pool which had no connection with the common drainage of the place; only one case occurred, which was quickly detected and promptly removed; yet their building was very near another, where out of one hundred and twenty inmates, twenty-eight died, and only six were not attacked. The disease was introduced from without; was reproduced by the discharges of the sick; and the rapidity and extent of its spread was due to the fact that so large a proportion of the inmates were brought in close relation with the poisoned air of the privies, which had become the receptacles of the choleraic discharges. If all the circumstances of every outbreak of cholera were investigated with the same untiring energy and sagacity as were displayed by Dr. Budd in this most interesting inquiry, we should soon cease to hear of outbursts of the disease being so mysterious and inexplicable as to justify the Dundreary lament, "that no fellow can understand them."* If we take into consideration that every case of cholera commences as an infectious diarrhœa, which may persist for two or three days, or even as many weeks, we can readily understand how the germs

* Brit. and For. Med. Chir. Rev., July, 1872.

of the disease are spread in various secret and widely-distant places before a fatal case may occur.

To complete the chain by which this cholera reached the United States, we have only to add, that early in 1866 cholera was reproduced in almost all the localities (Macnamara, p. 223) it had visited during the previous year, extending northward as far as St. Petersburg; appearing in several places in Bavaria, Saxony, and Prussia, as well as in Belgium and Holland. It also persisted, during the winter in Paris, extending to the northwest of France, about Brest and Caen. The movements of large masses of troops by Prussia, Austria, and Italy contributed to diffuse the disease, which told terribly on these armies during the summer campaign. We have all the official accounts, some of which detail most curious, subtile, and occult distributions of the disease; but must omit them here. The first case reported in Great Britain, in 1866, occurred at Bristol, in a sailor from Rotterdam. Next, two more deaths were reported in Liverpool among emigrants just arrived from Rotterdam via Hull. On the same day, (May 2,) the Helvetia sailed, with nine hundred and twenty-five steerage-passengers, among whom cholera broke out so severely, that she had to put back. From May 2, cases of cholera were of constant occurrence in Liverpool, but they were called sporadic; and it was not until July 22 that it became epidemic among the citizens; but up to the end of November it carried off one thousand seven hundred and ninety-two victims. The first cases in London occurred June 26, in a family at Bromley. Mr. Radcliffe traced their and other cholera-discharges into the river Lea, near the open reservoirs which distributed drinking-water to London; and seventy-two out of every ten thousand who drank of it were carried off by cholera, while only eight in every ten thousand suffered who had better water.

From 1854 until 1866, North America enjoyed a remarkable exemption from Asiatic cholera. Twelve years of security from this scourge was passed, but they were years of value to the cholera-student. Reference has already been made to the various theories which called out the queries of Dr. Wynne in relation to the epidemics of 1848 and 1849, and which are equally applicable to all other epidemics of the same disease. We quote from page 77: "Shall we consider the disease as eminently contagious, and as having been brought into the ports of New York and New Orleans by the emigrant-ships New York and Swanton, and from thence disseminated by the same agency along the great lines of travel through the length and breadth of the North American continent? Or shall we suppose that in its inscrutable progress from the east to the west it was wafted by the atmosphere over the wide expanse of water which separates the eastern from the western continent, and arrived at New York and New Orleans simultaneously with the two vessels leaving the same port under a remarkable identity of condition? Or shall we look upon it as a disease of indigenous origin to every place where it appears, and dependent upon a combination of circumstances connected with the localities which it desolates, which we can at least partly explain and almost entirely prevent?" And upon page 92, after summing up the evidence in favor of the malarial origin of cholera, Dr. Wynne remarks: "In all these circumstances, the adjuncts in the production of cholera are found to maintain a striking resemblance to those which produce malarial diseases. If the question were propounded to me, after the collection of all these facts, Can you tell what is the nature of the cause that produces cholera? I would unhesitatingly reply that *I could not*. But I should give the same answer if I were interrogated concerning the nature of autumnal fever.

It is true, I might reply, in regard to fever, that it depended upon the presence of malaria. But what is malaria? It is the decomposition, under certain known circumstances, of vegetable matter. These circumstances are the presence of air, heat, and moisture. Whenever these elements unite in due proportion, fever is produced; but if either be wanting, malaria is not generated. Hence, during the cold of winter and the dryness of midsummer, we have no fever, but with the decomposed vegetation of autumn, united with the heat and moisture of that season of the year, fevers prevail. Heat and moisture cannot produce fever. It requires decomposed matter, uncleanliness, and filth. These are precisely the circumstances under which cholera makes its appearance, and the reader will have had frequent occasion to observe how much it is under the conjoined influence of elevated temperature and moisture, and how steadily it dwells among filth and uncleanliness."

In the early spring of 1861 the American civil war was inaugurated, and the United States was hurriedly converted into a vast military encampment. In all the cities that had been favorite haunts of cholera in former years, from the Penobscot to the Rio Grande, and from the Missouri to the Atlantic Ocean, troops were collected, and vast armies were concentrated in the worst malarial regions of the United States, the valleys of the Potomac, Ohio, and Mississippi rivers.

It is estimated that during the years of this war the United States Army had in the field an aggregate of 2,335,942 men, or that the mean strength of the armies was about 783,906 men. These troops were in camp, constantly exposed to all the vicissitudes of the campaigns, or were in hospitals where, in spite of the lavish precautions which were adopted, not infrequently all the disadvantages of overcrowding and deficient food were present. Vast numbers of men were transported to and from the scene of active operations upon steam-transports. A very small percentage of the troops were in permanent fortifications. Vast prison-pens were formed, in which overcrowding, bad ventilation, indifferent police, and unsuitable food were present to co-operate with local malarial influences upon the unfortunate prisoners.

The record of the medical history of the war demonstrates that there occurred in the Army of the United States, of diseases of malarial origin, 1,468,410 cases, with 46,310 deaths; of intestinal diseases, 1,765,501 cases, with 44,863 deaths. Among the first are included typhoid, typhus, common continued, typho-malarial, yellow, remittent, the intermittents, and congestive intermittent fevers. Among the second are included diarrhœas, dysenteries, and cholera morbus. Of the latter, during the entire war, there were reported but three hundred and five deaths.

It must be borne in mind that these figures represent but one arm of the United States service. When to these already large figures the statistics of the United States Navy are added, and to this combination are added the statistics of the confederate armies, the mass of circumstantial evidence is overwhelming.

In the very region where it is claimed that every epidemic of Asiatic cholera that has visited the United States from 1832 to 1873 originated "*de novo*," these immense bodies of men were congregated, and the exceeding mortalities occurred; yet, during all those years of bloodshed and suffering, *not one case of epidemic cholera occurred. Why? Because there was none of the specific poison of cholera, which is alone cholera, from which the disease might be reproduced.*

If cholera originated spontaneously among the troops that formed the armies during the Crimean war; if among them there were to be found causes sufficiently potent to cause an explosion of the disease,

why did it not originate among the armies engaged in the internecine American war? It certainly cannot be said that any powerful local influences were present in one case that were absent in the other. Cholera existed and committed the greatest ravages among the Crimean troops, because, in a perfectly legitimate way, in a manner perfectly in keeping with the history of the disease, it was carried into their camps from previously infected localities; and it did not exist in the American armies during the civil war, because it was not then in existence at any point from which it could be conveyed to them.

The theory of spontaneous origin during the Paraguayan war deserves no further notice, as the light which Dr. Rego threw upon it has not yet been obscured.

The American war was concluded, the armies were withdrawn from the field of operations, and, to the admiration of the world, the men of whom they had been composed, returned without confusion or disorder to the walks of private life.

The disbandment of these armies had scarcely been accomplished when cholera appeared in emigrant vessels upon the Atlantic coast of the United States, and the narrative of the epidemic will demonstrate how rapidly and fatally the disease was diffused over the United States by recruits which were forwarded from New York Harbor to that remnant of the grand army, the regular army of the United States.

The introduction of epidemic cholera into North America in the years 1865 and 1866 is surrounded with no mystery or uncertainty. Dr. Peters has shown in the preceding portions of this chapter the advance of this dread disease through Europe.

In the annual report of the Health-Officer of the port of New York, dated December 30, 1865, we find the following: "Up to this date thirty-six vessels from European ports, at or adjacent to which cholera was known or reported to prevail, have been detained in quarantine for observation, fumigation, and purification. Strict surveillance had been kept upon vessels arriving from suspected or infected ports for some time before any case of cholera was by us discovered. In no case has the disease been detected in vessels from any other port except Havre."

The first vessel upon which cholera was detected was the English iron mail-steamer Atalanta. This vessel had three separate commodious steerages. She left London October 10, with twenty-eight cabin and twelve steerage passengers, and a full cargo. On the 11th she reached Havre, where she remained one day, and received five hundred and forty steerage passengers, all of whom were from or had passed through cholera-infected districts. Among these emigrants were two German families who had rested one day at the hotel "City of New York," in Paris, and five days at the Weissen Lomni and Stuttgarder Hof, in Havre. While at these hotels emigrants had been sent from them sick to hospital. October 12, the Atalanta left Havre. October 13, a cholera death occurred in the party from the Weissen Lomni. By the 22d of the month five cholera deaths occurred among the family from the Stuttgarder Hof.

The same day a fatal case occurred in the second steerage. On the 28th, cases occurred in the third steerage, and by the time that the Atalanta reached New York, November 2, sixty cases of cholera, with fifteen deaths, had occurred. Forty-two cases were admitted to the quarantine hospital-ship, eight of which were fatal.

November 26, the Hermani arrived at quarantine, and reported seven deaths upon the voyage. The first of these deaths occurred in a family

who had lost one of their number from cholera at the Stuttgarder Hof, at Havre, prior to the sailing of the Atalanta.

November 20, the steamer Cella arrived from Havre, with three hundred and sixty emigrants of the same nationalities as those already noted, but no sickness was noted as having occurred on the voyage.

December 12, the Mary Ann arrived from Havre. The captain reports five deaths from cholera on the voyage, *but for thirty days prior to arrival no cases had occurred.* (?)

It has been noted as a significant fact that the Atalanta, Mary Ann, Hermani, and Harpsvill had each names on the passenger list which were not among the passengers, but who were reported to have been sent to hospital by the local authorities at Havre.

Cholera existed on the Atalanta for two weeks after her arrival at port. The baggage of the passengers was aired and fumigated in cool chambers, and ten days after the last case occurred they were allowed pratique, and passed up to the city.

There is, however, nothing to show that any precautions were adopted as regards the passengers of the Hermani, Cella, Mary Ann, or Harpsvill.

We, however, learn from the report of the sanitary committee of the Metropolitan Board of Health that, "owing to the coldness of the weather, the disease did not extend" beyond the hospital on Ward's Island, where, at one hospital, twenty-four deaths occurred among convalescents from fever; and from Appendix M to the annual report of the Metropolitan Board of Health we quote the following: "Diarrhœa and dysentery were much more prevalent than in former years, but did not appear of an epidemic or fatal character until the rainy period, which occurred in November, 1865, when it assumed an epidemic or choleraic type. On the 22d of November the first fatal case was recorded, followed daily by others, until the middle of December, when it mitigated, owing, probably, to the favorable change which had previously taken place in the weather, and the sanitary measures then adopted to arrest it. Still it continued in the same building in which it commenced up to the 20th of December, when it entirely ceased." Dr. Ford says: "It was my opinion at the time that these cases were Asiatic cholera; *it is my opinion still*, and their history corresponds with my observation in all past epidemics of this disease which I have witnessed."

It is well to remember that the above was written of the State emigrant hospital, and that the disease occurred in the building devoted to women and children.

The cholera-epidemic of 1866 in North America opened with the arrival in the harbor of Halifax of the steamship England. Upon this vessel fifty fatal cholera-cases had occurred prior to her arrival, and she put into Halifax to obtain additional medical aid. The instance of cholera upon the England having been used by the opponents of quarantine as illustrative of the barbarities arising from the employment of that means of defense against contagious diseases, it is well to reproduce the story.

The steamship England left Liverpool for New York on the 28th of March, with eleven hundred and eighty-five German and Irish emigrants, seventeen saloon-passengers, and a crew of one hundred and twenty-two officers and men. On the 1st of April, a German boy died of cholera. On the 3d of April, the ship experienced heavy weather, and the hatches were battened down for two nights. When the hatches were opened, it was found that another cholera-death had occurred; and when she put into Halifax on the 9th, the surgeon reported one hundred and sixty cholera-cases, with forty-six deaths.

On the 11th, the sick were placed in the Pyramus, that had been converted into a hospital-ship; and the well were landed and placed in tents. On the 13th, it was reported that the deaths were twenty-five a day. The crew and saloon-passengers remained on the England. No sickness among the latter, and none among the crew after reaching Halifax.

On the 18th the England, *having been scraped, scrubbed, and fumigated*, left for New York with eight hundred and seventy-five steerage, sixteen saloon-passengers, and a crew of one hundred and sixteen officers and men. One saloon-passenger died of apoplexy.

A pilot who spoke the England on her arrival, but who would not board her on account of the cholera, but was towed after her, died on the 11th, of cholera, at his home near Halifax; his five children all had the disease, and two of them died.

Seventeen men were sent down from Halifax to clean the England. On the 13th one of these men died of cholera. Dr. Slayter, the health-officer who boarded the England, died of cholera on the 17th. The only cases that occurred in Halifax among persons that had not been in intercourse with the England were one family who had made under-clothing of some material picked up on the shore; in this family four deaths occurred. For the above facts we are indebted to the Buffalo Medical and Surgical Journal.

April 18, the first vessel having cholera on board arrived at New York quarantine; this was the steamship Virginia, from Liverpool, with fourteen cabin and one thousand and twenty-nine steerage-passengers. On the passage thirty-six of the steerage-passengers and two of the crew had died from cholera, and forty-six were ill on arrival; they were transferred to the hospital-ship as rapidly as possible. The subsequent cholera-arrivals are exhibited in tabular form:

Date of arrival.	Name of vessel.	Port of departure.	Total passengers and crew.	Total cholera deaths.
April 18	Virginia	Liverpool	1,153	116
April 20	England	do.	1,324	267
May 29	Union	do.	488	66
May 30	Peruvian	do.	834	115
August 15	Bavaria	Hamburg	386	6
August 16	Johan Martin	Antwerp	129	18
September 6	Gettysburgh	Havre	187	19
September 26	Bellona	London	235	1
October 8	Helvetia	Liverpool	731	44
October 25	Isaac Webb	do.	232	20
October 31	Herschel	Hamburg	289	18
November 7	Yorktown	London	134	4
November 7	John Bertram	Hamburg	479	37
November 7	Floride	Havre	591	50
November 8	Mozart	Bremen	376	12
November 12	Washington	Hamburg	186	19
November 21	Mercury	Havre	480	44
November 28	Jessie	Hamburg	257	16
Total			8,491	872

In the report of the health-officer of the port for the year 1866, it was stated that in every instance the passengers were detained twenty-two days after the occurrence of the last case. This, with the exception of the first four vessels, would have been most difficult to accomplish, and even in the case of the passengers of the vessels excepted would have demanded their detention from April 18 until June 21, which undoubtedly was not done; therefore, even with the precautions adopted, persons exposed to the infection of cholera, and therefore capable of conveying it, must have gone up to the city of New York.

The first cholera death in New York City occurred May 2, at a tenement-house in Ninety-third street, near Third avenue. The second case occurred May 2, in a tenement-house on Mulberry street. The third case was at No. 303 Broome street, in a private, well-kept house. The fourth case washed the soiled clothing of the third case. The fifth case was in a tenement-house on West Twentieth street. The sixth case worked on East River, and lived on Hester street. The seventh case spent a portion of the day before attack in the vicinity of Pitt and Willett streets. The eighth case was an Irishman on Cherry street. The ninth case was a farmer who ate breakfast near Greenwich and Liberty streets before his attack. The elaborate and complete report of Dr. Elisha Harris, to whose indefatigable exertions the United States owes so many sanitary reforms in past years, fails to determine any connection between any of these cases, except the third and fourth cases. But it must be remembered that prior to the occurrence of either of these cases, at least two thousand and ninety-four individuals who had been directly exposed to the infection of cholera at Liverpool, on shipboard and at quarantine, had arrived in New York City; further, that each of these cases occurred in the very portions of the city of New York that are frequented by the classes of the community to whom these emigrants belong. Dr. John Swinburne, who was at the time health-officer of the port, makes a suggestion that throws light upon this subject. We quote from his report: "The question may then be asked, if not traceable to quarantine, from what source did the infection in New York emanate? The answer is simple. Prior to the appearance of cholera in the city, all persons exposed to the disease, either on the passage or in this port, were, as I have already stated, detained during a period of twenty-two days, while others, among whom there had been no appearance of cholera during the voyage, but who came from European ports, where the disease is known to have prevailed, were mingling with their friends in New York in the course of from ten to fourteen days from the date of their probable exposure to cholera."

And this is the probable solution of the problem. The tenement-houses of New York were probably full of cholera-infected individuals and clothing, and but for the prompt and efficient management of the Metropolitan Board of Health; but for the almost universal system of disinfection which was adopted in 1865, and scrupulously continued, the city of New York would, in all probability, have witnessed a most disastrous explosion of the disease.

From the report of Dr. Harris we learn that up to July 8 twenty-one deaths from cholera had occurred in New York City, and that while none were directly exposed to persons or things from quarantine or from the emigrant landing, yet all resided in localities that were frequented by freshly-landed emigrants.

The first case occurred in Brooklyn in the first week in July, and in a locality inhabited entirely by foreigners. This case established the focus of an intense local epidemic.

On the 14th of July the first cases occurred at the emigrant hospital on Ward's Island, and became epidemic.

On the 3d of July the first fatal case occurred among the garrison of Fort Columbus, on Governor's Island, the general recruiting-depot of the United States Army. As from this point the disease was extensively diffused over the United States, we present *in extenso* the report of Assistant Surgeon J. J. Woodward, U. S. A., which is a most elaborate *exposé* of the diffusion of the disease of that year. This report is extracted from Circular No. 5, Surgeon-General's Office, May, 1867.

REPORT ON EPIDEMIC CHOLERA IN THE ARMY OF THE UNITED STATES DURING THE YEAR 1866.

By J. J. Woodward, M. D.,
Assistant Surgeon United States Army.

* * * * * * *

The first reported case of cholera in the Army during 1866 occurred at Fort Columbus, Governor's Island, New York Harbor, on the evening of July 3. The patient was a recruit from the recruiting rendezvous at Minneapolis, Minn., of whose previous history and exposure nothing is known. He had been but three days at the post. About an hour after his admission into hospital another case occurred, also a recruit of unknown previous history. Cholera was at this time prevailing in New York City.

Recruits from Governor's Island carried cholera to Hart's Island, where the first case occurred on the 8th of July. The epidemic becoming severe among the troops at this post, they were moved, on the 20th, to David's Island, where the disease subsequently prevailed to a limited extent among the troops thus transferred. These cases are reported from the De Camp Hospital, David's Island, where they were sent for treatment. A single case also occurred at Fort Schuyler, New York Harbor. The patient was a lieutenant of the First United States Artillery, who had slept on board the steamboat used the day before in transporting the infected troops from Hart's Island to David's Island. No cases occurred in the garrisons of Forts Hamilton, Lafayette, and Wadsworth, the fort at Sandy Hook, Madison Barracks, or Willet's Point, New York Harbor. Moreover, there were none among the officers and men on detached duty in New York City, Jersey City, and Williamsburgh. The total number of cases reported among the troops in New York Harbor was one hundred and eighty-one, with seventy-eight deaths.

On the 19th of July, a soldier died of cholera at the Soldier's Rest, Boston, Mass. This man arrived in Boston, on the morning of the 19th, from Hart's Island, where he had been on duty as a ward-master in the cholera-hospital. No further military cases occurred in Boston.

On the 14th of July, the steamship San Salvador left New York with seventy or eighty cabin-passengers, and sixty in the crew and steerage. She touched at Governor's Island and took on board four hundred and seventy-six recruits for the Seventh United States Infantry. The men were lodged between decks, and were greatly overcrowded. On the second day out cholera appeared among the recruits, and when the vessel arrived at quarantine, near Savannah, Ga., three deaths had occurred, and there were twenty-five ill of the disease. The troops were landed on Tybee Island and a hospital extemporized. Cholera continued to prevail on the island during July and the first few days of August. Altogether there were two hundred and two cases and one hundred and sixteen deaths, including eighteen deserters, reported as having died in the woods of Tybee Island, and one who escaped from the island and died in Whitemarsh quarantine hospital. The cabin-passengers and crew of the San Salvador appear to have escaped, but of the ten white citizens residing on Tybee Island, nine were seized with cholera shortly after the arrival of the infected ship and five died. The tenth fled from the island, and is reported to have died of cholera somewhere in the in-

terior of Georgia. No cases of cholera occurred among the troops stationed in Savannah.

Recruits from New York Harbor arrived in New Orleans on the 8th and 10th of July, others from Carlisle Barracks, by way of New York Harbor, on the 23d. One of these detachments, on the steamship Herman Livingston, brought recruits from Hart's Island, which she left on the 7th.

On the 8th a case of cholera occurred which proved fatal the next day. A week subsequently another fatal case occurred. The vessel arrived off quarantine in the Mississippi River on the 15th and put off two recruits said to have diarrhœa. On the 16th the command disembarked at Jackson Barracks, six miles below New Orleans, where two recruits were sent to hospital with choleraic diarrhœa. The command remained three days in New Orleans, and on the 19th of July embarked on the steamship Texas for Galveston. The first case reported among the troops at New Orleans was on the 22d of July in Company G, Sixth United States Cavalry, stationed at Holmes's Foundery. The patient was a recruit recently enlisted in New Orleans. It is not known whether he had been in communication with the New York recruits. On the 25th of July, a case occurred at Jackson Barracks, six miles below New Orleans. The patient was one of the recruits recently arrived from New York Harbor on the Herman Livingston. A number of cases subsequently occurred among the troops at this post, and in company G of the Sixth United States Cavalry. On the 25th of July, also, a soldier of the Eighty-first United States Colored Infantry, at the Louisiana cotton-press in the first district of New Orleans, was seized with symptoms of cholera, and sent to hospital; he died on the 26th. On the 27th another man of the same regiment, who had been on guard duty at Bull's Head stables, near the levee in the fourth district, was brought into camp with cholera, and died the same day. The disease spread rapidly through the regiment. Cholera already existed among the citizens of New Orleans, and a number of the early victims among the troops were out of camp when attacked, many of them being brought in a state of collapse from hovels in the city. The health-ordinance in New Orleans did not become a law until after cholera had manifested itself, and it is difficult, therefore, to tell when the first cases among the citizens occurred.

In the Seventh, Ninth, Thirty-ninth, and One hundred and sixteenth Colored Regiments, the disease had appeared while on duty in Texas; the large majority of the cases reported in New Orleans, however, occurred in company G, Sixth United States Cavalry, and in the Eighty-first United States Colored Infantry. Altogether ninety-three cases and twenty-four deaths were reported among the white troops at New Orleans, and two hundred and fifty-four cases and one hundred and forty-nine deaths among the colored troops.

The disease was carried to the colored troops at Forts St. Philip and Jackson, below New Orleans, on the Mississippi River, by detachments returning to those places after having been on duty in New Orleans during the riot. The first case appeared on the 10th of August, and during the rest of the month and September there were seventeen cases and eleven deaths.

At Ship Island, Miss., the first case occurred September 8. There was one fatal case among the colored troops during September, and others among the hired men, convicts, &c. On the 17th of August the first case was reported at Baton Rouge, La., in the Sixty-fifth United States Colored Troops. During August, September, and October, there

were sixty-nine cases and forty-three deaths. There was also a fatal case in August, and one during October, in the detachment of ordnance (white) stationed at the post.

The reports do not indicate the mode in which cholera arrived at Ship Island or Baton Rouge.

The first case at Shreveport, La., on the Red River, occurred September 22, in the Eighteenth United States Colored Troops; for nearly a month previously cholera had been reported on the plantations below, and in the city of Shreveport just above the post. During September and October there were eleven cases and four deaths in the command. The steamship Texas, with recruits from Hart's Island, for the Seventeenth United States Infantry, left New Orleans, as already stated, July 19, and arrived at Galveston, Tex., on the 22d. The day after their arrival one of the recruits was attacked with cholera, and died in thirty-six hours. In the outbreak which followed, forty-four cases and twenty-four deaths are reported among the white troops at Galveston, and one fatal case of a colored soldier in the post hospital during August. The subsequent progress of the epidemic in Texas was as follows:

The first fatal case among the colored troops at Brazos Santiago occurred August 21; in all, ninety cases and forty-seven deaths were reported.

Among the colored troops at White's Ranch, the first fatal case was on the 13th of August, ninety-eight cases and thirty-seven deaths being reported during the month.

Among the colored troops at Brownsville, the first case was on the 20th of August, and proved fatal the same day. In all there were ninety-nine cases and fifty-seven deaths reported during August and September. Among the white troops at the same post, the disease also appeared in the latter part of August. The first death was on the 1st of September; twenty-four cases and eight deaths are reported.

Among the colored troops at Indianola, the disease appeared in the latter part of August. The first fatal case was on the 6th of September; thirty-nine cases and seven deaths are reported. At San Antonio, the first case occurred on the 10th of September, in the Fourth United States Cavalry, (white.) The regiment was moving at the time, part of it being in San Antonio, and part in camp on the Medina River, about fifteen miles distant. In the latter detachment three cases appeared from the 7th to the 10th; in the former, two cases on the 11th. The first death occurred September 10. Cholera was prevailing among the citizens of San Antonio at the time, the first case having occurred September 2, at San Juan Mission, about six miles distant; the patient had just arrived from the Rio Grande, where the disease was epidemic. A detachment of the Seventeenth United States Infantry at San Antonio escaped until after it was moved from town, September 16, to camp on the Medina, near the cavalry camp. Cholera appeared in this detachment a few days afterward, however, having apparently been introduced by two Mexican teamsters who came from San Antonio, stopped for the night near the camp, and died of the disease. The total number of cases reported among the white troops at and near San Antonio during September, was three hundred and eighty-seven, with sixty-four deaths.

Among the white troops at Austin, to which place the disease was carried by recruits who arrived by way of Indianola, the first death was on the 18th of September. During September and November twelve fatal cases are reported.

At Richmond, Va., the first case occurred at Camp Grant, on the 12th of August. Recruits had been received during July and August from

New York Harbor and Newport Barracks. It appears, however, that the earliest cases were not among those recruits, but among soldiers who had been at Richmond the entire summer. Cholera appeared in the city of Richmond about the same time. The total number of cases was two hundred and seventy-one, with one hundred and three deaths, all white.

On the 21st of August, the third battalion of the Eleventh United States Infantry was sent from Camp Grant to Norfolk, Fortress Monroe, and Yorktown. Four cases and two deaths occurred during September and October, among the companies thus removed to Norfolk.

August 12, a death from cholera occurred at Carlisle Barracks, and another on the 20th. Both were Swiss recruits from Philadelphia, where cholera was prevailing to a moderate extent. One of the attendants on these men was attacked, but recovered. These men were attacked immediately after return from Jefferson Barracks, Missouri, where cholera was prevailing. On the 17th of October a cavalry recruit was attacked and died in thirty-six hours. He had arrived the day before his attack from Chicago, Ill., where cholera was then prevailing. No other case occurred at this post.

A detachment of recruits from Governor's Island, New York Harbor, arrived at Newport Barracks, Kentucky, July 12; recruits were also received during the latter part of July and first of August from Saint Louis, Mo., and Cincinnati, Ohio; from the latter place almost daily after July 13. The first case of cholera at this post occurred August 12. The patient was a recruit who had been doing duty as a teamster, and visiting Cincinnati daily. From this time to the close of November, there were nine cases and five deaths of cholera reported at the station.

During September cholera also appeared at Atlanta and Augusta, Ga., among recruits who went from Newport Barracks by way of Nashville. The disease was limited to the recruits. The first fatal case at Atlanta was on the 9th of September, and nineteen cases with seven deaths, occurred during the month. At Augusta the first fatal cases were also on the 9th, and the total number during the month was eight cases, of whom seven died.

At Louisville, Ky., the first case July 29. The patient was a recruit from Governor's Island, New York Harbor; three hundred and sixty-four recruits from Governor's Island arrived at Taylor Barracks, Louisville, between the 16th and 19th of the month. Cases of cholera occurred first among these recruits, but subsequently among the rest of the garrison. The first case in the garrison (excluding New York recruits) occurred August 18. The total number of cases at Louisville was thirty-six, with twenty-three deaths.

On the 21st of August, company E, Second United States Infantry, was ordered from Taylor Barracks to Bowling Green, Ky. Six cases of cholera occurred in this company during the remaining days of August and two in September. None were fatal.

During the last days of August and the first of September, squads of recruits, numbering ninety each, arrived at Nashville, Tenn., from Newport Barracks, Kentucky, and were quartered for quarantine purposes in the immediate vicinity of the post hospital. The first three cases occurred among these recruits—the first fatal case being on September 2. About this time, also, cholera began to prevail among the citizens of Nashville, and it would appear probable that it was from this source that the disease was introduced into the detachment at Sibley Barracks, as the first two cases at this post were men who had been on a debauch in the town. Altogether, there were seventy-two cases and

thirty-nine deaths among the white troops. Two deaths of colored soldiers also occurred in September, in the Nashville post hospital.

The first case among the white troops at Memphis, Tenn., occurred September 6, and died the next day. The patient was a recruit who had arrived, the day before the attack, from Nashville. Altogether, there were twenty-one cases and sixteen deaths during September among the white troops at Memphis. On the 15th of August, however, a fatal case had occurred in the post hospital at Memphis. The patient was a soldier of the Fifty-sixth United States Colored Troops, who was taken from on board the steamer Continental, passing up the river from Helena, Ark.

The first case among the white troops at Vicksburg, Miss., occurred on the 22d of August, on which day two soldiers were attacked. The colored barber had died of the disease the day before. There were in all fifty-nine cases and twenty-five deaths in Vicksburg. A detachment of one hundred and forty-five recruits had been received July 11, from Fort Columbus, New York Harbor. Cholera also appeared in a detached company (E) of the Fifteenth United States Infantry, stationed at Jackson, Miss., where, during August and September, there were eight cases and six deaths. A detachment of fifty-one recruits had been received at Jackson, July 17, from Fort Columbus, New York Harbor.

The Fifty-sixth Colored Infantry left Helena, Ark., in two detachments—the first on the steamer Continental, August 9; the second on the Platte Valley, August 10. A death, probably of cholera, occurred on the Platte Valley about twenty-four hours after starting, and another while between Cairo and Saint Louis. The disease, however, was not recognized until the morning of the 14th at Saint Louis, when the vessel was ordered to the quarantine-grounds at Jefferson Barracks. Cholera broke out on the Continental shortly after leaving Helena. A case was put on shore at Memphis, and died in the post hospital. This vessel also went into quarantine at Jefferson Barracks, where she arrived before the Platte Valley. During August and September, two hundred and fifty-six cases and one hundred and thirty-four deaths were reported in this regiment; this number, however, does not include those who died on the river before reaching Jefferson Barracks. The disease spread to but a limited extent among the white troops at Jefferson Barracks. The first fatal case was August 15, several days after the arrival of the Fifty-sixth United States Colored Infantry. Altogether there were eight cases and seven deaths. Four cases and three deaths also occurred during August and September in the ordnance detachment at Saint Louis Arsenal, the first fatal case dying on the 17th of August.

On the 25th of August three hundred and eighty-four cavalry recruits, (white,) from Carlisle Barracks, Pennsylvania, by way of Saint Louis, arrived at Fort Riley, Kansas. One of them died of cholera August 30. From this time to October 16, fifty-nine cases and twenty-seven deaths occurred, all among the recruits, the rest of the garrison escaping.

At Fort Leavenworth, Kansas, (white troops,) the first case occurred September 18; the patient died next day. Altogether there were seven cases and five deaths at this post. A few days before the appearance of cholera, about twenty cases were reported among the citizens of Leavenworth City, two miles south of the garrison. Intercourse between the city and the post was unrestricted. One case, not fatal, was reported at Albuquerque, N. Mex., in October; particulars not known.

At Helena, Ark., the first fatal case (white troops) occurred August 30, and during August and September there were ten cases and six deaths. A detachment of twenty-eight recruits was received at this

post August 3, supposed to be a portion of a detachment of recruits which left Newport Barracks, Kentucky, for Little Rock, Ark., July 28.

At Little Rock, Ark., the first case occurred September 12. Altogether there were one hundred and thirty-one cases and sixty-four deaths among the white troops. A company of the Fifty-fourth United States Colored Infantry, stationed at the same post, had three cases and one death in September, and four cases and one death in October, the first fatal case among them being September 27. Nine recruits of the Thirteenth United States Infantry arrived at Little Rock, August 10, from Newport Barracks, Kentucky. It does not, however, appear probable that cholera was imported into Little Rock by this detachment of recruits. The report of Bvt. Lieut. Col. J. R. Smith, Surgeon United States Army and Medical Director, would rather seem to show that it was carried there by steamboats coming up the river from infected points. Surgeon Smith says: "From time to time, during the month of August, steamboats arrived both at Little Rock, on the Arkansas, and Duvall's Bluff, on White River, on which rumor said that cases of cholera either existed or had occurred. Examination made by other physicians here and at Duvall's Bluff, as well as by myself, failed to confirm the report of the present existence of cholera on board these boats, *although I was satisfied, in several instances, from the histories related to me, that fatal cases of cholera had occurred during their trip from Memphis to Little Rock.*"

At Huntersville, a suburb of Little Rock, Ark., there were twenty-one cases and nine deaths during September, in the Fifty-fourth Colored Infantry, the first case occurring September 15, and proving fatal the next day.

At Fort Smith, Ark., there were two cases in September, and six cases and two deaths in October, among the white troops. Four cases and two deaths among the colored troops for the same time. The disease was carried to Fort Smith on a steamer from Little Rock.

Three cases and two deaths occurred at Fort Gibson, Cherokee Nation, during October; the first case occurred October 15. Two of these cases were soldiers belonging to Company F, Nineteenth Infantry, which arrived at Fort Gibson, October 12, from Fort Smith, Arkansas. The third had attended them during their illness. One fatal case occurred during November.

Finally the latest appearance of cholera during the year was in a party of recruits who left New York for San Francisco, November 20. On the 16th of December cholera appeared, the vessel then being on the San Juan River. On the 20th the command reached La Virgin, on Lake Nicaragua, about twelve miles from the Pacific; went into camp and established a hospital. Altogether there were fifty-four cases and twenty-seven deaths during the month.

The epidemic appears from the record to have radiated distinctly from two chief centers.

* * * * * * *

Originating in the overcrowded barracks of Governor's Island, New York Harbor, in the immediate vicinity of an infected city, through which recruits passed with more or less delay before arrival, the infection spread by readily traceable steps to Hart's Island and other posts in the harbor, to Tybee Island, Georgia; to Louisiana, by way of New Orleans; to Texas, by way of Galveston; to Louisville, Ky.; to Richmond, Va., and to La Virgin, Nicaragua Bay. From Richmond it was carried to Norfolk, Va.; from Louisville to Bowling Green, Ky. The probabilities appear to be that the disease was carried from New Or-

leans up the Mississippi River to various points on that stream, and west of it, and though the whole chain of evidence is not complete, yet there are a sufficient number of known cases of the transfer of the epidemic from one post to another in this region to put this view of the whole movement beyond reasonable doubt.

The other principal center appears to have been Newport Barracks, Kentucky, where the disease was plainly introduced from the infected city of Cincinnati, on the opposite side of the Ohio River. Although it did not prevail to any great extent at this post, yet it is in evidence that it was carried thence to Augusta and Atlanta, Ga., to Nashville and Memphis, Tenn.

At several points, as, for example, at Augusta and Atlanta, Ga., the epidemic did not extend beyond the infected recruits by whom it was reported. In many cases, however, it involved the rest of the command, and it is highly probable that this would have been the case far more generally but for the stringent hygienic precautions adopted.

* * * * * * *

The following medical officers died of cholera while engaged in the active performance of their duties in connection with the epidemic:

1st. Brevet Major J. T. Calhoun, Assistant Surgeon United States Army, died of cholera, July 20, 1866, at Hart's Island, New York Harbor.

2d. John E. McDonald, Assistant Surgeon United States Army, died of cholera September 10, 1866, at Saint Louis, Mo.

3d. Acting Assistant Surgeon J. F. Burdett died of cholera August 6, 1866, at Tybee Island, Georgia.

4th. Acting Assistant Surgeon Samuel Catlin died of cholera November 27, 1866, at New Orleans, La.

5th. Benjamin Hobbs, Surgeon of the One hundred and sixteenth United States Colored Troops, died of gastro-enteritis (?) August 28, 1866, after rising from a sick-bed to attend cholera-cases in his regiment at White's Ranch, Texas. * * * * * * * *

The report of Dr. Woodward is of great value, as it demonstrates the distribution of the disease throughout the United States by the movements of recruits for the United States Army; and were it possible to trace as accurately the progress of emigrants, the history of the epidemic would admit of no misconception. The table which we have presented shows that from April 18 to November 28, 1866, seven thousand six hundred and nineteen individuals, from vessels known to have been infected with cholera, were landed at the port of New York alone; but no record can be obtained of the number of emigrants who arrived upon vessels that did not become infected with the disease upon the voyages, although the port from which they sailed was infected with the disease, and the large majority of the emigrants were from cholera-infected countries. Neither can it be determined how many emigrants arrived at other ports, *i. e.*, Boston, Philadelphia, Baltimore, and New Orleans; but it is known positively that at the points of greatest virulence during this epidemic, viz, New Orleans, Memphis, Saint Louis, Cincinnati, and Chicago, the epidemic was largely fed by these unfortunates.

On the 24th of April, two cases of cholera occurred at Portland, Me., one of whom was an escaped emigrant from the quarantine at McNab's Island, Nova Scotia. This man was one of the Virginia's passengers.

On the 29th of May, three cholera-deaths occurred among the children of an emigrant party which arrived at Detroit by way of the Great Western Railway from New York City.

On the 16th of June, a man, who had contracted cholera at New York City, died at an infirmary in Baltimore, Md.

On the 11th of July, a German woman died of cholera in a filthy tenement at Cincinnati, Ohio. This woman had gone to Newport, Ky., with a party of recruits from Governor's Island the day before she was attacked.

During the last week of July, cholera occurred in Philadelphia, and one of the first victims, a negro in a miserable tenement-house, was left two days unburied.

On the 21st of July, the first case occurred at Chicago, in the person of an emigrant.

On the 27th of July, two cholera-deaths occurred at Saint Louis, Mo. These cases occurred in that portion of the city most frequented by emigrants.

On the 13th of August, a party of emigrants camped on the outskirts of Kansas City, Mo.; nine of this party died of cholera, and the disease spread to the city.

In the Medical Record for September 1, 1866, under the caption of *progress of the cholera*, we read: "The deaths in Cincinnati, Ohio, have increased from an aggregate of six hundred and ten, in twelve days, to a daily average of nearly eighty, and this in spite of vigorous sanitary measures, the gratuitous issue to the poor of remedies intended to control the precursory diarrhœa, and a re-enforced corps of district physicians. Newport Barracks, on the opposite shore, lost a recruit on the 11th ultimo, and the Louisville, Ky., Board of Health reports a few deaths, with the explanation that the cases were mostly imported. In Saint Louis, Mo., a city of imperfect drainage, the visitation as yet exhibits no prospect of a decline; the record of a single day sums up one hundred and forty-one cases, and fifty-two deaths. The steamer Continental also arrived at Saint Louis on the 13th ultimo, with a detachment of the Sixteenth United States Colored Infantry, of whom fifty-one died during the passage from Cairo, Ill., and twenty-six remained under treatment. From Saint Louis, Mo., the disease has been carried by the Canada, of the Northern Packet Line, to La Crosse, Wis.; while from Chicago, Ill., where the river has become substantially a stagnant bayou, we have advices indicating not only an invasion on the part of the pestilence, but the inauguration of what promises to be a very active campaign. From Saint Paul, Minn., we hear that two men have died of cholera, and that a quarantine is established at Kaposia, three miles above the city, where steamers will put off any cholera-patients that may be on board. New Orleans reports an increasing mortality, at the rate of 10 per cent., but the infected district belongs to the lower portions of the city, and the victims are to be found among the blacks; and Galveston, Tex., still suffers in the persons of its garrison. Approaching the interior, we find that Memphis, Tenn., has been visited, but not severely, although its physicians, evidently on the alert, have appointed a committee to confer with the governor of the State regarding the establishment of a river quarantine."

In the Medical Record of September 15, we read: "Turning to the Mississippi Valley, we find that Saint Louis has been the heaviest loser in the Southwest, having already published a death-list approaching, in round numbers, nearly two thousand five hundred, as the result of a month's prevalence of the epidemic in a very virulent form. The decrease in Cincinnati and New Orleans is counterbalanced by a fresh impetus to its force at Memphis, and an importation at Leavenworth, Kans. In Louisville, Ky., the disease just now seems keeping within

bounds; while into Mobile, despite the establishment of a fifteen days' quarantine on all New Orleans vessels, the scourge has somehow been smuggled."

September 26, one death from cholera occurred at Louisville, Ky. The same day there were twenty-six deaths in Nashville, and nine in Memphis, Tenn.

September 27, Nashville had twenty-two fatal cases, and Memphis twenty-four.

October 2, a gentleman from Richmond, Va., died at Washington City from cholera, and several fatal cases followed.

During the epidemic, Saint Louis lost eight thousand five hundred cases, Cincinnati one thousand four hundred and six, and Chicago nine hundred and ninety.

It was the fate of the writer, during the epidemic of 1866, to witness a demonstration of the efficacy of stringent hygienic precautions, in protecting small communities from the inroads of cholera, as well as the portability of the disease by means of cholera-infected clothing.

During the war, the Pea-Patch Island, at the head of Delaware Bay, upon which is located Fort Delaware, had been used as a prison for confederate soldiers, of whom many thousands during the war had been confined at that point. All the available space outside the fortification had been covered by the buildings occupied as prisons and hospitals; and from necessity, after the large rate of occupancy, the island at the close of the war was in a most unsatisfactory sanitary condition. During the fall of 1865 and the winter of 1865–'66, all unnecessary buildings were removed from the island, the ditches which traversed the island (the surface of which was below high-water mark) were drained and dredged. *Débris* of all kinds was collected and burned, and the island, at a very considerable pecuniary outlay on the part of the General Government, was placed in a most perfect sanitary condition. In the latter part of August, 1866, a case of cholera occurred at Delaware City, the eastern terminus of the Delaware and Chesapeake Canal, distant from Fort Delaware one and a quarter miles, from which town the garrison obtained its mail and supplies of all characters. The first case occurred in the person of a canal-boatman, and spread to the inhabitants of the town, and a mild epidemic was instituted. Shortly afterward the town of New Castle, Del., Salem and Bridgeton, N. J., were infected with the disease, thus completely encircling the post within lines of cholera-infection. By my advice the commanding officer at the post instituted a rigid system of isolation. But one boat, with a picked crew, were allowed to leave the island each day; and of this crew but one man, the cockswain, a most reliable and intelligent man, was permitted to enter the town. By this man the mail and all necessary supplies were obtained, and by this boat were conveyed to the island. The commissary department having been most liberally supplied, no stores in large bulk were required to be transported to the island. Although the epidemic during the season was so often carried into the towns that have been named in the vicinity of Fort Delaware, as to institute two distinct epidemics, no case of cholera, or of any disease assimilating it, occurred upon the island, beyond the ordinary diarrhœa of the season, with but a single exception which can be most satisfactorily accounted for. The isolation of the post which had been instituted had been most rigidly maintained, and, with the exception of the cockswain of the boat's crew already mentioned, no person but the post-surgeon had been allowed to leave the island. As post-surgeon, my services had frequently been asked during the prevalence

of the epidemic; and the precaution always had been adopted of changing my clothing in an isolated shed upon one of the wharfs every time I left and returned to the island. Convinced of the non-infectiousness of the disease by some instances which seemed to me to be inexplicable, one evening, on returning to the island weary and exhausted by a fatiguing day's work, I went, in the clothes in which I had been working over a cholera-patient in Delaware City, to my quarters, undressed, and retired in the same room with my wife, at that time in extremely delicate health, and the clothing remained in the room throughout the night. The next day my wife had a diarrhœa which she allowed to continue for two days without calling my attention to it; upon the third day cholera was suddenly developed at an early hour in the morning; she became fully collapsed, and reacted only after the most severe struggle. Disinfectants were freely used, every means of isolation were employed, and no other cases occurred.

In June, 1857, cholera re-appeared at the city of New Orleans, and rapidly spread through the Lower Mississippi Valley. During that month the disease was carried to towns upon the Mississippi, Arkansas, and Missouri Rivers. We reproduce so much of the second report of Assistant Surgeon J. J. Woodward, United States Army, Circular No. 1, June 10, 1868, Surgeon General's Office, as relates to the diffusion of the disease by the movements of troops:

REPORT ON EPIDEMIC CHOLERA IN THE ARMY OF THE UNITED STATES DURING THE YEAR 1867.

By J. J. Woodward, M. D., *Assistant Surgeon United States Army.*

* * * * * * *

It is well known that cholera prevailed extensively in the Army during the year 1866, causing over twelve hundred deaths among officers and men. Circular No. 5, of 1867, giving a detailed account of the epidemic of 1866, was sent to each medical officer, in anticipation of the possible return of the disease in 1867. It will be seen by consulting that document that cholera spread over the country during the year 1866, extending as far westward as Forts Leavenworth, Riley, and Gibson, and in the Southwest as far as Texas. In its progress the disease followed the lines of travel rather than any general westward course, and in the case of the Army it especially followed the movements of bodies of recruits, which were the most important movements from infected points during the year. The compiler of Circular No. 5 drew hence an argument in favor of quarantine, and the Surgeon-General, in Circular No. 3, instructed medical officers to endeavor, as far as possible, to protect any threatened command by a proper quarantine. The measures thus adopted, in conjunction with the hygienic precautions directed in the same circular, undoubtedly saved many lives in the Army, for the total number of deaths from cholera during 1867 was but two hundred and thirty, and it cannot be claimed that the disease in itself was less virulent during 1867, for the proportion of deaths to the total number of cases was 1 death to 2.19 cases, while during 1866 it was 1 to 2.22.

In a general way, it may here be said that the experience of the Army during 1867 confirms the views in favor of quarantine, formed during 1866, and especially confirms the opinions formed with regard to the danger of distributing recruits or other bodies of troops from an in-

fected point to other garrisons. An additional point, however, is also suggested by the experience of 1867, namely, the possibility of cholera re-appearing in the following year at places visited by it during an epidemic, if the most stringent hygienic precautions are not adopted.

* * * * * * *

Had the cases thus originating been the only ones, the mortality from the disease would have been comparatively small; but the unfortunate movement of infected troops and trains during July carried the pestilence across the plains to every post on the Arkansas River and the Smoky Hill Fork, and three other notable instances of the transplantation of the disease occurred: one on the route between Fort Gibson and Arbuckle, one in the case of the posts in New York Harbor, the third in that of certain recruits distributed from New York, by way of New Orleans, through Texas.

At New Orleans, where cholera had prevailed extensively during 1866, among both citizens and troops, continuing during the summer and fall until January, 1867, it re-appeared among the citizens in June. The reports of the board of health record four cases during June, and five hundred and seventy-one during the following six months. During the same period only six cases and three deaths were reported among the white troops, and but four cases and two deaths among the colored troops. The first of these cases occurred at Jackson barracks during August, and recovered; the second case, at the same barracks, during September, also recovered. After this no cases occurred until November. During November and December there were a few cases both at Jackson barracks and at Greenville, making, in all, but ten cases and five deaths during the six months in a garrison of over a thousand men. Besides these, one case, which recovered, was reported at Jackson barracks during January, 1868, and two cases of cholera and nine of choleraic diarrhœa during the same month in Company A, Thirty-third Infantry, which had just arrived from Georgia.

In view of the prevalence of the disease among the citizens of New Orleans, this comparative immunity of the troops must be attributed, to a great extent, to the stringent hygienic measures adopted in view of the approach of yellow fever. These measures are fully recorded in the reports on the yellow-fever epidemic.

At Fort Jackson, Miss., below New Orleans, one case, a colored soldier, who recovered, is reported during September. No particulars have been received.

During the month of June cholera also appeared among the freedmen on various plantations in the vicinity of Vidalia, La. The troops, however, escaped until October. During this month eight cases and three deaths are reported out of a strength of sixty-one officers and men.

At Vicksburgh, Miss., where cholera had prevailed among the troops during 1866, it re-appeared among the citizens during the month of June. The first case among the troops occurred on the 29th of that month, and died the same day. There were eight cases and two deaths among the troops during July; one fatal case during September; during October two cases, which recovered; in all, eleven cases and three deaths, not including the fatal case during June. The average strength of the command during the six months was two hundred and sixty-seven officers and men.

At Madison, Ark., cholera appears to have been introduced by the body of a citizen dead of cholera, who was brought from Linden for burial. Shortly afterward the disease appeared among the troops. Eight cases and three deaths are reported during July; two cases and

one death during August; in all, ten cases and four deaths; the average strength for the two months being seventy-five officers and men.

At Newport barracks, Ky., where cases had occurred during 1866, two mild cases are reported during June, both of which recovered. There was also one fatal case during August. The average strength of the command during the six months was five hundred and nine. Cases are said to have occurred in both Cincinnati, Ohio, and Covington, Ky., a few days before the first of these cases.

At Paducah, Ky., four cases and two deaths are reported during August out of a strength of one hundred and eight. No particulars have been received.

At Saint Louis, Mo., where cholera had prevailed during 1866, it reappeared among the citizens during the month of June, 1867. Cases continued to occur with increasing frequency during the summer and fall. Only one case, however, is reported at the Saint Louis arsenal out of an average strength of one hundred and twenty-five. This case occurred during October; the man recovered.

At Jefferson barracks, near Saint Louis, where cholera had prevailed extensively among the Fifty-sixth United States Colored Infantry during the previous summer, two hundred and fifty-six cases and one hundred and thirty-four deaths having been reported, one case of cholera and six of cholera morbus occurred during July, all of which recovered. Several fatal cases of cholera were reported, however, among Government employés.

It may here also be mentioned that, during June, prior to their movement from the post, a considerable number of cases of diarrhœa occurred among the soldiers of the Thirty-eighth United States Colored Infantry at Jefferson Barracks. To the story of these troops we shall recur.

On the 26th of October Companies G and H, One hundred and twenty-fifth Colored Volunteers, arrived at Jefferson barracks for muster-out. They had marched from Fort Bliss, Tex., across the plains to Fort Harker, and thence been brought by railroad to Saint Louis, where cholera was then prevailing. Two days after their arrival at Jefferson barracks, cholera appeared among them, thirteen cases and five deaths occurring before the close of the month, and two cases and one death during November.

At Fort Riley, Kansas, where there had been fifty-nine cases and twenty-seven deaths of cholera, and six hundred and forty-one cases of diarrhœa and dysentery among the troops during 1866, a quartermaster's employé was attacked June 22, 1867, and died the same day. Company K, of the Thirty-eighth Infantry, which left Jefferson Barracks June 9, and reached Fort Riley June 12, had moved for Fort Harker on the 19th, and Companies D and F, which left Jefferson Barracks on the 19th for Fort Riley, also left that place for Fort Harker on the 22d, arriving on the 25th. All these troops were suffering much from diarrhœa, and Companies D and F left behind them when they moved a number of men sick with diarrhœa. After this, however, no cases of cholera occurred at Fort Riley, where the most stringent hygienic means appeared to have been adopted, until July 11, when an employé of the Pacific Railroad was attacked, and died the same day. He had just arrived from the vicinity of Fort Harker, where cholera was then prevailing. No other cases occurred until November, when two colored recruits for the Tenth Cavalry were attacked; one of them recovered; the other died December 1. Of these men the first had arrived two days before his attack from Saint Louis, Mo., where he had been taken sick with

diarrhœa. No particulars have been received with regard to his comrade. The regular garrison of Fort Riley, averaging for the six months twenty-six white and one hundred and ninety-seven colored troops, wholly escaped. At Fort Harker, Kansas, the disease appeared shortly after the arrival of Companies K, D, F, and H of the Thirty-eighth Infantry. There were three cases and one death among the colored troops in June, fifteen cases and ten deaths during July and August. Among the white troops twenty-eight cases and twenty deaths are reported during July and August. The average strength of the command for July and August was eighty-four white and one hundred and ninety-seven colored troops. There were, also, at the post over four hundred quartermaster's employés, among whom were many deaths. The hygienic condition of the fort and its vicinity is reported to have been very bad at the date of the outbreak of the epidemic.

Company K of the Thirty-eighth Infantry reached Fort Harker June 22; Companies D and F arrived on the 25th; Company H, on the 27th; Companies A and B had been stationed there since May 16; and Company G, since May 17.

The first case among the troops at Fort Harker was a soldier of Company H, who was taken sick June 28, and sent to the post hospital. On the same day, but a little earlier in the day, a citizen in the employ of the beef-contractor was attacked. He lived in a dug-out on the bank of the river, near the slaughter-pen, a mile and a half from the fort, and half a mile from the camp of the detachment of the Thirty-eighth. Stress has been laid on this case in some of the appended reports, as showing that cholera was not introduced into Fort Harker by the Thirty-eighth Infantry; but the dates of the arrivals of Companies D, F, H, and K above given, perfectly accord with the theory that the detachments of the Thirty-eighth Infantry brought the germs of the disease with them from Jefferson Barracks; and it has not been shown that the beef-contractor's employé, living so near their camp, did not communicate freely with the newly arrived troops. At all events, the first cases among the troops at Fort Harker were soldiers of the Thirty-eighth Infantry, who were carried from their camp to the post hospital; and it was not till a number of these cases had occurred that the disease began to spread among the garrison of the post.

But whatever question may be raised as to the introduction of cholera at Fort Harker by the Thirty-eighth Infantry, there is no doubt of the mode in which the pestilence, once established at that post, was, unfortunately, carried thence across the plains.

On the 28th of June, the same day on which the cholera appeared at Fort Harker, a detachment of the Thirty-eighth Infantry, consisting of Companies D and F, Bvt. Lieut. Col. H. C. Merriam in command, and Bvt. Lieut. Col. George H. McGill, assistant surgeon United States Army, in medical charge, left Fort Harker to march by the Arkansas River route to New Mexico.

At the close of the first day's march they reached Plum Creek, and shortly after going into camp a case of cholera occurred among the men. The command marched next day, but cases continued to occur daily until it reached Fort Lyon, Colorado Territory.

The posts visited on this route were Fort Zarah, Fort Larned, and Fort Dodge, and the arrival of the detachment at each of these stations was promptly followed by the appearance of cholera. The death of Dr. McGill, July 20, has prevented the receipt of the usual monthly report of sick and wounded for this detachment, but it appears from the letter of Colonel Merriam that twenty-nine enlisted men were attacked, and

ten died, out of a mean strength of two hundred and thirty-two enlisted men. With the exception of Dr. McGill and his wife, the officers and their families escaped.

The headquarters of the Thirty-eighth Infantry, with Companies A, H, and K, remained at Fort Harker until the 20th of July. The first case of cholera among the troops at Fort Harker, already mentioned as occurring June 28, was a soldier of Company H. On the 29th another case occurred in the same company. On the 30th, another. July 1, five cases were reported; July 2, three. * * * July 4 there were two cases; July 5 and 7 each one case. After this no more cases occurred in this command for some days, although the disease still prevailed among other troops at Fort Harker, and among the quartermaster's employés and other citizens. July 20, headquarters, with Companies A and K, started across the plains with twelve officers, two hundred and twenty men, forty-four quartermaster's employés, and thirty-seven ladies, children, and servants. After crossing the Smoky Hill Fork they were joined by the sutler of Fort Sumner, with a family of ten persons, making in all three hundred and twenty-four souls. July 21, on the march, a soldier was attacked with cholera, and cases continued to occur until July 30, when the command had reached a camp a few miles west of Fort Dodge, after which no more cases occurred among the troops. Up to this time there had been forty-six cases and seventeen deaths, all enlisted men. The rest of the party escaped, with the exception of the wife of one of the officers, who was taken sick after the command reached Fort Lyon and recovered. The case reported during August was a man who had been detached with the mail between Forts Larned and Harker, and who was brought sick to camp. In making this march the command avoided communication with the posts along the route, and, after the 25th of July, avoided the route taken by Colonel Merriam's detachment. Two detachments of the Thirty-eighth Infantry are thus shown to have carried cholera with them across the plains by the Arkansas River route. It was by the first of these that it was distributed to the military stations on the way.

On the 1st of July Colonel Merriam's detachment of the Thirty-eighth Infantry arrived at Fort Zarah, and, on July 2 or 3, at Fort Larned, going into camp, within five hundred yards of the fort, and remaining there for forty-eight hours. July 6 the first case occurred in the garrison at Fort Larned, and subsequently cases occurred at both this post and Fort Zarah.

Fort Zarah being occupied as a picket post of Fort Larned, the cases at both posts are included in the monthly reports of sick and wounded of Fort Larned. In all there were five cases and four deaths of white troops during July; of colored troops, one fatal case during July and one during August. There were quite a number of cases among the quartermaster's employés.

According to Brevet Major C. S. De Graw, assistant surgeon United States Army, Colonel Merriam's command arrived at Fort Dodge on the afternoon of July 7 and went into camp a mile from the post, remaining forty-eight hours. An unsuccessful attempt was made to isolate the command when it was understood that cholera was prevailing in it.

During the evening of July 11, a Government employé, living about three hundred yards from the garrison, was attacked; and on the 14th another; and diarrhœa became very prevalent among the citizens about the post. On the 18th several trains arrived from Fort Harker with supplies for the post, and a man accompanying one of these trains was found to have cholera. On the 21st a soldier of the garrison was attacked

while on guard duty some distance from the post and brought to the hospital. This was followed by other cases, and during the rest of July and the early part of August, twenty-five cases and fourteen deaths occurred among the troops. The mean strength for the two months was two hundred and twenty-six officers and men. There were also a number of cases among the citizens. The pestilence did not extend on this route to posts west of Fort Dodge.

Returning now to the neighborhood of Fort Harker, we find that Company G, Tenth Colored Cavalry, moved from Fort Harker July 16, leaving behind three or four men sick of choleraic diarrhœa; they went nto camp at Wilson's Creek, about fifteen miles from Harker, where, during the rest of the month they had fifteen cases of cholera, eight of which died during July and one in August. The command subsequently went to Fort Hays and became a part of the garrison of that post.

Company F, Third Infantry, in camp near Cow Creek, Kansas, at the terminus of the Pacific Railroad, not far from Fort Harker, reports seven cases and four deaths during July and one case during August, out of a strength of sixty-eight officers and men; the disease was brought from Fort Harker. Company C, Tenth Colored Cavalry, at Camp Grierson, Kansas, on the Little Arkansas River, reports seven cases and four deaths during July, and ten cases and four deaths during August, the mean strength for the two months being seventy-eight men; the officers escaped. The disease is reported to have been brought to the camp by one of the messengers from Fort Harker.

Leaving, now, the vicinity of Fort Harker, we find cholera transported along the route of the Smoky Hill Fork, toward Denver, as far west as Fort Wallace. The posts on this route are Fort Hays, Downer's Station, Monument Station, and Fort Wallace. The first case at Fort Hays was a citizen who had just arrived from Salina, whither the cholera had extended from Fort Harker. On the same day, July 11, a colored soldier of the garrison was taken sick, and died the next day. During July, August, and September, thirty-three cases and twenty-three deaths are reported among the colored troops, whose mean strength during the three months was two hundred and fifteen men. September 1, a white soldier was attacked but recovered; the rest of the white troops, averaging, during the three months, thirty-four in number, escaped. Free communication had existed with Fort Harker previous to the appearance of the first cases, and trains with escorts of troops were continually passing from Fort Harker, by way of Fort Hays and the other posts on this route, to Fort Wallace and back again.

Notwithstanding the free passage of such trains, however, the detachment at Downer's Station, Kansas, escaped until August 9, when a supply-train *en route* from Fort Harker to Fort Wallace, accompanied by a detachment of Company B, Thirty-eighth United States Infantry, encamped at Grinnell Springs, a small stage station about twenty miles from Downer's, and guarded by a party from that post. The day after the arrival of the train, two of the men at the stage station were taken sick, and were sent to the hospital at Downer's Station for treatment. One of them recovered, the other died. The mean strength of the command at Downer's Station during August was ninety-one officers and men, but no other cases occurred.

Company I, Thirty-eighth Infantry, which had been stationed at Fort Hays since May 25, left that place June 24, and established a post at Monument Station, Kansas. During July three cases and one death of cholera are reported in this detachment, the strength being reported at one hundred and fifteen men. No particulars have been received.

June 1, 1867, a detachment of the Seventh United States Cavalry left Fort Hays on an expedition to the Platte River, and after marching over seven hundred miles, subjected to great hardships, went into camp July 13, near Fort Wallace. A second detachment of the Seventh left Fort Hays on the 12th of July, the day after the first cases of cholera had appeared at that post, and, marching directly to Fort Wallace, went into camp, July 18, with the first detachment. July 22 the first case of cholera occurred, and was rapidly followed by others, seventeen cases and eleven deaths being reported during July and August, besides a number among the citizen employés. The mean strength of this detachment during July and August was two hundred and twenty officers and men. It is reported that most of the cases occurred among the soldiers and employés who were debilitated and exhausted by the exposure of the Platte River expedition. Notwithstanding the proximity of the camp of the Seventh United States Infantry to Fort Wallace, the garrison of the latter place wholly escaped, intercourse being restricted, though not wholly prevented.

On the 8th of August, a detachment of the Fifth United States Infantry arrived at Fort Wallace from New Mexico, and encamped about a mile west of the fort. The command is said to have been healthy on the road, with the exception of diarrhœa, after leaving the Arkansas; seven days before reaching Fort Wallace they passed, without halting, a camp of colored troops, among whom cholera was prevailing. On the day of their arrival at Fort Wallace a case occurred, followed by others, making in all twenty-five cases and eleven deaths during the month. A quarantine hospital was established on the 10th, in which all the cases were treated. These cases were wholly confined to the detachment of the Fifth United States Infantry, which, at the time of its arrival, numbered about three hundred and forty-three officers and men. None of the original garrison of Fort Wallace were attacked.

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Turning, now, from the plains to the route into Indian Territory, the record will be found equally instructive. One fatal case of cholera was reported at Little Rock, Ark., during July. The patient had been intoxicated, and the case is admitted to have been a doubtful one.

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At Fort Smith, Arkansas, where cholera had occurred during 1866, it re-appeared among the citizens August 28, 1867. The precautions taken to prevent the disease from extending to a company of troops were so effectual that but two cases occurred; the first September 16, the second September 21; both proved fatal.

At Fort Gibson, Indian Territory, where cholera also prevailed during 1866, it re-appeared toward the close of June, 1867, among the Indians and negroes. These people, who were surrounded by the worst hygienic conditions, suffered severely till the close of July, when a nest of negro huts, where the disease had been most virulent, was burned, and the survivors removed to a camp in the open prairie, after which the disease abated. The troops, encamped in wall-tents on elevated ground near the fort, escaped, having but two cases; one, a negro soldier, attacked July 18, died July 23, and the other, a white soldier, attacked August 18, died next day. The mean strength of the command at Fort Gibson, during the six months, was one hundred and fifty-nine white and eighty colored troops.

Toward the close of June, just after the appearance of cholera among the Indians and negroes, near the post, Company D, Tenth United

States Cavalry, left Fort Gibson for Fort Arbuckle; had much diarrhœa on the road, and one man died July 1, with symptoms of cholera. The company, bringing with them the dead body of their comrade for interment, arrived at Fort Arbuckle July 2. Immediately after their arrival three cases of cholera occurred in this company, and five cases and four deaths followed, during July, among the white troops stationed at Fort Arbuckle, one hundred and sixty-six in number.

On the 11th of June two companies of the Sixth United States Infantry left South Carolina for Indian Territory, and, going by way of Memphis and Fort Smith, set out to march from the latter post to Fort Arbuckle. On the 8th of July a messenger from Fort Arbuckle passed their camp, who reported the existence of cholera at Forts Gibson and Arbuckle. They prevented his intercourse with the detachment, but, unfortunately, followed the road just passed over by Company D, of the Tenth United States Cavalry, and did not avoid their camps. July 14 cholera appeared among them in their camp on Sandy Creek, and before the close of the month forty cases and sixteen deaths occurred out of a command of one hundred and twenty-nine officers and men.

At Fort Columbus, New York Harbor, there were thirty-five cases of cholera and eighteen deaths during August and September. The first case occurred on the 21st of August. The patient was a recruit who had arrived the evening previous with a detachment of recruits from Saint Louis, Mo., where cholera was prevailing. One man had died on the road with symptoms similar to cholera, and the man attacked on arriving at Fort Columbus had been in attendance upon him.

Another recruit, who had also been in attendance upon the first patient, was sent to Fort Wood, Bedloe's Island, and was attacked by cholera shortly after his arrival there.

No additional cases occurred at Fort Columbus until the 31st of August, an interval of ten days, when ten new cases were admitted to hospital, four of these cases occurring among a fresh detachment of recruits who had arrived on the 28th of August, three days previous.

At Fort Wood, Bedloe's Island, New York Harbor, there were ten cases of cholera and four deaths during August and September. The first case occurred August 25; the last, September 24. Of these cases six were recruits, two belonged to the permanent party of the post, and two to the band. The first case was the recruit from Saint Louis, already mentioned.

One fatal case is reported at the Plattsburgh barracks, New York. The patient had just returned from Governor's Island, where he had been sent for trial by court-martial. He was attacked the night of his return, August 31, and died September 2.

On the 23d of November a detachment of several hundred recruits left New York Harbor, by steamer, for Texas. On the 30th another large detachment sailed.

The first detachment went on the steamer Raleigh, and reached New Orleans December 2 without sickness. Here one hundred and ten men were disembarked, but the detachment for Texas was kept on board, and, learning that cholera was prevailing among the citizens of New Orleans, an attempt was made to keep them isolated. December 3, this detachment was transferred to the steamer W. G. Hewes, and sailed for Galveston. During the 4th a number of cases of diarrhœa with rice-water discharges were observed, and in one case there were cramps and collapse, but none died. December 6 the vessel arrived at Galveston, the men were disembarked and placed in tents, but after three days, on account of bad weather, were transferred to the barracks of the Seven-

teenth Infantry at that post. December 11 the second detachment of recruits which had left New York November 30 arrived at Galveston, and after remaining a day, sailed for Indianola. This detachment had also stopped a day at New Orleans, and after leaving that place cholera appeared among them. One death had already occurred. This detachment left at Galveston a number of sick with choleraic diarrhœa or actual cholera. Altogether, twenty-two cases of cholera and eighteen of choleraic diarrhœa were admitted to the post-hospital at Galveston from these detachments; five of the cases of cholera died. Three men of the Seventeenth Infantry, into whose barracks the first party of recruits were received, were also attacked, but all recovered.

On the 13th of December a party of the recuits from Galveston arrived at Hempstead, Texas, where fifteen cases of cholera appeared among them, with, however, but one death. The detachment that went to Indianola reports thirteen cases and two deaths of cholera at that post, but the disease did not extend to the garrison. Finally, a party of these same recruits were quartered at Onion Creek, near Austin, December 24, where nine cases and one death are reported during December, and one fatal case during January in the same detachment, then at Indianola, on their way to Brownsville, Tex. The extreme mildness of the cases among these recruits cannot escape attention; there were among them, in all, sixty-three cases, and but nine deaths. This happy result, which is attributed by the medical officer at Galveston to the use of tannin in large doses, was observed also at Hempstead, where reliance appears to have been placed on camphor and opium pills; and at Onion Creek, where calomel was employed in large doses.

The foregoing brief statement will serve to indicate the movements of cholera in the Army during 1867. * * * * *

The total number of cases among the white troops during the year, including the month of June, was three hundred and seventeen, of whom one hundred and thirty-nine died; among the colored troops one hundred and eighty-seven cases and ninety-one deaths. The mortality was, therefore, 1 to every 2.28 cases for white; 1 for every 2.05 for colored troops. A comparison with the data of Circular No. 5 shows that the mortality during 1866 was 1 to every 2.5 cases for white; 1 to every 1.9 cases for colored troops. The proportion of deaths to cases during 1867 was, therefore, rather larger for white and rather smaller for colored troops than during 1866.

The following medical officers fell victims to cholera during the year: Brevet Lt.-Colonel George McGill, Asst. Surgeon U. S. A., died July 20, 1867, near old Fort Lyon, Colorado Territory; Act. Asst. Surgeon Algernon M. Squire died July 29, 1867, near Fort Larned, Kansas.

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From the report of the health-officer of the port of New York we learn that during the year three vessels arrived at that port upon which well-marked cases of Asiatic cholera had occurred on the passage from Europe, and one or two others had cases in many respects resembling that disease. After the arrival of these vessels there had been at quarantine two hundred cases of cholera with one hundred and thirty-three deaths.

On the 15th of November the steamship City of Cork arrived from Antwerp with ten cabin and three hundred and ninety-five steerage passengers. On her arrival fourteen cholera deaths had occurred, and ninety-two individuals were suffering from the disease. The first cases occurred among Swiss passengers.

November 25, the steamship City of Washington arrived from Liverpool with seventy-four cabin and five hundred and thirty-eight steerage

passengers. Seven cholera deaths had occurred, the first in an emigrant from Holland.

December 6 the ship Lord Brougham arrived from Hamburg with three hundred and eighty-three passengers, having lost seventy-five from cholera on the voyage.

During 1867, cholera having become epidemic on the island of Cuba, the United States ship of war Potomac became infected, the first death occurring October 19. By the Potomac the disease was carried to the Philadelphia naval rendezvous, but did not spread to the city.

After the subsidence of the epidemic of 1866 and 1867, North America enjoyed a cholera immunity of six years, when the disease was again brought to the Atlantic coast by ships.

CHAPTER VIII.

CHOLERA IN INDIA.

The festivals and pilgrimages which are so frequent in India have often been charged with regenerating and distributing cholera, as the march of armies is well known to do. From W. W. Hunter's Orissa we learn that twenty-four high festivals take place every year at Juggernaut, below Calcutta. At one of them, about Easter, forty thousand indulge in hemp and hasheesh to a degree that shocks the observers. The "car festival" takes place in June or July. For weeks before the pilgrims come trooping in by thousands every day. These are fed by the temple-cooks to the number of ninety thousand; and over one hundred thousand men and women, many of them unaccustomed to exposure or hard labor, tug and strain at the car till they drop exhausted and block up the roads with their prostrate bodies. Day and night, through every month in the year, troops of devotees pour along the great Orissa road, from Calcutta, and for three hundred miles every village has its pilgrim encampment. The parties consist of from twenty to three hundred persons, and at the time of the great festivals these bands follow so closely as to touch each other. At least five-sixths are females. Ninety-five out of every hundred are on foot, but occasionally some great nabob and his ladies sweep past with forty or fifty palankeens, three hundred bearers, and fifty luggage-carriers; or a big rajah with his caravans of elephants, camels, horses, and swordsmen, in all the indescribable confusion, dirt, and noise of Indian royalty. Parts of this great spiritual army march hundreds and sometimes thousands of miles. They are drummed up from every town and village by about three thousand emissaries of the temple, who visit every province and district in India in search of dupes. They often travel one thousand to one thousand four hundred miles by rail, but generally have to walk from three hundred to six hundred miles, and are always forced up to doing a full day's journey. Many a sickly girl and feeble man dies on the road, and all arrive lame, with their feet bound up in rags, plastered with dirt and blood. They rush into the sacred tanks and into the sea, and come out to dress in clean garments. They bathe every day, and at the great festival as many as forty thousand run together into the surf. The dead are buried in the sands, and the hillocks are covered with bones and skulls washed bare by the tropical rains. Disease and death make havoc of the pilgrims, for they are badly lodged and poorly fed. The temple kitchen has secured the monopoly of cooking for the multitude; and the food is always presented before Juggernath, and thus becomes holy food. When fresh, it is not unwholesome; but it is too sacred for the least part to be thrown away. Large quantities soon undergo putrefactive fermentation, and in forty-eight hours much of it is a loathsome mass, utterly unfit for human use. It is then dangerous even to a man in robust health, and deadly to the way-worn pilgrims, half of whom reach the temple with some form or other of bowel-complaint. This food forms the chief subsistence of the pilgrims, and the sole nourishment of the beggars, who flock in thousands. It is consumed by some one to the very last morsel. The natural drainage of the place is checked by sandy ridges, and the city is a very dirty one. Each house is built upon a mud platform about four feet high, in

the center of which is a hole which receives the filth of the household. The wretched inmates eat and sleep around this perennial source of death. These platforms are covered with rooms without windows or roof-ventilation; and into these caves of disease the pilgrims are massed together, at a temperature of 85° to 105° for seven months. The scenes of agony and suffocation that take place in these putrid dens baffle description. In some of the best of them, 13 feet long, 10½ feet broad, and 6½ feet high, with but one entrance and no escape for the effete air, eighty persons pass the night. The stench is overpowering, and the heat like an oven. The head clerk of the district says that three hundred thousand visited Puri, the city of Juggernaut, during the season; and ninety thousand are often packed together for a week, in five thousand of these model lodging-houses. But in certain seasons they can sleep out-doors. In the streets of Puri the spiritual army sometimes slumber in regiments and battalions, covered only by the same cotton garment that clothes them by day. The soaking dews are unwholesome enough; but the car-festival falls at the beginning of the rains, when the water pours down almost in solid sheets. Every lane and alley then becomes a torrent, or a stinking canal; and the wretched pilgrims are driven into the foul lodging-houses. Cholera (says Hunter, p. 152) invariably breaks out. The living and dead are huddled together, with a leaky roof above, a foul cess-pool below, and with only just as much space as they can cover lying down. There are also so-called corpse-fields around the town on which forty or fifty bodies are often seen at a time. Carnivorous birds were found sitting around gorged, and wild dogs lounged about full of the flesh of man. The streets and lanes presented many scenes of the most appalling misery and humiliation. In one sudden storm the bodies of poor deserted women formed a dam to the insufferable filthiness from a thousand bodies which was being washed down by the sudden shower. They were too weak to rise, and lay throwing their arms about in agony to the heedless passers-by. Some of them had been rolled about by the torrent till they had lost all their clothing, which is always mere wraps. Others lay quiet enough, having apparently died without much struggling. The horrors, says the bishop of Calcutta, are unutterable.

But on the return journey the misery of the pilgrims reaches its climax. They have been plundered by priests and landlords, and stagger along under their burdens of holy food, wrapped up in dirty cloths or packed in heavy baskets or earthen pots. Every stream is flooded, and they often have to sit for days in the rain on the banks of rivers before a boat will venture to cross. Then their corpses lie thick around, which accounts for much of the cholera about brooks, streams, and rivers. An English traveler counted forty festering bodies at one spot on the banks of one river. Some drag their weary limbs along till they drop from sheer fatigue; others crowd into the villages and halting-places along the road, blocking up the streets, after the available sleeping-places are crammed to overflowing; and every night thousands have no shelter from the pouring rain. Miserable groups huddle under the trees; long lines lie among the carts and bullocks on the road-side, their hair mixing with the mud in which they lie; the bridges are covered with the sodden bodies; hundreds sit on the wet grass, not daring to lie down, and rock themselves to a monotonous chant through the long, dismal night. It is impossible to compute the numbers that thus perish. Bishop Wilson thought fifty thousand succumbed; and Hunter, that from one in eight to one in five died. Every year six times more die there than fell at Waterloo.

This description will answer for all the great pilgrimages, especially to Ramisseram, opposite Ceylon; to Bigginnugar, near Bellary, in Southern India; to Conjeiveram, near Madras; to Gaya, near Patna, on the Ganges; to the holy cities of Benares and Allahabad, farther up the river; and to Hurdwar, at its source. Also to the holy places along the river Nerbudda, which runs from Central India to the Arabian Sea, north of Bombay; and to Punderpoor, below Bombay; and to hundreds of other minor shrines all over the country. So that cholera has abundant opportunities for spreading over the whole of India every year, by many huge armies of filthy pilgrims.

The customs of the Hindoos are very peculiar in some respects. It is calculated that one hundred and fifty millions of them always defecate on the ground; they have no privies or latrines, and even the native soldiers under British rule will not use them. A mutiny greater than that of 1857 might be produced if this necessary hygienic rule were rigidly enforced. Many thousands of tons of human excrement have thus been daily deposited upon the open ground for some thousands of years. Outside of the large cities of India, the bulk of the people always dwell in villages of from two thousand to ten thousand inhabitants, and from five to less than twenty miles apart. The result has been the accumulation of enormous amounts of fæcal matter, with a corresponding degree of saturation of the soil, and the consequent extensive pollution of water in every direction. The disinfection of India can only be a remote possibility, and Europe must make up its mind to be scourged by cholera from that prolific source for many years to come, unless she protects herself by quarantine and disinfection.

As regards the spread of cholera among the villages in India, Dr. White, of Assam, a devout believer in and follower of Bryden, is forced to admit (see "Sixth Annual Report of the Sanitary Commissioner with the Government of India," p. 8) that "the history of the outbreaks of cholera is the same in every case. A case of sporadic cholera occurs in a Hindoo village; the patient is placed in the *smallest and closest apartment* of the house; a *large fire is lighted*, and as many people, friends and relatives of the sufferer, as the room will hold, assemble and squat around him solely for the purpose of praying, as there is seldom, if ever, any attempt to administer remedies. The patient during this time is vomiting, defecating, &c., and *the fomites of the disease must necessarily be carried* off by the visitors to the crowded rooms and huts. After three or four days, five or six new cases occur, and so on daily, until it runs through the whole village or villages to which the persons first infected belonged. Its further progress is limited or circumscribed by the rude system of quarantine maintained by the natives. As soon as it is known that any considerable number of fatal cases have occurred in any particular village, all the other places in the neighborhood cut off every intercourse with it. Although they may have very dear relatives living there, they will not go near, nor allow any person from the infected village to enter their own; and so rigidly is this precaution enforced, that many instances are known in which persons approaching a healthy abode from one where cholera existed, have been violently assaulted."

Thus it will be seen that heat, filth, carelessness, and overcrowding are capable of making a non-contagious disease at least infectious. For Macpherson says, (p. 20:) "While admitting that it is impossible to resist the evidence that cholera is contagious at certain times, I must still assert that it is pestilent in a very slight degree in the better houses and general hospitals of Bengal." Again, ordinary dysentery is not contagious; but Professor McLean (see Reynold's "System of Medicine,"

p. 627) asserts: "Dysentery, once established as an epidemic, is propagated by the effluvia from the evacuations of those affected in crowded hospitals. In most of the Hindostan barracks, the latrines were so badly constructed, so injudiciously placed, and so illy kept as to aid materially in propagating both dysentery and cholera, by exposing the healthy to the effluvia arising from the evacuations of the diseased. He has seen these disorders propagated in hospitals by the practice of preserving the evacuations of large numbers of patients for inspection by the medical officers at their morning and evening visits. No single measure of a preventive kind yet tried has exercised a more beneficial effect on the health of troops in India than the improvement which has been introduced in the position, construction, and care of barracks and hospital latrines.*

The filthy habits of the Hindoos have carried cholera to the "Hill Sanitaria" of Hindostan. Dr. Macnamara (see "Treatise on Cholera," p. 262) says: "Simla is the most beautiful hill sanitarium in the world. It is placed seven thousand feet up the Himalaya Mountains, north of Hurdwar. Scarcely a year now passes without deaths from cholera occurring at Simla, and in 1866–'67 and 1868 it appeared in a deadly form. Nor can we wonder at this, when, as late as 1865, the sanitary commissioners inform us that the "sides of the hills were everywhere studded with human excrement, and the smells which arose in every direction were a disgrace to a place which professes to be an asylum for the sick. The water was contaminated. In summer the dry beds of the mountain-torrents are places of convenience and filth. The edge of a hill at a few yards distance from the public road was lined with filth, and evidently the resort of the numerous native servants of the locality; and at some distance lower down the slope is the spring from which the water-supply of the summer residence of Her Majesty's viceroy and many of the largest and best English houses in the vicinity is drawn. What must occur after every fall of rain is too obvious. Dr. Murray has made an elaborate series of analyses of the waters of Simla which are naturally the purest he has found in India; but, as they reach the consumer, they are the most impure he has ever analyzed. The amount of nitrates in them is something appalling."

In no other country in the world are the pilgrimages so vast and numerous; and if cholera be portable at all, it must be carried about by the thousands and millions of pilgrims who annually traverse Hindostan in every direction.

In spite of all this, the transportation of cholera in Bengal is generally denied; but if the diarrhœal cases were tracked down as they have been in Europe and America, this point would be cleared up. Until very lately the English had no correct idea of the population of India; the highest estimate being two hundred millions, while it has now been proved to be over two hundred and forty millions. So that the movements of forty millions were unknown. The highest estimate of the province of Nuddea was five hundred and seventy thousand; it was found to be one million eight hundred thousand. That of Cuttack, near Juggernaut, was said to be two hundred and sixteen thousand; while it really is one million five hundred thousand. All these uncounted millions escaped taxation and sanitary control. (See *official statement of the condition of India during the year* 1871–'72.)

*According to Inspector-General John Murray, (See *Observations on the Pathology and Treatment of Cholera*, 1874, p. 56:) "Out of two hundred and ninety-one cases treated in the civil hospitals in Paris, from September 16 to November 10, 1873, one hundred and one, equal to thirty-five per cent. originated in the hospitals in patients under treatment for other diseases." There was probably less ventilation than in warmer weather.

The opening of the Suez Canal has caused the gradual rise of trade between Bombay and Trieste, Genoa, Constantinople, and Odessa, which did not exist previous to 1869. (Ibid., p. 93.) Perhaps cholera has slipped or may slip into Europe this way.

In addition to the sea-borne commerce of India, there is the land-traffic from Western India and the Punjaub to Afghanistan, Turkestan, and Persia. The Afghan traders, called Provindahs, number twelve thousand fighting men with sixty thousand camels. If the route was safe, they could make four trips a year instead of one, as they could proceed independently, instead of being obliged to collect in strong caravans. They move toward the plains of India in October, and find their way to the chief marts of India, down to Delhi, Benares, and even to Calcutta. This traffic has existed from time immemorial, [and must often have led to the importation of cholera into Persia by land.] The numerous fairs held all over India, generally on the occasion of pilgrimages, are stimulants to trade. At the Delhi fairs fifty thousand people assemble; at Ambala, two hundred thousand. There are one hundred and twenty-seven other fairs in the Punjaub alone, at which the assemblies number ten thousand and upward. In the Bombay presidency the fairs are held all over the country. (Ibid., p. 96.) "Much of the disease in India is due to bad water and bad drainage; and the mortality is fearfully aggravated by the passion of the people for pilgrimages. Dr. Hunter's great work on Orissa has made an awful disclosure." (Ibid., p. 103.)

The marked resemblance between the progress of the great epidemic of 1841 to 1849, and that of 1867 to 1873, has impressed many. The huge twelfth-year Juggernaut pilgrimage of 1841, in India, was supplemented by an equally great Hurdwar festival in 1843. According to Professor Dickson,* in 1844 cholera was known to have made an encroachment upon Afghanistan, where its ravages were considerable. In May 1845, it was at Kandahar, carrying off three hundred victims a day. In June, at Cabul; in July, at Herat. Some pilgrims going to Meschid, carried it to that city in February, 1846. From Meschid it traversed Persia from east to west, following the great roads, reaching Astrabad in May, 1846, and Teheran in June, 1846; carrying off seven thousand persons in seventy days. It is significant that, in 1846 and in 1831, cholera appeared at the precise time when the pilgrims were flocking in from all sides. At the same time, following the west coast of the Caspian Sea, in November, 1846, it invaded the Russian provinces, attacking the same towns as in 1823 and 1831. Here it stopped at the end of the year 1846, and took up its winter-quarters upon the frontiers of Europe. For several months nothing was heard from it; there were, indeed, some moments of hope that it had disappeared entirely. But this illusion did not last. At the end of March, 1847, it started from its short sleep, and reappeared on the shores of the Caspian; in May, 1847, it was among the Kossacks; in July, at Astracan; on July 21, at Taganrog, on the Sea of Azof; at Kherson, at the mouth of the Dnieper; then at Kiev; and from there went north to the Baltic. It arrived at Hamburg in August and September, 1848; and at New Orleans by three ships from Hamburg and Bremen, in December, 1848.

In the "Bavarian Official Report," p. 14, it is stated that in two hundred and fourteen towns and villages importation of the disease could be proved, and that in eighty-one it was not. It is highly probable that intelligent and industrious investigators will find importation in almost all instances.

* See *New York Journal of Medicine*, January, 1849, p. 9.

In the Madras, Bombay, and central provinces the course of cholera has generally been traced; in Bengal it has not, owing to its greater population, the enormous number of pilgrims who are passing in every direction, the absence of a proper census until 1872, (when it was found that there were forty millions more of people than had been supposed,) the utter untruthfulness of the Hindoos, and the entire neglect of the sanitary authorities to track down the diarrhœal cases, and their fruitless endeavor to connect merely the fatal cases with each other. If the fatal cases only of scarlet or typhoid fever were counted, no possible relation between them could be found. The reporters to the Sanitary Commissioner of India in 1872 seemed so determined to prove that cholera is not portable and communicable in any way, that we read on page 33 of the Ninth Annual Report, Calcutta, 1873, "the law of contagion is not the law which governs the spread of small-pox any more than it is of cholera." In India, in the camps and jails, sanitary science is forced to its utmost perfection; disinfection and cleanliness are pushed to their most wholesome extremes. As soon as one or two cases of cholera occur in a barrack or prison, it is at once evacuated; the troops or prisoners are moved from camp to camp, at greater or lesser distances, as fast as fresh cases occur. If surgeons and hospital-stewards in sufficient numbers could be left behind to supply proper medical care to all the diarrhœal sick, the main body would soon be freed from pestilence. Various places in India, especially those like Moultan, near the great deserts, or high up on the mountains, have been found nearly always to escape cholera, unless it is brought to them in large quantities; and to these exempt places it is contemplated to remove infected troops. The report attempts to draw positive conclusions against the portability of cholera from necessarily imperfect materials. On p. 2, report of 1872, we read: "The mortuary registration among the natives is still confessedly imperfect; at the best it shows only the deaths from cholera and not the number attacked, and even the number of deaths cannot be relied upon. No doubt, as a rule, they are much underrated, for the fear of quarantine and other measures has prompted the people to conceal the disease altogether, or return it under another name." On page 14 it begs the question about travelers and pilgrims when it says, "It must be remembered that hungry, weary, very dirty, and crowded together, as they often are, they are in the very circumstances calculated to render them susceptible to cholera, if cholera be about." On page 18, in answer to the not very infrequent reports of attacks among hospital attendants, we are simply informed that "attendance on a cholera-case cannot confer immunity from the epidemic." The inability to find water-pollution in India shows scarcely less prejudice than prevailed in Munich up to a very late date. On page 27 we are told that "even in a cantonment anything approaching to a strict quarantine is simply impossible. Hundreds of grass-cutters and other servants must go out and in daily. Supplies must come from without. Many of the military stations lie directly on the great high-road of communication. The mails must pass; all travelers cannot be stopped; nor can ordinary traffic be arrested without interfering with the whole trade of the country. In addition to those who must not be stopped, there are many who cannot be stopped, and natives who desire to go in and out can find little difficulty in doing so. A small bribe to the native police is quite sufficient to insure the breaking of the quarantine. In every cantonment in which it was attempted there was a general admission that it was not strict, and that it was impossible to make it so." The entire absence of all allusion to the mendacity of the Hindoos, and of the com-

mon soldiers, who for purposes of licentiousness break the lines every night, and of all reference to the filthy domestic habits of the natives, shows that almost all the great causes of the propagation and transportation of cholera have been overlooked. All these criminal people, viz, quarantine-breakers, faithless police-officers, and jolly soldiers, would rather die than admit the truth.

In the northwest provinces, the sanitary commissioner, Dr. De Renzy, is an infectionist. In 1861, out of fifteen thousand prisoners, there were five hundred and twenty-four deaths from cholera; in 1863, among fifteen thousand five hundred and twenty, there were only one hundred and fifty-six; in 1867, amidst fifteen thousand one hundred, only thirty-one; in 1869, out of eighteen thousand five hundred, only eighty-eight; in 1872, out of sixteen thousand seven hundred, only forty-three deaths from cholera. "A striking example of the efficacy of sanitary measures," p. 34: "In Madras, from 1861 to 1866, from fifteen to thirty per thousand died of cholera; from 1867 to 1871, from less than one, to only four per thousand died. It is justly said that such marked diminution in the deaths from cholera in conjunction with great sanitary improvements is no mere coincidence." Bengal, with her retrograde views, cannot put herself in very favorable comparison with these results. In Bengal, p. 8, there were nearly nine attacks per thousand. On p. 11 we are told that "in most of the places where cholera was severe, cases of diarrhœa were frequent; and there can be little doubt that diarrhœa often represents merely a mild form of cholera." Yet, if every one of these be not detected, no one can say where or how the fatal cases arise. We venture to assert, if medical officers were specially detailed to hunt up the sequence of events, and were possessed of the patience, fairness, sagacity and knowledge of the one who has now unraveled most of the mysteries of the epidemic of 1873 in this country, the views in Bengal would rapidly undergo a great change. As it is, we may soon have to prepare for another outbreak in Russia. In 1872 another epidemic of cholera swept over Northern India. There were one hundred and sixty-five thousand four hundred and fifty-eight deaths from it in all Hindostan, eighty-five thousand of which were in the north. On p. 5 we read: "From Meshed, the capital of Persian Khorassan, the agent writes, on September 8: 'It is about a month since the cholera appeared here, and more than two hundred persons die from it daily.' Astrabad, which lies to the west of Meshed, at the southeast corner of the Caspian Sea, was also attacked. The disease was said to have been brought by a caravan of pilgrims who had lately arrived from Meshed." Hence the pestilence seems again to have passed over the north Persian route, and stands in the same places which led to the outbreak in Russia in 1869 and 1870. The great Juggernaut twelve-year pilgrimages will take place in 1877, and those of Hurdwar in 1879. At the former date, 1877, we may expect an outbreak like that of 1865, coming out by way of Bombay; and in 1879, another Hurdwar outbreak, which may reach Russia in 1881 or 1882.

CHOLERA IN CEYLON.

This island lies so near to Hindostan that the introduction of cholera into it has been studied with great care. From the official report [Colombo, 1867] of the cholera-commission appointed by the governor of Ceylon to inquire into the causes which led to the outbreak in 1866, soon after the twelfh-year festivals in India, we learn that the first cases were imported from India to a village called Katys; that the outbreak com-

menced soon after, aided by other importations. There were only five deaths in July, thirty-one in August, one hundred and thirty-eight in September, one thousand three hundred and four in November, two thousand two hundred and seventy-one in December, three thousand two hundred and eighty-seven in January, one thousand seven hundred and sixty-seven in February, and seven hundred and seventy-five in March. There were sixteen thousand two hundred and ninety-eight cases and ten thousand two hundred and seven deaths, in a population of three hundred and fifteen thousand.

Of two hundred and twenty-six villages, only sixty-two escaped. In almost every village the disease was introduced from the central road or from an infected village. The whole evidence renders it quite clear that cholera was imported into Ceylon in 1866 from India. The committee consisted of the treasurer, surgeon-general, chief government agent, chief medical officer, and chief of police. They visited every infected place, and got answers from the head-men of villages, priests, medical men, old residents, and native doctors. The latter recognized three forms of cholera—1. The patient vomits and purges, is quickly seized with cramps and collapse, and dies. Medicines are of no avail. 2. There is free vomiting and purging, but cramps and collapse come on slowly, or not at all, and the patient may be saved. 3. The vomiting and purging are not severe, and there are neither cramps nor collapse; the patients may recover without medicine. Diarrhœa and dysentery prevailed during the epidemic of cholera, and made a part of it. In the jail, where disinfectants were freely used, only nine cases occurred. Five of them recovered. The natives rarely take remedies, for they believe that cholera is a visitation of the goddess Amal, whose anger is so excited that she will kill ten for every one who takes medicine. The houses are surrounded by high hedges and fences, through which it is almost impossible for the air to circulate. The compounds or grounds are approached by narrow, tortuous lanes. The houses consist of rooms and verandas, looking toward a small space or yard in the center. The men and children sleep on the verandas, and the women in rooms with only one door and no windows; so that the ventilation is very bad. Most compounds have a well, the walls of which are so low and broken as to give an easy access to filth and water from the dirty clothes which are always washed near them. The inhabitants are very industrious, but poor. Their breakfast is cold and often spoiled rice left from the previous evening's meal. They have curry and rice for dinner and supper. The calls of nature are responded to by the women and children on the surface of the ground, near the houses, which generally emits an offensive odor. The men go to the fields or other uninhabited places. They all wash every day, or second and third day. The richer classes often rub themselves with oil and lime-juice. There is no system of sewerage. The burying-grounds are frequently quite near the villages. The bodies are, as a rule, put in graves only two or three feet deep, which not only emit offensive smells, but are often dug up by dogs and jackals. In 1866 there had been no rain for months, and the soil was saturated with decomposed animal and vegetable matter, as none of the human ordure, &c., had been washed away from the unswept compounds. The epidemic lasted long because the houses were overcrowded and badly ventilated, the compounds dirty, and covered with human ordure near the fences. The air was generally impure and stagnant from the height of these hedges and fences. The cholera evacuations and vomits were generally thrown out on the ground. The clothes of the sick were invariably washed at the wells in the com-

pounds, and the water must have become contaminated. Then when a case appeared in any house, there was every chance of the other occupants contracting the disease. Most of the bodies were buried hurriedly and at insufficient depths. Some graves in almost all burial-grounds were opened by dogs and jackals, so that bones, skulls, flesh, mats, cloths, &c., were often found scattered over the ground. The Hindoo priests refused to perform religious ceremonies over the dead, and hence many were exhumed and buried from fourteen to thirty days after interment, when the anger of Amal was supposed to be appeased. The buyers and sellers performed the calls of nature near the fish and vegetable markets; and even in the European parts of the towns the privies were often in close proximity to the wells. The evacuations and vomit of the sick were generally thrown into the former, and the epidemic spread rapidly by means of infection from the privies and foul grounds. From one privy belonging to a nunnery thus contaminated sixteen cases and fifteen deaths arose, because the evacuations of one girl coming from an infected district, with diarrhœa, which soon turned into cholera, were thrown into it. She, however, finally recovered, while fifteen of her companions died. If this first non-fatal case had not been detected the whole outbreak would have been an impenetrable mystery. It was calculated that the excrement of one hundred thousand people, left upon the ground, would impregnate the soil with an amount of putrescible matter equal to the decomposition of fifty thousand corpses disposed of in the same way. It was concluded that hygienists and sanitarians were wanted more than medical men and missionaries, unless the latter could also perform the duties of all. The soiled clothes of cholera-patients were usually cleansed at the wells of the houses of patients, but sometimes were given to the laundresses, who washed them at the public tanks. In 1866, sixty-two infected vessels arrived at Ceylon, having had twenty-four deaths on board and twelve after landing. Seventy-one thousand six hundred and eighty-seven emigrant-coolies arrived from India, and had eight hundred and seventy-one cases of cholera and six hundred and thirty-six deaths. One hundred and eighty-five deaths occurred among them along the coast-road, and three hundred and fifty-five along the central road. There are cooly-sheds every mile along these highways, and deaths occurred at the second, eighth, fourteenth, eighteenth, twenty-third, thirty-ninth, forty-third, fifty-second, one hundred and fifth, one hundred and twelfth, one hundred and seventeenth, one hundred and nineteenth, one hundred and twenty-eighth, one hundred and thirty-sixth, and one hundred and forty-sixth mile-sheds. Dead bodies were also found along the roads. The principal importation took place at Manaar, which is directly opposite Ramisseram, to which a great Hindoo pilgrimage in Southern India takes place. Year after year sickness has been introduced by emigrant coolies, and whole villages where they stopped have been swept away. Many of these villages were very small, having only thirty inhabitants; and in some of them only two or three people remained alive.

ON THE INTRODUCTION OF ASIATIC CHOLERA INTO LARGE CITIES.

The discovery of the steps by which this takes place is often a very difficult task indeed, and must always remain so. When it happens by means of diarrhœal cases these generally go long undetected, and the majority of the non-fatal cases will always remain undiscovered.

In the last outbreak in Munich, in 1873 and 1874, the facts were as follows: The disease had commenced in May, 1873, in Vienna, before the opening of the great exhibition there. In June it was present in Russia, as it had been for years, and in Bohemia, Galicia, Hungary, in the German provinces of Bromberg, Marienwerder, and Danzig; also in Saxony, in boats on the Elbe, and in two villages near Dresden. Hence the danger of importation into Munich was great and increasing. On June 25 an American clergyman, Cliny Wood, came from Vienna, put up at the Hotel Reinischen Hofe, with fully developed cholera, but was removed to the hospital, without being allowed to use the privy, and died in the afternoon. On June 29, another person came from Vienna by way of Nuremberg and died. Both he and Wood had lived at the Hotel Donau in Vienna, in which the well-known great outbreak occurred. A third person from the Hotel Donau died June 24 at Neveto, Italy. The room occupied by Mr. Wood and the railroad-car in which he traveled were cleansed and disinfected. No other fatal case occurred for twenty-one days, when, on July 16, another case from Vienna, by way of Darmstadt, was imported into another hotel, and was quickly removed to the hospital, where he recovered. The third case was a street-sweeper in a distant part of the town. The fourth was an infant four months old, July 19; and the fifth its mother, July 21, who had received a visit from an apparently healthy professor from Vienna. The house was washed and purified. The sixth was a railroad-laborer, who sickened July 17 and died on the 22d. The seventh, July 22, was a laborer, who recovered. The eighth case was a body-servant of Prince Leopold, who came sick with diarrhœa from Vienna on July 19, staid at the palace and then went on to Lindau, where he died on the 23d. His bed at the palace was burned, and disinfection and fumigation were carried out in the most thorough manner. The ninth case, July 27, was a locksmith working at the central works of the state railroad. He had had diarrhœa for four days at home, and was then taken to the hospital, where he died on the 29th. There was no prevalence as yet of diarrhœa in Munich. The sister of the last case, who had been with him during his sickness, but lived at a distant house, took some of his soiled clothes to wash, (although she denied it stoutly,) and had a severe diarrhœa for three days. In the same house a fatal case soon occurred, quickly followed by another. These three were the first fatal cases which could be traced to each other. The thirteenth case was fatal, in a cook in a distant house, and the cause of her attack could not be traced. The fourteenth case came from Papau, where no cholera was acknowledged; put up at a house where suspicious cases of diarrhœa had occurred, and died after removal to the hospital. Her child, who slept with her, remained well. The fifteenth case, August 2, occurred in the barracks of the cadet corps, in a servant, the origin of which could not be traced, but was followed by two other cases on the 10th and 11th of August. The first cases on the right side of the river Isar seemed sporadic, and did not prove productive. Those on the left side spread gradually to others, and finally over the whole city. Such was the commencement of an epidemic which culminated in three thousand and forty cases, of which one thousand nine hundred and twenty-three were called cholera, with one thousand one hundred and fifty-five deaths, and seven hundred and sixty-eight recoveries; and one thousand one hundred and seventeen were reported as cholerine, with three hundred and five deaths and eight hundred and twelve recoveries. Two hundred and twenty-four house epidemics were noticed with one thousand and eight cases, five hundred and eighty-one deaths, and five hundred and twenty-seven recoveries. One

hundred and fourteen houses had three cases each; forty-eight had four; twenty-seven, five; sixteen, six; four, seven; three, eight; three, nine; two, ten; two, thirteen; and one house each had sixteen, twenty-seven, thirty, thirty-one, fifty, and sixty-eight cases. In all there were two thousand and seventy affected houses with three thousand and forty cases. Six hundred and twenty cases occurred on the north side of houses, seven hundred and fifty-five on the east, eight hundred and twenty-six on the south, and five hundred and ninety-two on the west. There were seventeen cases in cellars, six hundred and sixty-seven on the ground-floors, eight hundred and sixty-seven in the second stories, six hundred and thirty-nine in the third stories, three hundred and ninety-eight in the fourth, one hundred and sixty-three in the fifth, and nineteen in the sixth. The number of cases in the different stories depended entirely upon the number of dwellers and their sanitary relations. There were one hundred and three epidemics confined to single stories of houses, with one hundred and ninety-nine deaths and one hundred and eighty-three recoveries. There were twenty epidemics confined to single rooms. The state of the ground-water was in opposition to the Pettenkofer theory. The drinking-water was found for the first time in Munich to have exerted an influence upon the spread of the disease. Many cases proved that the disease was infectious at times, at others not. The portability of the disease was often proved, but it was impossible to connect all the fatal cases together. Some of the imported cases seemed to produce no further result than the one death. Only ten washerwomen out of one hundred and two were affected, but disinfectants were generally used. Taking cold seemed to bring on attacks in one hundred and forty cases; mistakes in diet in two hundred and fifty-one; the use of bad cheese and sausage in forty-seven; bad beer and wine in thirty-eight; poor vegetables in forty-two; and exposure to other cases in two hundred and fifteen. Preceding diarrhœa was noticed one thousand and eighty-seven times. (See M. Frank's official report of the cholera-epidemic in Munich in 1873 and 1874.)

Hundreds of travelers must have come from Vienna to Munich, but none of the diarrhœal cases were detected; and only a few of well-pronounced cholera. These travelers must have distributed themselves over many and distant parts of Munich. Soon diarrhœa, which had not previously existed, began to prevail, with here and there a severe or fatal case of cholera in widely-separated houses. In order to have studied the outbreak thoroughly, every arrival from Vienna should have been watched, his place of residence become known to the health-officers, and his wanderings to and fro recorded, and the results obtained. This is, of course, a very difficult matter in large cities, but it is not impracticable; and one epidemic thus studied would doubtless clear up all the obscure points about every outbreak of the disease. Until this is done, nothing absolutely satisfactory will ever be known; and it will be time and money well spent to do it.

In further illustration of this subject see British and Foreign Medico-Chirurgical Review of July, 1872, for Dr. Parkes's account of the introduction of cholera in Southampton in 1865. On June 10 the steamship Poonah arrived from Alexandria, Malta, and Gibraltar. The crew and passengers had perfect health until two days before arriving at Southampton, when several men became ill with severe diarrhœa, and one died of cholera. This outbreak was attributed to foul water taken in at Gibraltar. The water had a disagreeable smell and taste. The firemen alone drank of it, and they alone suffered from decided choleraic disease. On June 8 one fireman drank a large quantity of this water, and early next morning was seized with vomiting, purging, and cramps. He became cold

and pulseless, and died in nine hours. On the same day six or seven other firemen, and on the following day three or four more, were affected with violent purging and some with vomiting. None of these men reported themselves to the medical officer, as they were afraid of being detained on board, and they all landed at Southampton and dispersed themselves over the town on the 10th and 11th of June. They were then seen by several medical men, who diagnosed the disease as the severest choleraic diarrhœa. Edward Palmer, one of the firemen in the same watch as the man who died on board, was attacked at his clean and pleasant home, on June 11, with diarrhœa, which was very severe for three days. He slept in an airy room with his wife and child, generally going to the closet outside, and occasionally using a chamber-vessel in the room. On June 13, his boy, aged three years, was suddenly seized, and died of cholera in six hours. The next day Palmer himself became worse, and died on the 15th. His wife escaped. There can be no doubt that the dejecta of cholera in large quantities must have passed from thirty or more persons into the sewers of the town; and in this way cholera was doubtless introduced into Southampton. Four cases, which could not be traced directly to the Poonah, occurred, and then the outbreak commenced, three weeks after the arrival of the vessel. The disease was soon confined to the low and unhealthy parts of the town. Except the Poonah, there was no traceable mode of importation. Except Palmer's child, it did not spread at first to others in close proximity. The water of Southampton was good, and the poison was probably disseminated through the sewers. At the lower part of the town the sewage accumulates, and gases are often forced back into the houses. Just before the outbreak the pumping of sewage had been discontinued while the sewers were being cleansed. The pumping was resumed just before the outburst, and several tons of offensive fluid were daily poured down an open conduit into the outlet-sewer. The odor was overpowering, and several cases of diarrhœa and cholera occurred near the pumping-station, for which no other cause could be discovered than the effluvia from the sewage. The conduit was covered, and carbolic acid was largely introduced into the sewer. The cases, which had been very numerous, then lessened, and in six days the worst was over. Dr. Parkes expresses his belief that the outbreak was mainly caused by the fæcal effluvia from the sewers, into which cholera-dejecta had been largely introduced. It was also suggested that some cases were caused by the escape of poisonous gases into the houses through insufficient traps, and thus occasioned a few scattered cases.

Among the numberless instances in which cholera was brought into South Germany, in 1866, by the Prussian soldiers, after their march through Saxony, we select the following, (see Vogt and Smidt's Official Report, Munich, 1868, p. 14.) The last battle between the Prussian and South German troops took place at Waldbrunn, four miles southwest of Würzburg, on July 26. By August 4, about seventeen hundred Prussians had occupied the little town, but left it the same day, as they could get no supplies of food, or even of water. No deaths occurred among the Prussians while in the place, but many had diarrhœa and cholerine. From house No. 2 a Prussian, suffering with vomiting and diarrhœa, was carried away. The first cases occurred near this spot. In house No. 14 about fifteen soldiers were quartered; some of them had diarrhœa and vomiting, and lay down on the beds of the house-people. Almost all this family sickened. In No. 28, they occupied a room which was subsequently used by the housewife. She became sick, and soon after, the rest of the occupants. In No. 46 a Prussian suffered with diarrhœa, and was taken to the hospital; the proprietor died on August 7. From No. 51 two Prus-

sians were carried away sick with cholerine. In No. 65 a woman waited upon a diarrhœal Prussian, who lay in the bed of her husband, who was attacked soon after. The woman, who would not allow her bed to be used, escaped. In No. 72 the Prussians said the disease prevailed in their homes, and that they were glad to be away; two of them had diarrhœa. In consequence of these occurrences, there was a sudden outbreak of cholera in various parts of the town. It seemed as if the disease had assumed a mild, almost diarrhœal form among the Prussians, but that they gave off a material which was capable of producing fully developed cholera in other predisposed persons. On account of their painlessness, and the slight sickness which these apparently slight cholerines or premonitory diarrhœas produce, it is often very difficult to follow up the trail of importation. And from the occasional long incubation of the disease quarantine and isolation often fail to further prevent the introduction and progress of the disease. When the Prussians marched away, the health of Waldbrunn was good; but in two days cholera broke out in the severest manner. On August 6 twelve persons were attacked in various parts of the town, all of whom died. One strong, healthy man went out to his fields in the morning quite well, and was suddenly attacked with great exhaustion; but diarrhœa did not come on until after his return home. He died the same evening, At noon a large, powerful female was attacked, and died in seven hours. She was nursed by her sister, a healthy, blooming woman, who died the next day. In house No. 59, a strong peasant woman, who had worked in the fields in the evening, was dead at 7 a. m., and six out of seven of her family died in succession. On August 10 eighteen persons were found in full collapse, and many with diarrhœa, which they were neglecting and overlooking in the general consternation. The period of incubation varied from two to eight days. Of five hundred inhabitants, one hundred and eighteen were attacked and forty-one died in fifteen days. In all of fifty-seven cases of fully-developed cholera, forty-two died and fifteen recovered. Of the forty-two deaths, one-fourth happened within twenty-four hours, another quarter the fourth day, and the other half from the fourth to the twelfth days; but two cases lingered for three weeks. In ninety houses there were multiple cases in thirty-one. The village lay high, the dwellings were large, the streets were broad, the cellars were dry, the people were not poor, but the water-supply was very scanty. There was only one spring in the place, and that may have become sullied by the soldiers, who drew it dry in one day. In order to prevent the too rapid use of the water, no facilities for drawing it were allowed, but each villager had to bring his own well rope and bucket. Many of these were soiled in some way, for the water soon acquired a suspicious look and taste. There was no ground-water about the place, for water could only be reached at a depth of eighty feet. The houses were all scattered, and separated from each other by yards and gardens. Although the center of the town seemed to be affected first, cholera quickly appeared in every nook and corner of the place. There seemed not to be the slightest regularity in the attacks as regards the running number or position of the houses. But a connection of the cases could be traced easily, and in no other way, by the visits of soldiers, and of friends and relatives. Thus Goezner, of house No. 2, who had attended his brother on August 7, at house No. 72, was attacked on the 9th. These houses were situated far apart. As before said, not a single Prussian soldier died in the village during their short stay. The disease had a strictly diarrhœal origin. If all travelers could be as easily recognized as uniformed soldiers, there would be but little difficulty in tracing the importation of cholera into towns and houses.

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BIBLIOGRAPHY OF CHOLERA.

BY

JOHN S. BILLINGS, M. D.,
ASSISTANT SURGEON, U. S. A.

SURGEON-GENERAL'S OFFICE,
Washington, D. C., April 1, 1875.

GENERAL: I have the honor to submit the following list of books, and journal and periodical articles, relating to cholera, compiled in accordance with your directions on a request to that effect made by Assistant Surgeon Ely McClellan, United States Army, in July, 1874. This list, although by no means complete, is believed to be sufficiently extensive to meet the wants of the great majority of inquirers.

The library of the Surgeon-General's Office at Washington is comparatively rich in the literature of this subject, a good foundation having been laid several years ago by the purchase of the collection of works relating to epidemic diseases made by the late Professor Baart de la Faille, of Groningen, and the majority of recent treatises on the subject have since been added as they appeared. The files of medical journals in the library which have been examined for this purpose comprise a little over 8,000 volumes, being about 75 per cent. of all which have been published, and the majority of those still wanting were either published prior to 1830 or are of minor importance.

As a rule, titles are given only of works which relate mainly or entirely to cholera. Hardly a treatise on epidemics, public hygiene, the practice of medicine, or the diseases of India, has been published since 1832 that does not contain more or less with regard to this subject, but it would be useless to attempt to give this class of references in a compilation of this character.

As it is, the majority of readers will probably think that the magnitude of the work is much greater than its importance; but it must be remembered that no two men would agree as to what should be omitted, nor have I had either the time or the material to make a careful selection. While hundreds of editorial notes, cholera-news items, extracts, &c., which are scattered through the medical journals of 1831–'34, 1848–'50, 1854–'57, 1865–'67, and 1873–'74, have been omitted, I have retained some which, although of little interest in themselves, may serve to give a clew to an inquirer, especially as regards the geographical distribution of cholera.

As is well known, there are two distinct diseases which have been called cholera, or cholera morbus; and while the classification can in most cases be made from the title and date alone, this is by no means always the case, and I am sure that some of the following titles relate to the sporadic and non-epidemic disease rather than to the true Asiatic pest. The titles given under the heading "Cholera prior to 1817" relate almost entirely to the sporadic form of the disease. The classification made use of is but a rough one, but will, I think, be found practically convenient, at least for verifying the titles of books, and from the collector's and librarian's point of view; and, as one object of this list is for use as a means of completing the collection of this library on this subject, it was considered advisable to bring it into book-sellers' form as much as possible, while affording enough classification to facilitate the work of literary investigators. No one of the latter class would find any classification made by another person suited to his wants, and I do not flatter myself that I have hit the golden mean, especially as I have been compelled to make my classification largely

from the data furnished by the titles themselves, on account of lack of time and opportunity to examine the original documents.

The classification made use of is as follows:

I. History, statistics, and bibliography.
  A. Works published prior to 1817, mostly relating to sporadic cholera morbus or cholera nostras.
  B. Periodicals.
  C. History and statistics, general treatises, and essays.
  D. Accounts of cholera, in particular localities.
II. General treatises on cholera.
III. Causes and prevention.
  A. Causes, theories of causation, and contagion.
  B. Hygiene and methods of prevention.
IV. Pathology and pathological anatomy.
V. Complications, sequelæ, and cases.
VI. Treatment.
  A. General.
  B. Special.

All the periodicals and transactions referred to are in the library of the Surgeon-General's Office at Washington.

With regard to books and pamphlets, the letters following titles have the following meanings:

L. in Library Surgeon-General's Office.

C. in same library as a special deposit from the Congressional Library.

C.L. in the Library of Congress.

An asterisk (*) prefixed signifies that the work is an inaugural thesis or dissertation.

I am indebted to Dr. Salvatore Caro, of New York, for some Italian titles, which are indicated by the letters S. C.

In each subdivision except I. D. (accounts of cholera in particular localities) and VI. B. (special treatment) the titles are arranged alphabetically under the name of the author, anonymous works being placed separate under the first word of the title excepting the article.

Any one noting errors of omission or commission will confer a favor by pointing them out to the compiler.

Very respectfully, your obedient servant,

JOHN S. BILLINGS,
Assistant Surgeon, United States Army.

Gen. J. K. BARNES,
Surgeon-General U. S. A.

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[LANCET, 1849, II, pp. 14–17.]

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Bekanntmachung [extr.]: Wenn gleich der mildere Character, den die Cholera bei ihrem Vorschreiten im nördlichen Deutschland gezeigt hat, . . . so hält es der Magistrat dennoch für seine Pflicht, die Bewohner hiesiger Residenz von denjenigen Maassregeln hiermit in Kenntniss zu setzen, [etc.] [Hannover 13. Oct. 1831.] fol. [*n. p., n. d.*] L.

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[GAZ. med. it. prov. Venete, 1872, XV, pp. 331–336, 339–345, 355–359, 363–367, 374–376.]

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[BULL. gén. de thérap., méd. et chirurg., Paris, 1849, XXXVII, pp. 337–342.]

Choléra (Le) et son traitement [signé : F. B.] 8°. *Paris*, 1865.

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[MED. Times, 1849, XIX, p. 274.]

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[Ann. de la méd. phys., Paris, 1832, XXI, pp. 461–552.]

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[Schat d. Gezondh., Haarlem, 1859, ii, pp. 353–358.]

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[London Med. Gaz., 1849, xliv, pp. 458–462.]

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[Canada Med. & Surg. Jour., 1873, i, pp. 425–426.]

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[Ugeskr., Copenhagen, 1849, X, pp. 209-219.]

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[Jour. of Pub. Health, 1849, II, pp. 15-16.]

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[Med. Times & Gaz., 1865, II, pp. 630-631.]

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[Wiener med. Wochenschr., 1867, XVII, pp. 683-687.]

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[Forhandl. vid Svenska Läk.-Selsk., Stockholm 1866, pp. 166-172.]

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[Medytzynskiy Viestnik, St. Petersburg, 1866, 6th year, No. 30, pp. 355-356.]

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[Gaz. méd. de Paris, 1866, XXI, pp. 635-636.]

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[Gaz. hebd. de méd. et de chirurg., 1866, 2e s., III, pp. 462–464.]

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[Gaz. med. ital. prov. Venete, 1867, X, pp. 161–163.]

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[Rep. Priv. Council, 1866 (appendix), pp. 219–239.]

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[Transylv. Jour. of Med., 1832, V, pp. 351–362.]

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[Aerztl. Intell.-Bl., 1875, XXII, pp. 127–128.]

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[Med. Times & Gaz., 1873, II, pp. 355–356.]

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[London Med. & Surg. Jour., 1833, II, p. 303.]

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[Supplement. til Bibl. for Laeger, Copenhagen, 1850, pp. 162–171.]

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[Lancet, 1849, II, pp. 380–381.]

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[London Med. Gaz., 1833, XI, pp. 356–361.]

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[Jour. of Pub. Health, 1849, II, pp. 99–101.]

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Gutachtliche Aeusserung der k. wissenschaftlichen Deputation für das Medicinalwesen, betreffend die Aufstellung eines Programms für die Ueberwachung des Schiffsverkehrs in Bezug auf die Verbreitung der Cholera. (Erster Referent: Virchow.)

[Vierteljahrsschr. f. gerichtl. Med. und öffentl. Sanitäts., 1873, XVIII, n. F., pp. 74–84.]

Haustafel (Unentbehrliche) in der Cholera-Noth für Jedermann, insbesondere aber für den Bürger und Landmann, oder: gründliche und deutliche Uebersicht der Kennzeichen der Cholera, der sichersten

Haustafel, *etc.*—continued.
Schutzmittel gegen diese und alles dessen, was bei einem Ausbruch derselben bis zur Ankunft des Arztes zu thun ist. fol. *Glogau*, 1831.

Hülfsbüchlein in Choleragefahr. 3te Aufl. 8°. *Leipzig*, 1866.

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[Revista med.-quirûrg., Buenos Aires, 1874, x, pp. 330–335, 342–345.]

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[Gaz. méd. de Paris, 1849, IV, 3e s., pp. 57–59.]

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[Revue méd. chir. de Paris, 1850, VIII, pp. 127–128.]

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[Med. Times & Gaz., 1865, II, pp. 469–470.]

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[Practitioner, 1874, XIII, pp. 456–460.]

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[Practitioner, 1874, XIII, pp. 220–228.]

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[Wien. med. Wochenschr., 1874, XXIV, pp. 527–529, 667–670, 687–690.]

Invloed (De) van Woning, Stand en algemeene Maatregelen.
[Nederl., Tijdschr. v. Geneesk., 1867, II, pp. 110–116.]

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[Lyon médical, 1873, XIV, pp. 201–203.]

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Karantaene-Foranstaltninger og Bestemmelser angaaende Cholera.
[Bibl. for Laeger, Copenhagen, 1848, IV, pp. 231, 474–478.]

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Können, *etc.*—continued.
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[Norsk Mag. for Laegevid., Christiania, 1840, I, pp. 80, 197.]

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[Jour. of Health, 1832, III, pp. 155–159.]

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[Ugeskr. for Laeger, Copenhagen, 1848, IX, pp. 95–96.]

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[Verein. tot Verbet. der Volksgezondh., Utrecht, 1872, VI, p. 62.]

Maatregelen wegens de Cholera in 1867 in Nederland.
[Nederl. Tijdschr. v. Geneesk., 1867, I, pp. 527, 557–559, 573.]

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[Lancet, 1832–33, I, pp. 48–50.]

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[Allg. Wien. med. Zeitg., 1866, XI. pp. 295–296, 303–305, 311–312.]

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[Report of Medical Officer of Privy Council, London, 1874, I, n. s., pp. 28–31.]

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[Jour. de méd. et de chir. prat., 1866, XXXVII, pp. 385–389.]

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[Gaz. des hôp., Paris, 1831, V, pp. 151–152, 231–232.]

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[Medytzynskiy Viestnik, St. Petersburg, 1866, 6th year, No. 30, pp. 355–356.]

Miery protiv cholery.
[Medytzynskiy Viestnik, St. Petersburg, 1866, 6th year, No. 4, p. 104.]

Militär-aerztliche Verwahrungs-Massregeln gegen die Cholera.
[Wiener med. Wochenschrift, 1865, XV, pp. 1699–1702, 1718–1719.]

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[Allg. Zeitschr. für Epidemiol., Erlangen, 1874, I, pp. 236–240, 309–318.]

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[Geneesk. Courant, 1855, No. 35.]

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[Geneesk. Courant, Tiel, 1855, No. 32.]

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[Geneesk. Courant, Tiel, 1867, No. 34.]

Monsieur choléra et madame santé. (Signé: Madame Santé. Pour copie conforme: J.-M. Dejey.) 16°. *Chambéry* [1867].

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[Gaz. med. da Bahia, 1866, I, pp. 37–39.]

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[Med. Times & Gaz., 1870, I, p. 184.]

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[Sperimentale (Lo), Firenze, 1865, XVI, pp. 150–162.]

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[Ugeskr. for Laeger, Copenhagen, 1849, pp. XI, 15, 30.]

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[Norsk Mag. for Laegevid., Christiania, 1866, XX, pp. 872–888 ; 1867, XXI, pp. 846–856.]

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