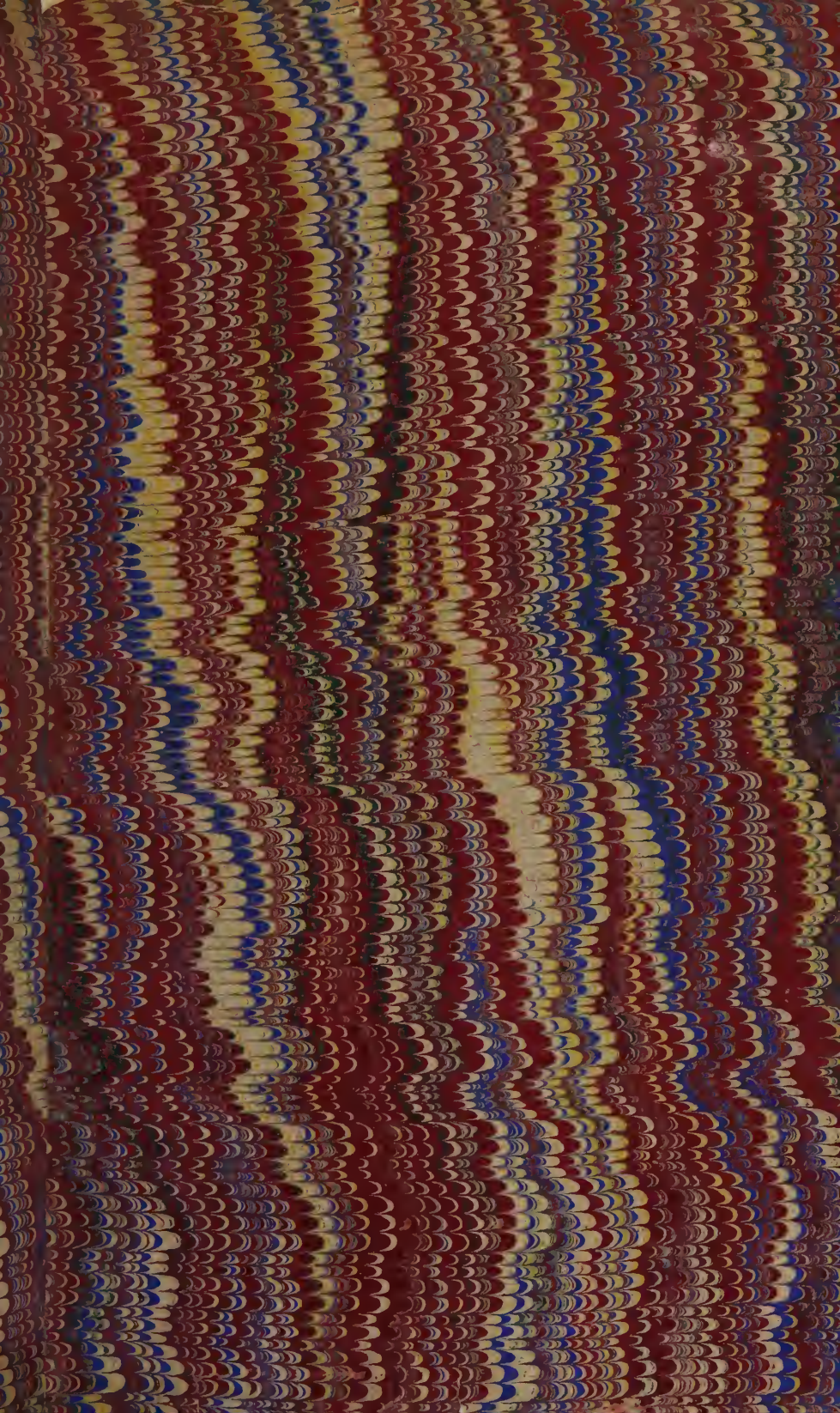



John W. Howland, M.D.

Superior Surgeon.

U. S. Marine Hospital Service. Washington, D. C.





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LETTER

FROM

THE SECRETARY OF WAR,

COMMUNICATING,

In obedience to law, information in relation to quarantine on the Southern and Gulf coasts.

DECEMBER 9, 1872.—Referred to the Committee on Commerce and ordered to be printed.

WAR DEPARTMENT, *December 6, 1872.*

The Secretary of War has the honor to transmit to the United States Senate and House of Representatives, in compliance with the requirements of a joint resolution, approved June 6, 1872, providing for a more efficient system of quarantine on the Southern and Gulf coasts, the inclosed copy of the report of Assistant Surgeon Harvey E. Brown, United States Army, who was detailed to make the investigations called for.

WM. W. BELKNAP,
Secretary of War.

WASHINGTON, *December 2, 1872.*

SIR: I have the honor herewith to present a report of the work performed by me, in obedience to Special Orders No. 139, current series, from the War Department, of which the following is a copy:

[Special Orders No. 139.—Extract.]

WAR DEPARTMENT, ADJUTANT-GENERAL'S OFFICE,
Washington, June 17, 1872.

On the recommendation of the Surgeon-General, Assistant Surgeon Harvey E. Brown is hereby detailed to make the inspections and reports required under the joint resolution of Congress approved June 6, 1872, "providing for a more effective system of quarantine on the Southern and Gulf coasts," and will proceed, via New York City, to Norfolk, Virginia; thence to such other towns or ports on the Atlantic coast as may be comprised in the said resolution; thence to New Orleans, Louisiana, where he will take his station, and make the necessary visits and inspection on the Gulf coast. On the 1st of November next he will return to this city and make his report to the Secretary of War, through the Surgeon-General.

By order of the Secretary of War:

E. D. TOWNSEND,
Adjutant-General.

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The joint resolution referred to in the foregoing order is as follows

JOINT RESOLUTION providing for a more effective system of quarantine on the Southern and Gulf coasts.

Whereas experience has proved that the present system of quarantine on the Southern and Gulf coasts is inefficient to prevent the ravages of yellow fever in the cities and towns of that section: 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 is hereby, directed to detail one or more medical officers of the Regular Army, who shall, during the coming season, visit each town or port on the coast of the Gulf of Mexico and the Atlantic coast, which is subject or liable to invasions of yellow fever, and shall confer with the authorities of such port or town with reference to the establishment of a more uniform and effective system of quarantine, and who shall ascertain all facts having reference to the outbreaks of this disease in such ports or towns, and whether any system of quarantine is likely to be effective in preventing invasions of yellow fever, and, if so, what system will least interfere with the interests of commerce at said ports; and shall make, also, a detailed report on this subject to the Secretary of War, through the Surgeon-General, on or before the assembling of the third session of the Forty-second Congress, in December, eighteen hundred and seventy-two.

Approved June 6, 1872.

In obedience to these instructions I have the honor to report that I have visited the various ports on the Southern, and Gulf coasts which have been in the past the seat of epidemics of yellow fever. In each place visited I have examined the quarantine laws in operation, conferred with the local boards of health when any such existed, conversed on the subject with physicians of experience, and with those whose long residence or commercial or professional position would qualify them to give an intelligent opinion on the subject; and have endeavored, so far as was practicable in the brief space of time allotted me, to ascertain the facts connected with the various epidemics of yellow fever in the ports and towns visited, both by examination of publications on the subject and by personal conversations with those most likely to be conversant with such facts; and have endeavored to arrive at a correct opinion as to the value of quarantine restrictions against yellow fever, and to what extent such restrictions can be enforced without material interference with commercial interests. The result of my inspections has been such as to convince me—

1st. That in the vast majority of epidemics, if not all, that have occurred in the United States, the germinal principle of the disease was imported from elsewhere, and was not due to local causes.

2d. That a system of quarantine can be organized which will prove effective in preventing invasions of yellow fever.

3d. That a properly-organized system, so far from interfering with the interests of commerce, will prove really beneficial to the commercial prosperity of ports where established.

4th. That the present quarantines at the South, being established by either State or municipal authority, lack that uniformity which is absolutely necessary to their efficiency, are not founded on rational views of the pathology of the disease, and are generally defective in their administration, and that, consequently, a system of a different character must be adopted to attain the end desired.

5th. That yellow fever needs to be planted in a favorable soil in order to become epidemic, and that, consequently, the danger from the disease is measurably lessened in proportion as attention is paid to the local hygiene and sanitary condition of those parts of the ports or towns which, by reason of the character of the inhabitants or other causes, are usually the habitation of the earlier cases.

I am aware that, in enunciating the first four of the above propositions, I am in opposition to the views of some of the ablest and best

minds at the South, who have had the largest experience in this malady; and it is with great diffidence that I feel obliged to differ from such distinguished gentlemen as Professor E. Geddings and W. F. Wragg, of Charleston; Doctors E. A. Anderson, of Wilmington, North Carolina; R. D. Arnold, of Savannah; and Warren Stone, of New Orleans; but, believing that the history of the epidemics in the United States warrants the conclusions to which I have arrived, and that a very decided change has taken place of late years in the minds of the profession on the subject of the portability of the yellow-fever poison, and the consequent value of quarantine measures, I propose, before entering into a consideration of the subject of quarantine, to present a brief abstract of the history of the epidemics that have occurred in this country, so far as any such can be obtained. To do this intelligently demands some notice of the early appearances of the disease in the West Indies, and of the great epidemics in New York, Philadelphia, and other northern ports, between 1790 and 1822; for, although these are not properly embraced in the scope of my report, yet they have such an important bearing on the subject, that some reference to them is necessary to do justice to the question at issue. I proceed, therefore, to an account of the epidemics that have appeared in various northern ports, before giving the details of those in the southern sections of the country, and along the Gulf coast.

HISTORICAL SKETCH OF YELLOW FEVER.

The earlier historians of the West Indies ascribe the origin of the yellow fever to the East. An insurrection having broken out in Siam, the French colonists at Bannock were driven from the country, and embarked on the ship *Oriflamme* and two other vessels in the latter part of the year 1690, and sailed for Martinique. The *Oriflamme* touched at Brazil, where yellow fever had been prevailing for seven or eight years, and soon after the disease broke out on board, and by the 5th of January, 1691, over a hundred deaths had occurred on the vessel. The disease spread to the shore, and was carried by other vessels to many of the other islands. Moreau de Jonnès, in his work on yellow fever, argues, however, that the disease had existed in St. Domingo for many years previous to that time, and had prevailed in the first settlements formed by the immediate followers of Columbus, (pp. 14-60.) However this may be, it is certain that the disease was known for many years as "*Mal de Siam*," and the fact of its importation by the *Oriflamme* received general credence with the medical writers of the eighteenth century. Another account ascribes its introduction to slave-ships from Africa in 1669, in which year a fatal epidemic prevailed in St. Domingo.

It seems certain from the narratives of some of the Jesuit missionaries, as well as the historians of the period of Columbus and his immediate successors, that fevers of a malignant type, and accompanied with a yellowness of the skin, were peculiarly fatal to the newly-arrived Europeans. Such fevers prevailed epidemically in St. Domingo in 1494, in Porto Rico in 1568, at Darien in 1514, in Guadaloupe in 1635, at Martinique in 1640, at Barbadoes in 1647, and at St. Croix in 1652, and, as before mentioned, at St. Domingo in 1669, and in 1686 the local authorities in the last-mentioned island, passed ordinances to prevent the introduction of contagious and malignant fevers by means of slavers. (Moreau de Jonnès, *op. cit.*, pp. 58, 59.) It seems most probable that these earlier epidemics were of yellow fever, but that after the arrival

of the Oriflamme in 1690, the disease acquired a peculiar degree of malignancy, which it did not before possess, and which led the inhabitants to imagine that a new disease had appeared among them. Chisholm fell into this same error in reference to the disease, which was imported into Granada in 1792, on board the ship Hankey, from the abandoned colony of Boullam, coast of Africa. This epidemic made its appearance after the West Indian islands had enjoyed a complete immunity from the disease for twenty years; and differing materially in its type and the degree of malignancy from former outbreaks, it was regarded by Chisholm (*Essay on the Boullam fever*, p. 89) as a disease previously unknown, and he dates the origin of the true yellow fever of West Indies from this year.

Probably much of the obscurity that hangs around these earlier epidemics arises from the confounding of the genuine "vomito prieto" with the malignant remittent of the West Indies (all these fevers being designated by the common name of "yellow" previous to 1690,) on the part of the earlier writers, who were, most of them, non-professional men—an error which is made in more recent times in every southern city with the first cases of an epidemic, and sometimes, throughout its whole duration, physicians of learning and experience are unable to determine, positively, whether they have had any yellow fever among them or not, as was the case, a few years since, at Jacksonville, Florida, and last year in Charleston, South Carolina, as will be shown on a subsequent page.

The first appearance of the disease in the United States was in 1693 at Boston. Previous to this time, "pestilent" and "malignant distempers" are reported as prevailing at various early periods among the Indians in New England, and attempts have been made to convey the idea that this sickness was yellow fever; but, as La Roche remarks, "We cannot be censured for undue skepticism if we entertain doubts as to its identity with true yellow fever, especially as it is acknowledged to have raged in winter;" (vol. 1, p. 47.) Numerous towns suffered during the last half of the seventeenth century from epidemic disorders, but it is more than probable that most, if not all of these, were fevers of malarial origin, due to the felling of the forests and the constant upheaval of the soil, which would take place in young and growing communities in settling a new country.

In 1693, an English fleet, under command of Sir Francis Wheeler, which had been sent the previous year to effect the reduction of Martinique, and had spent a month at Barbadoes, returned to Boston with yellow fever on board. The mortality had been so great among the troops and sailors, that over one-half of the whole number of persons in the fleet had died, and the disease is stated to have been introduced into Boston, and prevailed with great severity. Its next appearance was in Philadelphia and Charleston in 1699. It was asserted by one writing long subsequently, that the disease was imported from Barbadoes in a vessel laden with cotton; but none of the contemporary chroniclers mention this circumstance, although the fact that it was known by the inhabitants as the Barbadoes distemper, would seem to give a warrant to the assertion.

In 1702 it appeared for the first time in New York, and was said by contemporary writers to have been imported from Saint Thomas, West Indies, in a bale of cotton. It was called the "American plague" and "the great sickness." Although the population of the city at this time was not more than eight thousand, over five hundred persons died. *Griscom's History of Visitations of Yellow Fever at New York*, p. 2;

Currie, Diseases most prevalent in the United States of America, p. 63.) The disease did not appear again in New York until 1745, although Webster, in his book on Epidemics, speaks of "malignant infectious diseases" in 1732 and 1743. In 1741 it made its second appearance in Philadelphia. There were at this time a large number of German immigrants in the city, who suffered severely. It prevailed until the approach of cold weather, and caused about two hundred and fifty deaths. Carpenter (Sketches of Yellow Fever, p. 12) gives Lind as authority for the assertion that it was introduced about the 1st of June "by means of a trunk of wearing-apparel belonging to a gentleman who had died of the disease in Barbadoes." (Lind on Fevers and Infections, p. 107.) A rather doubtful outbreak of disease, thought by some to be yellow fever, occurred in 1744; and in 1747 it was again epidemic. It was the universal opinion that it was due to foreign importation from the West Indies, as it prevailed chiefly in those parts of the city near the wharves, in sailors' lodging-houses, and among the classes of people most likely to be about the shipping. Like the previous epidemic, the clothing of a person who had died in the West Indies was asserted to be the source of infection.

Dr. Thomas Bond ascribed it to the presence in port of infected ships, upon which the disease broke out after their arrival. No person seems to have thought of giving the disease a local origin. (Bond, North American Medical and Surgical Journal, vol. 4, p. 271; La Roche on Yellow Fever, vol. 1, pp. 60, 61.) In 1762 it again prevailed in Philadelphia, commencing about the middle of August and terminating the last of October. Dr. John Redman, in his account of this epidemic, (pp. 12, 13,) says:

Its first and greatest ravages were about the new market and the square to the eastward of it, in which, after some considerable search and tracing it, it was found to have originated in a number of small back tenements, forming a kind of court, the entrance to which was by two narrow alleys from Front and Pine streets, and where sailors often had their lodging, to which a sick sailor from on board a vessel, from the Havannah, (where it then raged,) was brought privately after night, before the vessel had come up to town, to the house of one Leadbetter, where he soon died, and was secretly buried; and, I believe, Leadbetter, with most of his family, and many others in that court, soon after fell a sacrifice; and from thence it spread rapidly, first affecting the houses nearest adjoining, in Front and Pine streets.

Public opinion was universal in ascribing it to foreign importation, from the West Indies.

La Roche lays great stress on the fact that, in all of these epidemics, contradictory statements are made by different writers as to the especial vessel, or other source, from which the infection spread; but this is not to be wondered at, when we consider, as stated by that distinguished author himself, that we have no accurate professional accounts of these epidemics, being dependent for what we know of them entirely to letters, &c., written by eye-witnesses, who would be likely to indite what was the prevailing opinion, without any minute investigation of the subject. Moreover, there is no reason why they should not all have been correct, and the fever introduced by two or three different channels in the same season. From this time until 1791 the country was free from the fever, an immunity which Carpenter shows (op. cit., p. 45) was due to the destruction of the West India trade by the passage of the series of acts of Parliament known as the "commercial monopoly," and by the subsequent war of the Revolution, which, of course, destroyed all trade. With the return of peace, however, came a renewal of the West India traffic, and with it the long respite which the coast had known from yellow fever came to an end, it making its appearance in

1791 in New York, and in 1793 in Charleston and Philadelphia. About the middle of August, 1791, it broke out in the neighborhood of Peck Slip, New York, a locality well fitted by its surroundings to propagate the disease—"a part of the city thickly inhabited; its houses generally small and badly ventilated; many of the inhabitants were in indigent circumstances, which is a frequent cause of the want of cleanliness." (Addoms, Inaugural Dissertation on Yellow Fever, p. 7.) For some time it confined itself to this locality, but at length began to spread, being carried to other parts of the town by those who had nursed the sick. It continued to rage until about October 15, and, on the approach of cold weather, disappeared. (Medical Repository, vol. 1, p. 305.)

The epidemic in Philadelphia, in 1793, has acquired a permanent interest, in the eyes of those interested in the subject, not only by reason of the great mortality, but on account of the bitter controversies which arose relative to its origin, the doctrines of a local cause for the disease being now advanced for the first time. The weather was very variable during the season, the spring being pleasant; July very hot, August moderate, and September hot. From August until October there was a great drought. Fevers of the exanthematous type had been prevalent during the season, but disappeared soon after the outbreak of the fever. The disease made its appearance about the 15th of August on Water street, in the vicinity of the docks. It was confined for a time to this locality, but toward the last of the month spread up Water to Vine street; thence along Front; and by the 15th of September was generally prevalent throughout the city, as well as in Southwark and Kensington, then separate villages. It raged with great violence until the 10th of November, when a severe frost put an end to it. "It did not escape observation that, during the whole course of the epidemic, the greater number of cases occurred in the vicinity of the Delaware River; that there also, as in close alleys and small streets, the disease assumed its most aggravated form, and proved most usually fatal; and that its severity lessened in its progress westward, and toward the districts." (La Roche, *op. cit.*, p. 68.)

The population of the city was over forty thousand, of whom four thousand and forty died, and upward of twelve thousand fled from the city. As regards the origin of this epidemic, the College of Physicians gave it as their opinion, in an official report to the governor of the State, that it was imported from the West Indies in July, many vessels having arrived from infected ports in that month. Some, however, of the members, including Dr. Redman, the president, Dr. Benjamin Rush, Dr. Jos. Hutchinson, and Dr. Foulke, dissented from these views, and an angry controversy ensued, which has been handed down from epidemic to epidemic, and maintained on either side, with varying success, until the present day. The local causes were to be found in the filthy condition of the streets and wharves, the want of any adequate police arrangements, and the exposure of a lot of damaged coffee, on a wharf, near Front and Water streets, the smell of which "was putrid and highly offensive," so that persons living in the neighborhood were obliged to keep their doors and windows shut to exclude the fetor.

Mathew Carey, in his account of this epidemic, ascribes it to the arrival of numerous vessels from the West Indies, and among them one from Cape François, which brought a large number of refugees from the island of Saint Domingo, whence they had fled to escape the horrors of the revolution. There was no attempt at a quarantine; the vessels came freely up to the wharves; and in some cases sick persons and infected articles were landed in the city. Dr. Currie gave to it the same origin.

(Carey on Epidemics of 1793, pp. 69-70; Currie, Treatise on Synochus icteroides, pp. 1, 84; Haygarth's Letter to Dr. Percival, April 9, 1801, pp. 169-170; Rush, Medical Inquiries, vol. 3, pp. 17-26.) In 1794 the fever prevailed moderately in Philadelphia, and was ascribed by Dr. Rush (Medical Inquiries, vol. 4, p. 63) to the exhalations from the gutters, and to the stagnating ponds of water in the neighborhood of the city. The following year it appeared in New York, prevailing, as before, in the streets bordering on the East River, as far up as the swamp; a part of the town "remarkably distinguished by peculiarity of circumstances and situation, seemingly well calculated for the accumulation and decomposition of all kinds of perishable animal and vegetable substance." (Dr. V. Seaman, Medical Repository, vol. 1, p. 306.) The disease was unquestionably imported this year in a vessel from Saint Domingo, which arrived at the Dover-street wharf on the 19th of July, having lost one man from yellow fever on the passage. On her arrival she had three persons ill of the fever, and one died on the 20th July. On the 22d the health-officer, Dr. Treat, was taken sick, and died on the 29th. On the 25th a man by the name of Valentine, who was employed about the vessel, took the disease. At this time the ship William from Liverpool was lying at the same wharf as the infected ship; and on the 25th four cases occurred on her, all of whom died within a week. The next cases were from the ship Connecticut, lying about two hundred yards from the other; then cases began to occur on shore among clerks and employés of the store-houses on the docks, and soon the disease spread through the surrounding neighborhood, causing seven hundred and thirty deaths, most of whom were recently-arrived foreigners. (Dr. V. Seaman, Medical Repository, vol. 1, pp. 316-318; Dr. Colin Chisholm's Letter to John Haygarth, M. D., on Yellow Fever, pp. 58, 61; Rev. J. McKnight, in American Medical and Philosophical Register, vol. 3, p. 293.) The disease was carried from New York to Huntington, Long Island, where many died. (Dr. David Hosack, American Medical and Philosophical Register, vol. 3, p. 191.) There were a few cases in New York in 1796-'97, due, according to the statement of Griscou, (op. cit., p. 7,) to the detritus collected by the building of a great dock at the foot of Whitehall street, and to the emptying of a sewer at the foot of Broad street; the slip being exposed at low tide to the action of the sun upon its muddy bottom. In the first of the above-mentioned years it was imported to Knowles's landing on the Connecticut River by means of the brig Polly, which arrived there from Cape St. Nicholas, St. Domingo, in August, and had on the passage lost several of her crew from yellow fever. About this same time a number of cases occurred at Chatham, Connecticut, near Middletown, the first victims being two young men from that village, who visited Knowles's landing and slept in the cabin of the infected vessel. (Miner and Tully on Fevers, pp. 359, 363; Tully's Letter to David Hosack, M. D., New York Medical and Philosophical Journal, vol. 1, p. 153.) In 1797 Providence, Rhode Island, suffered from an outbreak of the disease, which caused forty-five deaths. It prevailed almost entirely along Water street, and other streets and alleys near the water's edge, a very dirty and filthy portion of the town, where the tide ebbs and flows beneath the docks, leaving mud and oyster-shells exposed at low tide, and being the receptacle of all the waste and offal of the town. The first cases occurred about the 13th of August, and the disease disappeared about the last of the month. (Wheaton, Short Account of Yellow Fever, Medical Repository, vol. 10, p. 329.)

This year there was another severe epidemic in Philadelphia, where

it broke out about the 1st of August, prevailed extensively during that month and September, and was checked by a frost on the 15th of October, having caused about thirteen hundred deaths. There was the usual controversy as to its origin. The College of Physicians, as before, traced it directly to the arrival of two infected ships, in July, one from Havana and one from Port au Prince, while the Academy of Medicine called attention to the putrid exhalations from the gutters, privies, and docks, which were, if possible, in worse condition than in 1793. Strobel (*Essay on the Transmissibility of Yellow Fever*, p. 120) quotes the late Professor Chapman as asserting that his recollection was positive that this epidemic was imported from the West Indies. The fever this year was much more contracted in its area than before; a result, doubtless, owing to a policy of isolation adopted by the authorities, by which all communication was cut off with the infected districts during the epidemic. (Dr. Felix Pascalis on Contagious Epidemic Yellow Fever in 1797, pp. 8-29; Philadelphia United States Gazette, September 13, 1798; Condie and Folwell, on Pestilence of 1798; Rush, on Epidemic of 1797, &c.) This year the disease prevailed as an epidemic in Baltimore, and, as in 1794, it was confined to the vicinity of Fell's Point, a low, swampy, unpaved locality, in the immediate vicinity of the shipping. The first case which occurred in the city had just arrived from Philadelphia. (Davidge, *Treatise on Yellow Fever*, p. 17; Potter's *Memoir on Contagion*, p. 20.)

The year 1798 introduced the most wide-spread epidemic ever known in the history of the country.

At Boston, Massachusetts, it caused about two hundred deaths, prevailing, as it had previously, in 1796, about the docks, near the water's edge, along Front Street, and in the vicinity of Market Square, the victims being those persons who passed most of their time about the shipping. From here it was wafted by the wind to higher localities. Dr. Samuel Brown believed the disease to be entirely local in its origin. (*Yellow Fever in Boston*, pp. 21-37.) Portsmouth, New Hampshire; Norwalk, Hartford, and New London, Connecticut; and Salem, Massachusetts, also were visited by the disease.

In New York, the disease broke out about the 28th of July, on Front street, near Coenties Slip, then in the neighborhood, and during August spread along New Slip, Cliff, John, and Water streets, all localities renowned for their filth and general offensiveness. To those causes must be added the arrival of infected ships from the West Indies.

The epidemic lasted without intermission until October, when a frost suddenly caused its cessation, but not until two thousand and eighty-six persons had died. (Dr. James Hardie, *Account of Yellow Fever in New York*, pp. 2-6; Currie, *Memoirs of the Yellow Fever, 1798*; McKnight, *American Medical Philosophical Register*, vol. 3, p. 293; Seaman, *Letter to Dr. Miller, Medical Repository*, vol. 4, p. 250.)

In Philadelphia there were three thousand five hundred deaths between the 1st of August and the 1st of November. Its introduction was most positively traced to the arrival of the ship Deborah, with yellow fever on board, from San Domingo, on the 18th of July, and to the subsequent arrival of other vessels.

The disease, as before, began in the vicinity of the wharves, and prevailed chiefly along Walnut, Spruce, and other streets at first, but subsequently spread all over the city. The ship Deborah, which introduced the disease, was removed to Kensington for repairs, and in a short time the fever broke out in that village, first among the persons who had been on the vessel, and then among those who had visited or nursed the

first cases. (Coudie and Folwell, *op. cit.*, pp. 31-53; Currie, *op. cit.*, pp. 130-135.) Immense numbers of the inhabitants of Philadelphia fled from the city as the fever became generally diffused, and some of them carried the disease to other places. At Chester and Marcus Hook, Pennsylvania; Wilmington, Delaware; Bridgeton and Woodbury, New Jersey, it was introduced by refugees from Philadelphia, and carried off large numbers. (Currie, *op. cit.*, pp. 136, 138; Dr. James Tilton's Letter to Dr. Miller, *Medical Repository*, vol. 3, p. 128; Dr. George Monroe, *Medical Repository*, vol. 3, p. 136.) During the progress of this epidemic, the ship *Nestor*, of Portland, left Philadelphia for Petersburg, Virginia. She had four deaths on the passage, and the disease soon spread to those employed in loading her, and others who visited the ship, and many died, both in City Point and Petersburg. (Currie, *op. cit.*, pp. 109, 113.)

Two points are worthy of note in connection with this epidemic—one, that the authorities of Philadelphia had become frightened at the yearly appearance of the disease, and had placed the city in excellent sanitary condition compared to what it had been previously, by a careful and vigorous system of police, and yet entirely neglected any quarantine measures; and the other, that the authorities of Baltimore established a quarantine, not only against vessels coming from the West Indies, but also against persons and baggage from Philadelphia, and entirely escaped the disease.

In the next year there was a mild epidemic in Philadelphia, which the College of Physicians, as before, traced to importation from the West Indies. In 1800 it visited Providence, Rhode Island, and Baltimore, Maryland, prevailing, as in previous years, in the immediate vicinity of the wharves and shipping. It broke out this year in New Bedford, Massachusetts, where a vessel arrived from Demerara with the fever on board. She also contained a large quantity of damaged coffee. All the persons attacked had either been on board of her, or lived in the vicinity in dirty and ill-ventilated quarters.

In 1802-3 and in 1805 there were moderate epidemics in Philadelphia, after which the disease entirely disappeared from that city until 1819. There was more or less of the fever in 1802-5 in Baltimore, Maryland; Boston, Massachusetts; Alexandria, Virginia; New Haven, Connecticut; and Providence, Rhode Island. In 1803, in New York City, it made its first appearance in some houses on Coffee House Slip, and prevailed chiefly, as before, in the dirty, filthy streets, and among the wretched inhabitants living nearest to the river. The season was an unusually hot one, and Griscom says, "Proofs of its domestic production greatly accumulated this year;" but it is difficult to reconcile this statement with the assertion of Dr. P. S. Townsend (*Observations on Yellow Fever*, p. 368) that, "about this time" (*i. e.*, the first appearance of the disease) "several vessels, having sick on board, were ordered from the Coffee House Slip to the quarantine ground." The total number of deaths was between six and seven hundred. From New York it was carried to the village of Catskill, on the Hudson, where a number died. The next year there was a mild epidemic in New York, prevailing along the streets bordering on the East and North Rivers, and causing about three hundred and fifty deaths.

A few sporadic cases were noticed in 1806 and 1807, but from this time New York was free from any serious epidemic until 1822. In 1809, however, the neighboring city of Brooklyn suffered to some extent. Early in July the ship *Concordia* arrived from Havana, at which port yellow fever was epidemic. The first case was a sailor on this ship, and all the

subsequent cases were living in the immediate vicinity, (a very low, filthy portion of the city,) and were directly traceable to infection from this ship. There were about forty deaths. (Gillespie, *Yellow Fever in Brooklyn*, *American Medical and Philosophical Register*, vol. 1, p. 101.)

In 1811 a similar outbreak occurred at Perth Amboy, New Jersey, which was directly traceable to the ship *Favorite* and brig *Ocean*, infected vessels, which had recently arrived from the West Indies. The first cases were of persons who were either connected with these vessels or had been on board. (Hosack and Bayley's Report to Board of Health, *American Medical and Philosophical Register*, vol. 3, pp. 94, 106.)

In 1819 there was a good deal of fever at quarantine, New York, and cases occurred in September, at its old haunt in the vicinity of Old and Coenties' Slips, but there was nothing approaching an epidemic, there being less than a hundred cases in all. (Drake, *Yellow Fever in New York*, *Medical Repository*, vol. 6, p. 125.)

In this year the fever appeared in Baltimore, being immediately preceded by the arrival of an infected ship from Havana; communication having been held between her and the city. (Revere on Fever in Baltimore in 1819; Carpenter on Yellow Fever, p. 18.)

1820, *Middletown, Connecticut*.—The fever was introduced early in June by the sloop *Antelope* from New York. This sloop had on board a man from the schooner *Milo*, from Savannah, who was sick from yellow fever. The captain of the *Antelope* was then taken sick and recovered, but the first case died. About this same time the brig *Sea Island* arrived from St. Iago de Cuba, having lost two men on her passage, and with others sick. A man named Harrington, who went on board of her, died, and all the earliest cases were traced to this infection. (Dr. John B. Beck's Report to New York Board of Health, *New York Medical and Physiological Journal*, vol. 1, p. 158.)

In 1820 it prevailed epidemically, and, as before, broke out subsequently to the arrival of infected ships from St. Iago de Cuba and other places. The first case was on the 24th of July, in Water street, near Race, and nearly simultaneously to these were cases on Hodge's wharf, where a vessel, recently from Cuba, was lying. About the 9th of August it broke out near Walnut-street wharf, also occupied by infected ships, and spread from there to the adjacent street. In both of these cases its progress was arrested by sanitary measures. It prevailed afterward, to a limited extent, on Mulberry, Front, Water, and other streets, but the total number of cases was very small—about one hundred and twenty-five, of which eighty-three died.

After this the authorities of Philadelphia became fully awakened to the importance of measures to prevent the introduction of the disease, and devised a rigid quarantine law, as well as local sanitary measures. The result was, that the city enjoyed an immunity from the disease until 1853, a period of thirty-three years. Then the disease re-appeared, from the want of a vigilant quarantine, being clearly due to importation, as follows:

On the 12th of July, 1853, the bark *Mandarin* arrived at the Lazzaretto below Philadelphia from Cienfuegos, Cuba, which port she left June 25, with a cargo of molasses. There was more or less fever prevailing at her port of departure when she left, and two of her crew died on the passage, of fever. Although all on board were healthy, the vessel was detained one day for fumigation and disinfection, and all the effects of the deceased sailors destroyed. The next day she came up to the city, and stopped at South-street wharf. Three days later she was moved to the next pier above, at the foot of Lombard street, where she

discharged her cargo. On the 20th she was again moved to the second pier below, at the foot of Almond street, where she remained until the 26th, when she was sent back to the Lazaretto by the board of health. After the discharge of her cargo, and especially while lying at the Almond street wharf, it was noticed that there was a very offensive smell about the vessel, and especially when the bilge-water was pumped out. On the 19th of July a case of "suspicious fever" occurred in a man named Sharp, who occupied the head of the South-street wharf as a stand for business. It proved fatal on the 26th. On the 20th another case occurred, in the captain of a brig lying next to the Mandarin, in the Lombard-street dock. He died on the 23d, at a boarding-house on shore, called the Champion House. The same day a German and his wife, who kept the South Street Ferry-House to Red Bank, took sick; one died on the 26th, and the other on the 27th. The same day a young man named Koehler, who was daily on the dock, took sick, and died at the Champion House on the 27th. On the same day the mate of a bark lying just below where the Mandarin discharged her cargo was taken, and died on the 22d. On the 21st the mate of the Mandarin was taken, and died in hospital on the 23d. Three cases now occurred within the next week at the before-mentioned Champion House, and a large number of others in the immediate neighborhood. These cases all presented well-marked symptoms of yellow fever, and most of them had the black vomit.

The hygienic conditions of the vicinity of the docks were bad; a large sewer, emptying into the South-street dock, and there being foul wharves and dirty houses on shore. Dr. Wilson Jewell (from whose paper read before the College of Physicians August 5, 1853, I have obtained the foregoing details) says:

No yellow fever existed in our city until six days after the arrival of the Mandarin; it broke out immediately abreast of the wharf where she first hauled to, and although there were existing causes in the vicinity—on shore—for the production of disease, there were "plague spots" in other parts of our city remote from South-street wharf, when, had the question been asked, we should have unhesitatingly located the first appearance of fever of a malignant type, independent of the suspected existence of a foreign focus of infection competent to exercise its morbid influence, on an atmosphere already tainted.

The disease prevailed more or less until the beginning of October, confining itself, however, almost entirely to the first infected locality. In all, there were one hundred and twenty-eight deaths.

In 1870 the brig Home arrived at the quarantine station, below Philadelphia, from Jamaica. She arrived on the 29th of June, having lost her captain with yellow fever on the 24th, and had the cook sick with the same disease. On arrival there was no sickness on board. She was an old vessel and excessively filthy, so much so that the crew, while loading her, could hardly endure the foul emanations of her hold; and planks had to be laid over the bottom of her hold, to keep her cargo of logwood from being drifted by the mass of filth and water which had accumulated there. Besides this, she was found to have on board a large quantity of old rags, which had been purchased in Jamaica by the captain; these circumstances justified the Health-officer in detaining the vessel at quarantine. The rags were burned, and stevedores and lighters sent down from Philadelphia to unload the brig, while the crew were removed to the Lazaretto, from which, however, the second mate deserted on the 30th of June; a passenger on board was allowed to go to Philadelphia.

On the 30th of June, the pilot, Stephen Bennet, left the brig for the Delaware break-water, but was taken sick at Wilmington, Delaware,

and returned to Philadelphia, where he died of yellow fever. July 2, a sailor, named Elliot, from the brig, was taken at the quarantine station, and recovered. On the 3d of July, the second mate, who had, as remarked, deserted from the quarantine, was taken sick in the city, and died on the 6th, of yellow fever. Soon after, a French sailor, named Pierre, was taken sick in the city, and threw up black vomit, but recovered. One of the stevedores was taken sick on the 17th of July, and two days later the wife of the captain of a lighter, engaged in discharging the vessel, his son, and a man employed on board, were reported sick with the fever. Subsequently to this, quite a number of cases occurred at the Lazaretto and in the vicinity. In all, there were twenty-nine cases, and eighteen deaths. (La Roche on Yellow Fever in 1870, pp. 20, 26.)

In 1822 there were an unusually large number of arrivals at the New York quarantine of vessels from the West Indies. No less than seventy-six vessels and over fifty cases of fever reported there before the 1st of July. Some of these ships that were loaded with sugar had their cargoes lightered up to the city, and between the 1st and 9th of July there were four cargoes thus landed at the foot of Rector street from vessels that had yellow fever on board. On the 10th of July, two children, daughters of a Mr. Reder, living on the corner of Washington and Rector, next to the river, and a young man named Thomas, clerk in a store on the opposite corner, were taken with yellow fever. This man Reder was a cooper, and had been engaged in repairing the vessels and boxes containing the landed sugar. Thomas died on the 16th, and one of the children on the 15th; both with black vomit. On the 15th, a brother of the girls was taken, and died on the 22d. The next case was a little girl by the name of Rose, who had been continually in company with the Reder girls; she also died. Four other cases soon occurred in Mr. Rose's house; from this time it spread up Rector street, along Washington and Franklin, and soon became generally epidemic. The disease ran its course until the 5th of November, causing two hundred and thirty deaths. (Griscom, *op. cit.*, p. 19; Carpenter, *Sketches of Yellow Fever*, pp. 24, 25.) It should be borne in mind that Rector, Greenwich, and Washington streets were not then, as now, occupied by German lodging-houses, sailors' boarding-houses, and a low and vicious class of the population living in filth and misery. On the contrary, these were then the fashionable localities of the city; the houses, occupied by the wealthier classes, were roomy and cleanly, and contained nothing which could, by any possibility, be seized upon by the most ardent non-contagionist as evidence of the local origin of the outbreak. All observers coincide in attributing its appearance to the landing of cargoes of sugar from infected ships, and to that alone. (Hardin on Yellow Fever in New York in 1822; Townsend on Yellow Fever in New York in 1822.) This is the last visitation of the fever to New York City in epidemic form. It has, however, prevailed several times in the vicinity, presenting facts well worthy of note. In June, 1823, the ship *Diana* arrived at quarantine, New York Harbor, from New Orleans. She was detained thirty days, and then allowed to come to the wharf at Brooklyn to unload. A few days after her arrival, cases of yellow fever occurred in a family living near the wharf, who had communicated with the ship, and the disease spread generally throughout the village. An investigation showed that the *Diana* had cases of yellow fever on board, both before and after her arrival at Brooklyn. (Dr. P. S. Townsend's letter, quoted by Carpenter, *op. cit.*) The disease has prevailed in epidemic form on Staten Island three times, viz, in 1799, 1821, and 1848, and each time the first cases were directly traceable to infected ships lying at the quarantine

anchorage, or to the cargoes landed from them. (Report of Dr. Elisha Harris to New York quarantine commissioners, January 27, 1858.)

In 1856 occurred the well-known outbreak of the disease at Fort Hamilton, Long Island. The season had been characterized by an unusual number of arrivals of infected ships at the quarantine. "Forty-seven infected vessels, from twelve ports, from the 1st of April to the 1st of August, 1856, sent into the marine hospital fifty-eight cases of yellow-fever. Forty-seven vessels in 1856 reported having had in their ports of departure twenty-seven cases of yellow fever and sixteen deaths; * * * thirty-nine cases of fever on their passage to this port." (Report of Dr. R. H. Thompson, health-officer, August 4, 1868.)

The cargoes of a number of these ships were lightered from quarantine to the Atlantic dock, in Brooklyn. One of these vessels, the ship Jane H. Gliddon, had old rags for a portion of her cargo.

The first case of yellow fever, other than those who arrived in the infected ships, came to the marine hospital, Staten Island, from No. 12 Oak street, New York City. He was an Irish emigrant who arrived on the 3d of July in a vessel that had anchored over night in the midst of the infected fleet.

On the 14th two men were taken on Staten Island who had been employed in unloading the Jane H. Gliddon, and the next day a lighterman engaged in transporting cargoes to the Atlantic dock.

It made its appearance on Governor's Island on the 29th of July; the first case being that of a young woman, who had just returned from Fort Hamilton, and who lived in Rotten Row, in that part of the island nearest to the Atlantic docks, in Brooklyn. August 1, three other cases occurred in Rotten Row and the adjoining South Battery. "And in these two places the disease fixed its abode, as it were, almost exclusively, and continued until the number of cases amounted to sixty-three, fifteen of whom died." "With regard to its existence in this garrison, there is satisfactory evidence of its not having been generated on the island, but that its origin was in our vicinity, either on shipboard or on land, and that its causes, whatever they were, being thus eliminated in our neighborhood, were wafted to us by the wind." (Report of Assistant Surgeon L. Guild, United States Army, Army Medical Statistics, 1856, pp. 13, 17.)

Before these cases had happened, however, two men in the employ of a Mr. Bergen, on the Long Island shore, near Greenwood, gathered some straw which they found on the beach. This was on the 11th of July, and in a few days they both died with black vomit. Two men who were hired in their place and occupied their room soon sickened and died, and by the 27th of the month there had been fourteen cases in this vicinity, of which ten were fatal.

On the 1st of August the disease broke out at three different points in the vicinity of Fort Hamilton. Infected ships were anchored in Gravesend Bay, and the southwest wind, which prevailed, blew directly over these vessels toward the shore. Besides this, mattresses and bedding were thrown overboard and drifted up along the beach. There was no reason to doubt that this was the source of infection; the hygienic surroundings of the locality being excellent. Cases occurred during the season from Bergen Point, and several were sent to the marine hospital from Brooklyn. In all, there were five hundred and thirty-eight cases, and one-third died. It was a curious fact connected with this epidemic that, although it extended for four miles along the shore, at no time did it extend more than three hundred yards from the shore-road. (Report of Dr. Elisha Harris, quoted by Griscom, op. cit.) Dr.

Harris, in a letter to Dr. Griseom, dated July 13, 1857, reports a striking case of the importation of the fever in the person of a sailor who was employed as ship-keeper on the bark Lucy Heywood, just arrived from the West Indies with yellow fever on board. This man had just arrived from Bangor, Maine; and, after sleeping on board for seven or eight nights, was seized with symptoms of yellow fever, and died of black vomit in a few days. Harris says, "There could have been no other source for the origin of the fever in that man, who had just arrived from Maine, than such infection as inhered in the cargo and cavities of the Lucy Heywood."

In September, 1868, ten cases occurred at Fort McHenry, Baltimore, Maryland, concerning which Surgeon Charles McDougall, U. S. A., remarks, "We believe the yellow fever at Fort McHenry came from vessels infected with the disease, at quarantine, near by." (Army Medical Statistics, 1856, p. 85.)

In August, 1870, an epidemic disease broke out on Governor's Island, New York Harbor, in the same part of the island which had suffered in 1856. The disease was not at first recognized, but in the latter part of September, when it had become generally prevalent, it was pronounced to be yellow fever by experienced physicians, and the sick were removed October 1 to the West Bank Hospital, at quarantine. This did not, however, stop the course of the epidemic, which continued until October 26, when the last case occurred. The disease was confined to the southeast portion of the island, and was undoubtedly due to the arrival at the Atlantic and Empire docks, at Brooklyn, of vessels which, being infected, had evaded the New York quarantine by entering at Perth Amboy, New Jersey, and coming thence to Brooklyn to discharge. The tide in the channel, between the island and Brooklyn, is such that articles thrown overboard from these ships would readily be carried to the shores of the island. The people of Brooklyn did not become infected, because no susceptible person was permitted near these vessels, they being unloaded by their own crews. There was a number of cases which occurred in New York and Brooklyn of persons who had visited their friends on the island, but they did not communicate the disease. The population of the island was seven hundred and twenty-two, of whom one hundred and fifty-seven had the disease, and forty-nine died. (Report of Surgeon Charles Page, United States Army, December, 1870; personal information from Assistant Surgeon G. M. Sternberg, United States Army; report of Dr. Carnochan to quarantine commissioners, October 4, 1870.) This completes what I have thought it advisable to note in reference to epidemics occurring in towns situated farther north than the extent of coast over which I was required to make my inspections.

I proceed now to give a detailed account of the facts, as far as they have been accessible to me, of the various outbreaks of yellow fever in the southern ports and towns, commencing at Norfolk, Virginia.

Yellow fever first made its appearance in Norfolk in 1795. In the succeeding years there were a few cases, until 1800, when there was a most severe epidemic. During the summer, the weather had been unusually hot, with very frequent rains, and the sanitary condition of the city was very bad, as we learn from the report of Doctors Selden and Whitehead. (Medical Repository, vol. 4, pp. 329, 337.) About the middle of July, several vessels laden with fruit arrived from the West Indies. This fruit had rotted on the passage, and was left in a putrefying condition for many days on the wharves. The vessels themselves, as might be expected, were foul almost beyond belief. On

the 26th of July, two fatal cases occurred, of persons who lived in the immediate vicinity of the wharf, where this fruit was exposed, and who had been employed in picking it over and repacking it. A previous case had occurred, in a sailor by the name of Carter, on July 22, also fatal. Dr. Schoolfield, in his account of epidemics in Norfolk and Portsmouth, (Report of Portsmouth Relief Association, 1855, p. 98.) says, quoting from Doctors Selden and Whitehead, that others had died a few days before the 26th; but, though he argues from this fact that the epidemic had a local origin, and was not due to importation by the fruit-vessels, yet he gives us no particulars, and no dates, to substantiate his views, except in the case of Carter, who died on the 22d, after the arrival of one of the first vessels. And as other cases soon occurred, all in this immediate vicinity, it is certainly more rational to ascribe its origin to this cause than, with the imperfect information we possess, to insist on its local origin. The disease soon became epidemic, and raged until the 30th of October, when it ceased; having carried off about two hundred and fifty persons, among whom were a large number of negroes.

The fever prevailed again in 1801, 1803, and 1805, but there was no considerable epidemic until 1821. In that year, the schooner *George Armistead* arrived on the 20th of July from Guadeloupe; yellow fever prevailing at her port of departure when she left. She had several cases on board during her voyage, and two men died on the day of her arrival. She came immediately to dock, and, having discharged her cargo, was transferred to another wharf, where they pumped out her bilge-water, which was "so putrid and offensive as to render it expedient that the doors and windows of a neighboring house should be closed, in order to exclude the effluvia arising from it." On the 1st of August, a clerk in a warehouse on the dock, but a few yards from the vessel, was taken ill, with decided symptoms of fever, and died. The same day, a negro woman living in the house above mentioned took sick, and on the 4th there were two other cases in this house, and a few days subsequently two more. Two persons who had assisted in pumping out the bilge-water were next taken, and both died; and from this time the disease became epidemic. (Committee's Report on Origin of Yellow Fever in Norfolk, 1855.) Dr. Robert Archer, who wrote a history of this epidemic, (Medical Recorder, vol. 5, pp. 60-73,) and who was ignorant of the fact that yellow fever had prevailed on the vessel during her passage, or that two men had died of the disease the day of her arrival, ascribes the origin of the disease to the foulness of the vessel, and says, "It is evident that the effluvia arising from the bilge-water was the immediate cause of the disease in every instance that has been recorded; for every individual had been exposed to its influence, and almost every one who had come within its atmosphere was more or less affected by it."

In 1826 the disease prevailed again, this time being traceable to the unloading of a cargo of damaged coffee, and subsequent cleansing of the vessel, at one of the public wharves. (Committee's Report, p. 14.) From this time until 1852, Norfolk was not again visited by the fever. Long immunity from the disease had rendered the authorities very careless in regard to quarantine regulations; and on the 20th of July, a Spanish bark, the *Tascio*, from Havana, arrived, and, without being subjected to any health-inspection, discharged her cargo and pumped out her bilge-water at one of the wharves. She had two men sick on her arrival, whose cases were pronounced by a homoeopathic doctor—an uneducated man—to be typhoid fever. On the 7th of August, a death

from yellow fever occurred in a row of tenement-houses about a hundred yards from the vessel, there being no intervening houses. Several other cases were soon heard of in this row, and before long it became decidedly epidemic in the lower part of the town; but the weather was unusually cool, and the cases were of a mild character. In this year, for the first time, the disease made its appearance at Portsmouth, several deaths happening at the marine hospital and in the vicinity. (Committee's Report on Yellow Fever at Norfolk, 1855, p. 16.)

In 1854 the French frigate *Chimère* arrived at Norfolk with the fever on board; fifty-four of her crew were removed to the naval hospital, and the vessel placed in quarantine. While at her anchorage, a large number of cases of spoiled provisions were thrown overboard, and, drifting on shore, were collected by people living in the vicinity, and taken to their houses. In one house, about a mile and a half from Portsmouth on the river-shore, a lady and her son, who had been occupied with cleaning these jars, sickened, and both died with undoubted yellow fever. Soon after this, some cotton floated ashore from two New Orleans vessels anchored in stream, and being gathered up, was spread out to dry at a house not far from the other. In a few days four cases of yellow fever occurred at this house. During this season there were three fatal cases in Norfolk, but in neither that city nor Portsmouth did the disease become epidemic, and I merely mention them to show the unquestioned transmission of the disease by the jars and cotton, or if not transmission, then certainly a very remarkable coincidence. (Schoolfield, Portsmouth Relief Association Report, 1855, pp. 93, 94.) In the next year, the great epidemic, which attracted such general attention over the whole country, took place; and I shall go somewhat into detail in describing the commencement of this epidemic, as the facts have the most direct bearing on the general subject upon which I am called upon to report. Early in the season, March 19, 1855, the United States frigate *Columbia* arrived at quarantine from Saint Thomas, West India, with fever on board. Sixty-three cases were transferred to the naval hospital; of these five died, and there seems to have been no spread of the disease from this source.

The earlier months of this year presented no remarkable meteorological phenomena, and up to June the condition of the population as regards health was unusually good. June was very wet, and rather hotter than the average, while the remaining months of summer were very hot. The condition of the streets was comparatively good, and there were no local causes likely to bring on a pestilence which had not existed for a series of years. "On the 6th of June, the steamer *Ben Franklin*, Captain Byram, arrived, in distress, from St. Thomas." As yellow fever was prevailing at that island, she was quarantined by the Health-officer, having previously sent her passengers by the Baltimore boat, in the lower bay. She had lost two men on the passage, neither of them from yellow fever, as the captain positively asserted. The vessel remained at quarantine until the 19th of June, but the crew were allowed to come up to the city. The captain of the steamer admitted to the health-officer that he had two deaths on the passage, but denied that they were from fever; but subsequent testimony, obtained by the Norfolk committee, conclusively proved, not only that these were cases of yellow fever, but that there had also been a third, which recovered; and that, while in quarantine, another man died with undoubted yellow fever, who was secretly buried in the woods on the neighboring shore. On the 19th of June, the captain having pledged his word to the health-officer that the hold should not be broken into or the bilge-water

pumped out, and again positively certifying to the health of all on board, the vessel was permitted to come to Page and Allen's ship-yard, at Gosport, near Portsmouth, for repairs. And yet, at this very time, he had one case of yellow fever; for, on the 21st, a man named Palmer was removed from the vessel to the marine hospital, and died of black vomit on the 22d, having been sick since the 15th. The sanitary condition of the ship-yard and the neighboring localities was very bad. The wharf was rotten, the mud exposed at low tide, and the ground covered with rotting vegetable *débris* several inches deep. In the immediate vicinity was a row of tenements occupied by a large number of Irish, whose habits were filthy to an extreme. Nearly all the workmen in the ship-yard were unacclimated New Englanders.

After the arrival of the steamer at the yard, the captain deliberately violated the promise given but a day or two before. The bilge-water was pumped out, a portion of cargo and ballast transferred to the dock, and a large number of workmen employed in the hold and about the machinery.

On the 30th of June three cases of fever occurred in a house on Water street, fronting the ship-yard; and on the 3d of July a man by the name of Jones, who had been employed for a week on the steamer, was removed to the hospital, where he died of black vomit on the 17th. A day or two later another man, Carter or Courtright by name, also employed on the steamer, was taken sick and died on the 8th. The authorities now became alarmed, and ordered the vessel back to quarantine, where several more cases occurred, among them two negroes from the country, who passed a night on the vessel, and were subsequently attacked at their homes, neither of them having been in Norfolk or Portsmouth at all.

On the 8th of July the fever broke out in the low Irish row before spoken of, and from thence spread rapidly through Gosport, reaching Portsmouth about the 1st of August, where it speedily became epidemic. It should be mentioned that Doctor Schoolfield reports one case as having been seen by him on the 24th of June, in a house on the river-shore, about a mile and a half from Portsmouth. This was less than a mile from where the Franklin lay at anchorage at quarantine, being in the same house where some cases were seen in 1854, (above noticed as having derived the infection from the French frigate *Chimère*.) It is more than probable that this case received the disease in the same way, though Doctor Schoolfield thinks it positive evidence of the local origin of the epidemic. In the mean time there had been unrestricted communication between Norfolk and Portsmouth by means of a steam ferry-boat, which landed close to Barry's Row. The first cases in Norfolk were about the middle of July, in Barry's Row, (Irish tenement-houses on Church street, in the usual filthy and neglected condition of such places, and built on ground reclaimed from the river by filling in within twenty years.) Here the disease found a congenial habitation, and a large number of cases occurred. The authorities barricaded the streets and destroyed the obnoxious houses, but this did not prevent the epidemic from spreading in every direction until the whole city was involved. From the last of August until the middle of September was the period of its greatest intensity, after which it declined, finally terminating in the last week in October, in Norfolk, and somewhat earlier than this in Portsmouth. (Williman on Yellow Fever in Norfolk, *Charleston Medical Journal*, vol. 11, p. 169.) The population of Norfolk at this time was about 15,000, and of Portsmouth about 10,000. Of these, very large numbers fled to escape the disease.

Of those who remained there died, in Norfolk, 1,807, out of an estimated number of 10,000 cases, and in Portsmouth about 1,000 out of 4,000, who remained and took the disease.

The disease has not appeared at Norfolk since that time, though it has twice certainly, and perhaps oftener, made its appearance on vessels at quarantine. In 1869 a French frigate arrived in Hampton Roads with the captain and two surgeons sick, both of whom died. She was anchored off Sewall's Point and closely watched by the military authorities at Fort Monroe, and no importation of the disease took place. In May, 1871, a three-masted schooner arrived from Charleston with the captain, first officer, and two sailors sick, all of whom died. She was anchored at the Willoughby Spit light-vessel, and the dead buried on the shore above Fort Monroe, and there were no cases on shore. (Personal information furnished by Colonel W. F. Barry, United States Army.)

Wilmington, North Carolina.—There was a slight epidemic in 1796, but I have not been able to obtain any particulars in reference to it; but Dr. A. J. De Rossett, a venerable practitioner of that city, who witnessed it, was of opinion that it was entirely due to local causes, the disease being but an aggravated type of the common autumnal bilious remittent. (Medical Repository, vol. 2, pp. 153, 155.) From this time the city was free from the disease, except, perhaps, a few sporadic cases (of very doubtful authority) in 1819 and 1820. In 1821 occurred an epidemic of a very severe character. Wilmington at that time was a small town of from twenty-five hundred to three thousand inhabitants. Its sanitary condition is described by an eye-witness to have been the worst possible, and the fever was regarded by Dr. Nathaniel Hill (Medical Recorder, vol. 1, p. 86) to have arisen from the great amount of decaying vegetable matter about the wharves, which was daily washed by the tides, leaving it exposed to the sun at other times; and also to the low, damp, and filthy cellars, which were so wet as to require to be baled out. These foci of disease had, however, existed many years without producing an epidemic, while, August 9, 1821, the brig John London arrived from Matanzas, Cuba, West Indies, having had cases of the fever on board, and the first cases on shore were in the immediate vicinity of the wharves above spoken of, and which would be most likely to be the portion of the town where the sailors from the newly-arrived vessel would congregate. At this late day we are without any positive *data* to connect the arrival of this vessel with the fever, except the statement of old residents, that those first attacked had been on board; but the facts that the epidemic soon followed her arrival, and that the local causes that have been claimed as causing it existed equally in previous years, will not, I believe, be disputed by any. In 1854 nine deaths occurred as a direct result of importation from Charleston, but, it being late in the fall, the disease did not become epidemic.

After this Wilmington enjoyed an exemption from epidemics until 1862.

Her people escaped the great series of epidemics that extended from New Orleans to New York, 1853-56. In 1862 the most severe visitation the town has ever known took place. The city at the time was in a favorable condition for the development or spread of the disease. The larger portion of the male population had been taken away to enter the rebel service, and there was, consequently, a very general neglect of the most ordinary hygienic precautions; the authorities being so anxious to repel the enemy from their front by the erection of great lines of works that they overlooked the necessity of guarding against

the more insidious foe that was soon to cause a greater mortality and more distress and woe than an invading army. The stringency of the blockade had caused a general want of all the comforts and many of the necessaries of life; and there was much destitution and suffering among the poorer classes. Dr. W. T. Wragg, of Charleston, thus describes the condition of the city during the height of the epidemic:

On entering the city at the railroad depot I noticed the disagreeable odors which filled the air, and these became more evident as I advanced into the town. The hotels were all closed, and when admission into one of them was obtained I was struck with the same want of care as had been noticed in the street. When daylight appeared, the want of cleanliness displayed, both in the house and on the premises, accounted for the foul air around. In the yard were seen piles of offal, consisting of old bedding, rags, scraps of vegetables and, in short, the refuse matter of all sorts usually about the habitations of man, when the demands of cleanliness and care have been lost sight of.

Along some of the principal streets I saw the cellars flooded with water. In the yards I was called into I saw on every side the accumulated refuse of the house, the kitchen, and the stable. The heavy rains of the late summer and early fall had created a state of things well calculated, it seems to me, to generate disease. Through many parts of the town, in those (suburban) portions, ponds of water, stagnant, and covered with green vegetation, existed. Some of these ponds, I was told, had been drained in former years because they occasioned sickness, and had always been kept carefully dry till this season, when from scarcity of labor they had been allowed to refill by the choking up of their vents. In many places new ponds were formed by the unusual quantity of rain.

This statement refers to the condition of affairs toward the close of the epidemic; but Dr. W. G. Thomas, of Wilmington, shows (New York Journal of Medicine, December, 1869) that at the outbreak of the epidemic no such state of neglect existed; that while the sanitary condition of the city had been neglected for years to some extent, still the vast accumulations of offal and vegetable *débris*, of which Dr. Wragg speaks, were the result of entire neglect of cleanliness from the consternation of the people *after the epidemic commenced* and not before.

There must, therefore, have been some other cause for the appearance of the disease than either atmospheric disturbances or neglect of sanitary measures. After a careful consideration of the very able articles on both sides, above mentioned, as well as of information kindly furnished me by Dr. E. A. Anderson, of Wilmington, I am inclined to the opinion that the following is the correct solution of the question:

During the summer, yellow fever prevailed extensively at Nassau. On the 2d of August the blockade-runner Kate left that city, arriving at Wilmington on the 6th. She had one case of fever on board on her arrival, who died on the 8th, at the marine hospital. Six deaths occurred in a few weeks, all of them of persons who had been patients in the same ward where this man died. In the mean time a man by the name of Smith, who had spent the day on the Kate, on her first arrival, died on the 13th of August with black vomit. On the 17th of August a sea-man died in a house on shore, and within a few weeks a large number of cases and several deaths took place in this house and in the neighborhood.

On the 3d of September a man by the name of Swartzman died, having been frequently on the Kate. So with another, by the name of Crapen, who died on the 19th, his wife having previously died on the 10th; and with Hyer, who died on the 13th, having been constantly about the vessel. From this time cases rapidly multiplied until it was pronounced epidemic, some time between the 14th and 24th of September.

It is proper to state that Dr. E. A. Anderson, a gentleman of the highest professional standing, asserts positively that he had cases of yellow fever in his practice previous to the arrival of the Kate, and Dr. Wragg narrates eight cases said to have occurred previous to that

time; but as Dr. Thomas shows an error in dates in a number of these, and that others were under the care of an irregular practitioner, (who would be very apt to make a mistake in diagnosis,) it may be assumed that the weight of testimony is in favor of its introduction by the Kate. Even Dr. Wragg states:

In my first interviews with the resident physicians, I learned that their unanimous opinion was that yellow fever had been introduced into Wilmington by the steamer Kate, from Nassau, New Providence, which port she left on the 2d August, arriving at the wharf in this city on the 6th at 2 o'clock p. m. It was stated that, at the time of her arrival, she had a sick man on board, and that others of her crew were taken sick soon after, and, being carried to boarding-houses, spread the fever among those who nursed them or were near them. It was also stated that among the earlier cases occurring amid the resident population were those persons who had the most direct intercourse with the vessel for trading or other purposes.

I may add that in my late visit to Wilmington I conversed with many leading gentlemen, professional and otherwise, all of whom, with the exception of Dr. E. A. Anderson, concurred in this view.

As stated before, the disease became epidemic about the 20th of September. It attained its acme about the middle of October, and then gradually declined, until the third week in November, when it disappeared. Wilmington had at this time about five thousand inhabitants; of these fifteen hundred and seven had the fever, and four hundred and forty-six died—a percentage of mortality greater than that of almost any other epidemic. (Report of Acting Assistant Surgeon D. W. Hand, March 15, 1866; Dr. W. T. Wragg, Yellow Fever in Wilmington in 1862, New York Medical Journal, August, 1869; Dr. W. G. Thomas, Review of Dr. Wragg's Report, New York Medical Journal, 1869; Dr. E. A. Anderson's Examination of Dr. Thomas's Review, New York Medical Journal, September, 1872.) From that time to the present, Wilmington has been free from the disease in an epidemic form, though sporadic cases have been seen several years in the practice of leading physicians.

The disease, however, failing to spread, no especial pains were taken to ascertain its origin, and this, I may remark in this place, will be found to be the case in almost every town coming under my observation. Sporadic cases occur nearly every year in almost all the southern cities, and are assumed to be of local origin, and I am far from denying that they may be and often are so; but still, granting this, it is quite probable that a careful examination of these cases (such as always takes place at the time of a great epidemic) would develop some communication, in a proportion, if not a majority of the cases, with extramural sources of infection.

At Smithville, North Carolina, at the mouth of the Cape Fear River, a number of cases occurred. These are asserted to have originated as follows: A man by the name of Brown, belonging in Smithville, died in Nassau, New Providence, of yellow fever, and his trunk was sent home to his wife. It remained unopened for about two months, when it was opened, and the clothes spread out on the piazza to air. The widow who unpacked the trunk took the disease, and there were other cases in the family and neighboring houses. But, assuming that this story is not entirely to be depended upon, yet, as Dr. Anderson states, there being daily communication between the infected city of Wilmington and Smithville during the summer and fall, it is probably not necessary to go to an infected trunk to account for the appearance of the disease in the latter place.

It should be added that since the close of the war, Wilmington has changed vastly in her sanitary condition; an excellent health ordinance, improved drainage and sewerage, and a more general attention to

hygienic laws, have greatly increased the general health of the city, and will probably do much to prevent a return of yellow fever in epidemic form.

Coast of North Carolina, 1864.—At New Berne there was a most violent epidemic. The first cases were taken sick early in September, and the epidemic lasted until the first week in November. New Berne was very much crowded with soldiers, civilians in army employ, and refugees, and the percentage of mortality was very large; out of about three thousand cases there were nearly seven hundred deaths. No vessels had arrived at the port during the season from any place from which they could have brought the disease; and nothing was found in the history of the first cases to sustain the idea of extramural infection. It was, indeed, considered probable that some of the infected goods, introduced within our lines by Dr. Blackburn and G. J. Hyams, might have been conveyed to New Berne; but Dr. Hand, who carefully investigated this matter, found no evidence to warrant such a supposition. (Official report, April 1, 1866.) This being the case, the medical officers on duty felt bound in duty to discover some cause for so unusual an outbreak in a town which had been exempt for fifty years, and instead of one they found a dozen, any one of which they considered amply sufficient to account for the phenomenon. Dr. Hand says the streets were well and thoroughly policed, but the back yards were dirty, yet “the general sanitary condition of New Berne, when the fever broke out, was better than that of most southern cities.” Unusually low tides in the Neuse and Trent Rivers, which left exposed a strip of mud a hundred yards broad, was one cause assigned; the presence of filth and dead rats underneath old buildings, which had been in the same condition for twenty years; the presence of an unusual quantity of mud in the streets, &c. Privies, that from the statement of the writers had been uncleaned for a quarter of a century, suddenly became endowed with powerful septic capacity, and nursed in their vaults the germs of the disease. A large quantity of stable-manure had been thrown into the docks, though whether any had been brought from other places for this purpose, or whether any more was thrown there than ordinarily existed in such a town, is not stated. One writer ascribes it to the felling of forests on the southwestern outskirts of the city, so that the sun, acting on the soil, developed malarial influences which penetrated the city; and another, with equal gravity, ascertained that the trees in New Berne had not been trimmed for several years, and that consequently the foliage had grown so dense that the rays of the sun could not penetrate to dry up the mud. All concurred in ascribing to it a local origin and nothing but that. (Official report of Colonel Peter Pineo, medical inspector, United States Army, December 31, 1864; Surgeon C. A. Cowgill, United States volunteers, November, 1864; Surgeon D. W. Hand, United States volunteers, April 28, 1865, April 1, 1866; and letter of Dr. J. M. Davis, Ninth New Jersey Volunteers, June 24, 1865.) That some of these numerous and somewhat conflicting causes may have had an effect as affording resting-places for the disease, no one will question; but Assistant Surgeon J. J. Woodward, United States Army, whose experience in studying the medical history of the war entitles his opinion to the highest consideration, thinks that a more thorough investigation would have shown that the disease was introduced by means of the numerous refugees who were daily coming into New Berne in great numbers, and some of whom doubtless came from Charleston, at which place yellow fever was prevailing. This seems to me much the more rational view. Certainly it is

more in accordance with what we see of the history of yellow fever in other places.

The disease was carried from New Berne to Beaufort, North Carolina, where it broke out on the 24th of September. The first cases were of persons who had been in New Berne within a few days of their seizure; the next, persons who lived in adjoining houses. The epidemic lasted until November 17, causing sixty-eight deaths. (Official report of Surgeon U. P. Rice, United States volunteers, November 18, 1864.)

Charleston, South Carolina.—The yellow fever made its appearance at Charleston at a very early period in the history of that city, and has since that time visited it more frequently than any other place in the country. The following abstract of the epidemics I copy from the valuable census of Charleston by Doctors Dawson and DeSaussure:

Yellow fever first prevailed as an epidemic in this city in 1699 or 1700; the exact date cannot now be ascertained. According to the account given of it by Dr. Hewitt, it prevailed in that year very extensively, carried off a large number of the inhabitants, including many of the chief men of the province, and was called the plague. The same disease recurred in 1713, and caused as fearful a mortality as at its previous visitation. From this period, no mention is made of its occurrence until 1728, when it again recurred, and was then first called "yellow fever;" although from the description given of two former epidemics, there can be no doubt of the identity of the last with the two preceding. In this year also it caused a great number of deaths. In the year 1732 it commenced its ravages in May, and continued until September or October; during the height of the epidemic from eight to twelve whites were buried daily. It appeared again in 1739, 1745, and 1748, and is said to have raged as severely in these years as in 1732. The number of deaths which it caused in those years cannot now be ascertained. From 1748 to 1792 no epidemics of yellow fever occurred, although it is stated that in 1753 and 1755 a few sporadic cases were seen. In 1792 a new series of epidemics occurred; it raged in that year, and in 1794, 1795, 1796, 1797, 1799, 1800, 1801, 1802, 1804, 1807. * * * From 1807 to 1817, a period of ten years, there was nearly a complete exemption from epidemics of this disease. In this latter year it re-appeared and caused two hundred and seventy deaths, a large number of whom were children. In 1819 it again prevailed epidemically, causing one hundred and seventy-six deaths. In the next year it prevailed slightly, but did not become epidemic. In 1824 another serious epidemic occurred, which carried off two hundred and thirty-one persons. From this period, 1824, to 1838, no serious visitation of yellow fever occurred, although several cases of it existed in each of the years 1827, 1828, 1834, and 1835. In 1838 the most serious epidemic occurred which has been known in the annals of Charleston, and causing the largest mortality which has ever resulted from the disease in this city. In 1839 it was again epidemic, but to a much less extent than during the former year. From 1839 to the present time, (1848,) nine years have elapsed, during which the city has been exempt.

In 1849 it again made its appearance, but in a very mild form, and has since that time prevailed with varying severity in the following years, 1852, 1854, 1856, 1858, 1864, and 1871. Besides this, there have been unquestioned sporadic cases during other years, but no approach to an epidemic.

The local hygienic conditions of Charleston have always had a most important bearing upon the spread of the disease, and, as believed by many of her ablest practitioners, upon its origin. (See Simons on Yellow Fever in Charleston, *Charleston Medical Journal*, November, 1851, p. 792.) The city, situated at the junction of the Ashley and Cooper Rivers with the bay, is on very low ground; the average fall in drainage being not more than five feet. In early times, and to some extent still, there were numerous salt-marshes extending from the rivers toward the town and, to a considerable extent, within the limits of the city. These were washed twice a day by the tides, and as long as they were left alone did not seem to be deleterious to the general health; and, previous to their being filled in, the yellow fever was confined to what is known as Old Charleston, in the southeastern part of the city. Gradually, however, as land became more valuable by the natural extension

of the town, many persons owning lots on these salt-marshes filled them in, thus destroying the natural drainage in the vicinage. The material used for this purpose was often of a highly injurious character, consisting of old wood, offal, the detritus from the drains, and filthy dirt-heaps, thus making a vegetable compost of highly putrefying capacity, to be exposed to the hot sun. In every case where this has been done, yellow fever has extended its area over the newly-filled localities, until now there is hardly any portion of the city that can be considered exempt. Full details of the subject will be found in a very interesting letter of Dr. W. T. Wragg, (Report to Common Council on Epidemic of 1858, pp. 36-45.)

For the last seventy years the condition of the drains, privy-vaults, latrines, sewers, and yards around the houses has been such as to call for the severest comments from all that have interested themselves in the health of the city. Offal and garbage, and the detritus of cow-yards, have been openly placed in the streets; the drains have not infrequently been opened in summer to be cleaned, and their contents strewed over the surface to fill up vacant lots. "Another and a greater evil, alike favorable to the formation of an unhealthy state of the atmosphere, are houses crowded, or rather packed, from basement to attic, with human beings; and the yards or lots of small dimensions, equally crowded, with horses, cows, goats, and, in some instances, hogs and dogs. The filth of all these animals, biped and quadruped, is frequently, in one mass, placed in the street, for the scavenger's cart to remove." (Report to Common Council on Epidemic of 1858, p. 19.) Still another source of disease is the large number of burial-places in the most thickly settled portions of the city. These are very much crowded, and often in the heat of summer exhale the most offensive odors. This was the state of affairs in 1858; and Dr. Robert Lebbey's report to the mayor in 1872, as well as my own conversations with many physicians in the city, and personal observations during the past summer, all show that the condition of affairs has not materially improved since; perhaps, even for a year or two after the close of the war, it was worse than it had ever been, owing to the disorganized condition of public affairs caused by the war.

We are without detailed accounts of the earlier epidemics. Dr. John Lining says, (letter to Dr. Robert Whytt, of Edinburgh, December 14, 1753:)

Within these twenty-five years it has only been four times epidemical in this town, namely, in the autumns of the years 1732, 1739, 1745, and 1748, * * * and lastly, whenever the disease appeared here, it was easily traced to some person who had lately arrived from the West Indian Islands, where it was epidemical.

During this period the commerce of Charleston with the West Indies had attained considerable proportions, and there were many arrivals at the port from the West Indies in every year. Toward the last of this period this trade had been gradually growing less, in consequence of the unjust restrictions placed on the trade of the colonies, by Parliament, in the various navigation acts, and other measures, tending toward a commercial monopoly. By 1750 the trade had almost entirely ceased; and it was not revived until the independence of the United States was secured, and affairs settled down once more on a quiet basis. By a singular coincidence, yellow fever disappears from the annals of Charleston during the whole of this long period, and only makes its appearance again in 1793, when the trade had again become large with the West India ports. (Carpenter on Yellow Fever, p. 45.)

A reference to the preceding quotation from DeSaussure and Daw-

son will show that it was epidemic nearly every year after this until 1808, when it again disappeared from the city until 1817. Dr. Carpenter (*History of Yellow Fever*, pp. 45,46) shows that this period of exemption was exactly coincident with the suppression of traffic with the British West India Islands, consequent on the embargo act and the subsequent war with Great Britain, and that it was not until that traffic had been revived by the peace of 1815 that yellow fever again visited Charleston. The first cases this year (1817) occurred among sailors in the lower portion of the city, and from them it spread over the greater portion of Old Charleston. During the continuance of this epidemic a vessel left Charleston for Beaufort, South Carolina. The authorities of that place having no belief in the contagious or infectious character of the disease, admitted her to the wharf, without quarantine examination. "Two days after, one of her passengers complained of sickness, and was placed under the charge of a colored nurse. The fever was soon characterized; the patient died. The nurse was the next taken; she died; then some of her family, and from this point the fever extended over Beaufort, and destroyed one-sixth of the inhabitants." (Hume, "Report to City Council of Charleston on Origin and Source of Yellow Fever," *Charleston Medical Journal*, March, 1854, p. 154.)

Dr. S. H. Dickson says of the epidemic of 1819, (*Charleston Medical Journal*, November, 1856, p. 744,) that it was the most terrible year of relative mortality I have known," and of that of 1827, that it was "the least fatal in proportion." During subsequent years, there was no serious visitation of the disease, until 1838, when it caused three hundred and fifty-three deaths, two hundred and eighty-one of which were adult males. On the 4th of July of that year, the British bark *Lord Glenelg* arrived from Demerara, and lay at Boyce's wharf, having at the time several cases of yellow fever on board. At this time, the ship *Medora*, from Liverpool, lay at another wharf, about one hundred yards distant. The first case of fever among the citizens was the wife of the steward of the *Medora*, who had frequently been on board to see her husband. This case occurred on the 1st of August. The next case was a sailor from the *Medora*, who was taken to the hospital on the 4th of August. Both of these cases died, and the disease soon spread to other houses, and became epidemic. (Hume, *op. cit.*, p. 154; Strobel, *Essay on the Transmissibility of Yellow Fever*, p. 124.) It is not known that there was any communication between the *Lord Glenelg* and the *Medora*; indeed, Dr. Thomas T. Simons denies that there was at any time any yellow fever on the *Lord Glenelg*, and finds a sufficient cause for the fever in the great fire which swept over the city in the spring of that year, and which left a great mass of filth, decaying and putrifying material, old rags, all kinds of offal, of every description, exposed to the solar rays. To these causes, he thinks, must be added the influence of a large number of unclimated mechanics from the North, who came to Charleston to rebuild the burned district, and who lived in crowded boarding-houses, under unfavorable hygienic conditions. (Simons's Reply to Wm. Hume, M. D., before the city council, *Charleston Medical Journal*, May, 1854.)

The following year, 1839, the disease again prevailed epidemically. During May, June, and July a large number of vessels arrived at the city from the West Indies, laden with fruit, much of which was rotten, and all the vessels very filthy. Strobel says:

From the 1st of May to the 30th of July, inclusive, there were no less than thirty-six arrivals from infected ports in the West Indies. Now, we consider each of these vessels a source of infection, for they arrived in our harbor with the epidemic atmos-

phere of the places from which they came hermetically sealed up in their holds; not only so, but many of them were laden with fruit, vast quantities of which had rotted in their holds prior to their arrival, the effluvia from which must have added greatly to the virulence of the poisonous atmosphere with which they are freighted. (Op. cit., pp. 171, 172.)

But the vessel to which the first cases were clearly traced was the ship *Burmah*, which arrived on the 7th of June from Havana, having recently had two deaths among her crew from yellow fever, and having three sick on her arrival, who were immediately sent to the hospital. The *Burmah* lay for some days in stream, in the vicinity of a number of other vessels that were either in stream or at neighboring wharves. On the 17th of June five men were admitted to hospital from some of these ships, three being from the *Leonore*, from Boston; one from the *Chatham*, from Boston; and one from the *Elizabeth Bruce*, from New York. Cases were soon admitted from other vessels, until they became so numerous that there was scarcely a vessel uninfected. The first case in the city was on the 26th of June, in the person of a man named Humphreys, who arrived on the 19th of June from Havana, and was boarding on Market street. On the 7th of July a case occurred a few doors west of this boarding-house, and soon numbers of other cases occurred, and the fever was pronounced epidemic. The Medical Society of Charleston appointed a committee to investigate the origin of this epidemic, and they came to the conclusion that there was no warrant for supposing its introduction to be due to the *Burmah*, but that there were "local and general causes" within the city itself amply sufficient to give rise to it. Simons says that "many of the lots which had been exposed by the fire of 1838 remained unoccupied, and continued to present the same surface to the deleterious influences of the sun and rain, and many strangers, also, who remained in the city, engaged in the occupation of rebuilding." (Op. cit.) He also says, in another essay, that Dr. Robert Lecky, post-surgeon at Fort Johnson, had cases under his charge previous to the arrival of the *Burmah*. This epidemic lasted until some time in October, and caused one hundred and fifty-three deaths.

It prevailed next on Charleston Neck, in 1843, but did not become epidemic in the city. Hume traced the infection in this case to the arrival of a man by the name of Hewes, from Havana, sick with fever; but as Hewes arrived on the 27th of July, and the first cases thereafter were not until the 10th of September, the time seems too long to trace any connection between them.

The city was now free from disease until 1849, when again the fever became epidemic. The history of its introduction seems to be as follows, though, as usual, it gave rise to the most violent controversy between the advocates of local origin and the importationists. As this is found to be the case with every epidemic in Charleston, I merely present the facts, and will let inferences be drawn by others: The first case was taken to the hospital on the 6th of August, being a sailor from the bark *Numa*, then lying at the Union wharves, having arrived from Havana on the 18th of July. This case proved fatal the night of his admission; and the next day another case made its appearance from the steamer *Isabel*, which arrived from Havana on the 25th of July, and was at the same dock as the *Numa*. On the 20th of August the captain of the ship *Huron*, lying at the next wharf below the other vessels, was taken with yellow fever. On the 28th the captain of the British ship *Queen Victoria*, lying next above the infected ships, was taken sick and died of black vomit; and in a few days five of the crew of this last ship were taken. Cases began to occur in the houses in the

vicinity of the wharves by the 3d of September. Shortly before this a man by the name of Holman arrived by steamer from Savannah and died on the 29th of August at the poor-house. On the 2d of September a German, who had been on the infected ships to buy cigars, died of the fever on the corner of East Bay and Elliot streets. Other cases soon occurred in the vicinity, and by the middle of September it was decidedly epidemic. In October it was very severe, commenced to decline in the early part of November, and by December 1 had disappeared. In all there were one hundred and twenty-three deaths; but two of these occurring among natives. (Hume, *op. cit.*) The local causes that had their influence toward the development of this epidemic (as has been the case in almost the entire history of yellow fever in Charleston) were a high degree of temperature, a moist atmosphere, and the excavation of earth in various portions of the city. "In 1849," says Simons, "an extensive drain was opened in Hasel street, excavating the most filthy and offensive materials; and likewise an extensive drain on Market street from Church street to the wharf. Yellow fever occurred earliest in these localities, and was more fatal. Again, this earth, so filthy and offensive, was transferred to King street from Horlbeck's alley to Hasel street; and in this particular spot there were sickness and mortality among a class of persons who are generally exempt."

In 1852 the first case was the wife of a shipmaster named Cole, who died on her husband's ship, at one of the wharves, on the 16th of August. The ship lay at the dock, in the immediate vicinity of three vessels, recently arrived from the West Indies, and she had on board a quantity of damaged cotton, taken from a vessel that had been destroyed by fire a short time before. It is not known whether either of these circumstances had anything to do with the production of the disease. They are mentioned by contemporary writers (Hume and Simons) as having a possible connection with it. In January, of this year, excavations had been commenced, with the view of laying the foundations for the new custom-house, and this work was continued during the summer; about two hundred unacclimated Irish laborers being employed, most of whom had arrived in the city during the year. The earth taken from this excavation was sold, and distributed throughout the city, and used in filling up low and swampy lots. Dr. Simons regarded this as a powerful predisposing cause of the epidemic, in which Hume differs from him, who shows (*Charleston Medical Journal*, November, 1854) that in 1847, 1848, and 1853, much more extensive excavations and distributions of earth took place than in 1852, and yet these were seasons of complete exemption from disease. Still, it can hardly be doubted, that this excavation did act as a factor in this epidemic, and that in the other years mentioned other circumstances required to produce an epidemic were wanting. This much may be admitted without justifying Dr. Simons's assertion that the excavation originated the disease. A more rational view would be that the excavation and presence of unacclimated laborers favored its epidemic development; its origin being looked for in the holds of the West India ships lying at contiguous wharves to the ship when Mrs. Cole, the first case, died.

The disease became epidemic the last week in August, raged with violence during September and October, and declined and terminated during November. In all, there were three hundred and ten deaths, of which two hundred and seventy were of Irish and German laborers; at this time the population of the city, including the suburbs, was about forty-five thousand. But five of the deaths were natives of the city.

Early in the season of 1854 the steamer Isabel arrived from Havana and Key West. She came to the wharf on the 11th of May, and on the 14th a passenger was sent to hospital with black vomit. He, however, recovered, and there were no more cases from this source of infection, either in the hospital or on the ship. This man had been some weeks in Key West, where yellow fever was prevailing. On the 11th of July the steamer again arrived from the same ports, and an Irishwoman on board was taken sick to the Pavilion Hotel, and removed the next day to the lazaretto, where she died of black vomit. Still there was no propagation of the disease from this case. (Dawson, Report of City Register of Charleston.) On the 22d of July the Spanish vessels Columbus and Concha came to the wharf from quarantine, their port of departure having been Havana. Four days after each vessel sent a sick man to the lazaretto, one of whom died with black vomit. On the arrivals of these vessels, the ship Sullivan, just arrived from Liverpool, was lying at the dock to which they came, and on the 7th of August a sailor was taken with yellow fever from this ship, and on the 10th another case occurred from the same source. Dawson (op. cit.) thus narrates the next cases that occurred among the shipping:

The brig Emily arrived at Accommodation wharf from Boston on the 8th of August. A seaman was sent to the marine hospital on the 18th, having been three days sick before admission, and died on the 20th with black vomit.

The schooner Monterey, from Philadelphia, arrived at Central wharf (next to where the other vessels were) on the 7th of August; on the 17th one man was sent to the marine hospital, and is now convalescent.

The Susan Cannon, from Baltimore, arrived at the same wharf on the 8th of August; on the 17th one man was sent to the marine hospital, who is still under treatment.

On the 8th and 9th there were other arrivals of northern vessels with similar results. Nor was this the only source of infection, for on the 13th of July the bark Aquatic arrived at quarantine in distress. This vessel was from Matanzas, bound to Dublin, and on the voyage, all the crew being either dead or sick with yellow fever, she was run ashore, but subsequently got off, and brought to Charleston. At the quarantine, all of her original crew were sent to the lazaretto, and she was brought up to the Union wharves in charge of persons living in Charleston. At these wharves was the bark Vesta, from Boston. On the 7th of August a case occurred on the Vesta, another on the 11th, and on the 12th another, this latter on shore, in the person of a man who had worked on the Aquatic. The first case on shore was at a hotel, in the person of a Spanish gentleman, who visited the Concha repeatedly. He was taken on the 7th of August, but recovered. An Irish servant girl, who washed the bed-linen of this man, was next taken on the 20th, and soon after other cases occurred in this house. From these various centers the disease diffused itself throughout the city. (Frost, Review of Weather and Diseases, 1853, 1854; Charleston Medical Journal, January, 1855; Hume, Yellow Fever in 1854, *idem*.)

This was the most widely-diffused epidemic that had ever been known in Charleston. All classes, races, and conditions alike suffered attacks, though, of course, the mortality was greatest among the unacclimated. The fever was extremely general among the black population. It was noticed that there was an unusual number of second attacks. (Wragg's Roper Hospital Report, p. 19.) The fever was decidedly epidemic by the middle of August, and lasted as usual until some time in November, causing six hundred and seventy-five deaths.

There was no epidemic in 1855, but in 1856 it made its appearance on the 14th of July, and eight other cases occurred between this date and the 5th of August. Previous to this time there had been numerous

arrivals at quarantine of infected vessels, and in some cases these vessels had been permitted to discharge their infected cargoes at the city wharves within a day or two after their arrival; those engaged in unloading the cargoes went freely between the vessels and the city, and in some instances the crew and passengers had free access to the city. One of the earliest cases was that of John Abbott, who was engaged in lightering the bark *St. Andrew*, which arrived from Havana, on the 18th of July. He was taken sick on the 25th, on King street, near Broad, and was removed to the lazaretto. "Nearly all the earlier cases have occurred to seamen from vessels at the wharves, where the cargoes of the infected vessels were landed." (*Charleston Medical Journal*, November, 1856, p. 845.) The epidemic was not general throughout the city, being confined chiefly to the hospitals, and to the vicinity of the wharves and sailor boarding-houses. There were a number of cases, which occurred in patients in the hospitals, who had not been out of the wards for months previous to the outbreak of the disease. The majority of the sick were among the Irish and those who lived in crowded tenement-houses in the midst of filth. The disease was epidemic until the latter part of November, causing, in all, two hundred and forty-six deaths. Commenting on this epidemic, the editor of the *Charleston Medical Journal* remarks:

We would, in conclusion, recommend a more stringent quarantine system, which would exclude all vessels from infected ports from our harbor. The petty traffic during the summer with the tropical ports usually infected with yellow fever should not be allowed to continue, as millions of dollars are lost to the city when the fever is introduced, and hundreds of lives are wantonly sacrificed.

In 1857 there were seventeen deaths reported as yellow fever, but it did not attain the proportions of an epidemic. Not so in 1858, when a most severe epidemic occurred, and one very instructive in its details. Up to the 30th of June of this year there had been thirty-three arrivals of vessels from West India ports and five from New Orleans, most of them loaded with sugar and molasses, fruit, and cigars. On the 18th of May the bark *Nueva Rosalia* arrived from St. Iago de Cuba, with one case of yellow fever on board, who was removed to the lazaretto, where he recovered.

On the 28th of June, the steamer *Catawba* arrived in three and a half days from Havana, and was quarantined, although having no sickness on board. Her passengers were sent to the railroad the next day, and her crew detained until the 7th of July, when they were discharged and came up to the city. Among them was the steward, by name *Garcini*, who went to a lodging-house on Tradd street between King and Orange. On the 9th of July the first case of yellow fever occurred in the person of a man named *Abbott*, who lived in this house, and who died on the 18th. On the 12th of July the steward, *Garcini*, was taken sick, and died with the black vomit on the 15th. He was a very intemperate man, had been drunk ever since he had been on shore, and was reported to have had the fever before in 1856. In the mean time the cook of the *Catawba*, a German named *Schwacterer*, who lodged at No. 16 King street, near Tradd, and in close proximity to the house of *Ahrens*, where the other cases were, was taken sick on the 10th of July, and returned to the steamer, from whence he was sent to the lazaretto, where he died on the 16th with yellow fever. The next two cases were those of policemen living in the vicinity, and other cases soon followed, so that, by the 12th of August, it had been gradually diffused through all that part of the city and soon became epidemic, being most severe in September, declining gradually through October, and rapidly in Novem-

ber. There was one death in December. (Hinne, Charleston Medical Journal, vol. 15, pp. 1-32.)

The report of Dr. I. L. Dawson, city register, conclusively shows that the premises of Tradd street were in a most filthy condition. There was a large heap of manure festering in the sun by the door, which had been brought from a neighboring cow-yard, the odor from which was insupportable; a cellar had recently been excavated in the house, and the fresh earth heaped up on one side of the house, and the privies were filthy and very offensive. The sewers along Tradd street were filled with mud and offal and choked up, as were those of many streets in the vicinity. In fact, the sanitary condition of the whole city was as bad as could be, and presented the most favorable conditions for the development or spread of epidemic disease. The committee of the common council say:

The filth and putrefaction found in the subterranean cesspools were alone sufficient to engender the most malignant fevers that could possibly affect a city.

The committee further say:

The conclusions to be deduced from the foregoing facts are that if yellow fever be introduced by importation it cannot become epidemic, except by common causes, *i. e.*, the atmosphere of Charleston must be in the same condition as the atmosphere of Havana, (or elsewhere,) from local causes, to produce or favor an epidemic; and if not in this like condition, no epidemic can possibly result from such importation. (Report of committee of city council of Charleston on epidemic yellow fever of 1858, p. 45.)

Shortly after the fever became epidemic in Charleston it broke out in the garrison of Fort Moultrie, on Sullivan's Island. The first case was a man by the name of Jones, Battery E, First Artillery, who died August 15. This man was orderly to the commanding officer and was in the habit of associating freely outside the garrison, the island being then crowded with persons from Charleston. On the 20th a second case occurred, and on the 22d a third, the servant of the commanding officer; the fourth was on the 26th, and many others subsequently. The number of deaths in the city during the season was seven hundred and sixteen. (Report of Surgeon B. M. Byrne, United States Army, post surgeon, Fort Moultrie.)

There were a few sporadic cases in 1862, most of which occurred in the vicinity of the wharves, and were thought by Surgeon D. W. Hand, United States Volunteers, who investigated the subject, to be due to infection received from blockade-runners, "several of them having been quarantined that fall with yellow fever on board." In 1864 there was a general prevalence of the disease. "The first case was that of a Mr. Dallas, living on Calhoun street, near the citadel. He was taken sick July 27, and died nine days after, with every symptom of yellow fever. No more cases occurred for two weeks after this. Then it appeared in several parts of the town, and finally, August 24, came back to Mr. Dallas's house, where three persons then had it. Soon after this General Jameson, on duty at the citadel, sickened and died with the same disease. It now became epidemic and spread to all parts of the town. * * * It is thought that less than two thousand persons in all had yellow fever at this time, and that the mortality did not exceed 35 per cent. among all classes. Most of the physicians believe that the epidemic was this year originated in Charleston. Previous to the sickening of Mr. Dallas, no vessel had arrived in the port; but two or three days after Mr. Dallas was taken sick, the steamer *Druid* came into the harbor with three cases of yellow fever on board. Several other steamers came in during the month of August with the same disease on board, and it was known that yellow fever prevailed as an epidemic at Nassau."

(Report of Acting Assistant Surgeon D. W. Hand, United States Army, March 8, 1866.) It seems most rational to suppose that there was an error in diagnosis in the case of Mr. Dallas, (an incident which every one that has seen yellow fever at the south knows is of common occurrence at the beginning of epidemics,) and that the first cases really received their infection from the Druid. Dr. Robert Leiby, health-officer of Charleston, (letter of July 21, 1872,) speaking of this epidemic, says:

Fever existed or prevailed in Charleston in 1864, during the war. It was then said it was imported in the *Siren*, a blockade vessel from Nassau or Jamaica. Dr. Kinlock and myself saw cases in Calhoun street, northeast of the citadel, on the low lots, before the vessel arrived; she did have yellow fever on board, and it may have extended in an atmosphere prepared and compounded of atoms favorable for its propagation and extension.

The epidemic in 1871 was remarkable from the great blending of other types of fever with the true yellow fever, rendering the diagnosis difficult and often impossible; yet there were undoubtedly many cases of the latter in the city. Dr. Leiby, the health officer, also notes it as an extraordinary fact that, for the first time in many years, no infected vessels arrived at the quarantine during the season. Common report attributed the outbreak of the disease to infection received from the bark *Teresa*, a vessel which had been quarantined at Bull's Bay with yellow fever on board; but Dr. Robert Leiby (Report of Port Physician for 1871) and Dr. Manning Simons (Transactions of American Medical Association, 1872, pp. 316-20) both show very conclusively that this could not have been the case, no communication being possible between the ship and the first case which occurred within the time specified. Nor do there seem to have been any other possible sources of foreign importation. Dr. Simons finds sufficient causes for the prevalence of the disease in the filling of sunken and low lots with the garbage and offal of the town, in the construction of a new drain on Market street, (where the disease was chiefly located,) and in the caving in of a drain in Rafter's alley, near Market street. It is proper to add that the character of this epidemic was disputed by many of the physicians of Charleston, some going so far as to insist that there had been no yellow fever in the city at all.

The disease prevailed this year in Beaufort, South Carolina. "The first case occurred on August 6, in a man who was brought from Bull River, sick with fever, and died on the 17th, with marked symptoms of yellow fever. The disease ran its course from this time until November 21, when the last case terminated fatally. There were forty-one cases among the whites and one colored; seven of these (whites) died." (Transactions American Medical Association, 1872, p. 331.)

In 1862, when a large army was concentrated at Hilton Head, South Carolina, there being about ten thousand troops there at the time, the steamer *Delaware*, having troops on board, left Key West for Hilton Head, where, after a short detention at quarantine, she landed her passengers on the 8th of September. It is believed that she had cases of yellow fever on her passage; but, however that may be, soon after her arrival the fever broke out among her passengers, and, by the 17th of the month, eight had died. On the 9th of October an employé of the Quartermaster's Department was taken sick, and soon after a number of officers and soldiers on duty in the vicinity of the wharf where the *Delaware* had landed, but the disease did not spread generally among the troops. The total number of cases was forty, of whom twenty-five died.

Savannah.—The yellow fever prevailed at this place in 1820, but I have

not been able to put my hands on a copy of Dr. Waring's pamphlet describing the epidemic, and am consequently unable to give any particulars of it. In 1827-'28 there were a few cases of black vomit, occurring during a general prevalence of "dengue," or breakbone fever, but no epidemic of yellow fever. (Waring on the Epidemics of Savannah. *North American Medical and Surgical Journal*, vol. 10, p. 145.) The city was not visited by yellow fever again until 1854, when a severe epidemic occurred. The first case occurred on the 5th of August, on the corner of Lincoln and Broughton streets. Between that date and the middle of the month cases increased in number slowly, after which it became epidemic. It exhibited its greatest violence from the 20th of August to the 20th of September, commencing in the northeastern section of the city and advancing to the southwest. Professor R. D. Arnold, M. D., who attended the first cases, informed me that there was no reason to doubt the local origin of the disease. The weather was unusually hot, and the summer so dry that the ponds all dried up, and he considers this sufficient to account for the epidemic.

The causes assigned by Hon. John E. Ward (at that time mayor of the city) were—

1. The removal of mud from the Savannah River, by dredging, and its deposition on the wharves of the city. Lieutenant Morton, United States Engineers, who was in charge of this work, denied that any had been so deposited.

2. The conditions of the rice-lands in the vicinity. These, during the height of the epidemic, were in good order, but toward the close of the season a heavy storm broke the banks surrounding them, and they became overflowed. This was, however, too late to affect the course of the epidemic.

3. A peculiar epidemic condition of the atmosphere.

4. The arrival of the brig *Charlotte Hagne*, which put into Cockspar Road about the 29th of June. (Mayor's Report of City of Savannah, 1854.) This vessel was found off Tybee Island in distress, and was brought into Cockspar Road, with her captain and two men sick with fever. Dr. Humé (*Charleston Medical Journal*, vol. 10, p. 31) asserts that these were cases of yellow fever, and that they were brought up to Savannah and treated in a private hospital on Broad street, and were the cause of the city becoming infected, while Dr. R. C. Mackall (Health officer) and Dr. W. M. Chartres deny that these were cases of yellow fever at all, but of mild bilious remittent. (*Charleston Medical Journal*, vol. 10, pp. 150-153.) During the epidemic there were five hundred and eighty deaths among the white population and fourteen among the colored people. After this there were no more cases of yellow fever until 1858, when there were a few deaths, and since that time the city has been exempt.

The little town of Saint Mary, Georgia, suffered from yellow fever for the first and only time in 1808. The season was very rainy, causing stagnant pools of water to be formed about the town, and the water in the wells became offensive to the smell and taste; yet there was no change in the general health of the inhabitants until the 5th of September, when the schooner *Polly* arrived from Savannah with two men sick with yellow fever. These were carelessly allowed to be landed and taken to a house in the center of the town, where they both died. Two men who nursed these cases died on the 9th and one on the 10th of September. The whole family in the lodging next took sick, and the disease soon became epidemic in town. The malignancy of the disease was undoubtedly intensified by the extremely-filthy condition

of the town. (Letter of James Seagrove to Dr. Hosack, American Medical and Philosophical Register, vol. 3, p. 417.)

An epidemic which occurred in 1839 at Augusta, Georgia, gave rise to much discussion, the advocates of the local origin of the disease claiming it as clearly an instance of its spontaneous development. These pointed to what was called the "trash-wharf, a slide or inclined plane, which was erected in 1834 for the purpose of throwing the filth of the city, including dead animals, into the river. This mass of animal and vegetable matter having accumulated to upward of 200,000 cubic feet, it was resolved by the authorities of the city to have it removed, and accordingly, during the months of May and June, its interior was exposed to the action of the sun. Having penetrated the exterior crust, the heat evolved was so great that the workmen, although wearing thick shoes, were compelled to desist from their work for two hours at a time, so as to suffer it to cool." (Army Medical Statistics, 1819-'39, p. 249.) Dr. Frank Robertson, of Charleston, informed me that the river was unusually low that year, so much so that a crop of turnips was planted on what had been the river-bed, and stated his most positive belief that the disease originated from these two causes. On the other hand, Monette shows (Yellow Fever at Natchez and the Southwest, p. 128) that the town was unusually healthy for two weeks after the fever was epidemic in Charleston and ten days after it was so in Savannah; that Augusta was not only the terminus of the railroad from Charleston but of steamboat navigation from Savannah, and that very many persons had fled from these places to Augusta. The first manifestations of the disease were among those who had fled from these places. Strobel, who was in Charleston at the time, has no hesitation in affirming its importation from that place. On the subject Monette forcibly remarks:

Why did not yellow fever manifest itself in Augusta at the same time it made its appearance in Charleston and Savannah? Why was the epidemic in Augusta deferred until Charleston and Savannah were almost deserted by their inhabitants and the transient population? Why did it not commence in Augusta first, if it proceeded from local causes? Did the arrival of the people from those infected cities excite the extrication of pestiferous miasm from local causes which had lain dormant up to that time?

Monette is, however, in error, when he speaks of the disease as being epidemic in Savannah in that year. There were a few cases, and many of the inhabitants fled from the city for fear of its general prevalence, but it did not become epidemic, as it did in so many other towns in that year.

Saint Augustine, Florida.—Yellow fever is said to have visited Saint Augustine for the first time in 1807. It was known to have been especially severe in Havana that year. Florida was at that time under the Spanish domination; there were few or none of the inhabitants that were American, and the records of this visitation, if any such there are, are unknown to the profession in the United States. It did not appear again until 1821, the year of the cession of Florida to the United States. This political event had the most important bearing on the course of the subsequent epidemic. As a consequence of the change of flags, a large garrison of United States troops, all of whom were entirely unacclimated, were quartered in the town. Besides this, the city was crowded to an unprecedented degree with adventurers and strangers from all parts of the United States. On the 10th of July the exchange of flags took place, and immediately thereafter the Spanish garrison was sent in transports to Havana. Three of these vessels re-

turned to Saint Augustine about the middle of August, with yellow fever on board, one, the schooner *Alexander*, having lost her entire crew and being navigated into port by two passengers, named Miller, who lived in Saint Augustine. The cook of the *Alexander*, being the only one left of her original complement of men, died the day after her arrival, and his bedding, clothes, and other effects were thrown overboard. These floated, with the tide, up the river, and were picked up by a lawyer named Fitch, who was then going in his boat from the city to his plantation, at a considerable distance from the city. Arrived home, he had the bedding washed and dried, intending to use it. A few days afterward (it is impossible to give the exact dates) a negro woman who had washed these things took sick, as did also Mr. Fitch, and returned to Saint Augustine, where the latter died on the 10th of September. From these cases the disease spread to the whole of Mr. Fitch's family, all of whom died. In the mean time two young men, recent arrivals in the city, had gone on board one of the returned transports, and returning to town, soon after sickened and died. The disease spread slowly at first, but in the month of October it became violently epidemic, and nearly all the strangers in town were attacked. In all, one hundred and thirty-two cases died, besides forty among the troops, out of a mean strength of one hundred and twenty. No Spaniards, Minorcans, or other natives were attacked, and but three of the deaths were those of negroes.

The local causes which intensified this epidemic, and were said by some to have originated it, were as follows: The police of the town, during the Spanish occupation, had been extremely bad. Every one who has seen any of the New Mexican houses, or those on the Rio Grande frontier, can form a very good idea of its condition, without any special description. The streets were narrow and crooked, filled with filth and offal, the back-yards and privies never cleaned. Add to this that many of the houses, which had been closed in consequence of the removal of the Spanish residents to Havana, were occupied by the newly arrived strangers, often without proper means to render them habitable or remove the previously existing nuisances.

A second local cause was the closing of a bar, about twenty miles from town, at Little Matanzas Inlet, by which a broad bay extending from the bar toward the city was converted into a fresh-water marsh. In consequence, all the salt-water vegetation and the oysters and other shell-fish died, and putrefactive decomposition went on to such an extent that we have the authority of General Hernandez, a very old resident, for saying that it "gave rise to exhalations of malaria so offensive that the stench could scarcely be borne." The prevailing winds from the southeast blew directly over the marsh toward Saint Augustine. Billions remittent fevers had prevailed to an unusual extent previous to the advent of the vomito; the season had been hot and wet, and there was much sickness, especially dysentery. (Strobel, *Essay on Yellow Fever*, pp. 129-147; Dowler, *Epidemics of New Orleans*, p. 18.)

After this year there was no more fever at Saint Augustine until 1839. Early in the summer of that year, as will be remembered, yellow fever broke out in Charleston. On the 15th of August a family by the name of Abel, who had been living in a house on Meeting street, Charleston, in which were cases of yellow fever, arrived in Saint Augustine and took board at the house of a Colonel Johnson, fronting on the bay. Several of this family were slightly ill within a few days after their arrival; but it does not seem clear, from the account given by Strobel, that these were cases of undoubted yellow fever. About the 1st of September

their trunks, boxes, &c. were unpacked, and the contents, consisting of bedding, mattresses, and clothes, hung out on the balcony and rear fence to air. On the 4th of September a case of sickness occurred in the house of Antonio Andreo, living next door to Colonel Johnson, which closely resembled yellow fever. On the 8th of September Mr. Andreo was similarly attacked, and, two days after, three of his children. All of these cases recovered. The next cases were in the house of a Mr. Circopoly, who lived directly behind Colonel Johnson, their back-yards adjoining. Here a child was taken sick on the 10th of September, which was speedily followed by four more, in the same family, all of which recovered. The disease next broke out in the family of a Mrs. Brown, living about a block west of Circopoly's. Up to this time there had been no deaths, and the disease had been almost entirely confined to children, natives of the city, and it seems to me that these were all cases of dengue, or breakbone fever, although, if (as Arnold of Savannah thinks) dengue and yellow fever are identical, (Arnold on the Identity of Dengue and Yellow Fever, 1859,) this statement is of no consequence. Now, however, a new element arrived to complicate matters. On the 10th of September about forty Seminole Indians, who had been confined at Fort Moultrie, Charleston Harbor, arrived in Saint Augustine, accompanied by a guard of soldiers, and were transferred to Fort Marion. Some of the troops had the fever at Castle Pinckney, before leaving Charleston, and there were cases among them after their arrival at Fort Marion. Whether it was due to their arrival or not, it seems certain, from the evidence, that after this time the prevailing disease assumed more decidedly the characteristics of yellow fever. A German died of black vomit in Colonel Johnson's house, and other fatal cases soon occurred in the vicinity. The disease gradually extended to the westward, across the town, the prevailing winds being from the northeast. Those who affirmed the local origin of the epidemic ascribed it to the filling in of a gully, behind the sea-wall, (running along the front of the bay,) with shavings, old clothes, garbage, and other filth of the city, producing a large amount of decaying animal and vegetable matter to fester in the hot sun. Another local cause was that a rank growth of weeds had sprung up in many parts of the town in the place of the orange-groves, which had been destroyed by a frost in 1835.

In 1841 the disease prevailed to a certain extent, there being fifty-six cases and twenty-six deaths among the troops at Fort Marion. Dr. Porter, United States Army, from whose report I obtained this information, does not state how it originated. (Army Medical Statistics, 1839-1855, pp. 310, 311.)

An incident connected with the importation of yellow fever into Jacksonville, Florida, which was kindly furnished to me by Dr. A. S. Baldwin, of that place, may be mentioned here. I will give it in the doctor's own words:

In July, 1859, I was called to attend two children of a neighbor; one, a little girl, was sick for a few days and recovered; the other, her brother, developed regular black vomit, and died. This case was seen by several of my professional brethren, who had no hesitation in pronouncing it to be a genuine case of yellow fever, and a post-mortem examination still further confirmed our diagnosis, and settled the question beyond doubt, for the box-wood liver was a marked characteristic. The origin of these cases is a matter of interest in connection with the transmissibility of the disease. The uncle of these children had, a few days before, returned from a visit to Cuba, and the day before he left Havana had been through the hospitals, that for yellow fever included. The only article of woolen clothes he had on was a coat, and this his aunt sponged with alcohol after his return from the hospitals. In going through the hospitals he passed by the beds of those who were throwing up black vomit. After his return home these children were with him when opening and taking out the contents of his trunk,

and handled the articles, and they alone of the family were present, and they were both taken sick together a few days after, and, so far as could be ascertained, there was no other means by which they could have contracted disease, and no cases besides theirs occurred in the community.

Pensacola, Florida.—The first visitation of yellow fever to this city was in 1765. An English regiment was sent to garrison the town, coming from home via the West Indies, and was quartered at Barrancas. Shortly after their arrival they received supplies of food, clothing, &c., from the West Indies, where the fever was then prevailing. They took the disease, and lost one hundred and twenty men; but there is no record of its having spread among the citizens of the town. (Williams, Florida, p. 15; Lind on Diseases of Hot Climates, pp. 36, 37, 179.)

It did not appear again until 1811, and was then ascribed to some extensive ditching which had been made from the town to a swamp in its rear, thus exposing a large quantity of fresh soil to the influence of the sun's rays, which were uncommonly hot that year. Large numbers of the inhabitants perished. (Drake, Principal Diseases of Interior Valley, North America, p. 227.)

In 1821 occurred the transfer of Florida from the authority of Spain to that of the United States, and immediately thereafter there was a great rush of emigrants from all parts of the country to Pensacola. Most of these were adventurers of dissipated habits, and with but little money, who lived crowded together under highly unfavorable sanitary conditions. More or less trade immediately sprung up with the West Indies, and in the summer of 1822 there were several arrivals of vessels from those islands. Among these was the cutter Alabama, from Havana, which arrived on the 12th of August, having, during her passage, lost two of her crew from yellow fever. The day after her arrival the captain, feeling sick, went to a boarding-house on shore, where in a few days he died of black vomit. His case was followed by that of the landlady and her daughter, both of whom died. The boarders scattered all over town, but most of them took the disease, and several died; and cases soon occurred, not only in adjoining houses to the boarding-house but wherever these boarders fled. (Carpenter, op. cit., pp. 35, 36.)

While these events were taking place the brig Franklin arrived at the town. This vessel had left a northern port for Havana with a cargo of codfish, but on her arrival at that place, some of the fish being spoiled, she was ordered away by the authorities, and came to Pensacola, where she lay at anchor for some eight or ten days near the town. During this time most of her fish had been sold and distributed about the city, thus introducing a new source of infection.

The vessel was now ordered away by the authorities, but in departing went ashore at Fort Barrancas, where she was condemned and sold, and the remainder of her cargo unloaded by some artillery soldiers at the fort. The disease soon broke out among them, and a number died. (Army Medical Statistics, Report of Assistant Surgeon McMahon, United States Army, 1819-39, p. 36.) The disease became epidemic about the 19th of August, and lasted until the 27th of November, and during the season upward of two hundred died out of a total population of about one thousand. Of the sanitary condition of the town at this time Assistant Surgeon McMahon, United States Army, remarks:

From an attentive examination of its natural position I am induced to believe that this city holds out a fine prospect for salubrity. Exposed in front to the sea, and sufficiently remote on every other side from swamps or large bodies of fresh water, it possesses so much elevation as to have a constant and free ventilation, while the soil of the city, as well as of the vicinity, is one unvaried bed of sand mingled sparsely with a rich vegetable mold. The streets are wide and spacious, intersecting each

other at right angles. * * * The houses, generally built of wood, are many of them in a state of decay. The lots and yards, containing the accumulated filth of years, are extremely offensive. The privies, being very much neglected, are abominably fetid. The soil of the gardens, being in a great measure artificial, vegetation is very productive, and, as the leaves and offals are suffered to remain on the surface, decomposition, formed by heat and moisture, rapidly ensues. To these prolific sources of miasmata may be added a total neglect of cleanliness in the personal habits and domestic economy of the inhabitants. An unusual degree of heat and moisture during the summer has tended effectually to bring those exciting causes of disease into operation.

I have quoted somewhat at length, because this description will apply to almost every town and every epidemic that has occurred in the southwest. Everywhere, in studying the disease, we find bad drainage, vegetable decomposition, intense heat, superabundance of moisture, filthy privies and yards, old decaying houses, and dirty people present as elements to make up a factor in the production of an epidemic. It was remarked, during the epidemic of 1822, that there was a singular mortality among the brute creation, nearly all the dogs in town having died and foxes in the neighboring woods. (Drake, op. cit., p. 228.)

The next appearance of the fever was in 1825, in which year Monette says, it was introduced, and prevailed with great fatality; but I can find no details of its occurrence. Drake, however, refers the accounts of this epidemic to the year 1827, when it again prevailed, though in much milder form than hitherto. I have not been able to find any details of its origin. In 1828 it again made its appearance, at the navy-yard and hospital, but not in the city, being brought to the navy-yard by the arrival of vessels of war having the fever on board. The same occurrence took place in 1834.

In 1839 a sick person arrived from New Orleans, and stopped at the house of the naval surgeon there stationed. This man died five days after his arrival. Next the doctor took sick, then his negro servant, then other members of the doctor's family, and thence it spread through the whole yard. (Dr. J. A. Wedderburn, United States Navy, in Carpenter, op. cit., p. 27.)

It was epidemic, also, in the city of Pensacola, the first cases being in the persons of unacclimated refugees from Mobile, who came with the *semina* of the disease in their systems. Subsequently it affected the resident population. (Drake, op. cit., p. 234.) During this season the French frigate *La Gloire* arrived at the navy-yard with twenty cases of fever on board. She was placed in quarantine, and all intercourse cut off between her and the city, her sick being removed to the naval hospital. There was no extension of the disease from this source to the city. (Monette, op. cit.)

In 1841 the fever broke out on the sloop of war *Levant*, lying in the Bay of Pensacola. The sick were first placed under a shed on shore, and, after two weeks, moved to the hospital. The disease did not spread so long as they were isolated under the shed, but, on being removed to the hospital, they had to pass the marine barracks. After this, cases began to occur in the yard, first in the person of a negro woman who lived near the shed, then among the marines, and then generally throughout the yard. It was introduced, after this, every year to the navy-yard, by the arrival of infected ships, until 1848, and again in 1853. (Dr. Isaac Hulse, United States Navy, Maryland Medical and Surgical Journal, vol. 2, p. 391; Dr. S. C. Lawrason, United States Navy, Maryland Medical and Surgical Journal, vol. 3, p. 393; Dr. Wedderburn, United States Navy, in Barton's Report of Sanitary Commission, pp. 124, 125.)

In 1853 the disease once more appeared at Barrancas barracks and the navy-yard. Early in July a detachment of recruits arrived at the navy-yard from New Orleans. On the 9th of that month five of them were admitted to the hospital with yellow fever. Several of the attendants who nursed them were taken sick, but the disease spread no further. On the 24th of July the United States steamer *Vixen* arrived from Tampico, Mexico. A few days after her arrival, a boy who had been in the habit of going on board took sick and died, and his sister, who slept with him, also died, both with black vomit. About this time a man was removed from the *Vixen* to the navy-yard who had sustained a fracture, and his mattress was thrown overboard, which being picked up by a negro, he sickened with yellow fever and died in a few days. Cases began soon to multiply in the navy-yard and on the *Vixen*, until nearly the whole population in the vicinity suffered. From the navy-yard it spread to Barrancas barracks, and of the whole command but seven escaped an attack. It should be remembered that the sailors on the *Vixen* had suffered from what was called "Tampico fever" on the voyage to Pensacola and some were sick on her arrival. (Dr. John F. Hammond, United States Army. Army Medical Statistics, 1839-55. p. 326.)

From this time until 1867 there was no epidemic of yellow fever in Pensacola. In 1863 there was, however, a most instructive outbreak of the disease on board the storeship *Relief*, at the navy-yard, extending from the vessel to the yard and to the other vessels in the navy. This vessel had been for more than a year off Ship Island, as a store-ship. She arrived at the navy-yard some time in the month of August, and, being at the time perfectly healthy, was allowed to pass the military quarantine without question, and came to the anchorage off the yard. Shortly after her arrival a large amount of sickness was noticed on board, which was at first diagnosed to be typhus fever. There were thirty cases, of which seventeen were removed to the hospital in the yard, and the remainder, with the ship, were sent to the quarantine station, six miles distant.

The diagnosis of the cases sent on shore was soon corrected by the death of a man with black vomit at the yard, and by the occurrence of seven deaths on the *Relief* at the quarantine, "all these cases being the most decided and malignant yellow fever." About the 1st of September several cases died on a merchant-ship lying off the navy-yard, and much sickness took place in the bomb-fleet, which had come from the Mississippi River and were anchored at the yard. Other cases occurred in the yard and a few in the adjacent village of Warenton. There was a large body of troops encamped a mile and a half distant, at Barrancas. The camp was kept in the most perfect police, and a rigid "cordon sanitaire" established between the camp and the navy-yard, and the troops escaped the disease. Dr. Gibbs, of the Navy, thinks there can be no doubt that the disease originated on the *Relief*. He says:

There can seem little doubt that the disease was generated on the *Relief*. * * * Stores had remained undisturbed in the vessel over a year. During this time several hundred gallons of sperm-oil had leaked from the casks into the bilge. The ship made much bilge-water, which was exceedingly offensive in its odorous gases and very black; kegs of pickles were moldy, or in a state of decomposition; and the freshly-preserved meats, in cans, were unsound to such an extent as to give rise to an animal odor. When I first visited the ship the hatches were all closed, as the offensive odor with them opened was most intolerable. (American Journal of Medical Sciences, April, 1866.)

While these events were occurring, the frigate *Colorado*, on the blockade off Mobile, experienced a similar outbreak, there being about forty

cases and seven deaths. The disease was traced to stores received from the Relief. (Letter from Dr. B. F. Gibbs, United States Navy, July, 1872.) Dr. E. F. Holden, United States Navy, (*American Journal of Medical Sciences*, January, 1866. Causes of Certain Diseases on Ships of War,) however, considers the deleterious influences of the bilge-water in ships to be overestimated, and does not regard it as capable of generating disease of a malignant character; but Dr. Gibbs and others think that it will do so in tropical climates, especially when agitated by the motion of the waves after a long period of rest at an anchorage.

The year 1867 was, as is well known, one of general epidemic tendency throughout the Gulf region, and Pensacola did not escape. A military quarantine had been established on the 21st of May. On the 21st of June the English ship *Fair Wead* arrived from Jamaica, where yellow-fever was epidemic. She seemed to be clean, and had not a case of sickness on board, but was detained at quarantine until July 2, during which time one man died, suddenly, as was reported, of congestion. After coming up to the city yellow fever broke out on board, and by July 10 there had been eight cases and three deaths. On the 19th another man died, and the vessel was ordered back to quarantine. She does not seem to have communicated the disease to the shore. Some other vessels, lumber-laden, having fever on board, were ordered from the harbor to quarantine about the same time. On the 24th of July the schooner *Texana* arrived from New Orleans, and a few days thereafter her mate was taken sick with yellow fever and brought on shore to a boarding-house in the city. Other persons living in this house soon sickened, and the boarders, scattering to various other houses, spread the disease in several different localities. On the 9th of August the disease was epidemic. (Letter of Mayor to General Seymour, commanding United States troops.) The troops at Barrancas were thereupon, on the 14th of August, moved to Fort Pickens, leaving only a dozen men at the former place. This detachment were positively forbidden to pass to the village of Warrenton, which was separated from the barracks by a belt of woods between the two. On the 23d of August, the United States steamer *Alliance* arrived at Barrancas with a detachment of the Twenty-fourth Infantry, one man being sick who died, two days after, with black vomit. The men in the barracks were immediately removed from the vicinity of the hospital to the distance of two hundred yards, and there were no cases either among them or at Fort Pickens, although the disease prevailed extensively at Warrenton and at the navy-yard adjoining, approaching to the very belt of woods between the village and Barrancas barracks. (Report of Acting Passed Assistant Surgeon N. L. Campbell, United States Navy, to Naval Bureau.)

Some isolated cases that have occurred at different times have an interesting bearing on the subject under discussion. In 1867 there was but one case of yellow fever in the city. This was in the person of a little girl who died, during its prevalence, at the navy-yard. No connection could be traced with any extra mural source of infection, and at first it was considered a case of purely local origin, but inquiry showed that the child, a few days before being taken sick, had played hide-and-seek in her father's garret with her playmates, where were found some sails that had been purchased a short time before from an infected ship in New Orleans.

In 1853 a young man died in the village of Milton, a few miles from Pensacola. His clothing was placed in a trunk, put away, and forgotten. In 1855, two years subsequently, this trunk was opened and the

clothing taken out to be aired, and yellow fever broke out in the house, and there were several deaths. (Dr. Herron, Pensacola.)

The medical topography of Pensacola presents a more favorable exhibit than that of any other town on the Gulf coast. With a broad bay to the south, from which blows continually a cool breeze, it is situated on a high pine barren, with sandy streets, houses widely separated, and nothing about either its situation or hygiene to warrant the local origin of the disease.

Key West, Florida.—This island first suffered from yellow fever in 1824. The epidemic is ascribed by Dr. Benjamin Tieknor, United States Navy, to the combined influences of atmospheric vicissitudes, miasmata, and bad food, fatigue, and intemperance among the population. (North American Medical and Surgical Journal, vol. 3, pp. 216-222.)

In 1853 it was introduced from Tampa, Florida, by two soldiers who arrived in August, and died of the fever soon after their arrival. Other cases followed these, and in November it became epidemic, prevailing until August, 1854, causing one hundred and twelve deaths out of about three hundred cases. The most infected locality was in the immediate vicinity of a stagnant pond, near the center of the town, which had been made the receptacle for the offal and decaying vegetable matter of the village. (Report of Assistant Surgeon R. F. Simpson, United States Army, Army Medical Statistics, 1839-55, p. 323.) It is a little singular that, although Doctor Simpson details its mode of introduction from Tampa, he should still express his belief that the disease had its origin in local causes.

In 1862 the inhabited portions of the island were very much crowded by reason of the war. Three volunteer regiments were stationed there, besides a large number of sailors belonging to the blockading fleet and mechanics employed in refitting naval vessels, all of them unacclimated. Typhoid fever prevailed in the town and camp previous to the appearance of yellow fever, there being upward of one hundred admissions to the military hospital with this disease in April and May. On the 20th of June the bark *Adventure* arrived from Havana, having yellow fever on board, and was quarantined. Four patients from this vessel were taken to the Marine Hospital. Cases occurred, about this time, in the persons of some mechanics, who had been employed about the machinery and in the holds of some iron-clads that had been a long time on the blockade and were in a very filthy condition. By the last of July the disease was generally prevalent in town, and broke out among the troops. By the last of October there had been three hundred and thirty-one cases and seventy-one deaths in the command, besides a very large number in the town. From this point it was carried to the Tortugas, where there were eleven cases and four deaths. (Records of United States Post Hospital, Key West; Circular No. 1, War Department, Surgeon-General's Office, 1868; Reports of Assistant Surgeon W. F. Cornick, United States Army, October 4, 1862; Surgeon E. S. Hoffman, Ninetieth New York Volunteers, October 1, 1862; Harris, United States Sanitary Commission Memoirs, p. 241.) Local causes for the propagation of the disease were the crowded state of the island, the clearing away of large quantities of brush and undergrowth for military purposes, and the removal of a large number of dead bodies from a grave-yard near Fort Taylor, which was done by unacclimated Irish laborers, and "accompanied by an almost insupportable stench." (Sanitary Report of Surgeon E. S. Hoffman, Ninetieth New York Volunteers, September 30, 1862.)

In 1864, in April, a lot of blankets and other goods were received at

Key West from Nassau, New Providence, and exposed for sale. It was asserted that they were a portion of those sent to various places by the notorious Dr. Blackburn, with the view of introducing yellow fever. Be that as it may, the fact is that the Rev. James H. Schneider, chaplain Second United States Colored Troops, bought one of the saddles, and on the 23d April was admitted to hospital at the barracks, where he died, on the 26th, with well-marked symptoms of yellow fever. The saddle was subsequently sold to two other officers, both of whom took the fever and died. From this case others appeared in the hospital and among the troops, and the disease soon became epidemic. The population of Key West at this time was about five thousand, including about twelve hundred troops, two hundred prisoners of war, and one hundred and fifty Florida refugees. (Dr. B. S. Thompson on Yellow Fever at Key West, *New York Medical Record*, vol. 3, pp. 246-248.)

I have not been able to obtain any satisfactory information relative to its prevalence in 1865, though I was informed by the citizens of the town that it was epidemic in that season.

In 1867 there was no sickness up to the middle of August. On the 31st of July the Spanish frigate *Francisco de Assis*, accompanying the English steamer *Narva*, arrived in port. The latter ship had been employed in laying the telegraph-cable from Key West to Havana. Both of these vessels had yellow fever on board, and both were about being ordered to quarantine, when orders arrived from "superior authority" (so stated in the report of Dr. Cornick, from which I quote) to issue no such orders, and, in consequence, both vessels were allowed free communication with the shore. Besides this the sick on the *Narva* were moved to the shore, and treated, some in the marine hospital and some in private houses, where many of them died. Dr. Cornick, who reports these facts, gives it as his decided opinion (*Report on Yellow Fever and Cholera*, Circular No. 1, 1868, Surgeon-General's Office, p. 152) that the disease was introduced by these vessels. "Up to their arrival the island was perfectly healthy, and likely to remain so."

At Fort Jefferson, Tortugas, during this period, the disease prevailed with great severity. The first case was on the 4th of July, in the person of Captain G. W. Crabb, Fifth Artillery, who had just returned from Havana. He recovered, and left for the North on the 3d of August. The next case was on the 19th of August, (a private of Company K, Fifth Artillery,) and within a week there had been four more cases, all from this company. On the 25th the schooner *Matchless* arrived from Tampa with a case of yellow fever on board, and the same day cases appeared in Company L, Fifth Artillery, and among the officers' servants. From this time it may be said to have become epidemic. In all, there were two hundred and seventy cases (including fifty-eight relapses) and thirty-eight deaths. A board of officers was ordered by the commanding officer to investigate the causes of the outbreak. They ascribed it—

1. To the prevalence of yellow fever along the Gulf coast.
2. To persistent southeast winds and long-continued rains.
3. To the arrival of large numbers of unacclimated recruits during the summer.
4. To the damp and unwholesome condition of the barracks occupied by the men.
5. To the filling up of the moat with mud along two sides of the fort, (nearest the barracks of Company K,) owing to the incompleteness of the sea-wall. The stench from this source was very great.
6. Defective privies and bad drainage.

The board, after examining the whole subject, came to the conclusion that it was of local origin and due to the above causes, but they at the time of making their report were not aware of the case of Captain Crabb, (above referred to,) which clearly proves the importation of the disease. This was owing to the fact that the medical officer of the post had died during the epidemic.

The disease prevailed again with violence in 1869. Large numbers of Cuban refugees had arrived on the island, many of them poor and destitute and living under very unfavorable hygienic conditions. While I could obtain no satisfactory data in reference to the first cases this year, yet physicians resident in the town gave it as their unqualified opinion that the disease was introduced by these refugees.

But there is ample ground for the introduction of yellow fever into Key West at any time without going to any special vessel or locality to account for it. The local quarantine regulations provide (section 5) that all sponge-boats, wreckers, and other small craft sailing along the reef shall be exempt ordinarily from visit by the health-officer, but may come and go with impunity. Now, these of all others are the vessels that most need watching. Very many of them only plead the ostensible business of sponge-gathering to cover up their real one of smuggling, and make frequent illicit visits to the Cuban shores, to bring over contraband goods. Of course, where a case of fever occurs in any house having connection with any of these boats, the matter is carefully concealed, as an investigation would lead to an exposure of their illicit traffic were it to be ascertained that they had visited Havana. Hence all such cases are loudly trumpeted as of local origin, and, as persons high in position are not unfrequently interested in this species of trade, a certain kind of influence is brought to bear to favor the impression that fever always exists in Key West. That this is not so the foregoing record shows, it not having appeared at all in 1869, and previous to that not oftener than every other year.

Key West is a sand-island, resting on a coral reef, having in its interior lagoons, which frequently occasion outbreaks of malarial fever. The town is always dirty, which seems to be the normal condition of a great many of the inhabitants. There is always plenty of food for the disease, and always a convenient place for its location. I can see no reason why the disease should not originate here, but it certainly does not seem to have usually done so.

Western Coast of Florida.—The fever prevailed at Tampa in 1839, but I have not been able to find any particulars of it further than a statement in Carpenter's Sketches that "it was introduced from New Orleans." Strobel also asserts (Essay, p. 214) that the United States troops stationed at Fort Brooke obtained their supplies from New Orleans, and that the disease was brought from that city through that channel of communication.

In 1853 a steamer arrived from New Orleans, in September, with quartermasters' supplies on board, and came up to the wharf without any inspection. Lieutenants Cook, Second Artillery, and Silvey, First Artillery, went on board on her arrival and spent some time in the captain's cabin. There was no sickness on the vessel at this time, but she had several cases and some deaths from yellow fever on her passage over.

The same day, three soldiers from the garrison at Fort Brooke spent some time on board. These latter were taken sick three days afterward, and died with unmistakable symptoms of yellow fever. Two days subsequently, Lieutenant Silvey was taken ill, but recovered, and a short

time afterward General Childs, commanding the troops in the State, died, as did also Lieutenants Cook and Butler, Second Artillery, and Redfield, post surgeon. The disease spread generally in the community, and there were many deaths, both among the troops and the citizens. (Letter of Captain W. Silvey, United States Army, July 21, 1872.)

In 1871, about the middle of August, the fever broke out at Cedar Keys, Florida. The facts are not positively ascertained as to its origin, but it was generally believed to have arisen from a sick man, landed from the Havana steamer. The hygienic condition of the place was bad. "At the Keys there were some half dozen saw-mills, with considerable accumulations of saw-dust and slabs, undergoing slow but gradual decay, while the extensive pine piling of the railroad and wharf was in the same condition, besides the stumps of piling burned a few years since." (Tampa newspaper, April 27, 1872.) Shortly after the disease broke out at Cedar Keys, a white boy and a negro, who lived in Tampa, returned to that place from the Keys. They were both taken sick with yellow fever after their arrival in Tampa; both recovered. "The next case was a mulatto woman, who had removed from the country and had been living here something near a year." The next cases were a brother of Dr. Wall, of Tampa, and his wife. The latter died on the 6th of September, and a child died, the same day, in a house opposite to the doctor's. "The disease from that time spread rapidly among those who had settled here since 1867." (Letter of Dr. John P. Wall, August 23, 1872.) While these events were occurring, a physician, Dr. McCaw, from Gainesville, Florida, a village about ninety miles in the interior of the State, visited Cedar Keys to offer his medical services. On his return to Gainesville he was taken with the prevailing disease, and died; and the disease became epidemic in the town and was attended with fearful mortality.

Mobile, Alabama.—A settlement was made on the present site of Mobile about the beginning of the eighteenth century, and yellow fever is said to have prevailed there in 1705. (Drake, op. cit., p. 216.) Its next appearance was in 1765, when it was imported by a British regiment from Jamaica, and prevailed with considerable malignancy. (Roman's History of Florida, p. 13, quoted by Drake, op. cit., p. 216.) From this time there was no yellow fever there until 1819, when it appeared in epidemic form. It was said to have been imported from Havana by the schooner Patriot, which arrived at the wharves in Mobile on the 15th of August. A young man, who was a passenger on her, died of yellow fever a few days afterward, and the disease spread in this part of the town. Professor Drake (op. cit., p. 217) quotes old residents of the town as confirming this view, but a "committee appointed to investigate the causes and extent of the disease," in their report affirm positively that the disease had been in existence a month previous to the arrival of this vessel, and found a local origin for it in the filthy condition of the wharves and streets leading therefrom. (Medical Recorder, vol. 4, p. 160-163.) Such is also the opinion of Dr. Lewis. (New Orleans Medical and Surgical Journal, vol. 1, p. 284.) The total number of deaths was two hundred and seventy-four, in a population of not more one thousand. The disease spread from Mobile to various points on the Tombigbee and Alabama Rivers. The disease is said to have been epidemic in 1825, 1827, and 1829, but, except an allusion to these visitations by Drake, I can find no accounts of them. They are not mentioned by either Carpenter or Monette, who are generally very accurate. In 1837 it began about the 20th of September, and three weeks afterward became suddenly epidemic throughout the

town. There does not seem to be any evidence of foreign importation. (Drake, op. cit., p. 220.)

In 1839, about the same time it broke out in New Orleans, it appeared in Mobile. "In both places the first cases were among the shipping exclusively, or among those who had frequented certain vessels." (Monette, op. cit., p. 118.) It prevailed with great violence during September and October, and after a change of weather, about the 20th of October, commenced to decline. The total number of deaths was about six hundred and fifty.

I have quoted above Monette's statement in regard to this epidemic, but Dr. J. C. Nott says (New Orleans Medical Journal, vol. 4, p. 564) that the disease "commenced on the corner of Government and Hamilton streets, half a mile from the shipping, in a clean, well ventilated, and fashionable part of the town."

In 1842 the fever prevailed in about half of the town, commencing in Spanish alley, a very filthy place, near the docks, and marching steadily in a northwestern direction. It was not generally epidemic, there being only about one hundred and sixty cases and sixty deaths. (Dr. P. H. Lewis on Yellow Fever, New Orleans Journal of Medicine, vol. 1, No. 2, p. 31; Nott, op. cit., p. 566.)

In 1843 it prevailed over the half of the town untouched the previous year, commencing in its northern extremity and pursuing a course to the southeast. The number of deaths was two hundred and forty. (Nott, op. cit.) Carpenter asserts that this epidemic was introduced from New Orleans. (Op. cit., p. 30.)

"There was a very mild epidemic in 1847, and again in 1851, but no violent outbreak before the general prevalence of the disease in 1853.

"The first cases of yellow fever which occurred in Mobile in 1853, it is conceded on all hands, were imported from New Orleans on board the bark *Miltiades*."

The epidemic this year had this peculiarity, that it was not confined to the city alone, but spread to various localities in the vicinity which had previously acquired an enviable reputation for salubrity, and had on this account been places of considerable resort during the summer months. This I shall notice more in detail further on.

The bark *Miltiades* arrived on the 11th of July at Dog River Bar, twenty miles from the city, down the bay. She was from Portland, Maine, via New Orleans. At the latter place her crew had contracted yellow fever, and on her arrival below Mobile one of her crew was sent to the marine hospital, where he died on the 13th with black vomit. On the 19th a stevedore, employed on board in loading the ship, was taken sick and brought to the Sailors' Home, where he died on the 25th. Four other cases were removed from the bark on the 25th. All of these latter cases were brought up to town on the steamer *Daniel Pratt*, and, August 1st, the engineer of the steamer was taken sick. These men were taken to different houses in town. About the same time several cases appeared in town, which, on inquiry, were found to be of persons who had fled from New Orleans to escape the epidemic. The next that was known was the appearance of the disease among the citizens, and occurring in quite a number of different localities; and by the middle of August it had become decidedly epidemic, and continued as such until the 1st of November. The population of Mobile was about twenty-five thousand, of whom probably a third were absent from the city, and the number of deaths was eleven hundred and ninety-one.

About six miles west of Mobile, in a high, dry, sandy region, in a heavy pine forest, is the locality known as Spring Hill. It is the seat

of Saint Joseph's College, and the residence of about thirty families; the population is much increased in the summer by persons from Mobile, by reason of its well known salubrity. Dr. Nott gives the following account of the importation of the disease into this healthy settlement.

On the 12th of August, just about the time the yellow fever began to assume the epidemic form in Mobile, and one month after the first imported case, I was called to see a young gentleman, Mr. Alfred Murray, with a well-marked attack of the disease, at a boarding-house in Mobile, on Saint Louis street, near Saint Joseph, and on the 14th had him removed on a bed to the house of a brother-in-law, Mr. Wheeler, on Spring Hill, about the center of the settlement, and twenty days after he entered the house, September 5, two of Mr. Wheeler's children were attacked with the epidemic, and about two weeks afterward two other children were attacked; three had black vomit and two died. * * * * Mr. Greer moved, with his family, to the house of Mr. John B. Toulmin, on the 29th, from town, carrying a daughter convalescing from yellow fever. Another daughter sickened on the 8th; three of Mr. Fleming's children, in the same house, on the 10th, and Mrs. John Greer on the next day, &c. (New Orleans Medical and Surgical Journal, March, 1854.)

From these points the disease spread through the settlement, and nearly every person living there was sick.

At Citronelle, at the terminus of the Mobile and Ohio Railroad, thirty-three miles from town, a similar state of affairs existed, and there were twenty deaths out of a total population of two hundred and fifty. It also appeared at the Dog River Cotton Factory, five miles from Mobile, and other localities in the neighborhood of the town. (Doctor J. C. Nott, *op. cit.*, pp. 571-585.)

1867.—It was not long after the disease became prevalent in New Orleans before it made its appearance in Mobile. On the 13th of August, Lieutenant Hezlep, United States Engineers, who had been in New Orleans on duty, died at Fort Morgan, below Mobile, of the fever. Lieutenant Breckinridge, who shared his room with him, next took it; and next Doctor Reynolds, the post surgeon. Many other cases succeeded, and by the 15th of September there had been nine deaths at the fort. The first case in the city of Mobile was on the 17th of September, when Major Tracey, Fifteenth Infantry, died in a private hospital in the city. I was informed in Mobile that this officer had been exposed to the disease either in New Orleans or at Fort Morgan. The next cases were in a sailors' boarding-house near the river, where a boy died of black vomit, a sailor having been previously sick in the house. After there were some cases in the neighborhood of the camp, and before the end of the month there had been about thirty-five cases and six deaths. In September it became epidemic and ran the usual course.

1870.—The schooner *Louisa Williston* arrived on the 19th of August, 1870, from Havana, and came to wharf near Otis's Mills. On the 22d August Mr. John Otis, who was employed at the mills, was taken sick, and died on the 28th. It was not suspected that he had yellow fever until after he died. The next case was John Otis, jr., who was taken sick September 5, and, on the 6th, Mrs. Otis, mother of the last case, and, on the 8th, her daughter, all with unquestionable yellow fever. There had been no fever on the schooner. The portion of the city where these cases occurred was notoriously unhealthy, being in the vicinity of what is called the Choctaw Swamp, where all the refuse and offal of the city were deposited, and where there are many acres of stagnant water, while the prevailing winds sweep from the swamp over the city. (Dr. George A. Ketchum, in Proceedings Alabama Medical Society 1871.)

In conversing in regard to this outbreak with the members of the board of health of Mobile, I found them generally of the opinion that the disease was due in this case to the *Williston*. She had just come

from an infected port, and, though she had no fever on board, could readily have imparted the infection from her hold to those who were at work about her cargo. Still it is one of the doubtful cases.

Dr. Henry S. Levert, of Mobile, in a letter to Dr. Barton, of New Orleans, (Report New Orleans Sanitary Committee, p. 110,) remarks upon the epidemics of Mobile:

From the facts which have been forced upon my notice, my mind at last has been led to the conclusion that, if the causes existing in our midst do not generate the disease, they favor its introduction and contribute greatly to its extension.

One point I think is satisfactorily established, in connection with its appearance in Mobile upon almost every occasion, viz, that it has invariably occurred in those seasons when large excavations have been made, or extensive surfaces of fresh earth exposed to the action of the sun and air during the heat of summer; while, on the contrary, our city has been almost as invariably exempt from this scourge in those seasons in which no such causes existed.

New Orleans, Louisiana.—The city is situated on the east bank of the Mississippi River, and between it and Lake Ponchartrain, about one hundred and ten miles from the Gulf of Mexico, at the river's mouth.

The site of the city is a swamp, considerably below the level of both the river and lake, and protected from inundations by levees from seven to ten feet high. The streets nearest the levee have been gradually reclaimed from the river by the deposit of the earthy and organic matters in the water, and the condition of the swamp in the rear of the city much improved by the digging of canals, building of shell roads, and a system of drainage. The whole soil of the swamp, as well as of the ground on which the city is built, is diluvial, and, until some time in the present century, (1822.) the streets were unpaved, and, entirely uncaared for, in rainy weather becoming impassable from the mud. At present on either side of the streets are open gutters, into which great quantities of filth and garbage find their way, offending the sight and smell, in the poorer portions of the town, by the most horrible combinations. Vacant lots on the outskirts of the city often contain stagnant water; the back yards, alley-ways, and sinks are unclean, and evolve deleterious effluvia. Many of the cemeteries are in the most thickly-settled portions of the city, and the nature of the soil not permitting interments beneath the surface, burials take place in tombs above ground, with what effect on the olfactories of the neighborhood can easily be imagined. The poorer classes of the population, especially the foreigners from the south of Europe, called here "dagos," live in narrow streets, in crowded houses, in the French quarter, under the most unfavorable hygienic conditions: and it is in this quarter that yellow fever has oftenest committed the greatest ravages, especially in those streets in the vicinity of the docks.

Yellow fever did not make its appearance in New Orleans until 1796. During this year, and for two years previous, extensive excavations had been made in digging the canal Carondelet, and it has been very generally declared, by the advocates of the local origin of the disease, that it was due to the great overturning of the soil in this work. Unquestionably, this was a most prolific source of sickness. All writers agree that diseases of a miasmatic character were very prevalent, and that thousands of the workmen employed on this and subsequent enterprises of a similar character died. It may, therefore, well be that the spread of the disease was decidedly influenced by it. That it did not originate the disease, we are assured by Carpenter, (op. cit., p. 13,) who quotes from the Louisiana Courier of November 27, 1820, a positive assertion that "it was traced to a vessel which had brought it." We are, unfortunately, without any other particulars as to the name of the vessel or

the origin of the first cases. This remark is equally true of 1799, when there was "what was considered proof of its importation." It appeared after this in 1801, 1802, 1804, 1809, and 1811, epidemics of which I have been unable to find any details.

In 1817 the English ship *Phoenix* arrived on the 18th of June, from Havana, with yellow fever on board. The disease continued to prevail after her arrival, and, by the 30th, she had several deaths. On the 10th of July, the *Virgin del Mar* arrived from the same port with many of her crew sick. She had some deaths on her passage, others died on her way up the river, and still more after her arrival, "all with the black vomit." The first cases in the city were traceable directly to these vessels. The disease became epidemic about the middle of July, and prevailed until the last of December, causing about eight hundred deaths. (New Orleans Gazette February 3, 1818, quoted by Carpenter, *op. cit.*) Among the medical men of the day the opinion was unanimous in favor of the local origin of the disease, but in January, 1818, Governor Villeré sent a message to the legislature, stating that the proofs of importation were positive and recommending the passage of a quarantine law. This was accordingly done, in a very imperfect manner, although it was sufficiently effective to cause a number of infected vessels to be stopped at the quarantine station, and there was no epidemic this year in the city. The next legislature, however, repealed the act and directed the sale of the lazaretto. (Carpenter, *op. cit.*, pp. 17-18; Dowler's *Tableau*, pp. 14-16; Faget, *Premier Mémoire sur la Fièvre Jaune*, pp. 21, 22.)

In 1819 occurred the most severe epidemic the city had known. It broke out about the 1st of July, among the shipping moored to the levee. There had been in June a number of arrivals of infected vessels, and numbers more arrived in August, several of which had lost men on the passage with black vomit. From the wharves the disease spread to the neighboring streets, and it was epidemic by the middle of August. "It assumed a character of the highest malignity; medicine lost its effects, the skill of the physician was baffled, and multitudes were carried to the grave." (Carpenter, *op. cit.*, p. 18.) The Surgeon-General (Army Medical Statistics, p. 10) estimated the number of deaths at three thousand, but this is evidently an overestimate, as Dowler shows that the total mortality for the year was only two thousand one hundred and ninety. Doctors De Chambéry and Baxter both consider this epidemic to be of local origin, though the latter states that the first cases he saw were among the shipping in port. (Medical Repository, vol. 6, pp. 1-19.)

Early in January, 1820, Governor Villeré again urged upon the legislature the necessity for a stringent quarantine law. He admits in his message that his views are in opposition to those of the medical profession of the city, but believes quarantine to be of the highest value as a preventive. Nothing, however, was done this year, and about the middle of July cases of yellow fever made their appearance, at first among the shipping and sailor boarding-houses. An investigation, ordered by the governor, disclosed the fact that on the 17th of June a schooner, the *Gold-Hunter*, arrived from Havana, having had two deaths from yellow fever on the voyage; and on the 10th of July the brig *Charles Fawcett* arrived, having lost some of her crew. The disease prevailed in the city until the 21st of December. (Carpenter, *op. cit.*, p. 19; Dowler, *op. cit.*, p. 17.) During the progress of this epidemic a detachment of troops came down the Mississippi, *en route* to Bay Saint Louis, Mississippi, and were detained some time in New Orleans. They arrived

at Bay Saint Louis on the 20th of August, with one man sick with yellow fever, who died of black vomit twelve hours subsequently. Within twenty-four hours there were five more cases in the command, of which two died, and the disease spread among the troops stationed there. (Army Medical Statistics, 1819-'39, pp. 20, 21.) In December of this year Governor Robertson, the successor of Villeré, again urged upon the legislature the advisability of a quarantine. In consequence of this, in February, 1821, a quarantine law was enacted, by which a board of health was created, armed with the most extensive powers against the introduction of disease, and a quarantine was established below the city, at English Town. The board did not, however, seem to consider it necessary to protect the city from the importation of the disease by way of the lake, an omission fraught with grave consequences; for, although 1821 proved healthy, the year 1822 was signalized by a severe epidemic. Yellow fever broke out in Pensacola that year, about the 12th of August, and caused great consternation among the people, large numbers of whom fled the city. On the 21st of August two sloops, the *Ann* and the *Eliza*, both crowded with passengers, left that town for New Orleans, and entered by way of Lake Pontchartrain and Bayou Saint John, which brought them into the heart of the city without any quarantine inspection. Some of the passengers were sick on the trip and died. The official report of the board of health says:

The researches made by the board at the commencement of the late epidemic lead them to believe that the yellow fever was imported toward the end of August last by a vessel from Pensacola arriving at the basin of Canal Carondelet, and attention was first attracted to the disease in a family by the name of Lynch, passengers in said vessel. This family, of which every member but one fell victims to the yellow fever, had removed to Bienville street, where the disease first spread, and from here extended through the city.

Besides this source of infection, Dr. Forsythe, health-officer at quarantine, reports the arrival of a large number of infected vessels at the quarantine station, and that he had no means of preventing intercourse with those on these vessels, which frequently took place, and that vessels were often permitted to go the city without being properly fumigated. This epidemic prevailed until November, the number of deaths being variously estimated. Dr. Dowler places it at eight hundred and eight, which, from his well-known accuracy, is probably correct.

This same author states that the year 1823 was remarkable for its salubrity. "In no year since the first irruption of yellow fever in New Orleans were the cases of the disease so few as in 1823." This does not accord with the statement of Monette, who says that cases began to appear among the shipping in July, becoming epidemic in the city about the middle of August. (Observations on Yellow Fever of Natchez, p. 65.)

In 1824 the fever prevailed epidemically. Its history, as cited by Carpenter, (op. cit., pp. 55-60,) was as follows, as regards the mode of its introduction: On the 20th of July, the schooner *Emigrant* arrived at the Southwest Pass from Havana, and was towed up to the quarantine ground by the tow-boat *Balize*. The steamer was made fast alongside of the schooner until she got within six or seven miles of the quarantine grounds, when she dropped the schooner astern and towed her by a line to the quarantine station. From affidavits published by Carpenter, it is proved that there were at this time two cases of yellow fever on the schooner, and that several persons from the tow-boat visited these sick men, one of whom was throwing up black vomit at the time.

On the 7th of August John White was admitted to the Charity Hos-

pital and died the next day of black vomit. On the 10th of August there were two cases reported on the steam-tug Post Boy, and on the 11th two more from the Belize. These were the first cases occurring in the city, and Carpenter has no doubt that the epidemic was due to this cause, as he shows by further testimony it was a common practice for the tugs to tow vessels in this manner and for there to be unrestricted intercourse between the boats. Of internal causes of the disease at this time, the chief are thus noticed by a message of the mayor of the city, dated September 11, (I quote from Dowler's Tableau :)

The internal causes are: 1st, the filth daily created in a populous city; 2d, the low grounds and pools where stagnant water lies, the wooden gutters constantly wet and fermenting under the rays of a torrid sun; 3d, the want of privies in most of the populous districts, which renders it necessary to recur to the disgusting and dangerous use of tubs. The external causes are: 1st, the marshes lying north and west of the city, uncovered but undrained, and deprived by the cutting down of trees of the shelter formerly afforded to them by the shade of a luxuriant vegetation, for which the very miasms that now spread death and desolation among us were a source of life and vigor &c.

In 1825 the legislature repealed the quarantine code and broke up the stations, it having been in operation four years, during which time there were three epidemics. There was much controversy at the time on the subject, but the general opinion of the community was adverse to its continuance, believing that the facts had shown it to be of no avail against yellow fever and an arbitrary restriction on commerce. It may be doubted whether the unfortunate result of this attempt was not rather due to defects in the law and faults in its administration than to the falsity of the general principle involved; certainly the accounts of these epidemics, as well as the confession above noted of the health-officer, Dr. Forsythe, would seem to warrant this assertion.

There was a mild epidemic in 1825, the disease making its appearance about the middle of July. It does not seem to have prevailed very generally, the number of admissions to the Charity Hospital being but eighty-nine, with forty-nine deaths.

It is proper to remark that we have only the most meager accounts of all of these epidemics from 1825 till 1839, and it is very difficult to find any positive proof as to their mode of origin. The disease prevailed epidemically in 1829, and extended from there to Baton Rouge, Natchez, and Opelousas. It was asserted by Carpenter to have been introduced by Spaniards from Mexico, large numbers of whom had fled that country on account of the political troubles. The commencement of the epidemic was coincident with their arrival. (Sketches, p. 26.)

It was epidemic in both 1832 and 1833, and evinced peculiar malignancy, but I have been able to obtain no particulars as to its origin. In 1837 there was a very severe epidemic, there having been nine hundred and ninety-eight admissions to the Charity Hospital, of which four hundred and forty-two died. The first cases occurred on board the vessels recently arrived from the West Indies. The disease extended this year to various points in the interior. In another place I have given the facts relative to its introduction to Natchez by reason of the constant arrival of sick persons. Besides this it was carried by steamboat communication or otherwise to Baton Rouge, Opelousas, and Plaquemine, Louisiana. Dr. T. A. Cooke, in an essay on the yellow fever at Washington, Louisiana, gives some interesting facts relative to the introduction of the disease into that place in 1826 by means of infected clothing:

About the year 1826 Mr. L. Louaillier, a merchant of Opelousas, imported late in the fall from the city, during the prevalence of yellow fever, some merchandise. Three

individuals who were present in opening some of these goods contracted a violent fever: one died, and all were said by an experienced physician to have had yellow fever. In 1828 the same individual, with M. Lazaretti, another merchant, imported goods from the city during the prevalence of the fever. Mr. Lonaillier, ever regretting the error he committed in 1826—for he believed in the importability of the poison or cause of yellow fever—opened his boxes and bales and ventilated his goods for three days before taking them to town, and no disease followed from contact with them, whereas of four individuals present on opening the goods of Lazaretti, brought directly to his store in Opelousas, three died with black vomit, and the fourth narrowly escaped with his life. (New Orleans Medical and Surgical Journal, March, 1854.)

The year 1839 was a celebrated one in the history of the prevalence of the fever. At no time since its first appearance did it prevail over such a wide extent of country; never before had it so generally extended to inland towns. Monette remarks that these latter were invariably infected subsequently to its appearance in the coast ports with which they had most intercourse.

The first appearance of this disease in the United States during this summer was invariably in the maritime or commercial ports, and the first cases were invariably among the shipping in port, and especially among those which were direct from infected West India or Mexican ports. In every instance the disease for several weeks was confined exclusively to the shipping before it began to spread among the resident population. This fact is abundantly established by the concurrent statements of the public press in all the infected ports. In no part of the United States was a single case of yellow fever seen even on board the vessels until after it had been prevailing with great mortality for several weeks in the West India and Mexican ports. (Monette, op. cit., p. 78.)

There was no attempt at a quarantine in New Orleans, and the arrivals of vessels from infected ports were very numerous. The first cases occurred among the shipping about the last of June, and others throughout the month of July, until, by August 1, about twenty-five cases had been received into Charity Hospital from this source. It now began to appear in the streets adjacent to the wharves. The report of the medical society says: "The first sections affected were the streets of the old levee." By the 12th of August it was pronounced epidemic, and thenceforth raged violently, there being one thousand and eighty-six admissions to the Charity Hospital and four hundred and fifty-two deaths. The season was noted as being unusually hot and sultry, with a great drought. During this season the city was unusually cleanly, and, apart from the fever, there was a remarkable immunity from disease of all kinds. From New Orleans the disease spread to a large number of the interior towns of Louisiana, Mississippi, Alabama, &c. It was carried to Biloxi, Mobile, Pensacola, Tampa, and Galveston along the coast, and to very large numbers of the towns along the rivers. "In every instance where this occurred the *first cases* of the disease were *invariably traced* to New Orleans, and *only such towns* as had free intercourse with the city by steamboat were visited by the disease. Those towns which were cut off from such intercourse by nature or circumstances, invariably escaped the epidemic, although they might have double the population of others and might be only one-half the direct distance from the city. The first individual cases in any of these towns were either persons landed from steamboats with the disease openly developed in their systems, or persons who had recently left New Orleans with the infection dormant in their systems when they landed, but which soon after was developed in its most malignant form." (Monette, op. cit., p. 91.) Two or three instances will suffice, as the facts in nearly every case are alike. Donaldsonville, eighty-five miles from New Orleans, is a clean, healthy town, and had no case of yellow fever until after the 1st of September. About this time a number of persons were landed from steamboats and taken either to the hotel or to the lodging-houses

near the steamboat-landing, where they were sick and some died. By the 15th of September cases began to appear among the resident population, and the first taken sick were those who had visited or nursed the sick strangers. The disease continued to prevail until frost, giving rise to upward of thirty deaths.

On the other side, Baton Rouge, which at the time had but little trade with New Orleans, and whose inhabitants refused to allow of the landing of any yellow-fever patients, escaped the disease entirely.

At Waterloo, a few miles above Port Hudson, some créoles, believing they were exempt from the disease, visited New Orleans in the midst of the epidemic. On their return several of them sickened and died, and others took the disease, and there were about fifteen deaths in the place.

In a manner similar to what has been narrated of Donaldsonville, the disease was carried to Plaquemine, Port Hudson, Fort Adams, Natchez, Grand Gulf, Vicksburgh, on the Mississippi, and to Alexandria, on the Red River, the disease in every case making its first appearance in the vicinity of the steamboat-landing, or among those who had recently arrived from New Orleans. (Monette, pp. 77-120.)

Besides these river-towns, several of the villages along the interior bayous of the State suffered, viz, Franklin, New Iberia, Saint Martinville, Opelousas, &c. It was brought to New Iberia as follows:

A young physician, Dr. Smith, died of the disease at Plaquemine, and his remains were carried to his friends in New Iberia, and were exposed in the village-church according to usage of the Catholics. Many persons who entered the chapel for the purpose of seeing the remains, or for other purposes, took the disease, and many died with black vomit, and the disease was communicated from these to others. (Carpenter, *op. cit.*, p 28.)

At Franklin, on the Teche, a man named Thompson went on board the steamboat Tomochichi, from New Orleans, and spent some time. The boat had several cases of fever on board. Soon afterward Thompson was taken sick. A family named Birdsall nursed him, and they were all taken, and several died. The neighbors who visited the Birdsalls next suffered, and the infection thence spread through the village, causing about twenty-five deaths. (Carpenter, p. 27; Monette, p. 113.)

In 1841, in 1842, and in 1843, the disease was epidemic in New Orleans, and presents the same history precisely as regards its first prevalence on the shipping and in the vicinity of the wharves as was the case in 1839. Like that year, also, it was carried to many towns in the interior, and, without exception, the earliest cases were either persons who had come from New Orleans, or else had communicated with steamboats from that place.

There was no epidemic after this in the city until 1847. The fever prevailed very early in the season of this year at both Havana and Vera Cruz, and, in consequence of our war with Mexico, immense numbers of vessels were constantly arriving from Vera Cruz during the spring and summer. Graham estimates (*Sketches of Yellow Fever*, p. 36) that there were over three hundred and fifty arrivals from infected ports between the 1st of May and the 31st of July, of which over two hundred were from Vera Cruz. Many of these vessels were Army transports, and some of them had sick soldiers on board, returning to be discharged in New Orleans. The disease was positively introduced by the United States steamers Massachusetts and Galveston, arriving on the 16th of June; a man named John Strider being the first case. There were about three thousand deaths. (Fenner on Epidemic of 1847, *New Orleans Medical Journal*, vol. 5, pp. 194-196.)

The year 1853, when the next great epidemic occurred, forms an epoch

by itself in the history of the disease only equaled in its wide-spread devastation by those of 1839 and 1867. Fortunately, we have the most complete history of it, thanks to the labors of Fenner, Barton, Axson, and others, and to the admirable report of the New Orleans Sanitary Commission. From the great mass of testimony taken on the subject, much of which is irrelevant, and more conflicting, I condense the following statement: There was a general impression among the people that the disease was imported from Rio Janeiro, and especially by the barks Siva and Home, which arrived early in May, and both of which had more or less fever on board during the passage; but Dr. A. F. Axson, after a careful investigation of the facts, could not trace any connection between the earlier cases and these vessels. But, on the 16th of May, the British ship Camboden Castle arrived at the mouth of the river from Kingston, Jamaica. This vessel had been for several weeks in that port, where she had lost her captain and seven of her crew with yellow fever. After these cases she was washed with lime and cleansed, and had no sickness on board on her arrival. She was towed up to the city on the 17th of May in company with the ship Augusta from Bremen. This latter vessel brought two hundred and thirty immigrants, had been out fifty-two days, and had passed to the south of Cuba, but not nearer than thirty-five miles from shore. Her passengers and crew were healthy. On the trip up the river she was only separated from the Camboden Castle by the tow-boat, and there was free communication between the two vessels. On arrival the latter vessel was dropped at Post 27, while the Augusta was taken some half mile farther up the river to the foot of Josephine street.

On the 22d of May, Dr. Schuppert was called to see a sailor on the Augusta, whom he found with well-marked symptoms of yellow fever. The same day a man named James McGingan was taken to the Charity Hospital from the ship Northampton, lying at the same wharf, and he died on the 28th with black vomit. This ship, Northampton, was also an emigrant-ship, and had arrived on the 9th of May direct from Liverpool, having passed about fifty miles to the north of Cuba. The most contradictory testimony was given in regard to this ship. The captain asserted that she was much cleaner than the average of emigrant-ships, while Mr. Pashley, a stevedore employed to cleanse the ship, asserts that she was so foul that his hands became sick, and he was obliged to employ a second gang and discharge the first. The truth is probably somewhere between the two extremes.

The next case of fever that occurred was, from the Augusta, a sailor named Gustave Woette, who was taken on the 25th, and died on the 30th. Two more cases occurred on the same ship on the 27th.

The next cases occurred on some ships that were moored near the Camboden Castle at Post No. 26. These vessels, the Saxon and Harvest Queen, had arrived in May, and were loading with cotton for Liverpool, and had not been near any infected port.

Then cases began to occur on shore, two of rather doubtful character, of the 2d of June, at Gornley's Basin, a filthy locality in the back part of the city. Dr. Moses Dowler attended these cases, and pronounced them to be yellow fever. Faget was of opinion that they were attacked with swamp fever, as they worked every day in the swamp, getting out shingles. The next well-authenticated case was a young Irish girl, from a boarding-house on Tchoupitonlas street, near Race, about one block distant, and right between the Camboden Castle and the Augusta. She died on the 11th of June. The same day a young man, James Murray, died in another boarding-house, corner of Race and Tchoupitou-

las streets. Subsequently other cases occurred in this house. From this time cases occurred in other portions of the city, having no apparent connection with each other. Several of these were at a boarding-house for sailors, in the vicinity of the mint, and two or three miles from the other cases. The epidemic reached its maximum about the last week in August, and then gradually declined, there being but twenty-eight deaths in November and four in December.

Barton estimates the total population of the city as one hundred and fifty-four thousand, of whom sixty thousand were unacclimated, and the total mortality at eight thousand one hundred, and that the total number of cases in the city was rather more than twenty-nine thousand. (Sanitary Report, pp. 253-257.) The summer was an unusually hot one, and the amount of rain-fall greater than during any other year except 1839. The sanitary condition of the city was as bad as it well could be. "In the winter and spring, when the weather was comparatively dry, the streets and gutters were in as good condition as is ever observed in this city; at all times bad enough, but when summer came with its scorching sun and frequent rains, the streets, alleys, gutters, battures, privies, vacant lots, &c., were neglected to such an extent by the street-commissioner, whose duty it was to have kept them in good order, as to call down upon him the indignation and the bitter denunciations of the press." (Feuner's Report on Epidemic of 1853, p. 9.) "It is worthy of remark that the epidemic prevailed in the unpaved, and, of course, least improved, part of the city all around, long before it did in the central and best improved parts." (Ibid., p. 212.)

The history of this epidemic, as regards its extension to other towns, is but a repetition of that of 1839. As soon as it became epidemic in the city, the boats were crowded with people fleeing from the pestilence. Dowler estimates the number that left the city at thirty thousand. These scattered in every direction all through the country; many of them were taken sick *en route*, and the same wide-spread desolation ensued as in 1839. At all the towns on the Mississippi, and at many of the plantations as far as Napoleon, Arkansas, up the Red River as far as Shreveport, along the coast to Mobile, and thence up the Alabama and Tombigbee Rivers, to Pensacola, Tampa, Galveston, Indianola, and many other places in Texas and Florida, and to various towns along the interior bayous, the disease was epidemic and very fatal. The history of nearly all of these is so similar that it is not necessary to state them, and I will merely give, as an example, a short account of the disease as it appeared in Washington, Louisiana, condensed from a valuable history of this epidemic by Dr. T. A. Cooke. (New Orleans Medical and Surgical Journal for March, 1854.) About the 1st of August, four colored persons, being a portion of a family who had left Washington for New Orleans about a year before, and who had lost three of their family in the latter city of the epidemic, returned to Washington. They stopped at the house of some acquaintances, where one of them had the fever. They had brought their baggage with them, and a trunk remained unopened for some days, and it was at length determined to open it and ventilate its contents. The man who opened it complained of an offensive smell which arose from it, and the things were taken into a yard behind the store. Here a man by the name of Miller spent some time in examining the goods or clothes in the trunk. This man, the proprietor of the store, and the clerk who opened the trunk, were all taken with fever within a few days. The next case was a colored man in the next house. Then some persons in the house where the person from New Orleans had been sick were taken and there were seven cases in this house. Next a

Mrs. King, who lived at a distance, visited the sick, and she was taken, and her death was followed by the sickness of every person in her house. And so the disease spread until there were upward of two hundred cases in this small village. Commenting on these facts, Dr. Cooke remarks:

As far as I have been able to learn, no doubt exists this year that this fever has been transmitted, directly or indirectly, from New Orleans to *every place* in which it has prevailed as an epidemic, and I believe that the opponents of the importation of it into New Orleans must admit that there was this year at least a remarkable coincidence between the actual importation of the morbid principle and the actual occurrence of the disease, and it may be here remarked, inasmuch as in hundreds of certified instances which have occurred from year to year up to this time all over the country, and embracing also New Orleans, this pestilence can be legitimately referred to an imported cause; that, in the absence of overt acts proving its importation, a strong probability of this importation should be regarded as satisfactory as if proof positive existed. In the country towns the fact of importation can be, and is always, verified, and another admitted fact, indeed a necessary consequence of the preceding one, is that it never prevails in the towns unless it previously exists as an epidemic in New Orleans.

On the subject of the value of this testimony from the small towns Faget says, (*Deuxième lettre à la Société médicale de la Nouvelle-Orléans*, p. 3:)

Dans les grandes villes les faits de cette nature sont enveloppés de complications inextricables, et il est extrêmement difficile, presque impossible, de savoir à leur sujet toute la vérité, et rien que la vérité même à l'aide d'enquêtes consciencieuses et sévères; dans les petites localités, au contraire, les faits se présentent avec plus de simplicité, et sans trop d'efforts il est possible de les approfondir assez pour que rien d'important n'échappe aux investigations. (See, also, *Williams on Yellow Fever at Rodney, Mississippi*, 1847, *New Orleans Medical Journal*, vol. 5, p. 217.)

There was a mild epidemic in 1854, of which I have not come across any details, but after this the disease did not prevail epidemically until 1858.

On the 8th of May of that year the ship *Elizabeth Ellen* left Saint Thomas for New Orleans. She had been two months in Saint Thomas, where the fever was at the time prevailing. She had a number of cases and one death among her crew on the passage. Arrived at the quarantine on the 4th of June. She was fumigated, and authorized to proceed to New Orleans the same day, and reached pier 23, where, at the same time, was lying the ship *Independence*, from New York, but which had been for several months in port. In the immediate vicinity were two other New York ships, the *Trumbull* and the *F. B. Cutting*, both of whom had been a long time in port. Six days after the arrival of the *Elizabeth Ellen*, *i. e.*, June 10, a young lady named Eustis, daughter of the captain of the *Independence*, (who had his family living on board) was taken sick and died with the yellow fever on the 22d. On the 14th her brother was taken sick, and died on the 20th, and a few days later a nephew of Captain Eustis. On the 27th Thomas Mervin, a sailor on the *Independence*, was taken to hospital, and died on the 7th of July. About this same time Captain Smith, of the *Trumbull*, Captain Lyons, of the *Cutting*, his mate, and his daughter were taken; the two first died. Two sailors were admitted from the *Cutting* into hospital early in July, and there were other cases from other vessels subsequently. While these events were transpiring, a Captain Healey, who had assisted Captain Lyons and his mate to transfer the body of young Eustis from an ordinary coffin to a wooden one, was taken ill, and died on his way north up the river. Dr. Delery, in his "*Précis historiques de la fièvre jaune*," reports that he attended on the 16th of June a young Irish girl, Catharine Maxwell, under circumstances which precluded the idea of any connection with the other cases. She died on the 20th.

Between the 25th of June and the 2d of July, four Italians died in Charity Hospital of yellow fever. They were all from the bark *Rosalie*, of Palermo, that was located at post No. 21, second district. At the same wharf was a ship recently arrived from Rio, and at a neighboring one was one from Havana. Such was the origin of this epidemic as narrated by Dr. Chaillé in the *New Orleans Medical and Surgical Journal* for November, 1859, and which I have quoted from Delery's "Précis historiques," not having Chaillé's original memoir at hand. It is proper to add that Dr. Moses M. Dowler, in an elaborate review of the testimony in reference to the Elizabeth Ellen, (*New Orleans Medical and Surgical Journal*, July, 1859,) considers the evidence entirely insufficient to convict that vessel of having been the origin of the epidemic, but ascribes it to the usual local causes by the argument ordinarily advanced by the non-believers in the importation of the disease.

After 1858 there was no epidemic until 1867. A rigid quarantine was established by the military authorities during the war, which, conjoined with the excellent sanitary measures undertaken by the military authorities, effectually prevented any epidemic. Dr. Fenner reports a fatal case of fever in 1862, near Saint Mary's market, (*Southern Journal of Medical Sciences*, May, 1866,) which was imported from Key West, and another case was seen in the same year, which was brought from the Bahamas, but there was no spread of the disease. (Chaillé, *Life and Death in New Orleans*, pp. 7-8.)

In 1863 there were but two deaths among citizens, but a large number of cases occurred among the vessels of our fleet anchored in the river, and several of these vessels were sent to the quarantine ground with fever on board. (Chaillé, *op. cit.*, pp. 8-9.)

In 1864 the fever broke out on the fleet anchored in the river off the city. There were about two hundred cases distributed among some twenty-five gunboats and iron-clads, whose condition is thus described by Dr. Elisha Harris :

Filthiness, crowding, excessive heat and moisture, and utter lack of ventilation and lighting, together with the stagnation of the local atmosphere of those oven-like boats, incident to anchorage in a tideless stream, constitute the leading facts relating to the infected vessels. (*Sanitary Commission Memoirs*, p. 264.)

There were, in all, one hundred and ninety-one cases in the fleet and twelve on shore, among persons employed on board and in the vicinity, and sixty-one deaths. Five deaths are also reported among citizens living in the vicinity. The cases were removed to the naval hospital in the city as fast as taken, and there does not seem to be any spread of the disease beyond its limits.

Assistant Surgeon J. J. Woodward (Report on Cholera and Yellow Fever in Army in 1867, p. 37) suggests that these vessels might have been infected from the Spanish frigate *Pizarro*, which arrived at the quarantine-station July 4, with yellow fever on board. La Roche quotes Dr. Baldwin, health-officer at that quarantine, to prove that the *Pizarro* was there in 1863 and not in 1864, and Dr. Woodward informs me that this error in date was not ascertained until after the publication of the circular referred to. Assistant Surgeon G. M. Sternberg, United States Army, informs me that (he was the secretary of the board of health at the time) he is sure several naval vessels arrived with yellow fever on board, and that the authorities endeavored to detain them at the quarantine-ground, but were unable to do so, and he is decidedly of opinion that the disease was communicated to the other gunboats in this way. This does not agree with the views of Dr. Harris, who says :

No vessel infected with yellow fever arriving by the way of the Gulf of Mexico was allowed to pass the quarantine-station, sixty-five miles from the city. (La Roche, Yellow Fever in Philadelphia in 1870.)

And adds further :

Yellow fever was unequivocally generated in a large number of filthy and unventilated gunboats and other naval vessels lying idly at anchor within a mile from the densest portion of the city. (Sanitary Commission Memoirs, p. 266.)

As I have shown elsewhere in this report, the facts are indisputable as to the development of yellow fever in the filthy holds of ships, and I see no reason to doubt the correctness of the views of Dr. Harris, even granting the truth of the alleged arrival of infected vessels, as stated by Dr. Sternberg, who spoke merely from memory and not from official documents. The facts in regard to the Virginia, one of these gunboats, which are given in detail by Faget, (Second Memoir, pp. 10-13,) would seem to settle this point conclusively.

On the 14th of October, an officer on board of this vessel was taken with yellow fever, and subsequently to this the vessel had a large number of cases on board, which were removed to the naval hospital. The vessel had cruised in the Gulf during the winter, but since spring had been at anchor in the Mississippi. Now, this vessel, up to the year 1863, had been a slaver, and had landed a cargo of negroes on the coast of Cuba in that year. Shortly after she was captured by one of our gunboats off the coast of Mexico, and taken into Key West, and thence to New York, where she was converted into a gunboat. The bottom of her hold was thoroughly cleansed, but her hull was iron, *with double walls*, and this interspace between the two walls being inaccessible, was never cleansed. There was communication between this interspace and the hold, and as a consequence, when she was taken from dock and went to sea, the bilge-water became so foul from impurities that the pumps could not be used. She, however, remained a healthy-ship until the fall of 1864. In September she was hauled in to the bank of the river for repairs, and her hold pumped out dry and cleaned. In consequence the impurities between the walls, which before had been to some extent covered by the water, became exposed to the air, and thus spread what might well be a source of infection throughout the ship.

The year 1867 was remarked by another wide-spread epidemic, extending over a large extent of country, and although not as fatal as those of 1839 and 1853, yet the disease was probably more generally prevalent than had been known at any previous period. The whole southern country was peculiarly adapted to receive the seeds of the disease. The population of all the large cities had been enormously increased by the mastering out of troops, large numbers of whom had remained at the South to seek their fortunes. Consequently the ratio of unacclimated persons to the total population was greater than had ever been known before. Moreover, the political condition of the country was very unsettled. There was still a military occupation of the South, and municipal regulations were in many cases divided between the military and civil authorities, and as a consequence the latter did nothing to improve the sanitary condition of the towns, which, if possible, was worse than had ever been known before. About the 1st of June there arrived at New Orleans about five hundred of the disbanded "imperial army" of Mexico, ragged, filthy, and poverty-stricken, and with the seeds of disease about their persons; in fact, the fever broke out among them on their subsequent voyage to New York. The fever prevailed very early and with severity in both Havana and Vera Cruz. There was no attempt at an efficient quarantine, and large num-

bers of infected ships arrived from various ports. The first case of yellow fever reported was a man named John Cowarts, a seaman, who died in Charity Hospital, June 10th. This man had been working for some time in the hold of the bark Bessie, which had arrived from Havana on the 22d of April, and had been since that time in the dry-dock at Algiers for repairs. This man was admitted to Charity Hospital from 261 Circus street, where there were subsequently a number of cases. A case terminating in recovery was reported in Saint Charles street, near Julia, on the 13th, and a third on Julia, who died on the 23d. The fourth case was John Bonaman, a stock-raiser, who arrived from Texas on the steamer Hewes on the 21st of June. This man came from Indianola, and while there had seen and handled some infected blankets exposed for sale in an auction-store. (I have given the full history of these blankets in describing the epidemic at Indianola.) On the passage this man was taken sick, and on arrival went to the Texas Hotel, near the stock-landing, where he died of black vomit on the 26th.

The next case died at the Charity Hospital on the 29th, and was a man who had been employed among the shipping in Algiers.

On the 30th, Lieutenant Orville Dewey, Fourth Cavalry, died at the St. Charles Hotel. He came from Indianola a few days before, and while there had slept in the same room at the Magnolia House where the infected blankets before spoken of were stored. The next series of cases occurred on the bark Florence Peters. This vessel left Havana on the 3d of June, arrived at the Southwest Pass on the 13th, and tied up at Algiers on the 23d. On the way up the river, Mrs. Hooper, wife of the captain, was taken sick, and on arrival, Doctor Francis Barnes, who saw the case in consultation, pronounced it yellow fever. She died on the 30th of uremia. On the 25th, two days after the bark arrived, a young lady aged seventeen, sister of the last patient, was taken ill, and the case presented decided symptoms of yellow fever. She recovered. On the 26th the child of the captain was taken, and on the 29th the mate, both of whom recovered. Next the second mate was taken, and died at Charity Hospital on the 8th of July with black vomit. On the 12th of July the captain died, and on the 25th a man by the name of Seth Yorke, who resided in New Orleans, and had been frequently on the vessel in search of employment. While these cases were occurring several persons died at the Texas Hotel, near the stock-landing, where the man Bonaman, from Indianola, had died on the 26th.

In the mean time, the fright of the people of Texas had been so great that many of them had fled in all directions, and in this manner the disease was carried to New Iberia, on the Teche. On the 12th of August, Doctor George W. Shields died at 220 Common street, having just come from New Iberia. Several other cases occurred soon after in this house. By this time cases multiplied so rapidly in town that it was impossible to trace them out. It became epidemic in the city about September 1, reached its maximum on the 25th, and thence gradually declined until about the middle of November, when it entirely disappeared. The number of deaths was over three thousand; the number of cases in the city variously estimated; probably over forty thousand were sick.

As in previous epidemics, the disease was carried to all the towns on the Mississippi and Red Rivers, to Jackson, Mississippi, Mobile, Alabama, and other places. In all of these there was the most positive proof of its introduction by the steamboats, or by passengers on the railways.

There has been no epidemic of any consequence since 1867. In 1870

it prevailed more or less in the filthy localities near the French market, and in 1871 in the vicinity of the Magazine market.

The first case in 1870 was a man by the name of Dinslow, who was an officer on the steamer *Agnes*, which arrived from Honduras on the 16th of May. He was taken sick on the 26th, and died on the 2d of June. There were no other cases in the vicinity of where he died during the year. The next case was a woman named Dumfeu, who died on the 19th of August at 285 Old Levee street. The same day a case was reported of a Swede, about a block from this last house. The next case was a German girl named Lena Richs, from this same vicinity, who died at Charity Hospital, of black vomit, on the 24th. On the 26th a man by the name of Craig, from corner of Old Levee and Toulouse streets, died at Charity Hospital. This man had left Havana on the 17th of August, stopped in Mobile on the 20th, and arrived in New Orleans on the 21st, and was sent to hospital sick on the 22d. After this a number of Italians were sick in this neighborhood, and the disease continued to spread in the vicinity of the French market.

The next cases occurred in the first district of the city, the first one being an Italian from the French market, where the disease was then prevailing. He died September 6 at 186 Dryades street. The next day two cases were reported of Italians at 481 Rampart street. From these two foci of infection, viz, the vicinity of the French market and the locality last mentioned, the disease spread over radii of several squares, but at no time comprehended the whole city. Undoubtedly the vigilant measures of disinfection inaugurated by the board of health had much to do with its circumscription within such narrow limits. The epidemic continued until early in December, causing five hundred and eighty-seven deaths. (Report of New Orleans Board of Health for 1871.)

In 1871 the first case was a flat-boat man named Charles Collingwood, who died on the 4th of August at Charity Hospital. This was a dissipated, horseless vagrant, who had been in the habit of sleeping about the wharves, and who for four nights had slept on the bark *Mary Pratt*, which had recently arrived from Cienfuegos with sugar, and was then discharging her cargo. All of her crew had been discharged, and only one man slept on board, and the stevedores who were discharging her were acclimated. The vessel was immediately sent to the quarantine-ground, where she was disinfected and fumigated, and on August 13 she returned to the city and laid up at the foot of Terpsichore street. "August 23 George M. Moursé was employed as steward, and began work on the *Mary Pratt*, cleaning up her cabin, reported to be in a very filthy state; but was taken sick with yellow fever on the 29th, and died at the Hôtel-Dieu September 5. The vessel was again taken in charge by the sanitary inspector of the first district, thoroughly fumigated for a number of days, and no unacclimated persons allowed on board."

The next case traced to this vessel was John Hock, a sailor living at 433 Tchoupitoulas street, less than two blocks from where lay the *Mary Pratt*. This man had been in the habit of walking down on the levee every evening, and unquestionably contracted the contagion from the infected ship, although the board of health very singularly state, "No exposure to any infected place could be ascertained." He died on the 5th of September.

Before this time—August 15—John M. Rawlins, a custom-house inspector, was attacked, and died on the 20th, at 118 Washington street. This man had been sent August 11 to the mouth of the river to take charge of the brig *Hope*, just arrived from Havana without any sickness on board. This vessel was detained at the quarantine-station two days.

During this time her hatches were opened, a portion of her cargo removed, and the ship fumigated. Rawlins, although cautioned of the danger, slept during this time in a hammock on deck in the immediate vicinity of the open hatches. Two days afterward he was taken sick. On the 7th of September Mr. E. W. Pierce, a member of the board of health, was taken sick, and died on the 13th. He lived at 136 Fourth street, distant about a hundred yards from the residence of the last case, across a block of buildings, with a cottage intervening between the two houses, and with the prevailing winds blowing from the direction of Rawlins's house toward that of Pierce. It was subsequently ascertained that two children were sick with the fever in the intervening cottage. From this time cases rapidly increased in this locality, and "by the 14th of October there had been twenty-seven unmistakable cases within a circle of a radius of one hundred and fifty feet, taking the house of Mr. Rawlins as a center." Cases continued to occur, chiefly in this vicinity, until the last of October—the total being one hundred and fourteen, of which fifty-five died. (Reports of the New Orleans Board of Health for 1871 and 1872.)

Before closing this subject it may be proper to mention that in 1870 yellow fever prevailed at New Iberia and various other places along the Teche, which was clearly traceable to infection from a number of returned confederates who had been brought back from South America.

It is proper to state that one great cause assigned by those who believe the disease to be epidemic in New Orleans has been the constant excavations made in the soil of the city and neighborhood for public works. The more important of these have been as follows:

From 1794 to 1797 the great canal Carondelet, connecting the waters of Lake Ponchartrain with the city, was dug.

In 1817 the commencing of the paving of the streets was undertaken—a work which was continued from 1824 to 1832, during which years a large portion of the soil of the city was upturned and exposed to the sun.

From 1832 to 1835 the canal of the Bank was dug. It was said from six to seven thousand laborers on this work lost their lives from malarious fevers.

In 1836 the work of dredging out the canal Carondelet and of draining and ditching the swamp in its neighborhood.

From 1835 to 1839 the forest growth on the swamp in the vicinity of the city was cut down and removed.

From 1845 to 1850 the section of swamp between the two canals was ditched and drained, and other canals dug. (Fenner's *Southern Medical Reports*, vol. 2, p. 134.)

The following account of the epidemics of Natchez and its vicinity is condensed from Monette's essay on the subject and the writings of Perlee, Cartwright, and others, in the various medical journals. They may properly be added to this report as showing the importance of guarding those interior towns which have communication with New Orleans, whenever yellow fever is prevalent in that city. The history of Natchez in reference to yellow fever does not differ materially from that of all the other places located on the Red and Mississippi Rivers, and I have selected it as a specimen, because, thanks to the industry of Monette and Cartwright, the history of the epidemic there is very complete.

Prior to the year 1817, the commerce of the Mississippi had been entirely carried on in flat-boats and barges. In that year steamboats were first used, and intercourse between the different towns on the river became, in consequence, much easier. Yellow fever, as we have seen,

prevailed in New Orleans as early as the 30th of June; but, with the exception of sporadic cases, in previous years, had never been in Natchez. Early in September the steamer Washington arrived from New Orleans, having several persons sick on board with yellow fever. Some of these were landed. Besides this, a number of young men who went on board to see the steamer, then a great curiosity, took the disease and died. From these two starting-points the disease spread with unexampled malignity over the city, and by the 28th of September was declared epidemic. The circumstances favorable to its propagation were stagnant pools throughout the city and great filth, and above all the exposure of a large quantity of fresh earth, in excavating, so as to correct the grade of some of the streets. Many of the inhabitants fled to the surrounding country; but the disease continued to prevail until one hundred and thirty-four had died, up to the 9th of November, when frost occurred and put an end to it.

In 1819, as we have seen, the fever broke out in New Orleans about the middle of August. By this time steamboats had become so common as to excite no unusual attention, and it is, consequently, not surprising that we cannot trace the introduction of the disease in Natchez to any particular boat; nevertheless it appeared there about the 1st of September, became epidemic by the 14th, and continued to prevail until December, when, of a total population of only five hundred and sixty-eight, one hundred and eighty had fallen victims to it. This year, as in 1817, it was very wet; but the thermometer did not indicate a higher grade of temperature than usual.

In 1823 yellow fever became epidemic in New Orleans early in August, having prevailed more or less for a month previous. It made its appearance in Natchez about the 10th of August, and was considered epidemic by the 20th. Large numbers of the inhabitants fled to the country. For a month the disease prevailed with violence, when the equinoctial gales occurring arrested its course for a week or two, when it broke out again and raged until frost. The population of the city was about one thousand, not counting the runaways, and over three hundred died. The weather was very sultry, with frequent showers. Numbers of cases occurred in small places in the vicinity of Coonville, to which refugees had fled. The local causes were alleged by Dr. Cartwright to be the deposition of carcasses of animals on the outskirts of the city, and to some spoiled bacon and fish at a certain store house in the city, and he ascribed the entire origin of the disease to these nuisances. (Cartwright, Medical Recorder, vol. 9, p. 5.)

On this point Monette remarks:

These, however, we think were only contingent circumstances, which have often occurred to the same extent in previous years, and other epidemics have since prevailed, when all these circumstances did not exist; indeed, when those which have been considered most essential were entirely wanting.

In 1825 the first cases were near the steamboat-landing, "under the hill." The persons were those whose occupations would lead them to have frequent access to passing boats. This was about the 20th of August, when the fever had been for several weeks in New Orleans. It was confined for two weeks to the town "under the hill," when cases began to appear in the upper town, clearly traceable to sick persons who had been brought from below to their residences. On the 29th of August the board of health pronounced an epidemic condition of the city, when, as usual, all those who could get away ran away. Many of these went to Washington, a small town six miles distant, in a clean and elevated locality, carrying their bedding and goods with them. Some of

these were infected, and there were over eight deaths among them, when citizens of Washington began to sicken, and an epidemic prevailed there until sixty died. Monette says:

The first citizens of Washington were my patients, and their infection could be traced clearly to opening and handling those bales of blankets and other goods brought from New Orleans and Natchez. The disease was imported into Washington as surely as it was into Coonville in 1823. (Monette, *op. cit.*, p. 68.)

In Natchez, the epidemic continued until a frost, the 1st of November, and caused about one hundred and fifty deaths.

As usual, the epidemic was ascribed to putrid bacon, excavations, local filth, &c.; but Monette says:

These causes had no agency whatever in producing the epidemic, and we have shown already that such causes are harmless as generators of yellow-fever miasin. We assert, without fear of successful refutation, that whenever these circumstances have synchronized with a yellow-fever epidemic they were only incidental circumstances, and not in any manner essential to its existence. (*Op. cit.*, p. 69.)

In 1829 there was a mild epidemic, causing about ninety deaths. It broke out about the 1st of September, some weeks subsequent to its appearance in New Orleans, and prevailed until about the middle of November. It was ascribed to the same cause as the others. There was constant communication with New Orleans by steamboat.

The disease did not appear again in Natchez until 1837, when it broke out about the 8th of September, subsequent, as usual, to its appearance in New Orleans. Cases had been landed "in a moribund state from steamboats, direct from New Orleans." It prevailed until November 25, and caused two hundred and eighty deaths. The cause of this epidemic was unquestionable. By an act of the legislature, the Natchez hospital, which had been closed for several years, was re-opened for the reception of indigent sick. "It was in full operation when the yellow fever broke out in New Orleans, and scarcely a day passed without the reception of one or more patients from ascending boats, after the 1st of June; and after the 1st of August, nearly all of these were yellow-fever cases." "As a general remark, there has never been yellow fever in Natchez, unless when the hospital was open for the reception of indigent boatmen and others from the river."

In 1839 the yellow fever, as we have already mentioned, broke out in New Orleans as early as June, and was decidedly epidemic by the middle of August. During the earlier part of this season, Natchez was unusually healthy. The weather was dry and sultry. For a month after the appearance of the disease in New Orleans, there were daily arrivals of steamers from that place, and large shipments to Natchez of cotton and woolen goods, provisions, &c., for the use of the planters. There had also been several arrivals of parties of foreign emigrants, who lived crowded together in filthy, ill-ventilated houses. Moreover, during all this period there were quite a number of persons sick with the yellow fever, transferred from passing boats to the Natchez hospital; there were twenty deaths from this source alone up to the 20th of September. Some of the Natchez people had also visited New Orleans, and been taken sick on their return. About the middle of September the disease began to spread near the steamboat-landing, and soon after at the two hotels, both of which were crowded with refugees from New Orleans. It soon became epidemic, and by the middle of November, when it ceased, had killed two hundred and thirty-five persons. This year the authorities of the village of Washington established a quarantine against Natchez, and not a case occurred in their town. Natchez this year was unusually cleanly.

The city authorities, from the frequent statements made that the sole cause of the fever was the filthy condition of the city, had caused the whole town to be thoroughly cleansed and limed.

In 1841 yellow fever again prevailed at New Orleans, but the inhabitants of Natchez, warned by the fearful epidemic of preceding years, closed their hospital, and refused to permit any boats to land, and this year, for the only time in their history, they entirely escaped.

Vicksburgh, one hundred miles further up the river, placed "no restrictions on commerce," and suffered severely. Grand Gulf, Louisiana, which had frequently suffered before this year, followed the example of Natchez in prohibiting all intercourse with New Orleans, and escaped with but two cases.

The quarantine thus established at Natchez was kept up rigidly every season that there was any disease in New Orleans, and, as a consequence, the city continued free from yellow fever until 1853. In that dreadful year of pestilence, however, a number of persons arrived from New Orleans, and were taken sick before the quarantine was established for the season. (Graham: Yellow Fever, its Causes and Consequences. p. 14.) From these cases the fever became epidemic in Natchez about the middle of August. It was singular that the little town of Vidalia, Louisiana, directly across the river, became infected this year for the first time. Monette calls attention to the remarkable exemption of this town when Natchez was so frequently visited, and shows conclusively that it was due to the fact that the steamboats from New Orleans never landed there, but always made their landings at Natchez. Both towns were situated in precisely similar topographical conditions, with the same climate. One was frequently, nay, daily, visited by steamers from an infected port; the other, never. Result: the former had frequent epidemics, the latter none. This year, however, 1853, a sick woman was transferred from the Natchez quarantine to Vidalia, and soon after a family, with several sick, crossed from Natchez. In a very short time the disease became epidemic in the village.

The first case in Natchez in 1853 was on the 17th of July, in the person of a Mr. Pearsall, who died at the hotel shortly after his arrival from New Orleans. It was followed by several others in the same house. The next cases were of persons who fled from New Orleans. (Dr. Davis in Barton's Report, Epidemic of 1853.) I have said that the disease was absent from Natchez until the year 1853. Since writing the above I have come across an account of an epidemic in 1848, about which the physicians differed much, some calling it dengue, and others yellow fever. It was certainly very mild in its character; commenced about the middle of June in the district under the hill, and lasted until November. There was so much dispute on the subject that it hardly seems worth while to refer more definitely to it. This, though a very imperfect sketch, completes what I have thought proper to record of the visitations of yellow-fever to New Orleans and along the Mississippi Valley. The disease has frequently appeared in the places along the Gulf coast between New Orleans and Mobile, but except at Biloxi in 1702, never, without it was first epidemic, in either New Orleans or Mobile. An examination of the chronology of the yellow fever by Drake (op. cit., pp. 190, 191) will show the truth of this statement.

Galveston and other places in Texas.—Galveston is built on the west side of Galveston Island, the town now extending from its original location on the west bay, across the island, to the Gulf shore. The island is composed of shingle, and so saturated with water that it is found at a depth of but a few inches from the surface. A large portion of the

city is but a foot or two above the surface of the Gulf, and the highest elevation not more than four or five feet. The streets are wide, and, except in the business portion of the town, the houses usually separated from each other by a considerable space. Originally, along what is now Market and Mechanic streets (the second and third streets from the Gulf) existed a long morass, which was overflowed by the tide. In course of time this was filled in by the dirt and offal of the city, and now constitutes the most densely-populated portion of the town. Here, many of the houses are old; the inhabitants poor and dirty; the privies and cess-pools uncleaned; and everything exists favorable to a development of yellow fever. It is in this locality that nearly every epidemic of yellow fever has first made its appearance; or, if not commencing here, has prevailed with greater violence than in other portions of the city. In the rear of the city is Hitchcock's Bayou, a morass like the one before spoken of, extending into the heart of the city, and washed by the tide, which, when it is out, leaves great masses of putrifying materials exposed to the action of the sun. There are now many houses built in the vicinity of this bayou.

The mean temperature of Galveston is about as follows: In the hottest seasons, the mercury seldom rises above 90° ; the mean temperature for the year being about 74° . Heavy rains usually occur in April, May, and June, while the latter part of the year is dry, and subject to north and northwest winds, which often cause sudden falls of temperature, producing great discomfort. (Heard, Medical Topography of Texas.)

Until the epidemic of 1867, the sanitary condition of Galveston was very bad; especially at the close of the war (when large numbers of negroes rushed there from all over the State, and lived crowded together in filthy houses, and reeking with dirt) its condition was as bad as could be. Latterly, however, under its present efficient mayor and health-officer, great attention has been paid to inspecting and removing nuisances, and now it will compare favorably with most any southern city.

The first visit of yellow fever to Galveston was in 1839. At this time the city had been settled but a few years, and the inhabitants were mostly located on a street called the Strand, running along the west side of the bay, and in immediate contiguity to the wharves for shipping. The population was about one thousand. Toward the last of September a steamer arrived from New Orleans, having a case of yellow fever on board, who died of black vomit four days afterward. The same day or the day following her arrival, the cook of a vessel anchored a few yards from the steamer took sick, and died on the 2d of October with black vomit. About the same time a Mr. Tichenor, living on the corner of Strand and Twenty-second streets, was taken sick, and the day following a Mr. Lang. Two other cases occurred between the 27th and 30th, and the disease soon became epidemic, lasting until the 7th of November, during which time there were two hundred and fifty deaths. Such is substantially the account given by Dr. Ashbell Smith, (although he makes no mention of the arrival of any steamer before the occurrence of the first case.) (Account of Yellow Fever in Galveston, Texas, in 1839, pp. 7, 8.) But the Hon. Hamilton Stuart, of Galveston, informed me that the universal opinion at the time was that the New Orleans steamer introduced the disease, but he differs in his dates from Dr. Smith, placing the first cases as early as the 20th of September; the latter placing the arrival of the steamer on the 27th, the day before the three first cases occurred. Unless, therefore, we allow for a shorter period of incubation than has been generally regarded in this disease, the question of importation must remain a matter of doubt; but it is not

improbable that the universal sentiment of the population at the time was the correct one, and that the apparent discrepancy grows out of some error in dates.

The yellow fever prevailed this year, for the first time, in Houston, and was supposed to have been imported from New Orleans. (Dr. William McCraven on Yellow Fever, in Houston, New Orleans Journal of Medicine, vol. 5, pp. 231, 232.)

In 1842 a few cases of fever occurred. The season had been unusually rainy, with a high range of temperature, yet the disease showed no disposition to become epidemic. I have not been able to learn any facts in regard to the origin of the few cases that did occur.

In the latter part of June, 1844, the United States steamer Poinsett, *en route* from Vera Cruz to Pensacola, touched at Galveston for supplies. She had on board a number of persons belonging to the unfortunate Santa Fé expedition, who had recently been released from a long imprisonment in Mexico. Two of these were landed at Galveston sick, and on the 5th of July one of them died, on the Strand, at a sailors' boarding-house, as was supposed, of bilious remittent. A comrade of his, who lived with a boot and shoe dealer, persuaded the latter to go with him and lay out the deceased. In a few days the shoemaker sickened and died, and other cases succeeded in the house of the latter and in the surrounding neighborhood. Meanwhile the other sick man, from the Poinsett, had been taken to another boarding-house, and this, likewise, became a focus for the spread of the disease, several cases having been taken in that house and the neighborhood. Still the disease was not recognized to be yellow fever until about the 10th of July, when a man by the name of Street, who lived directly opposite to the boarding-house where the first case occurred, was taken sick. He was seen by a physician from Florida, who had extensive experience with yellow fever, and he pronounced it to be that disease, and that evening Street died of black vomit. The Washington Hotel, in the immediate vicinity, now became infected, and many cases occurred there. It next spread from the Strand among the shipping along the wharves, where it was especially fatal. By the 20th of July it had become generally epidemic all over town, and raged with great violence for about six weeks, when it ceased suddenly, simply for want of material to feed upon. It was noticed, however, that any unacclimated person who came into the infected district between the period of the cessation of the epidemic and the access of frost took the disease. Mr. A. Ball, of Galveston, from whom I derived much valuable information as to these visits of yellow fever, furnished me with some curious instances of the recurrence of the disease, in isolated cases, long after the epidemic had ceased. Some weeks after the last death occurred in the city, the wife of Mr. Gail Borden, who lived some distance from the infected district, and who had not been near it during the prevalence of the epidemic, came up to town to do some shopping. She remained all day in town visiting various stores, and at night returned to her house, where, in a few days, she was taken sick, and died of black vomit. About four weeks after this, there having been no cases in the city in the mean time, a Mexican woman, who lived some miles down the island, came up to market, and she likewise went home and died of yellow fever; and some six weeks later, just before the access of frost, another lady, who had been absent from the city throughout the whole epidemic, returned to the city, and very shortly died. The population of the city, at this time, was about four thousand, and the number of deaths not far from four hundred. The earlier part of this season had been wet and hot, but, during the prevalence of the fever, a peculiar

balminess of the air was noticed, with fine breezes from the Gulf, and cool, clear nights.

From Galveston the disease was carried to Houston; the first case occurring on the 10th of July, in a person who had just arrived from that place. Other cases came from there in July, and in the latter part of the month cases began to multiply in Houston, and by August 15th it was epidemic, and prevailed until some time in September. (McCraven, *op. cit.*, p. 232.)

In 1847 the disease re-appeared, but not until very late; the first case being a man living on Hitchcock's Bayou, back of the town, who, it was asserted, had been employed in unloading vessels from New Orleans. The fever was declared epidemic October 11, and ceased about November 25. The population was four thousand seven hundred and fifty-eight, and the number of deaths about two hundred. There was much dispute about the origin of this epidemic, and the question is still an undecided one. The Mexican war was then prevailing, and there was an unusual amount of commerce on the Gulf, especially from Vera Cruz, where the vomito had raged all summer. The Galveston Civilian of October 4, 1847, says: "We have had arrivals every week during the summer of vessels from infected ports, with diseased persons on board in some cases."

The city was now free from visits of yellow fever for six years. On the 12th of August, 1853, the steamer Mexico arrived from New Orleans, with three of her crew sick with yellow fever. They were sent to the hospital, and all died. Within a few days five cases occurred among the patients sick with other diseases in the hospital, and an epidemic followed, which carried off five hundred and thirty-five persons out of a population of eight thousand. The last death was on the 28th of November.

In 1854, it again appeared: the first case being on the 8th of August, on a vessel in the harbor. By the 12th, four cases had been brought to hospital from among the sailors and laborers on the docks, and the disease soon became epidemic, there being four hundred and four deaths up to its cessation on the 5th of November.

In 1858, the disease prevailed in New Orleans, and in the early part of August, a milliner in Tremont street, near Market, received some trunks of goods from that city. These were opened and handled by a young English woman employed in the store, who was taken sick, and died in a few days, with well-marked symptoms of yellow fever. Very soon after, a man who lived directly opposite, on the same street, took the fever and died, and within a week, a young man by the name of Hanna, living a few houses farther down on the same block, (and who, it was said, had visited the English girl when sick,) died of black vomit. The fever became generally epidemic by the 28th of August, and raged until some time in November, causing three hundred and seventy-three deaths out of a population of about ten thousand.

The next year, 1859, it re-appeared, was declared epidemic on the 17th of September, and lasted until November 30. There were one hundred and eighty-two deaths, the population being about the same as last year.

In the early part of the recent war the blockade was very strict at Galveston, and, as a result, her commerce was almost entirely cut off, the blockade-runners seeking Sabine and other smaller places in preference. As a consequence, there was no yellow fever at Galveston for several years; but in 1862 it was introduced, by means of a blockade-runner, at Sabine, and was thence carried to Houston, when an epidemic

of a mild character resulted. (Heard on Epidemic Diseases of Texas, p. 14.) It was also introduced this year into Matagorda, where, out of a population of five hundred, there were two hundred and fifty cases and one hundred and twenty deaths. (Harris, United States Sanitary Commission Memoirs, p. 240.)

In 1864 blockade running was carried on to a considerable extent at Galveston, as many as five vessels from Havana being in port at one time. Dr. Hanna, of Galveston, told me that the disease was introduced this year by a schooner from Tampico, who ran the blockade at San Luis Pass and came up the back bay, where she was visited by a young boy, who soon after died of yellow fever, this being the first case; but I have not been able to learn the name of this schooner or the date of her arrival, and am more inclined to consider the general impression the correct one, that the Havana blockade-runners brought the disease. It became epidemic by the 1st of September, and there were two hundred and fifty-two deaths out of a population of five thousand five hundred. The interesting fact in reference to this epidemic was the total immunity of the troops in the forts around the city, in consequence of a quarantine established by them. There were then four forts in the vicinity of the town, each garrisoned by a large force of confederate troops. As soon as the fever became epidemic in Galveston, the officers in command of these forts declared a rigid quarantine against the city, and totally cut off all communication. Flags were placed on staffs at a quarter of a mile distance from the fort, beyond which no person was allowed to go. Every day the teamsters, mail-carriers, &c., who brought supplies and letters from the city, came out as far as the flag, where they deposited their burdens and then left; after they were well out of sight, a detail of acclimated persons from the fort went out and brought in the supplies and mails, being forbidden to hold any intercourse with any one. This was kept up until the close of the epidemic, and not a single case occurred in any of the forts. Per contra, at this time there was a confederate regiment, the Second Texas, stationed at various points in the city. The colonel of the regiment was advised to remove them, but did not do so until several cases had occurred among his men. They were then sent down the island for several miles, but the command suffered very severely.

There was no yellow fever in Galveston after this until 1867. In the spring and early summer of that year there was no quarantine, and steamers were almost daily arriving from both New Orleans and Indianola, as well as very many sailing-vessels. Yellow fever, as has been shown, commenced to prevail about the 1st of June in the latter place. The meteorological conditions at this time are thus given by Dr. S. M. Welsh, (Galveston Medical Journal, February, 1868:)

The month of May was temperate, showery, pleasant, and remarkably exempt from all febrile diseases, nor was there anything to be observed in the type of disease to foreshadow yellow fever. June, however, was a month of uninterrupted hot weather, the thermometer ranging daily from 85° to 90°, with a breezeless, close, and stifling atmosphere. Toward the close of the month, from the 20th of June to the 5th of July, a period of two weeks, there were heavy falls of rain daily, literally flooding the streets, and accompanied with unusual electrical phenomena. In the intervals the sun shone brightly and with intense heat. It should be remarked that our municipal authorities had shown, for several weeks previous to the epidemic, unusual activity in cleaning the city. Everything seemed to have been done which prudence and foresight could suggest to ward off the scourge.

On the 26th of June, the first case of yellow fever occurred in Galveston, in the person of a young German, named George H. Moeller, who had just arrived from Indianola, and who died on the 4th of July, in a

boarding-house in the lower part of the city. There was, however, a case of a man by the name of Elliot, from New Orleans, reported on the 22d of June, at the city hospital; but there seems to be some doubt as to his case, as Assistant Surgeon Samuel Adams, in his report, (Circular No. 1, 1868, Surgeon-General's Office, p. 83,) makes no mention of him, and Dr. S. M. Welsh (Galveston Medical Journal, February, 1868) speaks rather doubtfully about it. On the 30th of June, a man who had been sick with syphilis in the city hospital, since the 17th, and who had tenanted a bed next to the supposed case of Elliot, took sick, with well-marked yellow fever. On July 1, a seaman, from a vessel in the harbor, was admitted to the city hospital, and two more July 5. Soon after two cases were found in the boarding-house where Moeller died. After these cases occurred in various parts of the city, "without apparent connection with each other;" and by the end of July it was unquestionably epidemic. The disease appeared among the troops about the same time as in the city; the first case being a private soldier, who was taken July 1, and which was rapidly followed by others. The disease raged with great violence in August and September. Early in October the number of deaths commenced to lessen, probably from lack of material, and in November there were but few cases. The population of this city was estimated at fifteen thousand, and of these, eleven hundred and fifty died of yellow fever. The mean average strength of the command of troops was one hundred and fifty-five, and there were one hundred and ninety-nine cases, and ninety-seven deaths; among them, many officers of great distinction and promise; viz: General Griffin, Colonels Abert and Swartwout, Drs. Taylor, Adams, and Rowe, and others. Dr. Welsh estimates the total number of cases in the city at about eight thousand.

It was not very long, after the disease became epidemic in Galveston, before it appeared in Houston. In the second week in August, the first case occurred, being imported directly from Galveston. By the 20th of August it had become generally epidemic. The first case among the troops (at that time encamped a mile from the city) was in the person of one Hale, a teamster, who was obliged to leave camp every day and visit the city to bring out drinking-water for the camp. This was on the 7th of September. On the 12th, Colonel J. D. O'Connell, commanding the post, who was boarding at the Hutchins House, in the city, was taken sick, and died on the 16th, and cases rapidly succeeded in the camp. During the whole epidemic there were seventy-one cases and twenty-five deaths, (out of a mean average strength of seventy-two.) The city was unusually filthy and muddy in consequence of the long continued rains of May and June. The range of the thermometer was unusually high during July, August, and September. Dr. F. Hasenbarg, in his official report to the Surgeon-General, remarks:

That the first cases of yellow fever observed in Houston occurred in persons who contracted the disease in Galveston is proved beyond doubt. (Report on Yellow Fever and Cholera, pp. 93-95.)

It is to be regretted that the doctor contented himself with this bare statement without giving his proofs.

In August, a man by the name of Vorhees went from Galveston to Hempstead, along the line of railroad, fifty miles from Houston, where he died of yellow fever. Other cases soon succeeded, and one hundred and fifty-one deaths occurred between August 9 and November 26.

On the 8th of August, Captain J. A. Devine, Bureau of Refugees, Freedmen and Abandoned Lands, came from Galveston to Brenham, took sick, and died on the 13th. Within two weeks there were two other cases, and between the 11th of August and 31st of October there

were two hundred and forty-six cases and one hundred and twenty deaths. There were no cases among the garrison stationed there, though encamped in the center of the town, which Dr. Warren, the post-surgeon, ascribed to his having administered every day a table-spoonful of white mustard-seed to each of the men.

At Navasota, on the line of the Texas Central Railroad, the proofs of importation were equally positive. The first case occurred on the 12th of August in the person of a man who had been in Galveston but a few days before. This man died on the 15th, and the next cases were among some friends who had visited the corpse, two of whom died on the 24th. Out of a population of about fifteen hundred, nearly every one had the disease between this time and the 1st of December, and there were one hundred and fifty deaths. (Report of Dr. A. R. Kilpatrick in Heard's Report on Epidemic Diseases of Texas, p. 33.)

Ten miles from Navasota is Millican. On the 15th of October, an ostler, belonging to one of the hotels there, took sick, having been in Navasota a day or two before. Next, the proprietor of the hotel and his wife died with black vomit, and a panic succeeding, nearly the whole population absconded. In all there were fifteen cases and four deaths. (Report of Dr. N. A. East, Heard, *op. cit.*)

At Chapel Hill, on the Washington County Railroad, a young lady, on the 6th of August, received a box of dress-goods from Houston, which she handled freely, and spent some time in examining. About the same time a young man received a box of books from Galveston. Both of these contracted the fever, and were the first cases. It soon became epidemic, causing one hundred and twenty deaths before the 1st of December. (Report of Dr. B. C. Meredith, Heard, *op. cit.*)

On the 4th of September it appeared at Alleytown, on the Colorado River, the first cases being employes on the railroad, who passed daily between that place and Houston. It soon became epidemic. At La Grange it was especially malignant, the first cases occurring about the last of August in the persons of refugees from Galveston and Houston, and soon spreading to others who had communication with them, prevailing with great severity until about the 1st of November, there being about eight hundred cases and two hundred deaths out of a total population of not more than fifteen hundred. (Reports of Drs. Hicks and McCown, Heard, *op. cit.*)

The towns of Columbus, Washington, and Richmond, though favorably situated for the introduction of the disease, established a rigid quarantine, and each of them escaped entirely. Dr. Heard says, (*op. cit.*, p. 38:)

So far as I have been able to learn, the origin of yellow fever was, during the past season, in every instance, clearly traceable to infection.

The meteorological conditions in all the above-named places presented a great similarity. Heavy rains until the last day of July; a very high temperature, much above the average; and winds, varying from north to northeast, constituted the most salient features. Nearly all these towns are dirty, and no attempt is made by the authorities at keeping them clean. In several of them malarial fever of an unusually severe type had prevailed previous to the outbreak of fever.

The first case of yellow fever in Indianola was in September, 1852. In that month a Mr. Jackson arrived by steamer from New Orleans and stopped at Sloan's Hotel, where he had a well-marked attack of yellow fever, but recovered. The inmates of the house at the time were Mr. Sloan and his wife, five children, a German servant-woman, and a negro

boy. On the eighth and ninth days after Mr. Jackson's arrival the whole family were taken sick, with the exception of one of the children. The German girl went to her home, and in due season the members of her family had the disease. The negro boy (who belonged to a General Woodward) was taken home by him, and communicated the disease to all of the general's family within the next twenty days. So far as the imperfect records at my disposal show, there were no local causes operating to produce or increase the severity of this epidemic. The town is built on a sandy strip of land, almost entirely surrounded by salt-bayous, with Matagorda Bay on its eastern front. Though but very slightly elevated above the Gulf, there are no known unfavorable hygienic conditions, and the place had always been free from malarial disease. (Dr. F. E. Hughes in *Indianola Bulletin*, December 16, 1870.)

In 1853 it again appeared. There was frequent communication with New Orleans by a regular line of steamers, and the first cases were two men, Sheppard and Stanley, who were employed in receiving goods from the steamers, and consequently spent nearly all of their time on or in the vicinity of the boats. The disease spread from these cases throughout the season, and a considerable epidemic resulted.

In 1858 it again appeared, the first case being an arrival from New Orleans by steamer. "As at Galveston, this disease never appeared before its being epidemic in New Orleans, and imported from there." (Dr. J. M. Reuss, *Heard's Report on Epidemic Diseases of Texas*, p. 15.)

In 1862 (exact date not known) the steamer *General Rusk* ran the blockade and landed at Lavaca, on Matagorda Bay, from Havana. She had one sailor sick with yellow fever on her arrival. A number of soldiers visited the ship and contracted the disease, and by them it was carried to the camp at Green Lake, and subsequently to Indianola.

In 1867 occurred the most severe epidemic ever known in the history of the town, and as this was the starting-point from which the disease spread through the whole State, and even to sundry points in Louisiana, a detailed account of it will be advisable. Dr. J. M. Reuss (in *Heard's Report on Epidemic Diseases of Texas*, read before the American Medical Association in 1868) thus refers to certain local conditions that no doubt influenced the course of the epidemic:

In the rear of the town are flats, which are also parts of the town and subject to overflow. These flats, as well as the bayous in the rear, were overflowed before the occurrence of yellow fever, by fresh water, in consequence of confined rains, the water running in from the surrounding prairies. This brackish water, as well as the clearing and filling up of streets in May and early part of June, also the making of a road by the military to their camp, and throwing up a bank and digging ditches on both sides of this road, by which very offensive emanations from the ground spread by the prevailing south winds over the city, made, no doubt, the atmosphere a very good vehicle for the propagation of epidemic disease, and it required but the germ of yellow-fever miasm to inaugurate a fearful epidemic.

For many of the subjoined facts I am indebted to Dr. F. E. Hughes, the mayor of the city, and for others to the official reports of Acting Assistant Surgeon Samuel Santoire, United States Army. On the 20th of May the schooner *Marguerita* arrived from Vera Cruz, which port she left on the 11th. She had a large number of passengers, persons who had left the South at the close of the war to found a colony in Mexico, and were now returning, the colony having proved a complete failure. She had no sickness on board during her passage, or on her arrival, but yellow fever was epidemic in Vera Cruz at the time. Shortly after her arrival, the bedding, blankets, and other effects of the passengers were landed and taken to the *Magnolia Hotel*, whence, after being kept a few days, they were transferred to an auction-store to be sold. A

drayman by the name of Hunter was employed to take the things from the hotel to the auction-rooms, and in packing the blankets on the dray he was assisted by a boy-named Henry Cook, who, after the dray was loaded, got on the pile of blankets and rode to the auction-rooms. Within a few days they were both taken sick, and both died on the 24th of June with black vomit. In the mean time the deputy-collector of customs, Mr. Prouty, who had boarded the vessel on her arrival, sickened on the 10th of June. There seems to have been some doubt about this being a case of yellow fever, and the length of time between his visit to the schooner and the date of his sickness is too great to warrant the ascribing the latter event to the former. About the next cases, however, there is no such doubt. Two men from the country, named James Duke and William Andrews, who were in Indianola for the purpose of shipping cattle, seeing the blankets advertised for sale, went into the auction-rooms and handled them very freely, but noticing some stains on them, they thought them dirty, and did not purchase. They left town that evening and returned home, where the following week both sickened, and one died with black vomit, as did also a negro woman who nursed them. Other cases soon occurred in the town of persons who had handled or bought the blankets, and by the last of June it had become decidedly epidemic. "In less than a week the whole business part of the town was struck down as by lightning, there being no less than one hundred and twenty-five to one hundred and fifty cases taken during that time out of a population of less than a thousand." (Reuss.) It next attacked the troops stationed there, the first cases being of soldiers detailed on special service in town, and thence spreading to the camp about a mile distant. By the 15th of July the disease had increased in violence, and there were many deaths, and the troops were then removed to Green Lake, twenty-two miles from Indianola. After moving, two soldiers took the fever and both died, after which there were no more cases. There were twenty-four cases and fourteen deaths in the command out of a mean average strength of fifty. The epidemic seemed to have ceased shortly after the 1st of August for want of material. The total number of deaths was about seventy-five among the citizens.

The seeds of the disease were carried in various directions by persons who left Indianola soon after the outbreak. As before remarked, it was carried to Galveston by a young German named George H. Moeller, who had been traveling in Western Texas, and who passed through Indianola on the 26th of June, and died in Galveston with black vomit on the 3d of July.

To New Orleans by two cases, one, John Boerram, a stock-trader, who arrived at the Texas Hotel, near the stock-landing, from Indianola, on the 21st of June, and died on the 26th; and the other, Lieutenant Orville Dewey, United States Army, who died at the Saint Charles Hotel on the 30th of June. It is a curious fact that Lieutenant Dewey occupied the same room at the Magnolia Hotel, in Indianola, in which the bedding brought from the Marguerita had been stored.

To New Iberia, Louisiana, it was carried by two men from Indianola, as I will show in detail in describing the epidemic in that locality. It appeared at Port Lavacca, twelve miles up the bay from Indianola, on the 3d of July, became epidemic about August 1, and lasted until some time in October.

At Victoria, thirty-eight miles from Indianola, it appeared about August 1, the first cases being infected persons from Indianola. It became epidemic about the 20th of August, and raged fearfully, there

being not less than two thousand cases, and a mortality of two hundred. (Heard, *op. cit.*, p. 32.) It also extended to Goliad, a country-village twenty-eight miles from Victoria, and prevailed epidemically. Early in August it was carried to Corpus Christi, and became epidemic there, and was thence taken, by means of an ambulance loaded with passengers, to Rio Grande City, where nearly one hundred and fifty deaths occurred in a total population of about seven hundred and fifty.

Brownsville, Texas.—Fort Brown was established by our army of occupation in 1848, and the city of Brownsville grew up around it. By 1853, when the yellow fever first occurred, the population was about three thousand five hundred. The first case of fever was on the 23d of September, in the person of a citizen, but previous to this a number of cases of a malignant fever had occurred on the steamer Comanche, at the mouth of the Rio Grande, and several persons were known to have come to Brownsville from this boat. The fever gradually extended to Brownsville during the last week in September, and in the first part of October appeared in the garrison. It was very malignant in November, and was so prevalent that nearly every person suffered an attack. The last case was on the 23d of December. During the same time the disease was epidemic in Matamoras, on the Mexican side of the river. The number of cases in garrison was two hundred and forty-five, and the deaths, fifty. The number of deaths was much increased by the intemperate habits of the soldiers. (Report of Surgeon S. P. Moore, United States Army, Army Medical Statistics, 1839-55, pp. 353-357.)

In August, 1858, the schooner Johnson arrived at Brazos Santiago, Texas, from New Orleans, having had one death from yellow fever on the passage. Soon after her arrival two of her crew were taken sick, and both died with black vomit. Some cases next appeared among residents at Brazos, next at Point Isabel, and at the mouth of the Rio Grande, and on the 20th of August the steamboat Mentoria arrived at Brownsville from the above-mentioned places, having a case of fever on board. On the 22d of August, a Mexican living near the steamboat landing was taken sick, after which there were several cases in this vicinity, and by the 1st of September it became generally epidemic in town. It broke out in the garrison of Fort Brown early in September. The epidemic reached its acmé in the first week in October, after which it declined, and entirely ceased early in November. Among the troops there were ninety-two cases and forty-one deaths. (Report of Assistant Surgeon A. F. Watson, United States Army, Army Medical Statistics, 1855-'60, pp. 182-184.)

In 1867, as soon as it became known that yellow fever was prevalent on the coast, the military authorities established a rigid quarantine at Brazos Santiago, and the Mexicans at Bagdad, on their side of the river. The roads leading to Corpus Christi were also placed under military espionage. The town of Brownsville remained healthy until October 7, when a great hurricane almost destroyed both it and Matamoras, after which it began to be very unhealthy, and on the 12th of October a German died of black vomit. Other cases succeeded, and the epidemic continued with considerable severity until January 10, when it suddenly subsided immediately after a frost, having caused about two hundred and fifty deaths. *The garrison immediately adjoining the town was placed in strict quarantine, and no cases occurred there.* The first cases were two Mexicans, who were sick between the 10th and 15th of September. There were several other cases that month, and the first death occurred (as before stated) on the 7th of October, in a low boarding-house, occupied by Germans, and, at the time, containing some imperialist

soldiers, just arrived from Mexico. There were three deaths in the house before the 12th of October, all of Austrians, and during the next ninety days many others. There was some sickness in Matamoras, but not until after its appearance in Brownsville. (Report of Assistant Surgeon E. Cowles, United States Army, Circular No. 1, Surgeon-General's Office, 1868, pp. 101-104.) There is no room for doubt that the disease was brought to Brownsville by the Austrian refugees, many of whom had come from Vera Cruz and Tampico, and other towns on the coast of Mexico.

Sabine, 1863.—In the latter part of July, 1863, the blockade-runner *Victoria* arrived at Sabine from Havana. She had no sickness during the passage, but came up to her dock and commenced unloading her cargo, without any examination of the ship by the health authorities. A few days after her arrival a man and a boy, by the name of Hartley, who lived on the shore, about two hundred yards from the dock, and who had been employed on the steamer since her arrival, were taken sick and died. Soon after this a stranger in town, who lived at the dock where the steamer lay, was taken ill and died with similar symptoms. Other cases followed in the house of the man Hartley, and in two weeks seven of his family were down with the disease. At this time there was a large force of confederate troops encamped in the vicinity, in anticipation of an attack from our forces. Some of these men coming into town were taken, and, being nursed in various houses through the place, spread the disease in every direction. (At all events, the disease extended through the place until a large number of deaths occurred.) Up to this time the disease was not supposed to be yellow fever, but, the epidemic becoming so widely spread and so fatal, its true character was recognized. I have not been able to obtain any figures as to this epidemic, but it raged fearfully until about October 1, when it ceased simply for want of material, the troops having been moved away during its progress.

The sanitary condition of the town was especially bad. Probably Sabine will carry away the palm for being the filthiest hole in the United States. Used chiefly as a cattle-port for shipping the beeves of Eastern Texas to New Orleans, the street bordering on the river and in the vicinity of the wharf was almost ankle-deep in cow-manure, and never cleaned, while the houses in the vicinity are old, rickety, and the yards filled with pools of stagnant water, filthy sinks, and everything that could contaminate the air. Nevertheless, this condition of affairs had existed for years, and yellow fever had never made its appearance there before; it has existed ever since, without a second outbreak. To add to the above, this year, a man living on the shore, not far from the wharf, had constructed a levee in front of his house three or four feet high, composed of oysters which he had dredged up, and these dying gave out a most unwholesome effluvia, which no doubt intensified the local causes for the epidemic.

From Sabine the disease was carried to Beaumont, thirty miles above, and thence by rail to Houston, where it raged with great violence, as regards the number of cases, though the mortality was small. (Information furnished by Mr. Gibney, Sabine Pass.)

A review of the foregoing pages will show that the yellow fever, while not following any definite law in its visitations, has yet been more generally prevalent in some years than in others. We find certain periods in which the disease has been of frequent occurrence in many places; certain others, in which it has been absent for a long series of years. Thus, from 1699 to 1765 there were occasional epidemics in

New York, Philadelphia, and Charleston, and one at Pensacola; after which it disappeared entirely from the country until 1791, when a great series of epidemics took place, the disease extending to a great number of small towns in the vicinity of, or in constant communication with, the larger cities.

These continued almost yearly until 1807, when, with the exception of New Orleans, the cities and ports of the United States were again exempt until 1817. A third series of epidemics now occurred, lasting until 1822; after which there was no general prevalence of the fever until 1839, when the whole southern country suffered severely, yet there was no appearance of the disease north of Charleston, except a slight outbreak at Portland, Maine. From 1853 to 1856 commenced another series of epidemics, beginning at New Orleans, and along the Texas coast in 1853, and culminating at Norfolk, Virginia, in 1855, and at Fort Hamilton, New York Harbor, in 1856. The last of these periods was 1867, when again the whole Mississippi Valley and Gulf coast suffered, as well as a large portion of the State of Texas. Now, it is noteworthy, in connection with this grouping together of epidemics, that these widely-extended outbreaks are much less frequent of late than they were formerly. From 1839 to 1853 the country was comparatively exempt from the disease; and again from 1856 to 1867, if we except the years 1858 and 1862, when there were epidemics at New Orleans, Charleston, and Wilmington, North Carolina, and since 1867 the South has suffered from no general epidemic. It is also to be remarked, that in each one of these extensive epidemics the evidence is positive somewhere that the disease has been imported. Though the evidence might be defective in one place, yet it was not in another, and, moreover, in these periods the disease is known to have prevailed with violence, either in the West Indies, the coast of Mexico, or Brazil, or else there were specific causes (to be alluded to hereafter) which led to its introduction into the United States. Moreover, it will be seen that the prevalence of the disease in towns away from the coast has always been coincident or immediately subsequent to its appearance in the sea-ports having most general communication with the section of country where the disease prevailed. I am aware that a reported epidemic at Gallipolis, Ohio, in the last decade of the eighteenth century, is often quoted as an instance of a perfectly-isolated epidemic; but after carefully reading Mr. Ellicott's account, and the arguments based upon it, I am inclined to consider the evidence defective as to this disease being yellow fever at all, and the same may be said of the reported epidemic at Woodville, Mississippi, in 1844. Certainly, the report of Drs. De Valetti and Logan (*New Orleans Medical Journal*, vol. 1, p. 237) is not satisfactory on this point; and Dr. Faget, of New Orleans, after examining the subject, came to the conclusion that this outbreak was of a malignant form of paludal fever.

Another point to be noticed is, that New York and Philadelphia have been free from the disease since 1822, (except in the latter city in consequence of importation by the bark *Mandarin* in 1853,) in which year (1822) both cities established a rigorous system of quarantine, which has been kept up ever since; while previous to this time they were the most frequently visited of all the American cities.

The influence of the commercial prosperity of the country in producing epidemics of yellow fever has been ingeniously argued by Carpenter, Hume, Faget, and others. They have shown in the most conclusive manner that from the earliest period in our history, epidemics of yellow fever have occurred in a direct ratio to the amount of commercial inter-

course between our principal ports and the West Indies. Very soon after the settlement of the colonies, the importance of the commerce with the West India Islands attracted the attention of the colonial merchants, and an active trade in lumber, horses, fish, &c., was carried on. This excited the jealousy of the mother country, and a long series of acts were passed by the Imperial Parliament, commencing about the middle of the seventeenth century and ending about 1760. These, known as the "commercial monopoly," had for their object to divert the trade of the colonies from the French, Spanish, and Dutch Islands, and to turn it toward those islands owned by Great Britain. Still, in spite of these enactments, the trade flourished for many years; but after the first quarter of the eighteenth century it began to languish, and by 1765 had nearly ceased altogether. As I remarked, in writing of the epidemics of Charleston, with the cessation of this trade yellow fever disappeared from the country. The war of the Revolution followed, when, of course, we had no trade. But after the close of the war came a great demand for West India products, and a general revival of trade took place, which attained great proportions between 1790 and 1805, and it is precisely in these years that we find yellow fever most frequent in all our commercial ports. Hume shows (*Charleston Medical Journal*, vol. 15, pp. 22, 23) that in the earlier history of the West India trade with Charleston, it was carried on entirely with small schooners owned in either Charleston or the West Indies, and always manned by acclimated crews; and that, consequently, the appearance of the disease was comparatively rare; but that with the revival of trade, after the Revolution, and especially after the passage of the navigation acts of 1789 and 1792, the New York and New England merchants saw a wide field for enterprise, and vast numbers of northern vessels engaged in the traffic manned and commanded by unacclimated New Englanders, and which rarely came into port without bringing one or more cases of yellow fever. During the ante-revolutionary period the Gulf ports were not in possession of the United States and carried on but little trade, and (excepting its appearance at Mobile in 1702 and 1765, and at Pensacola in the latter year) yellow fever was unknown among them. After 1791 a considerable trade with the Spanish West Indies sprung up in New Orleans, and yellow fever arrived there for the first time in 1796. Norfolk, Virginia, which had a large West India trade, had the fever almost yearly, and Portland, Boston, and Baltimore derived theirs from the same source. In 1807 all these places became again suddenly exempt. Why? Because in that year the embargo was laid on all trade with the islands. This continued in force until 1811, and then the war with England followed, lasting until 1815, so that the West India trade was not re-established before 1817. The fever appeared in 1809 and 1811, in New Orleans, a fact easily accounted for, if we remember that her trade was almost entirely with the Spanish West Indies, and the embargo, in so far as it related to those islands, was suspended in 1809. With the renewal of commerce, after the war, came also yellow fever: at New Orleans, Charleston, Philadelphia, and other places in 1817, at Baltimore in 1818, throughout almost the whole coast in 1819, 1820, and 1821. In 1822 New York and Philadelphia perfected their system of quarantine, and they have remained free from fever ever since, except at Philadelphia, in 1853, when there was a small epidemic, owing entirely to carelessness in permitting the bark *Mandarin*, from an infected port, to come up to the city. It has been repeatedly brought to the quarantine-stations in those cities, and has spread from the stations to the surrounding country on several occasions, as witness the memorable

epidemic in 1856 at Fort Hamilton; but the cities themselves have escaped. Now, to come down to our late civil war. In 1862 the southern ports were blockaded; but Wilmington was the principal resort of the blockade-runners by reason of its convenience to Nassau. Consequently we have in 1862 one of the most destructive epidemics ever known in Wilmington. During the first two years of the war the trade of Galveston was entirely destroyed; but in 1864 blockade-runners began to enter that port, and in that year the city experienced a great epidemic. Sabine Pass is a place absolutely without any commerce whatever except of a local trading character, but when the war broke out, from its insignificance, being but slightly blockaded, it became a favorite resort for blockade-runners, and before many months the whole of Eastern Texas experienced an epidemic. New Orleans being very early captured by the National Army, her trade was not interrupted, but the military authorities established an absolute quarantine, and for the first time in its history the city was thoroughly policed and cleansed, and there was no fever there during the whole war except in 1863-'64, on the fleet, an occurrence of which I have given an explanation in another place. Charleston had the fever but once during the war, and then it was brought in by a vessel running the blockade. The close of the war witnessed not only the revival of trade throughout the South and the thronging of all the southern cities with unacclimated adventurers, but, also, in 1867, the most wide-spread epidemic known in the history of the country.

As regards the introduction of the disease by blockade-runners, they were of all vessels (with one exception, to be noted presently) the ones most likely to become infected, or to originate the disease. In the first place, their ports of departure, Nassau or Havana, were almost always infected; the vessels themselves were small, never cleansed, most horribly filthy, and during the passage, from the very necessities of their traffic, run at so high a rate of speed that firemen had been known to die of the excessive heat. As a result, heat and moisture were always present in their holds, the two most efficient factors in putrefactive decomposition, and the third, vegetable or animal *debris*, was abundantly strewn everywhere throughout the ship. Consequently, they needed only infection from the shore to become veritable pest-houses, and they carried yellow fever with them into every port they went. Faget (op. cit.) calls attention to the remarkable fact that the yellow fever has been for so many years a disease from the western side of the globe, and is entirely unknown in the Indian seas. To be sure, it was many years known as the "Mal de Siam," but it is not recorded that the disease existed there on the departure of the *Oriflamme*, and the fact that she stopped at Brazil on the passage renders it probable that she received the infection from that source. However that may have been two hundred years ago, the fact is unquestionable that for the past hundred years yellow fever is localized in the countries bordering on western, and is unknown in eastern seas, if we except, perhaps, the recent great pestilence at Mauritius, and it is a matter of great doubt whether the fearful mortality of that epidemic was occasioned by yellow fever or not. Now, the fact of its prevalence almost exclusively in the West Indies opens another and very interesting phase of the influence of trade on these visitations.

When the slave-trade was first established it was carried on under direction of the Government purchasing the negroes, and was surrounded by few of the horrors which have made it so infamous in later times. Carried on under Government inspection, the vessels were larger and

well ventilated, the food served was sufficient, some care was given to the unfortunate victims, and the whole trade partook rather of the nature of transport service. Moreover, these vessels once employed in the trade were never withdrawn from it, but after landing a cargo were properly purified and dispatched after another. In time, however, the traffic passed into the hands of private parties, who, actuated solely by the desire for gain, employed small vessels, into which the poor negroes were crowded and packed in the hold worse than any cattle, were insufficiently fed and watered, obliged to perform the offices of nature where they lay, and the vessels themselves, being never properly disinfected, furnished altogether a combination of foci the most favorable for the development of the germinal principle of the disease. Moreover, very often these slavers, having completed the voyage from Africa, took a cargo from the West Indies to Europe. In this way the fever originated at Passage in 1823, and on board the *Virginia*, at New Orleans, in 1864. Now, the appearance of the yellow fever in the West Indies, and the prosperous epoch of the slave-trade, are almost synchronous; and it was during its continuance that the most destructive epidemics have occurred in the West Indies. With the suppression of this West India traffic, through the combined activity of English and American cruisers, the slave-trade to Brazil enormously increased, and it is then, in 1849, that for the first time in a century and a half yellow fever makes its appearance in Rio Janeiro and the South American coast. Of course, it is not intended to offer this as the sole cause and origin of yellow fever—the facts elsewhere narrated forbid such a supposition—but merely to present it as one, and perhaps not the least. (Faget, *Quatrième lettre*, pp. 9, 10; Andouard, *Annales maritimes*, vol. 1, p. 289.)

This last cause is a thing of the past, and need only occupy attention for a moment as a part of the history of the disease in former years; but the operations of legitimate commerce with the West Indies are increasing every year with the increased prosperity of the country. The past shows that the dangers resulting therefrom are not imaginary. It is not at all necessary to prove that the disease is always an imported one to render precautions against its introduction either advisable or necessary. The most earnest advocates of quarantine are willing to grant that certain, nay, many epidemics have occurred in which evidence is defective to prove the fact of importation; yet because the actual vessel that brought the disease was not found, nor the connection traced between some such vessel and the first cases, it by no means follows that it did not exist. Every person who has investigated the earlier cases of an epidemic in any of the southern ports knows how very difficult it is to get at any definite facts relative to the antecedents of the sick persons. Their own condition is such that they can give no connected account of themselves, often not being seen until they are brought to the hospital in a moribund state, and those by whom they are surrounded are frequently ignorant people, in the lower walks of life, who imagine some ulterior motive in the inquiries made by the health-inspector, and either refuse to give any information at all, or else falsify the facts. Hence it follows that the testimony in favor of the local origin of an epidemic is generally of a purely negative character. The fact of importation not being proved, therefore it did not exist, and, as there is usually a convenient cow-yard, privy, burial-place, or wharf in the neighborhood which is redolent with filth and unwholesome effluvia, or uncleaned gutters, or crowded houses, or extensive excavations for building purposes, which have their share in rendering the locality unhealthy, these are considered sufficient to account for all the

phenomena, and investigation ceases just where it should have commenced. Nevertheless, granting for the present that in some epidemics the fact of importation is not proved, yet in very many more the testimony is so strong that it must carry conviction to every unprejudiced mind that yellow fever has been brought into the country in the vast majority of cases in which it has appeared here epidemically, and that it has frequently been kept out by proper precautionary measures. I shall endeavor to show, before concluding this report, that the quarantine has failed to be always effective in the United States, not from any defect in the principle involved, but from insufficiency in most of the present laws and a want of their proper administration.

EPIDEMICS IN FOREIGN COUNTRIES.

The question of the possibility of carrying the infection of yellow fever by means of ships, and its introduction into localities where it has no congenial home, is strongly illustrated by many of the visitations of the disease to other countries than our own.

A full account of such foreign epidemics would fill too large a space, and they are already so familiar to all students of the subject that only a brief allusion to them will be necessary; consequently I shall not endeavor any complete description of them, but only of a few, the history of which have been carefully investigated by others, and afford additional evidence of the portability of the disease.

Ascension Island.—Ascension is a lonely island, situated many miles from any other land; is in the South Atlantic Ocean, in latitude $7^{\circ} 56'$ south, longitude $14^{\circ} 25'$ west. On the 27th of March, 1823, the British sloop of war Bann left Sierra Leone, coast of Africa, (where yellow fever had been epidemic for some months,) for Saint Thomas, but the fever breaking out among the crew she was compelled to put into Ascension and land her sick. She arrived on the 27th of April, and by the 2d of May had buried thirty-two men, at which date Her British Majesty's ship Driver arrived at Ascension.

All intercourse between the garrison and the sick-tents of the Bann was forbidden, and as much as possible between the men of the Bann and those of the Driver. In a few days an admiralty clerk, belonging to the Driver, (sent on board the Bann to assist at a survey,) and Captain Sawmarez, and his servant, (sent to join the Bann,) were all seized with fever. About the same time the fever made its appearance among the garrison ashore, in the family of a soldier's wife who had been washing for one of the Bann. It first seized a boy, and then the woman herself, and in a few days four men belonging to the garrison were attacked. Of the crew of the Bann, consisting of about one hundred and thirty, not so many as ten escaped fever, and thirty-eight died, and on the island of Ascension, of the garrison, consisting of thirty-six souls, five only escaped fever, and seventeen died, and of about eight from the Driver, exposed to the contagion, four were seized and died. (Report of Assistant Surgeon Sinclair, Her Majesty's steamer Bann, quoted by Ferguson, London Medical Gazette, vol. 24, p. 840; Burnett's Official Report of Fever on Her Majesty's steamer Bann, pp. 3-26.)

This was the first visit of yellow fever to the island, and it did not appear again until 1837, when it was carried by the brig of war Forrester from Sierra Leone. The commanding officer of the brig died on the passage, and his wearing-apparel and other effects were sold in the garrison. Soon after the yellow fever broke out in the command, and two officers and a number of men died. (Ferguson, op. cit., pp. 840-842.)

The local circumstances which we have found so uniformly present in other epidemics were not wanting, for a large mud-pit had been filled up during the season in the vicinity of the garrison, and this had been rendered unusually filthy by remarkably heavy rains.

EPIDEMICS IN SPAIN AND OTHER PARTS OF EUROPE.

It seems to have made its first appearance in Europe in 1741, when it was said to have been introduced into Malaga by means of a trunk of goods. In 1764 it prevailed at Cadiz; some sailors from a vessel recently from America being the first attacked; next, some persons who lodged in the same house with them, and afterward those in neighboring houses. In 1800 it was again introduced into Cadiz and Seville, by several vessels from Havana, and, after causing great mortality in the city, spread over a large portion of Spain, being communicated by inhabitants fleeing from the first-named city. In 1804 it prevailed at Leghorn, under circumstances that seem to leave no doubt that it was introduced by the Spanish ship *Anna Maria*, which arrived at Leghorn on the 18th of August from Havana. She had fever on board during her passage, and endeavored to enter at Cadiz, but was prevented by the authorities, who, nevertheless, it is stated, gave the vessel a clean bill of health, with which she entered at Leghorn. Shortly after two of her crew died at an inn on shore, and ere long twelve lodgers at the inn had died of yellow fever. Meanwhile some bread had been carried on the vessel in sacks, which remained on board several days, and on being returned to the bakery were used as beds by the workmen, a number of whom took the fever and died. There were a number of other deaths of persons, whose connection was directly traced to the ship, being employed thereon as calkers, unloading cargo, &c. Some of the cargo was transported to a warehouse on shore, and the men who carried it died, and many cases occurred in the vicinity of the warehouse. In 1819 it again appeared at Cadiz, immediately after the arrival of several vessels from Havana, that had fever on board. But the most dreadful visitation of the disease ever known took place in the city of Barcelona in 1821. The disease made its appearance in Barcelonette, the port of Barcelona, immediately after the arrival of a large convoy of vessels from Havana, ten of which had yellow fever on board. The physicians of the health board seem both to have mistaken the nature of the disease and to have neglected all precautions against its spreading, and cases multiplied with great rapidity, extending from the port to the town, until, in four months, no less than seventeen thousand persons had died of the epidemic. From Barcelona the disease spread to many other towns, as far as Marseilles.

The French Academy sent a deputation of physicians to investigate the epidemic, and this is the conclusion to which they arrived:

La première apparition de la fièvre jaune à Barcelone a coïncidé avec l'arrivée de bâtimens qui venaient de lieux où règne habituellement une pareille maladie. Il paraît même que les premiers malades appartenant à deux ou trois de ces bâtimens. Quelques circonstances, dépendant des localités ou de l'état de l'atmosphère, ont pu favoriser l'invasion de la maladie, mais elles n'ont pu la faire naître; et s'il restait quelque doute à cet égard, les tristes événemens de la Tortose suffiraient pour les dissiper. Il est donc pour nous, sinon d'une évidence absolue, du moins d'une probabilité très forte que la fièvre jaune a été importée d'Amérique à Barcelone, comme elle l'a été en Espagne dans la majeure partie des épidémies antérieures. (Bally, François, Pariset, Histoire médicale de la fièvre jaune, p. 640.)

In reference to this same epidemic, Andouard remarks:

La fièvre jaune a été apportée, de la Havane à Barcelone, par les bâtimens le *Grand-Turc* et le *Saint-Joseph*, et par plusieurs autres probablement. Elle s'y est développée d'une manière insensible dès l'origine, tant dans le port qu'à Barcelonette, d'où elle est parvenue dans la ville. * * * Vainement, on chercherait dans les miasmes du port les causes de tant de désastres. (Andouard, La fièvre jaune à Barcelone, p. 325.)

Rio Janeiro.—The great epidemic at this city in the winter of 1849-50 presents some very interesting features, bearing both upon the origin of

the disease by importation and the development of it by certain local conditions; and, also, by reason of the very wide difference of opinion which existed on the part of intelligent physicians, who studied the subject impartially, as to the cause of the outbreak. Before giving an account of its introduction, a few words will be necessary on the location, and certain climatic conditions which may have influenced the course of the disease.

The city is situated in latitude $22^{\circ} 56'$ south, longitude $43^{\circ} 9'$ west, at the head of a fine bay. It is surrounded by mountains, although the ground upon which the city is built is low; the soil is partially sand and partially clay. The average temperature during the summer is from 75° to 85° , and in winter from 55° to 75° .

For some years previous to 1849 it had been noticed that there was an unusual amount of humidity in the atmosphere; it had also been noticed that the amount of electricity was very much less, thunderstorms being less frequent than usual. It had also been noticed that the ordinary miasmatic fevers of the country had been undergoing a change of type, the intermittent becoming remittent, and the remittent continued; and the latter sometimes evincing decided malignancy. The hygienic condition of the city had been for a number of years very bad. Great quantities of mud were permitted to remain in the streets; the city offal was either collected in heaps at every corner, or else spread out over a large surface to dry before removal; the drainage and sewerage were by open gutters, which constantly emitted a most offensive smell; and the portion of the city near the shipping, where the disease first appeared, was crowded with sailors' boarding-houses, which were crammed with occupants, ill-ventilated, filthy, and the inmates dissipated and degraded.

In October, 1849, yellow fever broke out in Bahia, the second commercial city of the empire. How it got there is still a matter of dispute. By some it was ascribed to the arrival of an African slaver, and by others to importation from New Orleans by an American vessel. Doctors Rossi and Vidal (*Annals of Medical Society of Montevideo, 1854*) say:

It was looked upon as proven that the fever had been imported by the American brig *Brésil*, which arrived at Bahia the 30th of September of the same year, from New Orleans, and had touched at Havana during the prevalence of yellow fever.

However this may be, it is certain that it was epidemic in Bahia when the American bark *Navarre* left that port on the 20th of November, arriving at Rio Janeiro on the 3d of December. The vessel was pronounced clean and her crew healthy; she was not detained at quarantine, but came up to town, where the crew were paid off and discharged. Quite a number of them took lodgings at the house of one Franck, on Miseracordia street, in the low and filthy locality before spoken of. From this house, on the 28th of December, there was removed to hospital a Swede named Anderson, who had been a sailor on the *Navarre*. He died two days after his admission to hospital, and six after the inception of the disease. The same day a Finn named Euquist, who lodged in a house about forty feet behind Franck's, and who was frequently in his house, was taken sick, and died on the 29th, both with undoubted signs of yellow fever. On the 4th of January a seaman named Wilson, belonging to the American bark *Hercules*, was admitted to hospital. He had been staying at Franck's house. This case recovered. The next case was on the 5th of January, and was a sailor of the *Navarre*, named Baker, who had likewise been in Franck's house. He died a few hours after admission. On the 7th of January three more cases,

and on the 8th another, also from this same boarding-house. This same day five cases were discovered in the house of one Wood, directly opposite to Franck's, and within a few days four cases occurred at the boarding-house of Hourd , next door to Wood's. All these houses were much frequented by shippers and sailors, and by the middle of January cases began to appear in hospital from the Russian and Swedish ships in the harbor; and all of the earliest cases had been frequently at the houses above named. The disease now began to extend, at first slowly, but soon much more rapidly, until all the shipping in the harbor and all the streets in the city became infected. No class of the population escaped; but it was most fatal among the sailors, next among those who had recently arrived in the city; while among the permanent residents, although they very generally took the disease, the mortality was very small. It is remarkable that a number of masters of vessels direct from Europe made statements to the effect that the fever broke out on their vessels as soon as they arrived off the coast of Brazil. During the progress of the epidemic there was a number of cases occurred on different vessels in the harbor, which were anchored a long distance from each other and had held no communication with the shore. No less than ninety-five vessels in the harbor sent sick to the hospital during the epidemic, and the highest and cleanest parts of the city suffered as much as the filthiest. Nevertheless, it was noticed that a number of inhabitants fled to Petropolis, a watering-place thirty miles from and three thousand feet above Rio. Over a dozen of these died in a crowded hotel in that place, and yet in not a single instance did they spread the disease. The epidemic terminated in September, 1850, having killed from four thousand to thirteen thousand, according to estimates of different persons. (Dr. R. Lallement, "Observations on the Severe Epidemic of Yellow Fever at Rio Janeiro in 1859, Rio, 1851." Dr. Croker Pennell, "A Short Report on Yellow Fever, as it appeared in Brazil during the Summer of 1849-'50, Rio, July 1, 1850." Dr. Paula Candido, "Report on Yellow Fever at Rio Janeiro;" "Report of the Sanitary Commission of New Orleans on Epidemic of 1853.")

The following opposing conclusions were arrived at by physicians of high standing, who carefully investigated all the facts. Their articles may be found in the "Annals of the Medical Society of Montevideo for 1854." Dr. Souza, of the Brazilian navy, says:

1. Yellow fever always arises from local causes.
2. It possesses no germ of contagion, nor of reproduction.
3. It cannot, therefore, be transmissible.
4. It is always identical in the various climates in which it springs up, whether it be sporadic, endemic, or epidemic.
5. The only sanitary measures to be employed against the disease are strictly hygienic.
6. A sanitary system opposed to the introduction of imaginary virus should be abandoned as useless and frequently pernicious.

Per contra, these are the opinions of Drs. Rossi and Vidal, from the same journal of annals:

1. That yellow fever never originates from local causes.
2. That it does possess a germ of contagion and of reproduction.
3. That it is consequently transmissible.
4. That it is always identical in every climate.
5. The same sanitary measures should be adopted which are commonly opposed to pestilential diseases.
6. A sanitary system, having for its object the prevention of transmission of an infectious disease, ought to be regarded as the most sacred of duties; while it can never be or become dangerous. (Transactions of Medical and Chirurgical Faculty of Maryland, 856, pp. 68 and 74.)

From that date yellow fever appears to have taken up its residence in Rio, prevailing every year with more or less severity.

In 1851 the steamer *New World*, *en route* from New York to San Francisco, touched at Rio. After leaving that port, the fever broke out on board, and she finally put in at Callao, having lost most of her crew by yellow fever. A similar incident happened to the steamer *Quito*, which arrived at Callao in January, 1852. From this time a new disease made its appearance on the coast, which the natives called "pellusa," but which was subsequently ascertained to be genuine yellow fever. (New York Medical Record, January 15, 1872, p. 519.) During the prevalence of the fever on the coast, a soldier, who had deserted, started for his home in the mountains of Peru, but was taken sick at the village of Pisco, (it was said after spending some time in examining and looking after the effects of a man who had died of the fever.) He was conveyed six leagues in an open litter to his home in Charcas. At every town and village the people crowded around the litter from motives of curiosity, and the result was the breaking out of the disease in all the hill-country of Peru. It spread from the villages to Cuzco, the ancient capital of the Incas, where, out of a total population of forty thousand, it was reported there were twenty thousand deaths.

Port du Passage.—This is a small fishing-village of about twelve hundred inhabitants, not far from Bayonne. Its location is a healthy one; the streets are clean; ventilation abundant; the occupation of the inhabitants conducive to health; and affords no local causes for the spread or origin of pestilence. In 1823 the population of the town was nearly doubled by reason of some French army operations. On the 2d of August of that year the brig *Donostiarra* arrived at the port, and anchored off the town. This vessel had formerly been a slaver, and had not been repaired since her last voyage as such. She left Havana about the 1st of June, and, when ten days out, lost a sailor by sudden death. After a voyage of thirty-six days, she reached Corogne, on the west coast of Spain, where she underwent a quarantine of ten days. On her arrival at Port du Passage she was admitted to pratique without detention, as she had no sickness on board, and had already been subject to a quarantine at Corogne. On the 15th of August the custom-house officer placed on board fell sick, and died on the 17th. On the 30th, a carpenter at work on the ship was taken, and died on the 22d. From this time until the 1st of September a number of other persons at work in the hold of the ship were taken, as well as some watermen who were in the habit of visiting her. It was worthy of remark that although hundreds of persons had visited the vessel (for her arrival was a matter of great consequence to the people of the little port, being the only one that year) between the 2d and 15th of August, yet it was not until the cargo was discharged, and the hold empty, that anybody was taken ill. During the first week in September, cases began to occur on shore, in the houses adjoining the wharf where the vessel was moored. On the 6th of September, the authorities, having no doubt that the disease was traceable to the vessel, caused her to be moved to a distance of several miles from town, but, notwithstanding this, the epidemic continued to increase. About the middle of September, Andouard, a surgeon of the French army, was sent to the place, and he immediately ordered the dispersion of the sick in the country, which was done on the 25th, and from this time the epidemic ceased. There can be no doubt that this was genuine yellow fever. Andouard had examined the disease closely at Barcelona, in 1821, and so pronounced it: "Tous les individus, présentèrent les mêmes symptômes;

ils vomirent des matières noires, et devinrent jaunis avant de mourir." (Faget, Mémoires sur la fièvre jaune, deuxième lettre, pp. 3-5.)

In a similar manner, the disease was introduced into St. Nazaire, France, in 1861. On the 25th of July, 1861, the ship *Annie Marie* arrived at St. Nazaire, France. She left Havana on the 13th, there being an epidemic of yellow fever prevailing in that place. She had nine cases of fever and two deaths on the passage, and had seven men sick on her arrival, but convalescent. Ten days having elapsed since the occurrence of the last case, the ship was not quarantined, but came up to the docks, where her crew were discharged, and a gang of seventeen stevedores hired to discharge the vessel, which was loaded with sugar. Out of this party thirteen took the fever, and several died. The crew of a neighboring vessel, *Le Chaston*, came on board the *Annie Marie* while she was discharging. This vessel soon after left for Indret, on the Loire, and arrived there on the 1st of August with one of her crew of five men sick with fever, who died. Shortly after three others of her crew died. In the mean time another vessel in dock near the *Annie Marie* left for L'Orient, and arrived there August 10. On the 14th the disease broke out at L'Orient, and there were a number of deaths. At St. Nazaire the disease was likewise communicated to other vessels, and also to persons on shore. One of the workmen employed in discharging the ship went some miles into the country to the village of Montoir, where he resided. Here the physician who attended him was attacked with the fever, and died; and a physician at Indret likewise contracted the disease after attending some of those who were sick with it. The total number of cases was forty-four, of which twenty-six died.

Quebec, 1864.—In August, 1864, the ship *Montgomery* arrived at Quebec, from Nassau, New Providence. The captain stated that he had lost his wife and two of his crew from yellow fever on the passage. After her arrival a young man named McClusky, who lived but a few steps from the dock where the *Montgomery* lay, went on board of her, and was soon after taken sick with undoubted yellow fever. Other cases afterward presented themselves, but there was no epidemic.

This case is interesting from the existence of the disease in very high latitudes, showing the necessity for stringent quarantine regulations, not only in southern ports, but also wherever vessels may arrive from infected ports. Commenting on this case, Professor La Rue, of Quebec, says:

I am perfectly convinced that we have had yellow fever at Quebec; perfectly convinced that the case of which Dr. Wherry speaks (the case of McClusky) is really dead of this disease; and I have every reason to think that if the *Montgomery*, instead of arriving at Quebec in August, when the nights commence to get cool, had arrived at our port during the excessive heat of the month of June and the first part of July—I say, I have every reason to think—that Quebec would have had to suffer a most fatal epidemic. (Faget, *Considérations générales*, pp. 13, 14.)

Nor is this the only case of the appearance of the disease in very high latitudes, as witness the following:

Swansea, Wales.—The bark *Hecla* sailed from Cuba for Wales, July 26, 1865, and arrived at Swansea on the 2d of September. On the passage she lost three of her men with yellow fever, and landed three sick on her arrival, one of whom, named Saunders, died the next day. The authorities were much alarmed, and Saunders was buried within four hours after his death; his house and neighboring ones disinfected and fumigated; and orders issued to stop the further discharge of her cargo, from the *Hecla*. About thirty tons of copper-ore had, however, been landed. The ship was then thoroughly disinfected and fumigated with chlorine, and after this discharged her cargo, a work which was com-

pleted by the 21st of September; after which she was removed to another dock. On the 28th of September she left this dock and proceeded to sea. On the 23d of September a death from yellow fever was reported in town, and close inquiry resulted in the discovery that there had been quite a number of cases since the 15th. There were in all twenty-two cases, of which twenty were of persons in immediate communication with the ship, or living in the immediate vicinity. A ship lying close to the Hecla lost two of her crew. It should be remarked that the season was unusually hot. In all, fifteen died, and after the removal of the Hecla not a single fresh case occurred. (*La Roche, Yellow Fever in 1870*, pp. 33-35.)

It can hardly be supposed that, in spite of its low alluvial position, there would have been any yellow fever at Swansea had it not been for the arrival of the Hecla.

Buenos Ayres.—The mortality occasioned by the yellow fever in this city in 1871 attracted the attention of the whole civilized world. Rarely, if ever, had such destruction been caused by any pestilence. The city is not one that has ordinarily been visited by epidemics; in fact, previous to its first appearance at Rio Janeiro, in 1849, it was unknown to the south of that city. In 1858 it became epidemic in Buenos Ayres. Toward the latter end of March, the royal mail-steamer *Camila* arrived there from Rio. On the voyage she had three deaths from yellow fever. Soon after her arrival, cases of yellow fever began to occur on shore, in the streets running parallel to the river, and after prevailing for six weeks disappeared suddenly, under the influence of a strong southwest wind from the "pampas." The first cases on shore were clearly traceable to the steamer. The number of deaths was between six hundred and seven hundred.

In 1871 occurred the greatest epidemic known in the history of the world, except perhaps the Barcelona visitation of 1821.

During the few years previous, there had been numerous arrivals of emigrants from Europe. The weather was extremely sultry, the mercury ranging between 96° and 104° Fahrenheit. During the latter part of 1870 there had been a great drought, and the river had considerably contracted within its banks, exposing large quantities of alluvium, to be acted upon by the sun. On the first week in January, according to the local papers, a passenger in detention at the lazaretto escaped from the quarantine and rode into town, and joined his family, where he had the fever. He recovered, but a number of his family died; then those in the next house; and from thence it spread through the whole locality known as the district of San Telmo, which was inhabited chiefly by Italians, very much crowded, and the dirtiest in the city. About this time a vessel from Genoa arrived at Buenos Ayres, having touched at Barcelona on her passage. During the voyage she had fourteen deaths from yellow fever, and on her arrival the captain evaded quarantine by concealing both the facts of his touching at Barcelona, or having had any fever on board, and, proceeding to the city, landed her passengers, "many of whom were doubtless infected." During January the disease increased but slowly, there not being more than an average of twenty deaths per day up to the middle of February; but by the end of that month it had spread to adjoining districts, and the deaths were from forty to fifty per day. In March the increase was terrific, and by the close of the month the deaths were three hundred and fifty per day.

The epidemic followed in its course the route taken by a great flood the year before, the houses devastated by which, after remaining empty for a long time, had recently been re-occupied without being cleaned,

and were, as well as the streets, in a filthy condition, with the yards and streets contaminated by heaps of rotting clothing and other refuse deposited there by the flood. In March there were heavy rains, and on the 10th of April the epidemic reached its climax, when there were five hundred and forty deaths, after which it rapidly declined, probably from want of material. The number of deaths was variously estimated from thirteen thousand four hundred to twenty-six thousand; probably a mean between the two would be nearer correct. (Dr. J. H. Scrivener on Yellow Fever, in Buenos Ayres Medical Times and Gazette, February 17, 1872.

These brief accounts, selected from a very large number which have occurred in the present century, will suffice to show that yellow fever is not confined in its visitations by any considerations of latitude or longitude; that, while it has its natural home in that portion of the Western World where tropical heat prevails throughout the year, it may, and has repeatedly, been carried thence to extreme northern and southern latitudes; and that it has never prevailed in such latitudes except when accompanied by the most direct proof of its importation. Whether at Swansea, Wales, or Quebec, on the one hand, or Buenos Ayres or Barcelona on the other, the story is always the same—of the arrival of an infected vessel a short time previous to the appearance of the pestilence, and careful investigation uniformly connects the earliest cases on shore with some vessel from a port where yellow fever was prevailing.

In spite, however, of the vast number of facts of this description which are to be found in the history of yellow fever from the earliest times, the opinions of students of the disease have varied much as to the possibility of its importation.

Probably no question can be found in the literature of medicine which has given rise to such a long series of controversies, argued with such earnestness on both sides, and finding among the advocates of either view some of the ablest and most learned minds of the day.

Prior to the last decade of the eighteenth century, there does not seem to have been any question in regard to the contagiousness of the disease. The subtle distinctions which have been made by later writers between infection and contagion do not seem to have disturbed the mind of the profession of that period. It made use of the two words as synonymous, meaning simply the communication of a disease from one person to another, either by direct contact or by means of fomites, through the agency of ships, clothing, bedding, &c. Lining, as I have already mentioned, in his letter to Dr. Whytt, of Edinburgh, speaks in no doubtful terms of the "*introduction*" of the disease to Charleston in all the epidemics previous to 1753. Dr. John Redman has no hesitation in ascribing the yellow fever at Philadelphia, in 1762, to importation from Havana. One of the earliest accounts of the yellow fever which we possess was written by M. Desportes, who was sent, in 1732, to San Domingo, by the King of France, to investigate the subject. He called the disease "a pestilential one, and had no doubt of its contagious nature." (Pascalis, op. cit., p. 5.) In the North American Medical and Surgical Journal for October, 1827, will be found an introductory lecture, delivered at the Pennsylvania hospital by Dr. Thomas Bond, in 1766, in which he refers to two out of three epidemics which he had observed as having been imported; to the third he ascribes a local origin; and this seems to be the first allusion on record to anything affirming the local origin of the disease. All of the earliest historians of the West Indies speak of it as being carried from one island to another. Dr. Thomas Dancer says (Medical Repository, vol. 7, p. 247)

that most of the practitioners in the West Indies concurred with Dr. Chisholm in his views as regards the contagiousness of the disease. In fact, it was not until the great series of epidemics which began in 1791 that any doubt was expressed by medical writers on the subject. From 1793 to 1798 Drs. Nathaniel Potter and John B. Davidge, of Baltimore, Jean Deveze and Benjamin Rush, of Philadelphia, and others, enunciated the idea that the disease was of local origin in the United States. The official report of the College of Physicians of Philadelphia on the epidemic of 1793 was dissented from by Rush, Hutchinson, and others, and their views, which ascribed the disease to putrid exhalations from the streets and docks, and to decaying coffee and other articles on the wharves and in store-houses, soon gained ground, and found an official utterance in 1798, when Rush, Physick, and others, who had become incorporated as the Academy of Medicine of Philadelphia, made a report to the board of managers of the hospitals on "The origin, progress, and nature of the pestilence of that year," and repeated their former opinion that the first cases "appeared to originate from the putrid exhalations of alleys, gutters, and docks, and from the stagnating water in the neighborhood of the city." Nevertheless, even they qualified their opinion by the further statement: "We derive the late rapid increase of the fever from the foul air of several ships lately arrived in the port, and from some damaged coffee which arrived in a brig from Jamaica on the 29th of July." In a letter to Governor Mifflin, of Pennsylvania, dated December 3, 1798, this same body remarks:

We are the more confirmed in the opinion we have delivered that the yellow fever is a native disease of our country by discovering that the same opinion is held by most of the physicians and citizens of our sister States.

And they conclude their letter by deprecating in the most solemn manner the continuance of a belief in the supposed importation of the fever.

As before, these views were strongly opposed by the College of Physicians, who insisted that the disease was exotic, and that there was nothing in the condition of the streets, alleys, or docks to warrant the assumption of the local or domestic origin of the disease; but, on the contrary, the disease could be unequivocally traced to the vessel that introduced it.

The controversy, thus begun, soon extended beyond the limits of the bodies in which it originated. The volumes of the Medical Repository and other journals, from 1800 to 1820, are filled with able articles advocating one side or the other of the question. On the side of the importationists were to be found Currie, of Philadelphia, the Hosacks, Bayley, Townsend, Francis, Seagrove, and many more; while the domestic origin of the disease was maintained with equal energy and ability by Jackson, Miller, Mitchell, Seaman, Pascalis, Brown, Wheaton, &c. Abroad the physicians who had seen the disease generally believed that it was of foreign derivation. Dr. Robert Jackson says that "the Spanish physicians seem, all of them, to believe in contagion as the cause of this disease." (Yellow Fever on Coast of Spain since 1800, p. 16.) Bally, Francois, and Pariset, (as well as Audouard,) who made official reports to the French government on the epidemics at Barcelona and Passage, had no doubt that it was imported into those towns; but on the whole, in our own country, the doctrines of a domestic origin for the fever found most advocates. The southern physicians, as a rule, adopted these views, and after 1822 the controversy seems to have died out, until it was revived by the publication of Strobel's work in 1839. This was very soon fol-

lowed by the brochures of Monette, of Natchez, and Carpenter, of New Orleans; and before many years by an able series of articles by William Hume, in the Charleston Medical Journal, all of which, taken in connection with undisputed facts in relation to the epidemics of 1838 and 1839, and subsequent years, once more attracted attention to the doctrine that yellow fever was an imported disease. The history of the series of epidemics during the years 1853-'56 so strongly pointed to foreign importation as the source of the pestilence that this opinion once more rose in importance, and has, I think, continued to increase in prevalence since, being confirmed by the history of the late war, and of the great epidemic of 1867. During this period, however, the exhaustive work of La Roche supported the endemic origin of the disease. His views, however, seem to have been greatly modified since that time, if we may judge from his article on "Yellow fever in 1870 at the Philadelphia lazaretto." At present, so far as my observations and conversations with southern physicians enable me to judge, they may be divided into several sects or parties on this subject, viz :

1. Those who retain the views, held in the early part of this century, as to the endemic origin of the disease.

2. Those who believe that it can be imported, but also that it occasionally originates in the southern towns.

3. Those who believe that it is always imported, and that sporadic cases are to be accounted for, either by the hibernation of germs from a previous season, or else by the supposition that these cases may not be yellow fever at all but cases of malignant paludal or bilious fever.

Very soon after commencing the visits of inspection called for by the joint resolution, I foresaw the advisability of obtaining, in some definite form, the opinions of the profession at the South on this subject and that of the quarantine. I accordingly caused circulars to be printed, which were addressed to several physicians in each of the towns I visited, inviting them to give their views as to the portability of yellow fever, and the value of quarantine restrictions. This was done more as a matter of justice to these gentlemen than for my own information; for, as I had conversed with most of them, or had read their ideas in the medical journals, it was not necessary that they should address me for the latter purpose. To my regret, however, very few of those whom I addressed took any notice of my communication. If, therefore, I do them any unintentional injustice in my summary of their views, they are debarred the right to complain, as they were given ample opportunity to place themselves on the record had they so desired.

I think that a majority, especially of the younger physicians, believe decidedly in the transmissibility of the yellow-fever poison; but they hesitate openly to express their views, partly because by so doing they would find themselves in opposition to men who may be said to lead the profession at the South, and who, with the people at large, are considered to speak almost with infallibility; and partly because the acknowledgment of the importation of the disease carries with it necessarily a belief in the value of quarantine, which, when no epidemic threatens, is an unpopular idea with the mercantile community. I am led to this opinion from an incident which happened in New Orleans. The mayor invited a number of leading men to meet me to discuss the question. The distinguished Professor Warren Stone was in the chair, and made an eloquent address in favor of the domestic origin of yellow fever, and denouncing all quarantine measures whatever. But one gentleman ventured to differ from him, and he was not a physician; but after the adjournment of the meeting, several assured me privately that

they did not at all agree with Dr. Stone in his views, and would take occasion to express themselves in writing to me on the subject, but this they never did.

Thus far I have endeavored merely, in the words of the joint resolution of Congress, "to ascertain all facts having reference to the outbreaks of the disease" in the southern ports and towns; and to present what proofs may exist of its importation, in so far as they may bear upon the question of the benefits to be derived from quarantine measures. But there is another aspect in which the subject must be viewed. "The question of the mode of existence of contagious matter," says Dr. Burdon Sanderson, "lies at the foundation of all scientific inquiry as to the means of obviating or counteracting contagion." Here we leave the domain of ascertained facts, and enter upon that of mere hypothesis. The subject is one full of difficulty, and I cannot hope to do more than, by availing myself of the investigations of those who have made the question of contagion a special study, to offer such a view of the origin of the disease as will harmonize best with the most recent ideas on the intimate pathology of contagion.

If, up to the present time, the search after these means has appeared unsuccessful, and the results obtained by their application have been unsatisfactory, the explanation of the fact is to be found, not in any want of knowledge of the properties of the agents employed, but in the ignorance which prevails as to the physical characters of the substances which it is our object to destroy or render innocuous. (Twelfth Annual Report of Medical Officer of Privy Council, p. 229.)

If we look through the writings of the earlier authors on yellow fever, and, indeed, some of later date, we shall find that they regarded the disease as a malignant type of bilious remittent; and due to the same pestiferous miasm. Certain epidemics which prevailed in New England and Virginia in the early part of our history, being accompanied by a jaundiced skin and the vomiting of altered bile, were so closely assimilated in their phenomena with the true West India fever that the differential diagnosis between the two diseases was not clearly made out, and the subtle distinctions between them overlooked in the prominence of certain symptoms which they had in common. And yet a glance at the habits and habitats of the diseases would have shown how little it is possible for them to have a common origin. Yellow fever is essentially a disease of large cities and sea-port towns. It never originates in the country, even in the most swampy and malarious districts; and when carried there by refugees from any town where it prevails, it fails to spread.

The rice-swamps of Georgia and the alluvial districts of Alabama and Louisiana are saturated with malaria in its most concentrated form. Pernicious and congestive fevers, high grades of bilious remittent or intermittent, are the common lot of those whose business takes them to such localities, yet yellow fever is unknown from this source; but, on the contrary, it is found that very soon after the outbreak of an epidemic in New Orleans or Mobile, the remittents and intermittents partake more and more of the type of the imported disease, until at last the more potent poison overwhelms the feebler one, and malarial diseases disappear entirely for a time. Moreover, the attack of yellow fever is generally protective against a second one, which, as is well known, is not true of any form of malarial disease. Yellow fever finds its subjects chiefly among the unacclimated, while remittent fever attacks equally those who have lived their whole lives at the South. The colored people are peculiarly susceptible to the influences of marsh-poison, while, though yellow fever frequently prevails among them, it is

by no means so fatal as among whites. Yellow fever has prevailed as an epidemic at places (such as Pensacola) where the surrounding country is a high, dry sand-barren, without any malarial influences to produce disease. In fact, it requires but a close examination of the history and clinical phenomena of the yellow fever to show that it is a disease *sui generis*, and not dependent on marsh-poison, or allied to any of the forms of paludal disease that are so common in the southern country, away from the cities.

What the peculiar nature of the yellow-fever poison may be, we have thus far failed to ascertain; yet it may be permitted to generalize a little on the subject, and endeavor to see whether recent researches into the pathology of contagion will serve to elucidate the question. The fundamental deduction arrived at by recent observers is, that every kind of contagion consists of extremely minute particles of organic character, capable of growth and multiplication to an indefinite extent; and that the contagious fevers are due to the introduction of such particles into the blood. They differ materially as to the nature and origin of such particles. Hallier, of Jena, considers the organic forms found in contagious fluids to consist of fungi, composed of single cells, which reproduce themselves with extreme rapidity, and are capable of being developed into higher organisms than themselves. These are called by him "micrococci," and by Bechamp "microzymes." Beale, on the contrary, regards the contagious particles as the result of retrogression of a normal germinal principle, or bioplasm, from which all the tissues of the bodies are developed. All the complex tissues and organs of man are dependent on the changes which take place in a transparent, colorless, living matter, called "bioplasm." This germinal matter has the faculty of dividing into other bioplastic masses, each mass going to fulfill some special purpose in the economy, and not being capable of any other. These bioplasms are analogous to certain forms of low organism found in nature, called "amœbæ," and like them they have certain remarkable powers of locomotion.

After a time some of these bioplasms cease to multiply, though they still live and take up food. The living matter of which they are composed undergoes change, and is converted into tissue. There are, however, some masses of germinal matter in the adult which continue growing and multiplying through life, as they did in the embryo; among these are the white corpuscles of the blood. Under certain circumstances these masses of bioplasm may become degraded and incapable of performing their higher functions, while still possessing the power of reproduction and multiplication to an enormous extent. Actively living, degraded bioplasm of this kind may retain its vitality for a long time, although entirely removed from the body. Beale consequently defines a disease-germ to be "a particle of living matter derived from direct descent from the living matter of man's organism."

With the abstract truth or falsity of these two theories of disease we are not at present interested. They both agree in ascribing the origins of contagious disorders to organic living particles, and whether these are called microzymes, bacteria, or bioplasts; whether they are of fungoid growth, obtaining entrance to the body as parasites; or whether germinal masses, "derived from normal cells, and due to a series of changes in existing matter under new circumstances," is of little consequence to the inquiry before us. Without, therefore, entering further into this discussion, it will be proper to inquire into the relations that these contagious particles may bear to the subject of the spread of yellow fever. Assuming for a moment the fact of their existence, they may

escape from the organism in which they have been developed in various ways. As Cohnheim has demonstrated that bodies as large as the white corpuscles of the blood may migrate through the walls of the capillaries in inflammation, it requires no credulity to believe that these particles, which are infinitely smaller, may also thus escape into the surrounding tissues; especially when the surface capillaries are congested during an attack of fever. Once outside the vessels, it is an easy matter for them, aided by their amœboid movement, to make their exit from the body. Reaching the surface, they may be expelled with the expired air, pass away with the discharges from the body, or be thrown off with the epithelial scales from the cuticle. Perhaps they may be eliminated from the blood by the action of secreting and epithelial cells without the vessels. In whatever way they escape from the body, their vitality is so great that they will live and multiply for many days when so removed. In a partially-desiccated condition they may float in the air; they may impregnate water and food, attach themselves to clothing, bedding, or other articles around a sick-room, and, existing thus under so many and such different conditions, have unlimited facilities for gaining access to the bodies of other persons favorably situated for their reception. Sanderson and Chauveau, in their experiments on the cattle-plague, have shown that the amount of contagious material necessary to produce disease in another individual is extremely small. "A mere trace of serum is sufficient to propagate the cattle-plague." This is further manifested in the very small amount of morbid matter required to infect a person in the case of a dissection-wound. Consequently, assuming that such morbid particles are given off from a person sick with yellow fever, it is easy to conceive how extensive may be the morbid influence arising from a single patient. In times of epidemic prevalence, the air will become filled with these floating particles of contagium. In consequence, where a ship leaves an infected port, and her hatches are battened down after her cargo is stowed, she carries within her hold, hermetically sealed, a portion of the air of the infected town, heavily charged with these floating particles. Many of these sink to the bottom and impregnate the bilge-water, or become incorporated with the filth which exists on the sides and bottom of the vessel. Individuals who leave an infected port carry with them in their clothes millions of these little particles, which grow and multiply in whatever position they are placed, and may even acquire increased virulence after their exit from the body in which they were developed.

It has been objected to this theory that if these particles of contagium are so numerous and exist so universally in an infected town, how is it that anybody escapes an attack? Perhaps, in the present condition of our knowledge, it is hard to give a satisfactory answer to this question, yet it is no more than occurs in life under other circumstances. In battle but a very small number are killed or wounded in comparison with the number of shots fired. The air seems filled with missiles, but yet comparatively few are hit. Many conditions may be required in the organism beyond the simple reception of the germ to enable it to develop disease. Of the seed scattered over a field but a small proportion finds a congenial soil in which to germinate; the rest perishes

The fact that of a number of persons equally exposed to the influence of contagium some will contract the disease while the majority will escape, may be accounted for by supposing either that, in the latter case, the particles do not really penetrate the vascular wall at all, or that they are in some way destroyed as soon as they traverse the wall of the capillary and come in contact with the blood. (Beale on Disease-Germs, p. 84.)

There may also be certain circumstances connected with locality or population which will favorably influence the reproduction of contagion. Peculiar meteorological conditions, defective drainage, poisonous gases, rotting vegetable *débris*, can no more originate yellow fever than they can small-pox, but they may so vitiate the vital capacity for resisting disease as to render the organism peculiarly receptive to the influence of a morbid poison.

The vital and all-essential fact in the etiology and geography of yellow fever is that which relates to the *implantation of the epidemic germs, or the fomites*, in a locality where temperature, humidity, and personal conditions favor their pestilential propagation." (Harris, United States Sanitary Commission Memoirs, p. 242.)

Among such personal conditions may also be considered the influence of fear; the psychical depression caused by dread of an epidemic operating probably more powerfully than any other predisposing cause in affording a congenial resting-place for the germs of the disease. It should also be borne in mind that, of the total population of any southern city, but a small portion is really susceptible, the balance being composed of acclimated persons. The number of cases is apt to be in direct proportion to the number of unacclimated residents.

While it has been uniformly found that a temperature below 32° Fahrenheit has stopped the progress of an epidemic, it is probable that the commonly-accepted belief that the poison of the fever is thus killed is not altogether true. The vast majority of the germs unquestionably perish, but some may continue to exist under a lower condition of vitality, and passing the winter in a hybernating state become revived by the renewed warmth of the following spring, or under certain circumstances they may slumber for a much longer period, until roused into action by circumstances favorable to their development. It is found, however, that most commonly in such cases these particles have lost a portion of their contagious vitality, and are no longer capable of originating other germs that can propagate the disease. Hence the cases which occur under these circumstances are sporadic, and the disease does not assume an epidemic character. This is not always the case, for occasionally outbreaks of the most severe type have occurred when it was probable that a long time had elapsed since the original germs of infection had been received. In this way we may account plausibly for the appearances of the disease on ships at sea, which have always been seized upon as favorite examples by those who advocate its spontaneous development.

The germinal principles of contagious diseases differ remarkably in their power. Some are vigorously infectious, others very feebly so. It is equally probable that, under different circumstances, the same contagion may possess much more virulent properties than at others. The germs may retain their vitality for a longer period, or develop a greater capacity for reproduction, and hence, in one year, we have a wide-spread epidemic, in another the germ of the disease may be introduced, but the only result be a few sporadic cases.

A phenomenon which has been frequently observed during the progress of an epidemic is its intermission or sudden cessation immediately after a violent gale. This is accounted for by the dispersion of the contagious particles beyond the city limits and the renewal of the atmosphere; a view which is confirmed by the fact that generally, after an intermission of a week or two, the disease breaks out again with increased virulence, only sufficient time being requisite for the fresh air to become charged with germinal atoms; and further, by the observation that in the most sultry seasons, when the air is comparatively mo-

tionless, the fever has confined itself sometimes to certain sections for several weeks, and afterward, under the influence of a gentle breeze, has appeared in several detached localities at once.

THE QUESTION OF QUARANTINE.

The joint resolution calls for an opinion "whether any system of quarantine is likely to be effective in preventing invasions of yellow fever." I believe that this question may be unqualifiedly answered in the affirmative, and that the war on quarantine has been partly the result of ignorance of the facts, or illogical views of the origin of the disease, and partly because the love of gain, outweighing the natural feelings of humanity, has distorted the unavoidable inconveniences, attendant on any quarantine system, into a barbarous cruelty, which has come down to us from the Middle Ages, and has no part in the enlightened civilization of the nineteenth century. It is, I think, possible to show that the cruelties and barbarities of quarantine need have no existence under a properly-organized system; that its restrictions on commerce have been greatly magnified by those who are interested in the West India traffic; and that the general trade of any city, so far from being injured, would be immensely benefited by a quarantine which would be absolutely protective, such as, it is believed, it would be possible to institute.

A strong argument in favor of quarantine may be found in the varying aspects of public opinion at the South. "À la longue, rien ne résiste à l'autorité des faits, et le simple bon sens du vulgaire l'emporte souvent sur les hésitations et les sophismes de l'intérêt et du savoir." It is found that during periods of health the sentiment of the southern people is strongly opposed to quarantine; but should there be a danger of the approach of the disease, it is astonishing what unanimity there is on the subject. The press makes fervent appeals to the boards of health to increase the efficiency of quarantine; leading men, both in and out of the profession, use all their influence to urge its establishment; and should the disease unfortunately break out, the authorities are denounced in the severest manner for their neglect. The medical profession may prove, to their own satisfaction, that the disease is of local origin, but the community does not believe it, and in times of pestilence they see what dreadful losses accrue to them from the prevalence of the disease, and all are quarantinists.

The objections raised against quarantine measures may be either professional, personal, or commercial, and may be summed up as follows:

1. It is urged that inasmuch as yellow fever is a disease of domestic origin in the United States, and due entirely to local causes, or else to the prevalence of what is called an "epidemic atmosphere," a quarantine can, by no possibility, be of any value in warding off an epidemic.

This objection is best answered by inviting attention again to the facts as set forth in the histories already narrated of the epidemics of yellow fever. These accounts show that in the majority of epidemics of which we have any detailed history, its outbreak has been preceded by the arrival of one or more vessels from a port known to be infected; that the first cases are generally either persons who came to port in such vessels or who are known to have been on board of them, and that those next taken sick have had communication with the first; or if the proof be not so direct as this, it is found that the vicinity of the wharves and docks, and the streets and alleys bordering the harbor, are

the localities first infected. The earliest cases are in sailor boarding-houses, or warehouses where foreign goods are stored, and these cases are in the persons of sailors, stevedores, or workmen about such wharves or warehouses. The filthy condition of such places, always insisted upon as sufficient of itself to produce the disease, does not afford a satisfactory explanation of its existence, because such localities are always the most neglected in a city, and the population such as defy all considerations of personal cleanliness or local hygiene. They are in no worse condition in years of sickness than in those of health, and on the assumption that overcrowded tenements or accumulations of putrefactive *débris* will produce an epidemic, it should prevail in such localities every year, which is not found to be true.

Let it be particularly noted that the conditions productive of fatal disease are in all cases subject to little or no variation, and therefore, where the causes are perennial, there ought to be no respite from the ravages of deadly maladies. The facts, unfortunately for the theories, are perverse; instead of a confirmation they supply a refutation, to my mind irresistible. (Pratt on Origin of Fevers, Medical Press and Circular, March 6, 1872, p. 206.)

It has already been remarked that the absence of direct evidence of the foreign importation of the disease is no proof that it might not have existed, and been overlooked in the difficulty of tracing the previous history of the first victims, who are frequently strangers without friends that are acquainted with their movements before the attack. It is, in fact, a matter for surprise that we have been able to trace the disease to foreign importation in such a large number of instances rather than that the evidence should be defective in a few.

It is further shown that when the disease leaves the sea-board it has generally followed the great routes of travel or trade. Natchez was not visited by yellow fever before steamboats commenced their trips on the Mississippi River in 1819; after that year the town was ravaged by the disease whenever it prevailed in New Orleans, and never at any other time. Vidalia, Louisiana, never suffered previous to 1853, in which year, for the first time, steamboats stopped there. Sabine and Matagorda, in Texas, having only a coastwise commerce, were always exempt until the severity of the blockade at Galveston and the possession of New Orleans by our forces made them convenient resorts for blockade-runners. Houston and the interior towns in Texas have only been visited by the disease subsequent to its appearance on the coast. Many similar instances could be cited.

Moreover, the direct facts in favor of quarantine are equally cogent. New York established a rigid quarantine in 1822, and although the disease has been brought almost yearly to the port, it has since that time only twice appeared within the quarantine lines, viz, at Fort Hamilton in 1856 and Governor's Island in 1856 and 1870; both instances being plainly traced to an evasion of the quarantine law. Philadelphia presents a similar record, having been exempt from yellow fever for fifty years, except in 1853, when the bark Mandarin was improperly allowed to pass the quarantine.

In 1798, when almost every sea-port town at the North was visited, the authorities of Baltimore established a quarantine, and forbade all intercourse with the infected city of Philadelphia, and alone, of all the great commercial cities of the North, escaped, though repeatedly ravaged by epidemics in previous years. From 1840 to 1853 the authorities of Natchez quarantined all steamers arriving from New Orleans, during an epidemic season, and in those years they had no fever. In 1853, when they relaxed their quarantine, the disease again made its appearance. In 1862, when the city of Galveston was crowded with

the sick and dying, there was not a case among the ten thousand troops in the neighboring forts, all communication between the soldiers and the inhabitants of the town being forbidden by military orders. In 1867 the disease appeared at every town in Texas, along the railroads diverging from Houston, except Columbus, Washington, and Richmond. These three places established a quarantine against Houston and Galveston, and they escaped entirely. In 1868 and 1869 the military authorities exercised a supervision over the quarantine along the Texas coast, and there was no appearance of the disease, although it was epidemic at Vera Cruz, Havana, and Key West, and several vessels arrived at the various quarantine stations with cases of fever on board.

These, and many other facts which might be adduced, go far to show that the favorite theory of an "epidemic constitution of the atmosphere," bidding defiance to all restrictive measures for preventing the entrance of the disease, has no foundation in fact, except as dependent on infection by means of fomites, and an acceptance of the hypothesis of the invariable spread of the disease as a result of the multiplication of its germinal principle, (this principle being generally, if not always, an importation in ships, cargoes, or personal property,) will afford the strongest possible argument why a properly-constituted system of quarantine can be of efficacy, and that the southern towns can only be rendered free from visitations of yellow fever by such means. Yet it is not to be considered that the value of quarantine depends on the acceptance of any hypothesis of contagion; the actual historical facts are amply sufficient to prove the great service it has been in the past, and to warrant further investigations into the subject, with the view of making it more efficient in the future. It can, moreover, be urged with propriety that even if it is granted that some epidemics are not to be explained except by assuming the domestic origin of the disease, yet even then the facts prove that a large number of others are certainly due to importation, and therefore, by preventing such importation, we can materially reduce the number of epidemics, even if we fail in entirely keeping off the disease, which is certainly "a consummation devoutly to be wished."

2. Another objection is, "All epidemic diseases are present in the country, and disorder the health of a people before they are manifested in their peculiar and recognized forms."

This may be true of influenza, and possibly of some of the exanthematous diseases, but it is certainly not the general rule as regards yellow fever. Malarial fevers have often been very common in the spring and early summer, preceding an epidemic of yellow fever, (as was the case at Rio Janeiro in 1849;) but this coincidence can always be accounted for by local or meteorological causes, and only those who regard the latter as a paludal disease, or a more aggravated form of bilious remittent, would trace any connection between the two. Any one who regards yellow fever as due to a specific poison must reject the idea of such an influence of that poison on the general health as could exhibit itself in an increase of other diseases not allied to it in pathological or etiological phenomena. Typhoid fever was prevalent at Key West in 1862 before the appearance of the vomito; but it may be presumed this was owing to the presence of an unusually large number of troops, and the great increase in the civil population of the town, from causes resulting from the war. The yellow fever being positively traced to importation by the bark Adventure in the latter part of June, it is simply absurd to suppose any connection between the prevalence of the two diseases.

3. That the experience of the past proves quarantines to be worthless as safeguards against yellow fever. The instances already cited of its value at New York, Baltimore, Philadelphia, on the coast of Texas, and elsewhere, are a sufficient refutation of this assertion; but as the opponents of quarantine point to particular instances in which it has proved ineffective, it will be proper to examine some of these cases, and ascertain with what justice the charge has been brought. One of these instances may be found in the fact that the legislature of Louisiana established a quarantine in 1821, which was continued until 1825, during which time the city of New Orleans suffered from two severe epidemics, viz, in 1822 and 1824. What are the facts as regards these years? The board of health established a quarantine on the river below New Orleans, but none on Lake Pontchartrain, and, in consequence, in August, 1822, two sloops (crowded with persons fleeing from the fever which raged at Pensacola) passed through the lake, and entering the Bayou Saint John, without any inspection, landed their passengers at the basin of the canal Carondelet, in the center of the city. A family by the name of Lynch that arrived on one of these sloops were the first victims, and from their residence on Bienville street the fever extended throughout the city. Moreover, the health-officer, Dr. Forsyth, reported the quarantine law so defective that there was no restriction placed on intercourse between persons from New Orleans and those detained on infected ships at quarantine; and that vessels were permitted to leave the station and proceed to the city without any proper fumigation. Such are the facts of the epidemic of 1822, and it would be difficult to select an instance which more directly proves the value of a proper quarantine, instead of militating against it; for, can any one suppose that if the board of health had used efficient measures in guarding all the avenues of approach to the city there would have been any importation of the disease from Pensacola? As regards 1824, there is equally positive proof of the utter inefficiency of the health authorities. The disease was introduced by a steam-tug, which had towed the infected schooner *Emigrant* to the quarantine station. There had been free communication between the tow-boat and the schooner on the passage up the river. Sick men on board the latter were visited by hands employed on the former; yet the schooner alone was detained in quarantine, and the tug proceeded to the city, sending, in a few days, several cases from among her hands to the Charity Hospital with yellow fever.

Commenting on these facts, Carpenter remarks:

In 1821 a mockery in the shape of a quarantine was established, which, in consequence of its total inefficiency, had no effect in preventing the introduction of the disease. It had, moreover, a most pernicious effect in prejudicing many well-intentioned persons against the establishment of such an institution by leading them to regard it as a needless restriction upon trade. The fact is well known that the inadequacy of that institution was solely attributable to the imperfection of the law, and not to the fallacy of the principle upon which quarantine is based. (Op. cit., p. 47.)

Of the quarantine in 1867, at New Orleans, (which has been repeatedly pointed to as an illustration of the worthlessness of such institutions,) Dr. Francis Barnes reports:

The Florence Peters' history illustrates the viciousness of the system of quarantine in operation here, which does not deserve the name, being a sham, a delusion, a make-believe, in place of one which would be efficacious if properly carried out. * * * The quarantine here is notoriously a failure in sending any protection to the city, while that of New York is a success. (Circular No. 1, Surgeon-General's Office, 1868, p. 120.)

Assistant Surgeon Samuel Adams, United States Army, writing of the epidemic at Galveston, Texas, in the same year, says:

The entrance of the disease was entirely the result of gross negligence on the part of

the city authorities in failing to take any measures to establish a quarantine for the protection of the city. (*Ibid.*, p. 83.)

A further point in regard to this same epidemic may be mentioned. Of the towns situated on Matagorda Bay, Texas, only one (Matagorda) established a quarantine in 1867. This place escaped entirely, while Indianola, Lavacca, &c., suffered severely.

The prevalence of the fever in the vicinity of the South street wharf, in Philadelphia, in 1853, affords testimony of the same character; being unquestionably due, not to the worthlessness of the principles upon which quarantines are established, but to the neglect of the authorities at the lazaretto, in permitting the bark *Mandarin* to come to her dock without proper detention and fumigation. And it may be remarked that this will be found true of every instance where quarantines have been denounced as incompetent to keep out yellow fever; the fault has always been either in a defective law or in maladministration of its provisions; and it may be positively asserted that in our own country, at least, every absolute quarantine conducted with rigid impartiality has proved successful. The first quarantine convention held at Philadelphia, in 1857, composed of some of the ablest hygienists in the United States, came to the following conclusion, after mature deliberation:

Efficient sanitary measures, including quarantine, will in most cases prevent the introduction of these (importable) diseases. * * The present quarantine regulations in operation in most of our States are inefficient, and often prejudicial to the interests of the community. (*Proceedings*, p. 40.)

4. "That quarantine, instead of guarding against and preventing disease, fosters and concentrates it, and places it under conditions the most favorable that can be devised for its general extension."

This objection, made by the General Board of Health of Great Britain, (*Report on Quarantine*, 1849, p. 61,) can only, like the last, apply to a defective administration of a lazaretto. It is hardly to be conceived how it could be true, were ordinary common sense exercised in the management of either infected vessels or persons. Yet, if the account given by the board of the quarantine arrangements at Hull, England, be a fair sample of those in general operation in the United Kingdom, it is not to be wondered at that they arrived at the opinion they express. They state that this quarantine was in Whitebooth Roads, eight miles from Hull, a locality so stormy as only to be accessible by steamers; that sick and well persons were confined together on board of the detained vessels; and that the quarantine hulk at the roads had no medical officer attached to her. Further, Mr. Robert Hardey, medical superintendent of quarantine at Hull, states that he considered it doubtful whether he had any authority to visit sick persons detained in quarantine; and, although he had been in his official position for seven years, he has "no recollection of receiving either printed or written instructions from the authorities of the customs appertaining to the duties of his office, and does not consider that at present his duties are defined with sufficient clearness."

At another station, at Stangate Creek, the surgeon reported "that his orders were positive and strict not to go on board any vessel in which there was a case of cholera; that he could not, therefore, on any consideration, go on board such vessel." (*Report*, pp. 130-138.)

It is no wonder the poor unfortunates, subjected to such inhumanity as this, should denounce quarantine as a relief of barbarism, worthy of the Middle Ages; but that a board of men could only see in such a state of affairs an argument against the principles upon which quarantines are founded is creditable neither to their honesty nor intelligence.

There is no reason whatever why a rationally conducted quarantine station should "foster or concentrate disease." Let all persons be removed from an infected ship; the sick to a commodious hospital, the well to a separate building, only to be detained so long as may be requisite for their proper fumigation and disinfection; let all the inhabitants and officials at a quarantine station be acclimated persons, and there need be no cause to fear the extension of the disease. The records of all the well-managed quarantine hospitals in the United States contain ample proof of the truth of this statement. But if even for the sake of argument we assume the possibility of the occurrence, yet I hold that it would be no valid objection to the institution of quarantine. If it comes to a choice between the infection of a lazaretto, containing at most but a hundred or two persons, or the spreading of contagious disease broadcast through a large town, few will be found to question which is the preferable of two evils. On a par with the foregoing, and of as little importance as a valid argument, is the complaint of the inconveniences to which passengers are subjected by detention at quarantine. No doubt it is extremely unpleasant after a long voyage, and when almost in sight of home, to be refused admission to pratique; but, in the first place, were a uniform system of quarantine in operation throughout the United States, the certainty of such delay would be well understood, and persons would refrain from coming from infected ports during the fever season except in cases of necessity; and, in the second place, it is unreasonable that a large city should jeopardize the lives of thousands of its inhabitants to avoid inconveniencing the few passengers who may arrive from foreign ports. Moreover, leading quarantineists now are of opinion that it is unnecessary to the efficiency of a quarantine that healthy persons should be detained any longer than may be necessary to render it certain that they have not within them the seeds of disease, and to destroy all germs of contagion which might have infected their clothing or baggage. The *point d'appui* of the quarantine of the future is to be the disinfection of the ship and her cargo, and the care of the sick, and the well will be subjected to detention only so long as to insure their safety and avoid the possibility of their infecting the place of their destination.

5. It is further alleged that the difficulty of obtaining accurate information as to the health of the ports of departure is an insuperable obstacle in the way of an efficient quarantine. This may be granted under the present system, controlled entirely by State or municipal authority; but it would not be true of a quarantine managed by the General Government, which could instruct its foreign consuls in all ports where yellow fever prevails endemically to forward frequent reports of the condition of the places where they are resident. The lines of telegraph now are so widely extended that there would be few towns of any consequence from which a daily report could not be received. Some ports, as Havana and Vera Cruz, may be assumed to be always infected; while others may always be considered as healthy, unless positive evidence to the contrary is received. Every health-officer should be required to obtain all the information possible as to the ports from which vessels are likely to arrive, and, aided by the reports obtained from consuls, there is no reason why the most exact knowledge should not be had relative to the health of the whole yellow-fever zone.

6. The last and most important objection to be noticed is, that quarantine places unnecessary restrictions on commercial enterprises by interference with the transit of goods by the detention of ships, by the losses of perishable articles, such as fruits, and by the additional

expense attendant on increased freightage and insurance charges from delay. These charges seem very plausible, and require to be examined with some care to expose their fallacy. It is not to be denied that under the present unequal system much inconvenience results to those engaged in foreign trade; but it is believed that many of the present restrictions can be so modified, by a wise law, as to meet the acceptance even of those engaged in the West India traffic. In a subsequent portion of this report, occasion will be taken to notice the abuses and defects of the present want of system in the southern quarantines, and to suggest proper remedies; at present, I desire merely to show that the charge above mentioned cannot be fairly sustained as a reason why quarantines should be abandoned altogether. The mistake in this case grows out of the assumption that the only persons whose interests are to be considered are those who are, directly or indirectly, engaged in commerce with West Indian or Mexican ports. But this is not a fair view of the question. "Commerce," remarks the distinguished chairman of the New Orleans Chamber of Commerce, "is as much the life of the city merchant as of the ship-owner." The only vessels that need be subjected to delay at quarantine are those coming from West Indian or Mexican ports, and not even all those, but only such as arrive from places where yellow fever is actually prevailing. The business done by these vessels constitutes but a very small portion of the trade of any of the southern towns. Let there be an epidemic in New Orleans, Charleston, or Galveston, and all their immense traffic with the interior is immediately cut off or greatly diminished. Country merchants will not visit the cities to buy goods during the progress of an epidemic, not only on account of the personal danger to themselves, but also because the goods they buy may be infected, and thus the disease be introduced into the country towns. This actually happened at Washington, Louisiana, in 1826, at Opelousas in 1828, and at Galveston in 1858. Moreover, New York, and all other places at the North, enforce quarantine against the southern sea-ports as soon as yellow fever appears at any of them; and thus the presence of the disease in the latter operates as a restriction on the great trade between the two sections of the country; a matter of far greater importance to the South than the temporary interruption to her West India commerce, which would be caused by an absolute quarantine, conducted on rational principles. Even if such a system had the effect of entirely extinguishing the West India commerce, it would still be a pecuniary gain to the South in the increased trade which would come to her ports from other directions, as a result of the feeling of security accruing from the certainty that these places would be kept healthy.

Should the restrictions on the commerce with the West Indies by quarantine amount to a suspension of the whole trade, for six months each year, the evils to the city will be less than it now suffers from the annual apprehension of the fever, and the pecuniary loss of a hundred years by the quarantine establishment cannot equal the ruin and desolation of a single season of the pestilence. * * * Is the health of the city to be placed in competition with a few cargoes of sugar and molasses, introduced without care or caution, so as to afford a luxury to our people at the least possible expense of money and at the greatest cost of human life? (Hume, Report to City Council of Charleston, Charleston Medical Journal, vol. 9, pp. 150-151.)

The editor of this journal further remarks:

We would recommend a more stringent quarantine system, which would exclude all vessels from infected ports from our harbor. The petty traffic, during the summer, with the tropical ports usually infected with yellow fever, should not be allowed to continue, as millions of dollars are lost to the city when fever is introduced, and hundreds of lives are wantonly sacrificed. We trust that in future the city authorities

will look to the interest of the many, and enforce the quarantine law now in existence, or enact others which may prove efficient. (Ibid., vol. 11, p. 850.)

It is admitted that much inconvenience would result to the mercantile community from the strict enforcement of the aforesaid measures, (of quarantine,) but it is believed that the loss of property in the aggregate would be much greater if our citizens shall be compelled annually to flee from the pestilence than would result from a system of strict quarantine, duly observed and rigidly enforced. (Dr. A. F. Vaché, Letter to Committee of House of Assembly of New York, November 5, 1845.)

Vexatious and inconvenient as quarantines may be, yet even under the worst circumstances, their restraints fall upon a very small portion of any community, and those the ones best able to bear them. An epidemic of yellow fever affects all classes and conditions. It brings desolation into every household, paralyses trade, stops immigration, and causes an enormous waste of money and the material resources which go to make up the prosperity of any city. Especially in its present condition the South needs men, yet those who would add to its material prosperity will not go where they cannot have a permanent residence for themselves and their families, but are obliged to leave every summer to escape the pestilence. It may safely be asserted that the southern cities would soon double their population were it not for the dread which universally exists of these epidemics of yellow fever. Replace this feeling by one of security, such as will be given by a well-regulated quarantine, and the unequalled advantages which the southern sea-port towns offer for commercial enterprises of every kind will attract the capital and labor which more than anything else they require. The public mind is not disposed to theorize on such questions. "It demands protection against the importation of infectious disease, and will not sanction the abolition of quarantine inspections." The moral effect of an efficient quarantine on the community at large outweighs in its importance all the inconveniences resulting from the restrictions placed on a portion of the southern trade; and when to this is added, as it justly may be, its absolute protective influence, the objections made to its continuance will not for a moment stand the ordeal of investigation. The whole argument may be summed up in the following words of wisdom from the pen of Professor John T. Metcalfe:

To abandon quarantine is to put a price on human life and barter it for trade. (Essays of the United States Sanitary Commission, p. 272.)

It being then conceded that if the Southern and Gulf ports are to be protected from periodical visits of yellow fever, an effective quarantine must be maintained, the question next arises whether those now in operation at the South are sufficient to accomplish the desired end. To this there can, unfortunately, be but one answer. They neither commend themselves to the medical profession nor to the community at large. While agreeing in their main features, they lack that uniformity which is especially desirable to secure efficiency. A brief abstract of the laws now in operation in the various States will present their deficiency in this regard more forcibly than any description.

In Virginia it is left entirely optional with the authorities of any town whether they will establish a quarantine or not, but even if they decide to do so, the consent of the county court must first be obtained before they can use any land without the limits of their town. They (the town-council) are authorized to prescribe all rules and regulations for the management of such quarantine. The health-officer is appointed by the town-council, and has authority to direct what vessels are to be quarantined, and may cause *all* persons arriving in such vessels, or handling cargoes, to be removed to a hospital, at his own discretion.

All expenses incurred by the quarantine are to be paid by the master or owner of the vessel, or by the person on whose behalf such expense is incurred.

Penalties for violations of quarantine range from five to five hundred dollars fine, and may be collected before any justice of the peace. Persons coming into town by land, if infected with dangerous disease, may be detained by the health-officer, and restrained from traveling, *unless it is to return to the State from which he came*. Pilots are directed to conduct all vessels to quarantine that *they find* have infectious disease on board, for which they are allowed an extra fee of \$7; and if, in consequence of his having gone on board of a vessel having contagious disease among her crew or passengers, any pilot is detained in quarantine, he is allowed \$3 per day for each day's detention. Both of these extra fees are to be paid by the master or owner of the vessel.

With these exceptions, no provision is made for the collection of fees, leaving it to be presumed that the amount of such fees is optional with the town-council or the health-officer. (Code of Virginia, 1860, pp. 447, 448, 483.)

The law of the State of North Carolina provides only for a quarantine at the mouth of the Cape Fear River. It is presumed if any other port in the State desires a quarantine, that the municipal authorities will take such action as they see fit. The health-officer (designated in the law as "medical quarantine officer") is appointed by the governor, and is authorized "to prescribe such regulations as may be necessary for the protection of the inhabitants from contagious diseases." He is required to make ont a monthly report of all receipts and disbursements, and to pay over all moneys received to the treasurer of the State. The State furnishes the boat for the use of the health-officer, and establishes the quarantine hospital; but all persons employed at the station are designated by the health-officer. Vessels subject to visit and inspection are required to pay a fee of \$5, and every sick person taken to hospital \$3 a day, the vessel being held responsible for all such expenses. The medical officer alone has authority to declare what ports are infected.

Pilots are required to bring vessels to the quarantine anchorage, and any pilot violating the law forfeits his commission.

Masters of vessels and other persons refusing to obey the quarantine regulations forfeit and pay a fine of \$200 for every day they so refuse, and all persons violating any regulation prescribed by the health-officer forfeit \$200 for each offense. All penalties and forfeitures so incurred "may be recovered before any jurisdiction having cognizance of the sum due, and applied, *one-half to the informer*, the other half to the payment of the expenses of the quarantine establishment."

The health-officer is authorized to issue his warrant to any sheriff or other officer, commanding him to arrest any person violating the quarantine. The compensation of the health-officer is fixed at \$600 a year, and of the boat's crew at \$20 a month. (Laws of North Carolina, 1868, pp. 46-48.)

By the law of the State of Florida the mayor and aldermen of every incorporated town in the State, upon or adjacent to any bay, river, or harbor, or in the absence of such incorporation, the justices of the peace of any justice's district, are constituted a board of health, who are authorized to take such measures as they may deem necessary for the prevention of the spread of contagious diseases, the expenses to be a charge on such incorporated town, or, in the absence of any incorporation, upon the county, (except as subsequently provided for in the act.)

Such board of health is authorized to appoint "port-inspectors," whose duty it shall be to board all vessels approaching the port from the high seas, and ascertain the condition of health on such vessels, and, if they consider them infected, are authorized to order them into quarantine. *Pilots may be appointed port-inspectors.* The board of health is required to appoint a port-physician, who *may* be required to examine into the condition of any vessel ordered into quarantine.

No vessel in quarantine is permitted to approach the port or town unless the master thereof has a certificate from such physician to the effect that no danger to the public health is likely to occur thereby; and if disease break out on any vessel while in port, the board of health is authorized to remove her to the quarantine-station.

The location of the quarantine-station, and all rules and regulations for its governance, and the number and character of the employes, are fixed by the board of health. Sheriffs and constables are required to aid the board in enforcing these rules.

Violators of the law are liable to a fine not exceeding \$300.

The governor of the State is authorized to issue his proclamation declaring what ports or localities are infected.

Masters, pursers, and owners of ships refusing to obey the orders of a port-physician or port-inspector may be fined not to exceed \$1,000, or imprisoned until such fine and the costs be paid; and any vessel may be attached or may be sold for satisfaction of such fine and costs.

The mayor and aldermen of the town prescribe the compensation of the port-physician and port-inspector; the former is paid out of the treasury of the town, and the latter by the master or owner of the ship placed in quarantine. There is no section fixing the amount of the fees to be collected. Unless the vessel has contagious disease on board, quarantine is limited to twenty days. Whenever practicable, the duties of port-physician and port-inspector shall be performed by one person. (Laws of Florida, 1869, pp. 15, 23, 26.)

The law of the State of South Carolina is based upon that of New York, and is very complete in its details. It provides a quarantine for the ports of Charleston, Georgetown, and Hilton Head.

The health-officers at each of these ports are appointed by the governor, and hold office for two years, unless sooner removed. The one at Charleston receives a salary of \$1,500 per annum, and those at the other places \$1,200, payable quarterly out of the treasury of the State. In addition, each health-officer is entitled to \$15 per month for boat-hire and incidental expenses. The law prescribes what vessels shall be quarantined, as follows:

1. All vessels coming from infected ports, or having any case of contagious or pestilential disease on board during the voyage and arriving between May 1 and November 1, are quarantined for at least thirty days after arrival and twenty days after their cargo has been discharged, and undergo such further detention as may be considered necessary by the health-officer.

2. All vessels from any place in Asia, Africa, or the Mediterranean, or from the West Indies, Bermuda, or Western Islands, or from any place in America, in the ordinary passage from which they pass south of Hilton Head, and all vessels having had any sickness on board during their voyage arriving between the same dates, shall be subject to visitation by the health-officer, but shall not be detained unless they have had contagious or infectious disease on board during the passage, in which case they shall undergo such quarantine as the health-officer may prescribe. Vessels navigated by steam are not to be detained

longer than may be considered necessary by the health-officer. The health-officers and city officials have power to remove any vessels from the wharves to the quarantine-grounds, and may send thither all goods, stores, or persons arriving by such vessels, and such vessels or persons are not permitted to return to port without the written permission of the health-officer of said port. Vessels arriving at quarantine may put to sea again, provided they do so before breaking bulk. The duties of pilots, in connection with the arrival of vessels, are carefully defined. They are to inform themselves of the probable condition of the vessels they hail, and whether they are subject to quarantine or examination by the health-officer; and if they find that they are so, they are to bring such vessels to anchor within the buoys marking the quarantine anchorage, and to be careful to see that no violations of the quarantine act are committed while the vessel or vessels are under their charge. They are further required to subject themselves to such detention for fumigation and purification as may be considered necessary by the health-officer. Health-officers are required to reside at or near the quarantine-ground, and must visit every vessel subject to examination immediately on arrival, between sunrise and sunset; to inquire into the health of all persons on board, and the condition of the cargo; inspect the bill of health, manifest, and log-book; examine on oath any or all persons on board, so as to enable them to judge as to the disposition to be made of the vessel. Whenever any vessel is placed in quarantine, the health-officer is required to report all the facts to the mayor. Health-officers have entire control over affairs at their stations, and may cause vessels to be anchored at such places as they may think the safest for the public health; may cause persons or cargo to be removed from any vessel, and said vessel to be disinfected or purified in such manner as he shall direct; and may destroy any bedding, clothing, or cargo as they may judge necessary to be so destroyed to prevent infection, provided that in the case of the destruction of cargo, the concurrence of the mayor of the city shall first be had. They are also authorized to administer oaths and take affidavits in all examinations prescribed by law. Boats are forbidden to pass through the range of vessels lying at quarantine, and lighters forbidden to unload such vessels without permission of the health-officer. All expenses incurred at the quarantine-stations shall be paid by the master, owner, or consignee of such vessel, and all such expenses shall be a lien on the vessel, and the health-officer may detain such vessel at the quarantine-station until such expenses are paid. To oppose or obstruct the health-officer in the performance of his duties is a misdemeanor, punishable by a fine of not less than \$100 nor more than \$500, or by imprisonment in the penitentiary from three to six months. Masters of vessels who refuse or neglect to obey the provisions of the quarantine law, or give false information relative to their vessel, or the health of the places from which they departed, or any other person violating any of the provisions of the act, are guilty of a misdemeanor, and may be punished by a fine not exceeding \$2,000, or by imprisonment not exceeding twelve months, or both. Persons who are aggrieved by any decision or order of the health-officer may appeal to a board composed of the governor, attorney-general, and comptroller-general, who shall have power to reverse or modify such order or decision of the health-officer. The governor may, from time to time, declare by proclamation what ports are to be considered infected within the meaning of the act. There is no provision made by this law for the collection of fees for visiting vessels or fixing the amount of such fees. (Act approved September 26, 1868.)

The quarantine law of Georgia provides that the corporate authorities of any town may prescribe all rules and regulations for the preservation of the public health. In the establishment of quarantine grounds, the jurisdiction of the corporation of Savannah shall be held to extend to all vessels entering at any port or inlet from Ossabaw Sound to Tybee. All persons coming into the State from an infected port, or otherwise violating the quarantine regulations, may be indicted in any county when found, and, on conviction, may be fined not exceeding \$500, or imprisoned at the discretion of the court. Any justice may issue his warrant to any sheriff or constable, commanding him to arrest persons guilty of a violation of the law. Health-officers are appointed by the corporate authorities of the town, and have power to remove any vessel to quarantine, or detain them there as long as they may deem necessary. He is authorized to examine all persons on board, under oath, and any person refusing to answer may be fined \$100. Persons coming into any town by land from an infected place, or suffering from any infectious disease, may be compelled to perform such quarantine as the health-officer may consider necessary. Pilots are required to make themselves acquainted with the condition of vessels they board, and of the ports from which such vessels came; and, when subject to quarantine inspection, to conduct them to the proper anchorage. When a vessel is detained in quarantine no person is permitted to land therefrom, under a penalty of fine and imprisonment. When any vessel is admitted to pratique, the health-officer must give the master thereof a certificate, stating that the vessel has performed quarantine.

The governor of the State may, at his discretion, issue his proclamation, declaring what ports are infected. All fines collected under the provisions of the law are to be paid into the county treasury, and to be expended in carrying out quarantine and sanitary regulations. The health-officer is authorized to collect a fee of \$2 for inspecting each vessel. (Revised Code of Georgia, pp. 254-258.)

In Alabama, any town may establish a quarantine, but if located without the limits of said town, the consent of the county commissioners must first be obtained. All needful regulations for its management are prescribed by the corporate authorities of the town, and persons violating such regulations, after five days' public notice shall have been given of their establishment, shall be fined not less than \$50. Health-officers are appointed by the authorities of the town, and have power to remove all infected or foul vessels to the quarantine anchorage, there to undergo such detention as may be considered necessary for the public health. Any master, seaman, or passenger on board such vessel refusing to answer all questions put to him under oath, relative to the condition or health of the ship or port from which she came, may be fined not less than \$100. Masters of vessels refusing to deliver their log-books, manifests, or bills of health to the health-officer for his information, or to repair with their vessels to the designated anchorage, must be fined not less than \$200. Any justice may, on complaint of a health-officer, issue his warrant to any sheriff, constable, or marshal commanding the arrest of any person charged with violation of the law. Persons coming into town by land from an infected place, may be detained in quarantine, and, on escape therefrom, are subject to a fine of \$100. All expenses are to be paid by the vessel or person in whose behalf such expenses were incurred; and all fines are to be paid into the treasury of the town where the quarantine is established. (Revised Code of Alabama, pp. 230-232.)

The legislature of Mississippi has passed no general quarantine law, but

has simply enacted that the board of police of any town, or the municipal authorities, shall have power to pass such ordinances as they may see fit, to prevent the introduction of infectious or contagious diseases.

The State of Louisiana directs that a quarantine be established on the Mississippi River, not less than seventy miles below the city of New Orleans, and subordinate stations at the Rigolets, (entrance to Lake Pontchartrain,) and on the Atchafalaya River. These stations are to be under the control of a board of health, to be composed of nine competent citizens of the State, three of whom are to be selected by the city council of New Orleans and six to be appointed by the governor of the State, and all to be selected with reference to their known zeal in favor of a quarantine system, and to hold office for one year. This board is to meet once a month, from November till June, and once a week between June and November. This board appoints the resident physicians at the Rigolets and on the Atchafalaya, and all nurses, boatmen, and other employés at every station. They have the power to fix the number of days' quarantine for vessels, provided it be not less than ten; to determine how such quarantine shall be performed; to make all legal arrangements necessary to carry out a proper system; and to issue warrants to any constable, sheriff, or marshal, commanding him to arrest any person charged with violation of the quarantine law.

The resident physician at the station on the Mississippi River is appointed by the governor of the State, and receives a salary of \$5,000 a year, and is entitled to one assistant at a salary of \$2,000 a year. He is required to visit every vessel approaching New Orleans by way of the Mississippi River, and is entitled to charge fees as follows: On vessels of one thousand tons burden, \$30; ships less than one thousand tons burden, \$20; barks, \$15; brigs, \$10; schooners, \$7.50; steamboats, \$5: provided that the fee for steamships coming from any port in Alabama, Florida, or Texas, shall be \$10; and for all other steamships, \$20. The health-officer has power to detain vessels, with their crews, passengers, and cargoes, whenever they come from an infected port, or where such vessels have any case of contagious disease on board; and may keep them at quarantine for such time as he may consider necessary, provided it be not less than ten days. He can compel the captain of any vessel so detained to land the sick at the quarantine ground, and may cause such vessels to be cleansed and fumigated. All expenses, including \$5 for every person so landed, shall be borne by the master, owner, or consignee of the vessel. The board of health may, from time to time, delegate such other powers to the resident physician as may be necessary for the performance of his duties.

The governor is required to issue his proclamation on the advice of the board of health, declaring what ports are to be considered as infected, after which all vessels arriving at any of the quarantine stations from such ports are to be subject to all regulations prescribed by the board of health. Masters of vessels refusing to obey any of the quarantine regulations may be fined not exceeding \$2,000, or be imprisoned for twelve months, or both. All persons who neglect or refuse to obey the orders of the board of health may be punished by fine and imprisonment, at the discretion of the court. Resident physicians must report to the attorney-general all violations of the statute, and it shall be the duty of this official to prosecute the offenders. During the summer tow-boats are to be subject to the same inspections as vessels coming from sea. Any person going on board a vessel detained at quarantine, without permission from the health officer, is subject to a fine of \$50. When a vessel is admitted to pratique, the health-officer must

give the master of such vessel a certificate, which shall be delivered to the harbor-master at New Orleans on her arrival.

Vessels out ten days from infected ports having clean bills of health, and having had no sickness on board during the voyage, will only be detained at the quarantine-station long enough to undergo fumigation.

The health-officer shall also have power to grant permits to acclimated persons to proceed to the city without detention.

In cases of emergency the board of health shall have power to issue a proclamation of quarantine, and to enforce the same, without reference to the governor of the State. (Acts approved March 15, 1855, and March 18, 1858.)

In Texas the governor is authorized to issue his proclamation declaring quarantine, whenever in his judgment it shall be necessary; and for such length of time as he may deem essential to prevent the introduction of any infectious or contagious disease. As soon as practicable after such proclamation is issued the corporate authorities of every town and city on the coast shall establish a quarantine-station, and appoint a competent physician as health-officer, and furnish him with everything necessary for the proper discharge of his duties.

Health-officers are required to make a rigid examination of every vessel coming from an infected port, whether she has a clean bill of health or not. They are authorized to take the affidavits of the master as to the health of himself and crew; may detain the vessel at quarantine for the length of time designated in the proclamation of the governor, and may use force when required in order to discharge their duties.

When there are no town or city authorities, the governor shall appoint the health-officer and prescribe regulations for quarantine.

Any vessel arriving at a quarantine-station without a clean bill of health shall be taken possession of by the health-officer, and the master thereof shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined, not less than \$500 nor more than \$5,000; and said vessel shall be held by the health-officer until such fine and costs are paid or such vessel replevied; provided that the payment of the fine and costs shall not operate as a release of the vessel from undergoing the usual detention at quarantine. Every master of a vessel that passes, or attempts to pass, the quarantine-station without permission from the health-officer is deemed guilty of a felony, and, on conviction thereof, may be imprisoned in the penitentiary not less than one year nor more than five years, or fined not less than \$500 nor more than \$10,000. Persons belonging to a vessel, when placed in quarantine, who shall go ashore without permission of the health-officer shall be fined not less than \$50 nor more than \$500.

Any person who lands, or permits to be landed, any goods, wares, or merchandise, from such vessel, without the written permission of the health-officer, shall be fined not less than \$50 nor more than \$1,000 for each article of merchandise so landed. The health-officer shall collect fees as follows: for each vessel of one hundred tons or under, \$5; for every vessel of over one hundred tons, \$5; and also a further fee of 1½ cents for each ton. These fees are to be reported to the corporate authorities of the town where quarantine is established, and all fees and fines collected shall be used to defray the expenses of quarantine. On the cessation of the quarantine in each year the town or city authorities shall make a statement of receipts and expenditures to the comptroller of the State, and, should the expenditures amount to a greater sum than the receipts, they shall draw from the treasury of the State, upon an order from the comptroller, a sum sufficient to meet the defi-

ciency; and should the receipts exceed the expenditures, the excess shall be appropriated to the maintenance of marine hospitals in their respective towns or cities. Any town or city may establish such additional regulations for quarantine as the authorities thereof may judge advisable. (General Laws of Texas, 1870, pp. 3, 5, 75-77.)

Besides these general laws, the municipal authorities of most of the southern cities and towns have passed ordinances defining rules and regulations for the management of their respective quarantines, and these differ from each other to the same extent that the general laws do. It needs but a glance at the foregoing abstracts to be convinced how impossible it is to maintain an effective system of quarantine based on such heterogeneous enactments. In some cases the health-officer is appointed by the governor, in others by the municipal authorities; in some, the administration of sanitary measures is confided to a board of health, in others to the municipal councils, and in others to the health-officer alone. Sometimes the fees collected are to be paid into the State treasury, at others into the city; and sometimes no provision at all is made for their imposition. The amount of fees and penalties imposed for violation of law differs in every State to such an extent as to produce confusion. The authority of the health-officer in some cases is almost absolute, in others he is nearly powerless. In no case is proper provision made for the disinfection and fumigation of vessels and cargoes; the mode of doing so being left entirely to the discretion of the health-officer. In more than one instance the duty of inspecting vessels is confided to pilots, a class of men whose education does not permit them to be competent judges of the nature of sickness on a ship or of her sanitary condition. Unquestionably, the best of all these laws is that of South Carolina; yet this is defective in many particulars, as, for instance, in not defining and classifying cargoes so as to declare which may be fomites for the transmission of the disease and which are harmless. Beyond one or two vague expressions relative to "competency," there does not seem in any of these laws any requirements insisted on defining the qualifications required in the health-officer; and with the exception of New Orleans, the salaries paid are such as to render it impossible that physicians of experience in hygienic laws can be obtained, unless they are permitted to devote a portion of their time to other pursuits, which in itself would be a fatal bar to their efficiency.

The want of uniformity in regard to the duration of the quarantine will also be noticed. In some cases it is dependent on the proclamation of the governor, at others on the will of the board of health or the visiting physician. Unless issued after the receipt of accurate information as to the condition of all the West Indian and Mexican ports, which is not the case, the proclamation of the governor is an absurdity. For instance, the governor of Louisiana issues his proclamation, specifying certain ports which he declares infected, on and after the 1st of July, utterly irrespective of what their actual condition of health may be; and all vessels arriving from any of those ports are obliged to undergo a certain number of days' detention, without regard to their condition or the health of their crews and passengers. If a ship should have left Havana on the 30th of June, she comes from a healthy port and is not quarantined; but if her departure takes place the next day, she is detained for ten days.

A second objection to the present system of quarantine at the South is in its administration. Defects and abuses exist fatal to efficiency, which can only be removed by the adoption of an entirely different organization.

The first relates to the character of the health-officers. While some of these, notably at the larger ports, are men of character and experience, most owe their appointments to political influence, personal popularity, or, especially unimportant places, to the fact that, owing to the paucity of salary, no one else could be found to accept the place. I could not learn that provision is ever made for the examination of health-officers as to their qualification for such an important trust; nor are inspections ever made of their stations, except perhaps at the important commercial centers.

A second defect grows out of the neglect of the authorities to provide suitable quarantine accommodations. The station on the Mississippi River, below New Orleans, is an exception, but it is the only one with which I am acquainted. A complete quarantine-station should consist of a hospital for the sick, a commodious house for the temporary detention of the well, a residence for the health-officer, and store houses for the care, fumigation, and disinfection of cargoes.

Some stations, as at Galveston, have none of these; others have a building which may be used for a hospital; but generally there is no provision made for the storage of cargoes or the residence of the health-officer. In consequence of this last omission this official resides in the town for which the quarantine is established, and only visits his station when called on to inspect a vessel. Apart from the constant communication thus kept up between the station and the town, which may in itself be the means of introducing disease, it is manifest that efficiency must be sacrificed where the health-officer resides miles away from the scene of his duties, and must consequently intrust a large share of his responsibility to subordinates.

A third defect is found in the manner in which the health-officer performs the duties. There is a great deal in the various laws about inspections of log-books, manifests, and bills of health; mustering of passengers and crew; examinations of masters and others under oath; but practically all these requirements are seldom enforced. What actually takes place is for the health-officer to come on board as soon as the vessel heaves to off the quarantine-ground, hurry to the captain or purser's office, and, if she come from a non-infected port, simply inquire if all are well on board, receive his fee, and depart as soon as possible. If from an infected port, he directs the master to bring his ship to anchor, and does not concern himself further about her unless she have sickness on board. During his brief stay on board, the steward of the ship is generally engaged in loading the health-officer's boat with fruit, ice, or other delicacies, which are received as a matter of course, and, indeed, any omission in this particular has been known to subject certain lines to great inconveniences. Lest this may be thought an exaggeration, I may mention that the health-officer of one of the southern ports told me some years ago that he saved all his salary, as he was entirely supported by the great variety of articles he received in this way. As at present administered, the visits of inspection are simply a farce, the only object being to collect the fee and receive the *douceurs*, which are the perquisites of the health-officer.

The present system of collecting fees is a serious abuse, which goes a great way to dissatisfy the mercantile interests with quarantine.

At some of the southern ports, especially those on the coast of Texas, the fees are placed so high as to yield a considerable revenue, and a large portion of them is collected from vessels in the coastwise trade, that should not justly be brought within the jurisdiction of the quarantine law at all. Thus, at Galveston, Texas, there is a large trade in

lumber from Sabine and Calcasieu, which is carried on with small schooners, ranging from twelve to forty-five tons burden. Each of these little vessels, coming from ports less than a hundred miles distant, is required to pay \$5 quarantine tax on her arrival at Galveston. She unloads, and taking in a cargo of groceries or "store goods," or, quite as often, only in ballast, returns to Sabine, where she is again mulcted of \$5. Many of these vessels make one or two trips a week, and, their average net profit not exceeding \$40 per round trip, they are thus required to pay about one-fourth of this amount as a tax to the State. Further, I was informed by an intelligent citizen of Sabine that these boats are hardly ever inspected by the health-officer. His boat is sent out, with the "permission to pass" duly made out and signed, and, coming alongside the inward-bound craft, the boatman passes up the certificate, the money is handed over, and not a question asked.

The steamers of the Morgan line run from New Orleans to Galveston, thence to Indianola, then return to Galveston, and thence back to their port of departure. Other steamers of the same line run to Brazos Santiago, via Rockport or Aransas Pass. At each of the Texas ports they have been required to pay fees, amounting to \$20 for each vessel, and, on returning to New Orleans or Berwick's Bay, \$10 more. I was informed by Mr. A. C. Hutchinson, agent for the line in New Orleans, that it paid over \$9,000 quarantine fees in 1871. No examination of the ship or muster of the crew is ever made. This one line has, as is well known, paid fees more than sufficient to support the quarantine along the whole Texas coast. Early this year the agents of this line sued the health-officer at Galveston for the recovery of this tax, and, pending a decision, applied to Justice Joseph P. Bradley, of the United States Supreme Court, for an injunction restraining the health-officer from collecting any more fees. Justice Bradley, in granting the injunction, remarks:

In this case we think that the charge which by act of the legislature is authorized to be exacted from all vessels coming to the quarantine-ground, namely, \$5 for the first one hundred tons, and $1\frac{1}{2}$ cents for each additional ton, is a "duty of tonnage" within the meaning of the Constitution; and that it is also an unconstitutional tax upon the commerce of the port. The States have a right to establish quarantine regulations for the preservation of the public health; but they have no right to place toll-gatherers at the gateways of commerce, and lay indiscriminate exactions upon all vessels that enter thereby.

We think, therefore, that the tax-duty or fee which is complained of is unauthorized and void, and while the complainant might, by successive actions at law, recover the amount exacted, this court, as a court of equity, in order to prevent a multiplicity of suits, has a right to entertain a bill for an injunction. We therefore grant the injunction as prayed, with liberty to the complainant to enter a final decree for a perpetual injunction, if he elects to accept the answer without replying thereto, unless the defendant desires the usual time for final hearing.

Since the rendering of the above decision no fees have been collected at any of the Texas ports. While on this subject, it may be remarked that it is very questionable whether the present system of supporting quarantines by fees collected from vessels is not altogether inadvisable. At most ports the whole expense of maintaining a quarantine is paid by a few ship-owners, who derive no benefit therefrom, but are rather embarrassed by an inquisition which is solely for the protection of the community at large. Where a vessel at quarantine requires fumigation and cleaning, or where hospital accommodation has to be provided for the sick, it is but proper that the extra expense attendant on such measures should be borne by the owners of the infected ships, who would thus be rendered directly responsible that their vessels were not the agents for the introduction of disease. With this exception, a direct tax on the

community at large that reap the benefit of immunity from pestilence would seem more just. Not only the unacclimated but every class benefits by freedom from epidemics, and there is no reason why all should not bear a share of the expense of the maintenance.

Still another defect in the present administration is found in the manner in which vessels are compelled to undergo quarantine. The custom at most of all the stations is to detain vessels coming from an infected port for a certain number of days (usually ten) from the date of their departure from such port, or (if she should have had any sickness on board during the passage or on arrival) for ten days from the disappearance of the last case. Now, the period of incubation of yellow fever being variously stated from two to forty-three days, (*Gazette médicale de Paris*, September 28, 1872, p. 477,) it is manifest that either this period must be too long or too short, and that any detention founded on what is yet a matter of mere speculation must be empirical. It is, moreover, objectionable as leading to unnecessary restrictions on commerce by delaying the days of sailing of regular lines, and by subjecting merchants and shippers to vexatious expense, exciting a strong prejudice against quarantine. Further than this, it is of not the slightest use to detain a vessel at a quarantine station, even for six months, if her cargo be not broken out. It is in the hold of the ship that the morbid poison is carried, and the air at the bottom of the hold is certain to be most impregnated with it. It is impossible to disinfect this cavity by merely raising the hatches and making fumigations without the removal of the cargo, and yet if disinfection is practiced at all (which is very seldom) this is the mode adopted. Secondly, no discrimination is made between different kinds of cargo. All hygienists know that some articles are more apt to retain the infection of a contagious disease than others: these are cotton and woolen goods, hides, rags, coal, &c. Others may become dangerous by undergoing putrefactive decomposition after shipment, as sugar, coffee, and fruits; while many others are under all circumstances harmless. No distinction is made at the majority of stations between these cargoes; they are alike detained, and, for want of proper accommodation on shore, are kept in the hold of the vessel—an entirely useless procedure.

Thirdly, the manner in which passengers are treated is not in accordance with the most enlightened views on the subject of the origin of epidemic diseases. Sick and healthy persons are detained together on ship-board, or at the station on shore, if there be any building for the purpose—a course which is extremely likely to increase the amount of sickness, and thus develop new germs for the propagation of the disease; so that the quarantine-station soon becomes a “pest embankment,” which may infect other vessels passing it or temporarily detained in the vicinity.

The rational management of a vessel required to undergo quarantine should be as follows:

First, her passengers and crew should be removed from on board, the sick to an hospital for treatment, and the healthy to a separate building. The latter should be required to change their clothes, and to submit to such cleansing of their persons and other disinfection as the health-officer may judge advisable; their clothing and personal baggage should be thoroughly disinfected by means of the most approved modern appliances, and then those who are acclimated should be permitted to pass the quarantine, while others may be detained in a quarantine of observation; no longer, however, than is necessary to prove that they are free from the morbid elements of the fever. Secondly, the cargo

should be broken out and assorted, and, if of a character to transport infection, should be placed in warehouses in the vicinity of the quarantine grounds, whence it should not be removed until the occurrence of frost, while, if harmless, after due fumigation, it might be transported direct to its destination. Cargoes of fruit, sugar, coffee, canned articles, provisions, &c., should be thoroughly inspected, and whatever portion found to be tainted or spoiled immediately destroyed; but there should be no detention of articles of a perishable nature beyond the period necessary for such inspection. Dr. Elisha Harris, of New York, suggests that samples of cargoes might be specially disinfected by artificial cold, and then safely offered for sale. Probably the use of superheated steam or of Wells's apparatus for the use of steam and carbolic acid spray could also be made serviceable with all cargoes that are not of a character to be injured thereby. Thirdly, the cargo being removed, the vessel should be properly ventilated, fumigated, and disinfected; not in the hasty and imperfect manner usually adopted, but so completely as to render it impossible that any part of her hold, fore-castle, steerage, or cabin shall remain in a foul condition. The baggage, clothing, and bedding of any person who has died on board should be destroyed by fire; the ship constantly ventilated by means of wind-sails; the bilge-water pumped out two or three times a day, and water from outside pumped in, and every portion of her cavities subjected to disinfection and fumigation. This need not take more than two or three days, after which it is useless to detain the vessel, and she should be permitted to proceed to her destination. It is true that cases have been known where the fever has broken out on ships, after the most complete disinfection, (notably on the United States frigate *Susquehanna* some years ago,) and it is not claimed that this course will procure absolute security, but that it will be all that is necessary in the majority of instances, and that no length of detention, after proper breaking out and disinfection, adds anything to the security. On the subject under discussion, Harris remarks:

The accumulation of a large amount of infected materials without complete ventilation, or the close aggregation of a large number of infected vessels with their cargoes in the absence of other ventilation than that attainable by the usual means on ship-board, would, during any of the summer months, constitute a *pest embankment*, dangerous to all persons and vessels coming in near proximity thereto. Therefore, we must conclude that a safe anchorage, completely removed from the track of other vessels and the ordinary paths of commercial intercourse, with ample provisions and appliances for securing the storage and complete ventilation of cargoes, &c., constitute most essential requisites for a quarantine establishment.

The ligherage of cargoes directly from infected vessels to the city or elsewhere should be prohibited, and in its stead a commodious warehouse should be provided near the anchorage on the most isolated portion of the quarantine grounds. To those warehouses all cargoes should be transferred from infected vessels immediately after arriving. (Reply to Quarantine Commissioners of New York, January 28, 1858, Assembly Document No. 69 of 1858, p. 27.)

The last inquiry made by the joint resolution is, "What system will least interfere with the interests of commerce at said ports?" Having already given my opinion that quarantine can be made an effective protection against the invasions of yellow fever, and that under a wise administration of its provision it need not interfere to any great extent with the commercial prosperity of the southern ports, and having shown in the preceding pages that the quarantines under the present State and municipal regulations are not to be depended upon to accomplish the desired end, it follows that some other system must be looked to to secure immunity from epidemics. On this point the opinions of those with whom I had an opportunity of conversing was nearly unanimous that

only under the direction and control of the General Government can any reasonable degree of protection be afforded, conjoined with such competency of administration as will afford the largest liberty to the interests of trade, consistent with public safety.

The board of health of the city of Pensacola state that—

This board does earnestly solicit that Congress may take such further action upon the subject as shall place the whole matter of quarantine under the exclusive jurisdiction and control of the authorities of the United States.

Dr. Jerome Cochran, health-officer of the city of Mobile, writes:

I am thoroughly satisfied that a quarantine under the control of the General Government would be far more efficient than any other plan that can be adopted. We need a complete sanitary cordon all along the Atlantic coast, and especially all along the coast of the Gulf of Mexico, and this will be very difficult under the action of the various State and municipal governments. The fever-poison follows the lines of commercial intercourse, and the power which regulates commerce should be extended also to the regulation of quarantine. (Letter, September 23, 1872.)

Professor J. T. Gilmore, of Mobile, writes:

Believing that the yellow fever can be imported, I, of course, am an advocate of efficient quarantine, and I am satisfied that this cannot be done except by the Federal Government. Local and private interests always so vitiate the efficiency of a local quarantine that it is rendered useless. (Letter, September 10, 1872.)

Mr. J. H. Oglesby, president of the New Orleans Chamber of Commerce, is of opinion that—

The laws imposing quarantine from foreign infected ports ought to be uniform throughout the United States. In giving expression to this opinion it is not necessary to discuss the extent of power legally to be exercised by the Federal Government. It is sufficient to know that the power to regulate commerce enables Congress to impose a uniform tax on all commodities imported, and so prevent one city from intercepting the commerce of another by an offer of more favorable duties on such imports. The effects of the quarantine system, as adopted by the several States, enables one city to cut off all communication with another, except under certain conditions fatal to the trade. Congress should, therefore, organize an appropriate bureau of public health. With the chief of this department should be reposed the power to make, at his discretion, proclamation of the existence of infectious or epidemic diseases at any foreign port, and thereupon to declare such foreign port interdicted (except on conditions defined by law) with all ports within the jurisdiction of the United States, and to make such interdiction at his discretion. The health authorities at all such American ports should be appointed or approved by the bureau of public health. The salaries of all such officers and employes so appointed, with all other expenses properly attending the enforcement of the law, should be paid out of the Federal Treasury, and in no other manner. * * * The Federal Government can better preserve the general health and protect the general commerce than can be done by the competitions or even combinations of rival cities. (Letter, July 20, 1872.)

Many assurances of a similar character were given to me in conversation with persons, both professional and otherwise, in every city visited. It is true that some made the objection that it would be adding to a supposed tendency to centralization on the part of the General Government; but even these acknowledged that, apart from this political consideration, the quarantine would be more efficiently and, at the same time, leniently conducted under national auspices than at present.

There is much truth in the remark of Mr. Oglesby, just quoted, that only by the General Government can those defects in administration be obviated which grow out of the commercial rivalry of different cities, which has often been a serious obstacle in the way of united effort to prevent the introduction of disease. Only under a common authority can a uniform code of regulations be established, which, as already shown, lies at the foundation of all efficiency.

A uniform system of quarantine, operating alike in all our sea-ports, we are persuaded is not only desirable, but is highly essential if we would remove many of the existing

embarrassments to commerce. This prevailing and abused inequality in the laws of quarantine to which our commerce is made subservient operates both oppressively and unjustly; for while those of some States are unnecessarily rigid when enacted, others again are so deficient in wise and proper regulations, or so defective in their enforcement, as to be rendered almost a nullity. (Wilson Jewell, Proceedings First Quarantine Convention, p. 8.)

At many ports that have but little commerce there is at present either no quarantine or only a nominal one, because the revenues from fees are not sufficient to defray the expense of its management. This would be obviated under a general system by the transfer of the surplus accruing at the larger cities to pay such deficiency. Many of these unimportant ports, especially those situated near the Mexican frontier, carry on a trade in small vessels which, being seldom cleansed or repaired, become more dangerous as transports of the germinal principle of the disease than the regular traders to the larger sea-ports. One of these craft introduced the fever into Indianola, Texas, in 1867, whence, as we have seen, it extended over a large portion of the southern country. The facilities for illicit traffic are very great in such places, and the class of vessels so employed are of all others the most difficult to keep under a lax quarantine.

It would obviate, to a great extent, the necessity for detaining vessels on their arrival if precautionary measures were adopted at their port of departure, and during the voyage to insure their being kept in good sanitary condition. Arrangements should be made by international treaty with all friendly powers to insure that the giving of bills of health should not be, as it is now, a mere matter of form, by requiring that all vessels shall be refused clearance until the masters thereof present a certificate from the American consul or commercial agent that they have been inspected by a competent physician and pronounced clean, and that the passengers and crew are in good health on the day of embarkation. In addition, all masters of merchant-vessels coming from ports within the so-called yellow-fever zone should be required to keep on board a supply of the simpler disinfectants, and to use them frequently about their vessel during the voyage, and to inform themselves as to the proper hygienic measures to adopt in the event of the appearance of the disease among the passengers or crew, and especially of the importance of the isolation of the sick as a precaution against its spread. These and similar means would do much to diminish the number of infected ships; but they are of such a character as only to be practically enforced by the National Government.

The importance of obtaining accurate information of the condition of health in the West Indies and Mexico during the yellow-fever season has already been alluded to. Beyond a few chance inquiries made to masters of vessels, the southern health-officers take no pains to gain information on this point; but if they did, it is unlikely that, as merely the officials of a State or municipality, their request, if made to foreign authorities, would meet with the attention the importance of the subject would demand. This information, however, could always be obtained from our consuls abroad, through the State Department, were the Government to assume the care of the public health. The accuracy of the bulletins furnished by the Signal Bureau of the War Department has been found of the greatest service to commerce; a similar system, giving information each week of the health of every port having commercial transactions with the United States would be of vast importance, and equally beneficial both in its effect on commercial interests and public health.

It would no longer be necessary to assume every port to be infected,

and to declare them so by proclamation, and in consequence to subject many vessels to uncalled-for detention; but, on the contrary, health-officers would be enabled to act on positive information furnished them from their official superiors, and would be required to detain but a very small proportion of the vessels arriving even from tropical ports. Thus one great objection to quarantine as a restriction on commerce would be nullified.

If the meteorological phenomena upon which storms depend and their effect upon commerce are deemed of sufficient importance to merit the attention of a government, how much more so are the phases of a disease which renders a large portion of the coast of the United States uninhabitable during several months, which in its periodical visitations sacrifices thousands of valuable lives, paralyzes trade, diminishes immigration, and retards the progress of some of the most important cities on the continent?

A further argument for a national quarantine may be based on the decision of Justice Bradley in the case of *Charles Morgan vs. George W. Peete*, before referred to. This decision, if confirmed, will have the practical effect of preventing the collection of fees for quarantine visitation, and will render the Southern States, especially in their present impoverished condition, averse to maintain any quarantine at all when the expenses have to be paid from State or city treasuries; and it will certainly result in abandonment of quarantine by the smaller towns, where it is of the greatest consequence. The National Government, moreover, is directly interested in the maintenance of an efficient quarantine from the numbers of persons in her employ whose duties require their residence in ports liable to outbreaks of yellow fever.

At present the troops stationed in southern cities are moved into the country every summer at great expense, while the officers of customs, of the courts, &c., are continually exposed to epidemic disease, and often the most important duties of their respective offices seriously embarrassed by their sickness or death. The possible abandonment of even the imperfect quarantines now in operation becomes, therefore, a matter calling for serious consideration by Congress, that a system may be devised which will be both effective and permanent.

The necessity for a vigilant quarantine at the mouth of the Rio Grande, in Texas, furnishes an additional reason why action should be taken by the General Government. This *débouchure* is under the jurisdiction of two nationalities. The quarantine by the State of Texas at this point does no good, because any vessel detained at Clarksville, Texas, can enter at Bagdad, Mexico, and her passengers, cargo, &c., be transported to Matamoras, whence there is no obstacle to their crossing the river to Brownsville, Texas. Yellow fever has been twice introduced into Brownsville by way of Matamoras or the river, and both times from the want of an efficient quarantine. The local and State authorities at Matamoras are extremely averse to a quarantine. This probably grows partially from the unfriendly feeling existing between the two nationalities on this frontier. It is probably that the Mexican government would cordially co-operate with ours in an international quarantine, which would insure the health of the region of country bordering on the Rio Grande, while they might object to take any measures looking to such an end without such international action. Should this not be done it would be necessary to quarantine all persons coming from Mexico to any port on the Texas coast, which has been tried and found impracticable.

While, however, the assumption of quarantine by the National Gov-

ernment would be a step in advance, by affording an opportunity for the abolition of the defective systems now in operation at the South, yet even this will not insure security from epidemics, unless the administration of affairs is intrusted to the proper department of the service.

The creation of a new bureau, to be filled by office-seekers, and of political places for the reward of political partisans, would be but transferring the objectionable features of the present system to the wider arena of national politics, and would soon result as unsatisfactorily. Experience shows that safety lies only in an absolute system, and the past offers examples conclusive enough to an unprejudiced mind that in the administration of the War Department alone will be found that freedom from political influences and authoritative management which will demand absolute obedience to law, conjoined with the largest liberty to the individual consistent with public safety. The Medical Department of the Army numbers among its officers many who have, by the nature of their service, been obliged to make sanitary science a special study, and the possession of this corps of well-trained hygienists would enable the Government to assume, with the least difficulty, the direction of quarantine affairs and at an expense which would be trifling as compared with any civil régime. The admirable service rendered by the Signal Bureau in its weather-reports affords presumptive evidence of the fidelity with which duties of this character would be managed by the Medical Department. Nor will it be deemed irrelevant to point to the uniform efficiency and fidelity with which the War Department has conducted all public trust confided to its charge. Skilled hygienists cannot be obtained from civil life at the salaries the Government would be willing to pay. It would not be at all necessary that every quarantine station should be in charge of a medical officer; but the general management of affairs should be confided to the Surgeon General's Bureau, and be under his supervision, aided by such inspectors as he might consider necessary, who should be detailed from the officers of the medical corps.

This system was adopted after the close of the war in the southern departments, and proved not only eminently successful but entirely satisfactory to the people of the South.

The last of the five propositions laid down at the commencement of this report refers to the necessity of local hygienic measures in arresting the spread of an epidemic. It is germane to the subject to consider briefly some of these local causes which influence the propagation of yellow fever, not only because they are unquestionably of great importance, but also for the reason that a large proportion of the students of yellow fever have found in them a sufficient foundation upon which to build a theory of the domestic origin of the disease, which, not many years ago, was held as orthodox by the majority of physicians all over the world. While more enlightened views of the etiology of contagious disease have done much to render this hypothesis obsolete, yet they should not lead to undervaluation of the importance of cleanliness, disinfection, isolation, and collateral measures, which can never supplant quarantine but may efficaciously supplement it.

The local causes influencing epidemics of yellow fever may be divided into personal, meteorological, terrene, and intramural.

1. By *personal conditions* are meant the presence of large numbers of unacclimated persons in any town subject to visitations of yellow fever.

The history of the disease in the United States proves that this on more than one occasion has exercised a most important influence on the progress of an epidemic.

When Florida was ceded to the United States in 1821, large numbers of adventurers flocked from all parts of the country to seek their fortunes in the new acquisition. Most of them came without the means of rendering themselves comfortable in their new home, and on arrival at Saint Augustine and Pensacola they took possession of the houses left vacant by the Spaniards, where they lived crowded together in unclean, badly-ventilated rooms. Their habits were of the most reckless character, passing the days in drinking, gambling, and cock-fighting: they would not even take the time necessary for the decent cleansing of their persons and their houses.

Consequently, when yellow fever was introduced in 1821 into Saint Augustine, and in 1822 into Pensacola, it found the very food most appropriate for its rapid development, and most fatal epidemics followed.

Unquestionably, an important factor in the wide spread of the great epidemics in 1867 was the immense numbers of discharged soldiers of the Army who had remained at the South after being mustered out of service. It was estimated that there were not less than fifty thousand unacclimated persons in New Orleans alone, most of whom belonged to the class just mentioned. Besides this, the negroes at the close of the war flocked into all the large cities in vast numbers, and although, in general, not susceptible to the poison of the fever, yet by overcrowding the cities, and that in the filthiest and most unhealthy localities, they exercised a great influence on the spread of the epidemic which followed. At least one outbreak in Charleston owed its fatality to the arrival of an unusually large number of immigrants a short time before; and just previous to the great visitation of fever to Buenos Ayres, there had been an extensive immigration from Europe, and the town was crowded with unacclimated foreigners. At Galveston, in 1839, the fever, after raging with great severity for six weeks, suddenly ceased, not because the infection was dead, but because there was no more material upon which it could feed. Every unacclimated person had either run away from town or had suffered an attack. This was proved by the fact that as soon as the refugees began to return the disease broke out again among the newly arrived, and there were a number of deaths. Doubtless, too, the very erratic course often taken by the disease in the progress of an epidemic may be accounted for in this manner; the leaving of certain houses, streets, and districts comparatively unscathed, and its prevalence, with great mortality, in a neighboring locality; the sudden cessation of the epidemic in one district and its equally sudden development in another; or the selection of certain victims in the wards of a hospital into which the disease is brought, leaving others unharmed.

2. The *meteorological conditions* determining the origin or progress of an epidemic are not yet satisfactorily determined, yet enough is known to render it certain that they exercise a great influence. We never find yellow fever prevailing in the winter season in any part of the United States, nor, indeed, very often before June. We always find that on the appearance of frost, or the reduction of the thermometer to 32° Fahrenheit, the epidemic ceases. Hence we may put it down as a positive law that heat is one of the essential elements in its development; and a reference to the preceding sketch of the epidemics in this country will show that the severity of the epidemic has been often in direct proportion to the heat of the season. To this we may add the moisture in the atmosphere. Heavy rains in May, June, and July have almost always preceded the great epidemics. But even apart from these rains, the position of most of the southern cities is such, surrounded by swamps and intersected by bayous, that there is an immense evapora-

tion from large surfaces of stagnant water all the time, rendering the air excessively humid. There was an exception to this rule in the season of 1839, which was extraordinarily dry. "The whole region between 30° and 36° was literally parched with drought. Before the last of August the surface of the earth, to the depth of several feet, had become entirely deprived of all ordinary moisture; vegetation began to droop; creeks and small water-courses became entirely dry, or lower than they had been for many years; the cotton-plant began to shed its leaves, many forest-trees likewise began to shed their leaves." (Monette, *op. cit.*, p. 82.) And yet this exception is rather apparent than real; for this drying-up of the creeks and pools, while it diminished the amount of humidity, intensified other elements favoring yellow-fever development, viz, the exposure of large surfaces of decomposed vegetable matter to the influence of the sun and air, heretofore rendered innocuous by being in solution in water, or so covered from the sun that no decomposition would take place. That the "general atmospheric predisposition," of which some authors write, has any foundation in fact, I am inclined to doubt; for if it did, there should be no reason why the disease should be confined to the towns, and those living in the country on plantations so generally escape. Nor do I think a sufficient number of experiments have been made to warrant the assertion made to me by a southern physician, that he was satisfied the absence of ozone in the atmosphere was the "*fons origo*" of all yellow-fever epidemics. Certainly, a large number of experiments, conducted under my direction during several years in Galveston and New Orleans, led to entirely negative results; the ozone was as often absent in healthy as in sickly seasons, and during 1867, on some days of great mortality, the atmosphere was surcharged with it, and, on others equally fatal, it was entirely absent. But apart from these theoretical considerations, there can be no doubt that very soon after the commencement of an epidemic, especially if the weather be calm and sultry, the whole atmosphere of a town will become so infected as to render it poisonous to any unacclimated person that passes through it. Very soon in the history of all our epidemics, it becomes unnecessary to look for any special infection to trace the progress of the disease, for we find cases springing up in every direction, without any connection either with each other or with the sick. To what can these be due, if not to the general atmospheric infection? It is chiefly in this manner that the holds of ships coming from infected ports so frequently prove sources of disease; when their hatches are battened down, they shut inside a portion of the air of the infected town, which is carried along to the port of destination, and, on arrival, passes out, carrying with it destructive germs, which produce their effect on any unacclimated person that may become exposed to their noxious influence.

3. *Terrene and intramural causes.*—The topography of almost all the southern towns most subject to yellow fever shows a striking similarity. Charleston is built on low ground, at the confluence of two rivers, with swamps around and in rear of it, and estuaries extending from these rivers in every direction, often with large tracts of low ground which are covered with the tide at high water, exposing to the sun at low tide an extensive surface covered with animal and vegetable remains. Savannah (until the adoption of the regulation forbidding the wet culture of rice within the city limits) was surrounded by rice-swamps almost to the doors of the houses. Mobile, on land scarcely raised above the level of the Gulf, and with the Choctaw Swamp embracing many acres of stagnant water.

as a receptacle for all the filth and offal of the city; New Orleans, surrounded by swamps surcharged with the most deadly malaria, penetrated in various directions by bayous and canals, the city built on ground so low that levees are required to keep the waters of the river and lake from inundating the streets; and Galveston, its business portion built over an old swamp or shallow bayou, and with Hitchcock's Bayou in the rear of the city, and extending one arm almost into its heart. And the resemblance is still stronger when we consider the sanitary condition of these cities. Take up any report of the board of health of Charleston, New Orleans, or Mobile, for the last twenty years, and one may find the same dreary record of neglected hygienic laws, and in many cases a want of exercise of the simplest common sense in the prevention of the disease. In Charleston, as land became more valuable, vacant lots were filled in so as to become available for building purposes, and often large surfaces washed by the tide, and harmless in their former condition, became vehicles for the propagation of pestilence by the improvements to which they were subjected. To accomplish this filling in, the refuse material from all over the city has been used from time to time. The city offal, the contents of the tidal drains, the earth obtained from excavations made elsewhere for building, shavings, sawdust, oyster-shells, anything that produced bulk, were dumped on the lots, forming a vast mass of putrefying material, sometimes of several acres in extent, and well calculated to breed a pestilence anywhere. In New Orleans, the first epidemic was coincident with the digging of the canal Carondelet, by which vast excavations were made in the soil of the swamp, and an immense amount of decaying vegetable matter exposed for four years to the sun. In fact, the people of this city seem to have had a perfect mania for excavating the soil in every direction. There is scarcely a year in their history but what canals have been dug, or pavements laid, or ditching carried on for drainage purposes, or some similar work, by which the original soil has been overturned. In Charleston, in 1871, the tidal drains, which extend beneath the principal streets of the city, were cleaned out in the heat of summer, in direct violation of every law of common sense, and the contents used to fill up some vacant lots on the outskirts of the city. In Mobile, in former years, the vicinity of the docks was so foul from the decaying shavings, oyster-shells, dead animals, and marine organic remains, that a medical committee stated that the smell was so foul they could not remain to inspect it.

It is only within a very few years that the southern cities have become awake to the danger of intramural cemeteries. Both New Orleans and Charleston have numerous burial-places within the city limits, in which interments still are permitted. In New Orleans there are no burials beneath the ground, but tombs are constructed above the surface, in which the dead are deposited and the tomb then walled up. This mode of sepulture, necessitated by the saturation of the ground with water, cannot but be prejudicial to the health of the community, from the immense amount of animal matter undergoing decomposition that is thus always present. In Charleston, although the interments are made in the usual manner, yet all the older church-yards are crowded to excess, and a visit to any one of them will satisfy any inquiring person of their banefulness.

Still another condition, more or less of influence on the progress of epidemic diseases, is the defective nature of sewerage in most of the southern towns. This is a misfortune growing out of the flatness of their situation, there not being fall enough to carry away the wastage

of the city by natural drainage. In all these cities, the boards of health made constant complaint of the habit of emptying slops and the waste and scrapings of the kitchens into the street gutters, where they are but imperfectly removed by the scavengers and soon become offensive to the smell and the source of pestiferous exhalations. In fact, in all of these places, though much better than they were many years ago, the city police is bad, and the condition of many of the streets bordering on the docks, and the habitations of the poorer classes, such as to invite a pestilence at any time. The people live crowded together, their houses are dirty, the alley-ways, back yards, and privies unclean and offensive, and as a result these localities are often the first to be visited by an epidemic, and suffer the most severely.

Now, in considering all these points mentioned as sufficient to account for the prevalence of yellow fever without the presence of an imported germ, is where I am constrained to think the distinguished gentlemen who advocate the local origin of the disease are in error. I am very reluctant to write anything which would seem presumptuous, in placing my opinion, with my limited experience, in comparison with the great learning and wide experience of these gentlemen of whom the South is justly proud; but it seems that thus far the weight of evidence is with those who believe that the disease is uniformly exotic. The local causes above alluded to exist every year, yet the fever appears as an epidemic only occasionally, and even then, in every instance where due patience has been exercised, has been traced to importation from an infected port. As said before, it by no means follows, because no importation can be directly or positively ascertained, that none existed; and to assert the local origin of an epidemic, simply on the negative testimony of the absence of positive proofs of its foreign origin, is very weak ground upon which to stand. One positive fact outweighs all the testimony of a purely negative character that can be accumulated, and in regard to such facts, we have not merely one, but hundreds connected almost with every epidemic in the history of the country, showing beyond a doubt that the first cases are coincident almost always with the arrival of one or more ships from infected ports; that very often these first cases can be traced directly to such infected vessel, to her cargo, or to sick persons who have been landed from her; that the next cases are generally in houses adjoining or in the neighborhood of the first, or in the persons of those who have spent some time with the first; and that the disease only becomes generally epidemic when a sufficient number of cases has occurred to infect the atmosphere of the locality. We see also that, when the disease prevails at New Orleans, it invariably, after some weeks, breaks out in those towns having steamboat communication with the city, and that those towns having no steamboat communication (as Vidalia, opposite Natchez) always escape; and that those who establish a local quarantine, and refuse to prevent the landing of steamboats during its prevalence in New Orleans, also escape. We know that the great offal mound at Augusta, Georgia, about which so much has been written, existed for five years without causing any disease, until persons sick with the fever arrived in that town from Charleston in 1839, and then immediately an epidemic followed, and the dirt-beap was made responsible for it. But while thus rejecting the idea that any of the causes above mentioned can originate an epidemic, it would be a sad mistake to undervalue their agency in propagating the disease by preparing a richly-manured soil for the reception of the foreign seed. While it is unquestionably true that yellow fever has prevailed epidemically in high, dry, and clean localities, as at Pensacola, Florida, and Spring Hill, near

Mobile, Alabama, yet the vast amount of information collected by La Roche, and other historians of the disease, shows most conclusively that the disease chooses for its favorite habitats those towns and portions of towns which are badly policed; where the inhabitants live in neglect of all hygienic laws, or where overturning of the soil or defective drainage gives rise to offensive malarial emanations. The moral of this is evident: that while, perhaps, it may be difficult to prevent the importation of the yellow-fever germ, much may be done by local boards of health to prevent the spread of the disease by improving the system of drainage; by rigid inspections of all localities inhabited by the class above mentioned; by a thorough police of streets, alleys, back yards, &c.; by the introduction of the earth-closet system in place of the present pernicious style of privy, which allows its contents to permeate the surrounding soil and neighboring cess-pools, and thus rendering them saturated with human excreta; and, finally, by a careful disinfection of all dirty localities, not only those in which fever exists, but wherever there might be reason to apprehend its spread by reason of the habits of the persons living there. This branch of the subject does not strictly come within the scope of inquiry upon which I am required to report, but it is too intimately connected with the history of yellow fever to be passed by without this brief notice. With many it is regarded as of more importance than quarantine.

In concluding this report, I hope it will not be considered improper for me to refer to the kindness and courtesy evinced by every person with whom I was brought in contact during my tour of inspection on the southern coast.

As a representative of the General Government, executing an important mission, every assistance was given to me, both by the authorities and the medical profession, in the prosecution of my inquiries, and this without regard to the personal views of any as to the value of the undertaking.

Had it been possible to have extended the inquiry over a greater space of time, this report could have been more complete. As it is, it is hoped that it may be considered as but preliminary to a more elaborate examination of the subject on the part of Congress, which will lead to important practical benefits, not only to the southern and Gulf ports, but to the whole country.

I have the honor to be, sir, very respectfully, your obedient servant,
 HARVEY E. BROWN,
Assistant Surgeon, United States Army.

The Hon. the SECRETARY OF WAR,
Through Surgeon-General, United States Army.

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