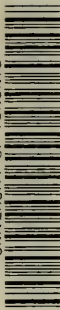


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HISTORY

OF

YELLOW FEVER

BY
GEORGE AUGUSTIN.

Assistant Secretary Louisiana State Medical Society; Assistant Secretary-Librarian Orleans Parish Medical Society, New Orleans; Author of "Romances of New Orleans" and other Creole Stories.

TO WHICH ARE ADDED THE FOLLOWING ARTICLES:

MEDICAL.

ETIOLOGY—G. FARRAR PATTON, Ex-Secretary Louisiana State Board of Health.
PREVENTION—QUITMAN KOHNKE, Ex-President New Orleans Board of Health.
PATHOLOGY—O. L. POTHIER, Pathologist to Charity Hospital, New Orleans.
DIAGNOSIS—HAMILTON P. JONES, Physician-in-Chief New Orleans Yellow Fever Hospital, Epidemic of 1905.
TREATMENT—LUCIEN F. SALOMON, Ex-Secretary Louisiana State Board of Health
PROGNOSIS—CHARLES CHASSAIGNAC, Dean New Orleans Polyclinic.
THE LOUISIANA SYSTEM OF HYGIENIC EDUCATION—FRED. J. MAYER, Secretary Louisiana Sanitary Commission.

HISTORY AND STATISTICS.

THE PANAMA CANAL AND YELLOW FEVER—COL. W. C. GORGAS, U. S. Army.

EPIDEMIC OF 1905.

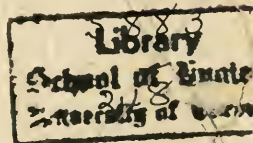
HENRY DICKSON BRUNS, M. D.
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By GEORGE AUGUSTIN,
NEW ORLEANS, LA.



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TO
THAT CHIVALROUS SOUTHERN GENTLEMAN,
DR. CHARLES CHASSAIGNAC,
OF
NEW ORLEANS,
THIS VOLUME IS DEDICATED,

As a Testimonial of the high esteem in which he is held in this community, and in recognition of valuable assistance rendered in the compilation and classification of the Medical Part of this Work to

THE AUTHOR.

ACKNOWLEDGEMENTS.

I specially desire to thank Major Walter D. McCaw, Surgeon, U. S. A., Librarian Surgeon-General's Office, for his unfaltering courtesy in placing at my disposal the works contained in the Surgeon-General's Library. During the long years consumed in the compilation of this work, Dr. McCaw's promptness in lending me books necessary for research work has greatly facilitated my labors, and I desire to signify my heartfelt appreciation of his kindness.

I desire also to thank Drs. W. C. Gorgas, Henry Dickson Bruns, Charles Chassaignac, Quitman Kohnke, Hamilton P. Jones, Jules Lazard, Louis G. Le Beuf, Fred. J. Mayer, G. Farrar Patton, Oliver L. Pothier, Lucien F. Salomon and Sidney L. Theard for the valuable articles contributed to this volume.

THE AUTHOR.

June 30, 1909.

REMARKS BY THE AUTHOR.

The original intention of the writer was to publish a brochure on "The History of Yellow Fever in Louisiana," the idea suggesting itself to him while acting as special stenographer in the office of the United States Marine Hospital Service at New Orleans during the Yellow Fever outbreak of 1897. The duty of copying the reports made by the medical staff under Surgeon Carter devolving upon him, the thought occurred to him that a statistical and historical compilation of the many epidemics of yellow fever which have afflicted our State would prove interesting. With this end in view, the work of collecting data was begun shortly after the mild epidemic of 1898. Such was the nucleus of this work.

During the decade which has elapsed since the collection of data for this volume was begun, the original scope was enlarged, and as the years rolled by and the magnitude of the task became more and more evident, the author found himself constrained to dodge around corners whenever he spied a medical friend who had been assured that the book would be out "by the end of December" the year previous; and the patient, good-natured people of New Orleans, who had been told by complimentary articles in the public press, from time to time, that the work would "soon be issued," naturally reached the conclusion that the end would arrive simultaneously with the Millennium.

No apology is made for the long-deferred appearance of this volume. A glance is sufficient to show that it is a work of love, for no amount of financial gain (should it meet with public favor) could be adequate compensation for the time consumed in its compilation. Not being possessed of independent means, the author had to steal moments out of the busy work-a-day life to complete his task, aided by his devoted wife, to whose valuable assistance is chiefly due the completion of a work which, until very recently, seemed unending.

It was the author's intentions also to include within these pages a history of the ravages of Yellow Fever in the West Indies and South America, but, judging by the time which has been consumed in the compilation of what is included in this volume, he has concluded that the span of life is too short for the accomplishment of such a task, and humbly submits the result of his labors to the cynical public and to the judgment of indulgent friends.

GEORGE AUGUSTIN.

New Orleans, June 30, 1909.

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PART I.

GENERAL
OBSERVATIONS.

PART FIRST.

CHAPTER I.

THINGS EVERYBODY OUGHT TO KNOW.

Definition of Technical Terms.—What is Meant by Epidemic, Endemic and Sporadic.—What Fomites Are.—The Difference Between Contagion and Infection.—What a Pandemic Is.—Brief Remarks on Quarantine.

As this work is not solely for the use of physicians, but also for the information and guidance of the public, we will give a brief synopsis of the meaning of certain words which have been used quite freely by the lay and medical press recently, so that anyone who reads these pages will be perfectly familiar with technical terms which might otherwise seem confusing.

EPIDEMIC.

The term *Epidemic* is applied to any disease which attacks a great many persons in a locality at any particular period and spreads rapidly in every direction, although every conceivable effort to check it or stamp it out is resorted to.

The popular belief prevails among the laity that a disease is epidemic when the deaths from any cause exceed those from all other diseases occurring simultaneously in any locality. Such is not the case. A disease may be epidemic without having an unusual rate of mortality. This was illustrated by the epidemic of jaundice (some say it was yellow fever in its mildest form) which prevailed in Rotherham, England, in 1862. There were over three hundred cases, with only one death. And yet the disease was decidedly epidemic.

ENDEMIC.

A disease is said to be *Endemic* when it is permanently established or is ordinarily prevalent in a locality, and dependent on local conditions.

SPORADIC.

Sporadic means that a disease manifests itself by the occurrence of scattered or isolated cases, cropping out here and there, at irregular intervals, and easily amenable to remedial measures.

FOMITES.

The word *Fomites* has been juggled with so much by non-medical writers and by physicians who ought to have known better, but who made use of the expression in a hap-hazard way, that we desire to call special attention to its true etymology. *Fomites* is the plural of *Fomes*, and is derived from the Latin *fomes*, meaning touch-wood or tinder, or something which spreads quickly. It is applied to any substance capable of absorbing, retaining and transmitting contagious or infectious germs. Such things as woolen clothes, moss, etc., are decidedly active *Fomites*, but it is impossible for wood, stone, iron, cork, books, newspapers or anything which does not *retain* germs, to propagate them. As yellow fever can only be transmitted by a certain species of mosquito, it cannot, under any condition whatsoever, be propagated by *Fomites*. Even if one wears the garments of a person who has died of yellow fever, he can never contract the disease and will never be susceptible to it, unless he is bitten by a female *Stegomyia Fasciata* which has bitten a yellow fever sufferer during the first three days of the attack.

The only diseases believed to be capable of being transmitted by *Fomites* are cholera, typhoid fever, smallpox, scarlatina, diphtheria, tuberculosis, measles and eruptive and venereal affections.

Prof. Beyer admirably sums up the question in the New

Orleans *Harlequin* as follows:¹ "A quarantine against any kind of freight is stupid. It is as silly as the disinfecting of crude carbolic acid and pig-iron which occurred in Galveston during the last fever panic. Only the house mosquito conveys the disease. You can take a thousand people, all ill of yellow fever, into the most populous city, and if there are no mosquitoes in that city not one case will develop. With those thousand cases, the disease will end. * * * The genius of the world cannot take any article of freight and make it the transmitting agent of the disease."

Further comment is unnecessary. In conclusion, we echo Prof. Beyer's sentiment, that this fact should be driven home to the intelligence of every community.

THE DIFFERENCE BETWEEN INFECTION AND CONTAGION.

Infectious. The pathological definition of *Infectious* is a disease capable of being communicated by contact, or through the medium of air, water or fomites.

Contagious. Transmissible by contact.

Infection is frequently confounded with *Contagion*, not only by the laity, but even by medical men. The best usage now limits *Contagion* to diseases that are transmitted by contact with the diseased person, either directly by touch or indirectly by use of the same articles, by breath, or by eating or drinking after a diseased person. *Infection* is applied to diseases produced by no known or definite influence of one person upon another, but where common climatic, malarious or other widespread conditions are believed to be chiefly instrumental in their dissemination.

Yellow fever is neither contagious nor infectious. There are only two ways in which it can be transmitted:

1. By the bite of the female mosquito of the genus *Stegomyia Fasciata*, which has previously fed upon the blood of a person suffering from yellow fever during the first three days of the attack.

2. By inoculation with the blood of a yellow fever

¹ August 3, 1905.

sufferer during the first three days of the attack; after the third day, the disease cannot possibly be communicated.

PANDEMIC.

A *Pandemic* is an epidemic which attacks the whole or a greater part of the population of the world. It generally follows the routes of commerce, but has been known to ignore the by-ways of travel and to proceed by leaps and bounds, crossing wastes of waters and covering miles and miles of territory to reach a certain fated spot, without leaving a trace of its influence between the point of departure and the locality it was destined to ravage.

One of the most noteworthy pandemic waves of modern times began at the Cape of Good Hope in 1822 and ended in the frigid zone seven years later, after having covered nearly the entire globe. Starting at the Cape, it traveled along the southern coast of Madagascar and reached the Island of Mauritius, in the Indian Ocean, in 1823. It was next felt in Ceylon, India and in some parts of Eastern Asia, after which it seems to have "doubled upon its tracks," for it stopped when it reached China and travelled westward, skirting the southern coast of Asia and entering the Mediterranean by way of Asia Minor, in the fall of 1824. It then successively invaded Malta, Gibraltar and some of the islands off the west coast of Africa. It next sojourned towards the north, reaching Great Britain the same year. Observers have recorded the fact that during the visitation of this pandemic, the admissions into the fever hospitals of London, Dublin, Glasgow and Edinburgh increased to an abnormal extent. The wave then crossed the Atlantic and was felt in the West Indies in the Autumn of 1824, where it caused a high rate of mortality. Its influence seems to have lingered in that locality, for in 1825, Jamaica, in which had taken place the preceding year a slight advance in the death rate, experienced a terrible epidemic. By one of those strange and unaccountable vagaries which often characterize the phenomena of Nature, New Orleans was the only locality in the United States which felt the influence of the wave; the mortality,

however, was not very great, the deaths from yellow fever in 1824 aggregating 108, against 808 in 1822.

The pandemic then jumped, as it were, from the Gulf of Mexico to Canada, where it caused much sickness and mortality in 1825, especially in Nova Scotia and the eastern provinces. The wave seems to have been loth to leave the British Isles, for its baneful influence was felt now and then throughout the United Kingdom from 1825 to 1828, during which manifestations the death-rate rose to a noteworthy degree.

This remarkable pandemic finally spent itself on the frozen shores of Iceland in 1829, leaving in its wake throughout the island a series of epidemic diseases, in which typhus played a prominent role.

Lawson, who minutely noted the occurrence and influences of pandemics, says:²

“These waves occupy about two years in passing over a given station; the mortality from fever, of whatever description it may be, increases during their passage, subsiding again as they move onwards. They follow each other at intervals of a few years, and may be traced from the Cape of Good Hope, where they first become sensible, to Iceland. Some embrace Ceylon, in 80° E. longitude, and New Orleans, in 90° W. longitude, or nearly half the circumference of the earth. Were information for other places available, no doubt their passage might be demonstrated still more extensively.”

Again:³

“The occurrences in the Mediterranean in 1828 are extremely interesting and important. There, under the same pandemic wave, while yellow fever was causing such mortality at Gibraltar as to induce many to think it an imported disease, the remittent fever, the undoubted product of the locality, was causing a much higher one at Santa Maura, and other forms of febrile disease—petechial typhus at Naples, and plague in Albania—were prevailing on either side the latter. It must, therefore, be concluded

² Lawson: Trans. Epidemiological Society of London, Vol 2, 1862.

³ Ibid.

that though the pandemic cause determines the occurrence of febrile disease in places over which it passes, the peculiar form, and even the frequency, of the disease is determined rather by the circumstances, whether meteorological, malarial, hygienic, or social, to which each population is subjected. The same local circumstances may exist in other years, and, so far as can be estimated, to an equal extent, but fevers do not become rife; but no sooner is the pandemic cause added, than these seem to acquire a potency which is almost inexplicable."

QUARANTINE.

Quarantine is derived from the Italian word *quarantina*, which means a space of forty days, the period (originally forty days) during which a ship having a contagious disease on board, or coming from a port suspected of being infected with pestilential disease, is forbidden intercourse with the place at which she arrives. The period of quarantine in this country is generally from six to twenty days.

Quarantine is practically abolished in England and its dependencies. If there is evidence or suspicion of infectious disease on board a vessel arriving in a British port, the customs officers report the occurrence to the sanitary authorities of the port, whose decision in such matters is final.

In the United States, by act of Congress passed in 1888, national quarantine stations were established. This statute makes it a misdemeanor, punishable by fine or imprisonment, or both, for the master, pilot or owner of any vessel entering a port of the United States, without first presenting a clean bill of health.

Pratique is permission given to a vessel to unload without hindrance from quarantine laws. To do this, the vessel must present a clean bill of health.

A comprehensive history of quarantine, from its earliest enforcement to the present day, will be found in the medical part of this volume.

CHAPTER II.

THE RAVAGES OF PESTILENTIAL DISEASE.

The Peculiar Pranks of Epidemics.—Ancient Notions about the Origin of Pestilences.—Full Text of the Extraordinary Document Promulgated by the College of Physicians of Paris in 1665.—An Outline of the Appalling Mortality caused by Pandemics in Ancient and Medieval Times.—The Great Plagues of London.

THE PECULIAR PRANKS OF EPIDEMICS.

Fortunately for the human race, it is seldom that two diseases are epidemic at the same time in the same locality. When yellow fever raged with such violence at Gibraltar in 1804, it was remarked that all other diseases declined; and well they might, for in that great epidemic, out of a civil population of 14,000, only 28 escaped an attack.

A similar retreat of inferior diseases has been observed to take place during the prevalence of the plague in London, Holland and Germany, according to histories of that disease by Sydenham, Diemerbroeck, Semmertus and Hildamus.

A modern instance of the malignity of yellow fever took place at Woodville, Miss., in 1844. When the fever broke out, all those who could get away fled, and out of a total remaining population of 500 some 495 were attacked by the fever.

There have been notable exceptions to the rule that only one epidemic can rage at the same time.

In 1839, both smallpox and measles were epidemic in England and Wales.

Smallpox and scarlet fever were both epidemic in New York in 1840, 1841, 1842 and 1843; and in 1840 and 1841, measles was also epidemic, so that the three diseases were epidemic at the same time in the last mentioned years.

In the year 1802, Charleston, S. C., was affected with four epidemics—smallpox, measles, yellow fever and influenza.

It was a common occurrence, during the prevalence of cholera at New Orleans in the autumn of 1832, for a

person to be attacked with yellow fever, and before, or as soon as the febrile excitement ceased, for the patient to be destroyed by the cholera in its most marked and malignant form.

The cholera which was imported to New Orleans in 1866 maintained its existence throughout the yellow fever epidemic of 1867, diminishing in its intensity as the fever advanced, and again becoming more malignant as the fever subsided. But it was never entirely absent. In November of that year, 234 deaths occurred from cholera and 103 from yellow fever; in December, when the fever had almost disappeared the mortality from cholera was 210.

In 1853, according to Fenner,¹ there was a remarkable series of epidemic disease. We cull the following from his report, p. 1: "During the past year,² two of the most terrible epidemic diseases that ever afflicted mankind have prevailed, to a greater or less extent, in parts of the extensive region assigned to my notice.³ I mean cholera and yellow fever. Smallpox has also appeared in several places; and other epidemics, such as measles, scarlatina and whooping cough, have made us their customary annual visitations."

Measles and smallpox were also epidemic in Philadelphia in 1823 and 1824, and in 1835 and 1845, smallpox, measles and scarlet fever were all epidemic.

Measles and scarlet fever were both epidemic in Baltimore in 1837, and smallpox and scarlet fever in 1838, and again in 1845.

In 1868, smallpox, cholera and yellow fever prevailed in Cienfuegos, Cuba.

Other instances could be cited, but these suffice for the purpose in view.

Epidemic diseases seem to be more fatal among the uncivilized than the civilized. In an epidemic of rubeola

¹Fenner: Report of the Epidemics of Louisiana, Mississippi, Arkansas and Texas in the Year 1853, by E. D. Fenner, 1853.

²1853.

³The four States mentioned in above title.

among the Crees (a tribe of North American Indians) in the summer of 1846, as reported by Dr. Smellie in the *Monthly Journal of Medical Science* for December, 1846, of 145 cases treated in his camp, 40 were fatal.

Smallpox has sometimes swept off an entire tribe of Indians, as was the case with the Mandans (another North American tribe), and has generally proved abnormally fatal when it attacked the Red Race.

It has been observed by Gregory⁴ that epidemics are usually severe when they first appear in a country or are renewed after any long intervals of time. When cholera first invaded India in 1817, it raged with an intensity which may have been equalled, but never has been surpassed. When smallpox first made its appearance in America (Mexico) in 1518 and gangrenous sorethroat (diphtheria) first visited Naples in 1618, America in 1735 and London in 1747, the ravages of each disorder were terrific. It seems, then, to be the law of animal economy that the susceptibility to any morbid poison is great in proportion as it has been little accustomed to the impression.

ANCIENT NOTIONS ABOUT THE ORIGIN OF PESTILENTIAL DISEASE.

The works of Hippocrates contain many interesting observations upon the origin and nature of epidemics. He states that disease, in general, may be said to arise either from the food we eat or the air we breathe. When, therefore, a disease seizes upon a multitude of persons of different sexes, ages and habits, he infers that it must arise from the latter cause.⁵ In his first book, fourteen cases of disease are related, and in the beginning of the third book, twelve, and sixteen in the end, thus making forty-two in all. It is worthy of remark that in twenty-five of these the result was fatal. There is every reason then to suppose that they were selected for a purpose, but what that purpose was cannot now be easily determined.

⁴Gregory: *A Treatise on Eruptive Fevers* (1851), p. 35.

⁵Paulus Egineta (Adams' translation), Vol. 1, p. 274.

The most natural result would no doubt have been to illustrate the different pestilential diseases which are described as occurring at the time.⁶

Galen also attributes the origin of epidemics to the state of the atmosphere, but holds that the nature of the country may contribute. Lucretius accounts for the prevalence of epidemics upon similar principles, and Silius Italicus refers an epidemical fever to the same cause.

The purifying of the atmosphere as a means of preventing or limiting the spread of disease, is as old as the world itself. It is reported of Hippocrates that he changed the morbid state of the atmosphere of Athens by kindling fires. Plutarch also makes mention of one Acron, of Athens, when the great plague visited that city at the commencement of the Peloponnesian war, and attributes to him the advice that was given to the Athenians to kindle large fires throughout the streets, with the view of purifying the air, which is the same plan as was adopted by the priests of Egypt.⁷

Pliny also speaks of fires as a corrective of the state of the atmosphere, and Herodotus relates that fumigation with aromatics were recommended as a preventive of the plague.⁸

ODD BELIEFS AND PRACTICES OF SUPERSTITIOUS AGES.

The ancients attributed to their gods the authorship of epidemics, and under this belief, religious sacrifices were made to appease their anger. Terror-stricken and demoralized, they abandoned all measures calculated to give them protection and relief and relied solely upon their offerings and their prayers at the foot of the altar for preservation. Cardan and Valesco de Tarente did not fear to attribute the origin of disease to the influence of certain planets, while Nat. Webster, an American physician, gives also more than fifty instances of the concurrence of an epidemic with some commotion of

⁶ Hippocrates (Adams' translation), Vol. 1, p. 342.

⁷ Histoire de Medecine (Leclerc), Vol. 1, p. 57.

⁸ Paulus Egineta, Vol. 1, p. 174.

nature, such as earthquakes, volcanic eruptions and the appearance of comets. Jackson, Joubert and others, have dwelt upon the influence of the moon upon epidemic disease; and during the plague that nearly depopulated Paris in 1580, when forty thousand people were swept away, the sky was so clear and serene, that the stars were looked to as the cause which could not be found in the atmosphere.⁹

According to researches made by Eager,¹⁰ in the earliest period, superstition and stellar influence took the principal place in the confused ideas of etiology. Ill-ordered doctrines led to all sorts of irrational practices. Among the Greeks, in the rites of Esculapius, the sick were not permitted to enter the temples, where they underwent treatment, without first being purified by various baths, frictions, and fumigations. All this was accompanied by ceremonies similar to those practiced within the temples, namely, magical performances and fervent prayers recited in a loud voice, often with musical accompaniment. As an accessory to the purification preliminary to being admitted, the patient was required to pass the night stretched on the skin of a sheep that had been offered as a sacrifice. Here he was ordered to compose his mind for sleep and await the arrival of the physician. Throughout these ages as well as in more recent times a fanciful association between the phenomena of the material world and the destinies of mankind closely linked the doctrine of etiology with astrology. The persistent belief of learned men in the relation of stellar conditions to epidemics is in part explained by the fact that astrologers who predicted epidemics wrought charms against the impending pestilence, thus saving their credit, in event the disaster did not materialize, by claiming that it had been averted through their efforts.

These primitive views of the origin of epidemics did not necessarily place the cause of the disease outside the earth and its immediate surroundings. Winds, thunder and

⁹ Chastant: Observations on Yellow Fever, 1879, p. 5.

¹⁰ Eager: The Early History of Quarantine (Yellow Fever Bulletin No. 12, U. S. Treasury Dept.), 1903, page 7.

lightning, fogs, and even meteors were blamed for causing pestilence, and the flight of birds and insects were supposed to be dependent phenomena.

Xanaphanes, five hundred or six hundred years before Christ, expounded an idea that the sun was a torch and the stars candles that were put out from time to time. According to his notion, which was seriously accepted, the stars were not heavenly bodies in the wider sense, but meteors thrown off from the earth. So a belief in stellar influence did not carry the mind outside worldly ranges. For this reason other practices than prayers and sacrifices were believed to be effective. They consisted chiefly in efforts to dissipate the meteors, such as huge and numerous fires, and to avoid meteoric influence by confinement in closed or otherwise protected places.

"During the period under consideration," concludes Dr. Eager, "the promptings of superstition were paramount and the epidemiologists of the times confined themselves principally to interpreting the signs of the heavens. More advanced views came as the result of reasoning, but the path of discovery by experimental science was not entered upon until after many centuries."

It was a common practice among the Phenicians to immolate their children during the prevalence of epidemics, hoping thereby to appease the anger of the gods and put a stop to the pestilence.

Plutarch relates the manner of Esop's death, B. C. 581. The famous fabulist went to Delphi with a great quantity of gold and silver to offer, in the name of Cresus, a great sacrifice to Apollo, and to give each inhabitant a considerable sum. A quarrel arose between Esop and the people of Delphi, occasioning him afterwards to send back the money to Cresus. The people of Delphi caused him to be condemned as guilty of sacrilege, and to be thrown from the top of a rock. The god, offended by this action, punished them with a plague and famine, so that, to put an end to these evils, the terrorized Delphians offered to make reparation to any of the relatives of Esop. "At the third generation," continues Plutarch, "a man presented himself from Samos. The Delphians made this man re-

paration or satisfaction, and thereby delivered themselves from pestilence and famine which distressed them."¹¹

Epidemic disease was frequent in Greece before the Christian Era. The Athenians were wont to make annual sacrifices to Toxaris, "the foreign physician," because their city had been delivered from the plague by his means, or rather by a woman who had dreamed that Toxaris, who dwelt at Athens, had told her that the pestilence would cease if they washed the streets with wine, "which they did, and the plague ceased immediately."

In the year 665 B. C., Thaletes, the Milesian, is reputed to have put a stop to an epidemic which had baffled the skill of the most renowned physicians of the time, by the influence of music. Had Thaletes lived in the present age, he would undoubtedly have amassed a princely fortune by stating what particular make of instrument he used. Unfortunately, history is silent on this point.

In the year B. C. 534, a terrible plague raged at Carthage. The devastation was so great, that the people sacrificed their children to appease the gods.

According to Niebuhr,¹² the eruption of Mount Etna, which took place in the 81st. Olympiad, coincided exactly with the pestilence which devastated Rome about that period. The same authority says that in the year 301, the Northern Lights could be distinctly seen in Italy and were "eminently connected with the ferment in the bowels of the earth." In the year 290, and also 295, the firmament seemed to be on fire, "broken by flashes of lightning; armies and the tumults of battles were seen in the sky and sounds were heard which heightened the terror of this phenomenon."

Dr. Howe (quoting Niebuhr) also speaks of another phenomenon which is said to have occurred in the year 295, and observes that, however incredible it may seem, "it ought not to be rejected as an idle tale." The paragraph referred to reads as follows:

¹¹ Howe: Epidemic Diseases, 1865, p. 21.

¹² Niebuhr: Lectures on Roman Historie (Howe, loc. cit., p. 85).

“There fell, we are told, a shower of flakes like flesh, which the birds devoured. What remained on the ground did not rot.”

No explanation is made of this alleged phenomenon, except in metaphors, which, when carefully sifted, explain nothing, as is usually the case with metaphors.

In the Year of Rome 300, a plan was adopted to cause the cessation of the plague which had afflicted Rome 350 years from its foundation. The Romans, by the advice of their oracle, sent ten deputies to Epidaurus, a town in ancient Greece, in the Peloponesus, celebrated for its magnificent temple of Esculapius. The delegation was headed by Quinctus Ogulnius, and the object was to bring the statue of Esculapius to Rome, as a means of stopping the ravages of the pest. On their arrival at Epidaurus, and while they were admiring the statute of Esculapius for its extraordinary size, the Romans perceived, emerging from the base of the statue, a serpent. This unexpected apparition, instead of causing dread and consternation, was regarded as a good omen by those present and impressed upon their minds feelings of awe and veneration. The serpent glided through the crowd, sped swiftly through the streets of the town—followed by the populace—and betook itself to the vessels of the Romans and went straight to the apartment of Ogulnius. The Romans immediately erected a temple to Apollo, and the pestilence ceased.¹³

AN EXTRAORDINARY HISTORICAL DOCUMENT.

One of the most remarkable theories concerning the origin of epidemic disease was solemnly promulgated by the Faculty of Paris in 1665, to account for the ravages of the Black Plague, which was then devastating Europe. The pestilence commenced in December, 1664, and ended in January, 1666, a period of thirteen months. The learned medical men of France assembled at Paris in June, 1665, in order to discover the cause of the epidemic and devise

¹³ Leclerc: *Histoire de Medecine.*

sanitary measures to arrest its progress. After much deliberation, the conclave finally evolved the extraordinary document copied below, which, at this day, would be viewed in the light of a burlesque, but which was looked upon as an oracular pronouncement by the superstitious people of the time. We think the document possesses such an element of quaintness and absurdity, that we publish it in full:

"We, the Members of the College of Physicians, of Paris, have, after mature consideration and consultation on the present mortality, collected the advice of our old masters in the art, and intend to make known the cause of this pestilence, more clearly than could be done according to the rules and principles of astrology and natural sciences; we, therefore, declare as follows:

"It is known that in India, and the vicinity of the Great Sea, the constellations which combated the rays of the sun, and the warmth of the heavenly fire, exerted their power especially against that sea, and struggled violently with its waters. (Hence, vapours often originate which envelope the sun, and convert his light into darkness.) These vapours alternately rose and fell for twenty-eight days; but at last, sun and fire acted so powerfully upon the sea, that they attracted a great portion of it to themselves, and the waters of the ocean arose in the form of vapour; thereby the waters were, in some part, so corrupted, that the fish which they contained, died. These corrupted waters, however, the heat of the sun could not consume; neither could other wholesome water, hail or snow, and dew, originate therefrom. On the contrary, this vapour spread itself through the air in many places on the earth, and enveloped them in fog.

"Such was the case all over Arabia; in a part of India; in Crete; in the plains and valleys of Macedonia; in Hungary, Albania and Sicily. Should the same thing occur in Sardinia, not a man will be left alive; and the like will continue, so long as the sun remains in the sign of Leo, on all the islands and adjoining countries to which this corrupted sea-wind extends, or has already extended from India. If the inhabitants of those parts do not

employ and adhere to the following, or similar means and precepts, we announce to them inevitable death, except the grace of Christ preserve their lives:

“We are of opinion, that the constellations, with the aid of Nature, strive, by virtue of their divine might, to protect and heal the human race; and to this end, in union with the rays of the sun, acting through the power of fire, endeavor to break through the mist. Accordingly, within the next ten days, and until the 17th of this ensuing month of July, this mist will be converted into a stinking deleterious rain, whereby the air will be much purified. Now, as soon as the rain shall announce itself, by thunder, or hail, every one of you should protect himself from the air; and, as well before as after the rain, kindle a large fire of vine-wood, green laurel or other green wood; worm-wood and chamomile should also be burnt in great quantity in the market places, in other densely inhabited localities, and in the houses. Until the earth is again completely dry, and for three days afterwards, no one ought to go abroad in the fields. During this time, the diet should be simple, and people should be cautious in avoiding exposure in the cool of the evening, at night, and in the morning. Poultry, and water fowl, young pork, old beef, and fat meat, in general, should not be eaten; but on the contrary, meat of a proper age, of a warm and dry, but on no account of a heating and exciting nature. Broth should be taken, seasoned with ground pepper, ginger and cloves, especially by those who are accustomed to live temperately, and are yet choice in their diet. Sleep in the day-time is detrimental; it should be taken at night until sunrise, or somewhat longer. At breakfast, one should drink little; supper should be taken an hour before sunset, when more may be drunk than in the morning. Clear light wine, mixed with a fifth or a sixth part of water, should be used as a beverage. Dried or fresh fruits, with wine, are not injurious; but highly so without it. Beet root or other vegetables, whether eaten pickled or fresh, are hurtful; on the contrary spicy pot-herbs, as sage and rosemary, or wholesome. Cold, moist, watery food is in general prejudicial. Going out at night, and even until

three o'clock in the morning, is dangerous, on account of the dew. Only small river fish should be used. Too much exercise is hurtful. The body should be kept warmer than usual, and thus protected from moisture and cold. Rain water must not be employed in cooking, and every one should guard against exposure to wet weather. If it rain, a little fine treacle should be taken after dinner. Fat people should not sit in the sunshine. Good clear wine should be selected and drunk often, but in small quantities, by day. Olive oil as an article of food is fatal. Equally injurious are fasting and excessive abstemiousness, anxiety of mind, anger, and immoderate drinking. Young people, in autumn especially, must abstain from all these things, if they do not wish to run a risk of dying of dysentery. In order to keep the body properly opened, an enema, or some other simple means, should be employed, when necessary. Bathing is injurious. Men must preserve chastity as they value their lives. Everyone should impress this on his recollection, but especially those who reside on the coast, or upon an island into which the noxious wind has penetrated."

HISTORIC MORTALITIES CAUSED BY PESTILENCE IN ANCIENT AND MEDIEVAL TIMES.

If we were to compute the total mortality from pestilential disease from the earliest times to the present day, the figure would be appalling and almost beyond credulity. Pandemics have played havoc with the human race. At times, half the population of the world was swept away before an epidemic had run its course; it spared neither man nor beast, but surged like an overcharged torrent over leagues and leagues of country, overleaping the highest mountain summits, swirling over miles of desert land, crossing rivers, lakes and even seas, and finally, like a huge beast that has gorged itself to suffocation, ceasing its awful carnage for want of new material.

We shall cite only the most notable examples of great mortality.

The greatest mortality caused by a single pestilence took place in Egypt in 1792, when 800,000 persons are reported to have perished.

The next greatest mortality on record occurred in Naples and vicinity in 1656, where, in six months, 400,000 perished, almost depopulating that section of Italy.

From December, 1664, to January, 1666, a period of thirteen months, the "Great Plague" of London caused a mortality of 69,000.

Even "Bonnie Scotland" comes in for a niche in the annals of epidemiology, for it is of record that a pestilence carried off 40,000 of her sons in A. D. 954.

Let us now take a peep into antiquity.

In the 1017 B. C., "David, being elated with success, God sends a grievous pestilence, of which 70,000 died in less than three days."

In 594 B. C. a third of the inhabitants of Jerusalem perished by pestilence.

In 480 B. C., while the army of Xerxes was retreating into Asia, after the battle of Salamis, 150,000 died from pestilential disease.

In 395 B. C., a terrible plague attacked Himilco's army, which was on its way to sack and destroy Syracuse; 50,000 died.

In 378 B. C., according to Howe,¹⁴ immediately after the arrival of the troops from Italy, Carthage had a most terrible calamity to struggle with. "The plague broke out afresh there and swept away an infinite number of inhabitants. This seems to have raged with greater violence than any distemper the city was ever visited with before, for such vast multitudes were carried off by it, that the country was, in a manner, depopulated."

In B. C. 188, a great plague raged in the Greek Islands, Egypt and Syria, and destroyed 2,000 persons daily.

In the reign of the Echeopean king, Micipsa (B. C. 125), according to Orosius, a great part of Africa was covered with locusts, which died by billions, causing a plague, which swept away an incredible number of people. In

¹⁴ Howe, loc. cit., p. 57.

Numidia alone perished 800,000 persons, and in Africa proper 200,000, and also 30,000 Roman soldiers quartered about Utica. At Utica, particularly, the mortality raged to such a degree that 1500 dead bodies were carried out by one gate in one day.

In B. C. 22, Rome was about depopulated by plague and famine.

In A. D. 77 and 78 a most appalling pestilence raged in Southern Europe; 10,000 persons perished daily.

In A. D. 717 an epidemic carried off 50,000 of the inhabitants of the then known world.

In the Year of Rome 666, "all of a sudden the plague manifested itself, but with such violence, that in a few days it carried off eleven thousand men."

In the year of Rome 540, during the siege of Syracuse by Marcellus (according to Catrou and Rouille, *Histoire Romaine*, vol. 8, p. 152), it appears that Heaven took pleasure to combine all the scourges of its anger against unfortunate Syracuse. In addition to other calamities, a pestilence supervened to afflict the city. At first, the contagion commenced in the country. The heat of the climate and the season had corrupted the air, and the filth which the sea ordinarily leaves upon the shore when the waters retire, had still further deteriorated it. The two camps of Himilco and Crispinus were first attacked. Then the malady communicated itself to the army of Marcellus, from the intercourse with that of Crispinus. Soon after Acredina was attacked by the pestilence. Thus around the city, and in the interior of it, nothing was seen but the dead and dying. From the fear of catching the infection by approaching the dead bodies, they were left without burial, to poison the place where they lay decomposing. Hippocrates and Himilco died of the scourge.

The plague which broke out in the army of Sennacherib (B. C. 709), is said to have caused a mortality of 185,000. This was regarded by the Jews as a punishment of Divine Providence, meted out to Sennacherib for having invaded Judea.

During the plague of Rome (A. D. 256), 2,000 persons were buried daily.

In the year 89 B. C., while Pompeius, a Roman general,

was leading an army against Marius, the Carthagenian, a plague broke out among the soldiers, which carried away 11,000 men in a few days.

From A. D. 746 raged the great plague of Constantinople, which destroyed nearly 300,000 people in that historic city. In 1611, after a period of eight hundred and fifty-two years, occurred the second "great plague" of Constantinople, when 200,000 persons are said to have perished.

In A. D. 772, an epidemic carried off 34,000 of the population of Chichester, England.

In 1545, the "Trousse Galante" swept away 10,000 of the foreign population of Boulogne, France. The fatalities among the natives could not be ascertained.

"In 1445," says Sauvel, "from the month of August to St. Andre's Day (November 30), 6,000 infants died in Paris from smallpox."¹⁵

The "Black Plague" of the fourteenth century was one of the most appalling pestilences which swept the earth. In the space of four years, 42,836,486 persons died. Asia, exclusive of China, lost 10,840,000. China alone lost 13,000,000 inhabitants. In Europe, the mortality reached the appalling figure of 18,916,486, Germany alone losing 12,000,000 souls.¹⁶

In 1773, Persia was devastated by an awful pestilence. In the City of Bussorah alone, 80,000 perished.

In 1799, the city of Fez, Africa, lost 247,000 of her population by pestilence.

In 1799, 3,000 persons died daily in Bombay, India.

The fever which swept over the Coromandel Coast, India, in 1809, 1810 and 1811, caused the loss of 106,789 out of a population of 1,828,610.

The ravages of the glandular plague were enormous. In London, in 1625, it carried off not less than 35,417 individuals; at Lyons, in 1628-29, in a population of 200,000, it is reported that 50,000 died; at Marseilles, in 1720, the mortality was 40,000; at Cyprus, in 1760, the deaths were

¹⁵ Sauvel: *Histoire et Recherches des Antiquites de la Ville de Paris.*

¹⁶ Ozanam: *Histoire Medicale, etc., des Maladies Epidemiques,* 1835, vol. 4, p. 86.

70,000; at Aleppo, 1761-62, the plague carried off 21,800 and in 1796-97, in the same city, the mortality amounted to 60,000.

In 1720-21, in the space of seven months, 60,000 persons died of the plague at Marseilles, France.

THE GREAT PLAGUES OF LONDON.

London shares the palm with Rome for having been the nidus of the plague from nebulous times. As early as 207 A. D., when Severus invaded Britain, 50,000 of his soldiers perished from a pestilence which was then ravaging the island. Not counting the lesser epidemics, in which the mortality amounted "only to a few thousands," the following table will show the appalling havoc wrought by pestilence in London, without counting the balance of Britain, in the short period of forty-four years:

Table of Deaths from all Diseases and from Pestilence in London, England, from 1592 to 1636.

Year.	Mortality from All Diseases.	Mortality from Plague Alone.
1592.....	25,886	11,503
1603.....	37,294	30,561
1625.....	51,758	35,403
1630.....	10,545	1,317
1636.....	23,359	10,400
Total mortality during forty-four years....		119,042
		89,184

It is thus seen that out of a total mortality of 119,042 from all diseases, the plague carried off 89,184.

In December, 1664, twenty-eight years after the terrible visitation of 1636, began what is known to history as the "Great Plague of London." From its inception to January, 1666, a period of only thirteen months, it caused a mortality of 69,000. Some historians place the figures as high as 100,000.

In 1666, also occurred the "Great Fire," which spread over 396 acres, destroying over 13,2000 houses, ninety churches and many public buildings.

CHAPTER III.

THE GREAT EPIDEMICS OF THE MIDDLE AGES.

The Inguinal Pestilence of the Sixth Century.—The Black Plague of the Fourteenth Century.—Le Mal des Ardents.—The Eruptive Fevers of the Sixth Century.—The Sweating Sickness.—Notable Epidemics of Scurvy.—Leprosy and its Attendant Horrors.

THE INGUINAL PESTILENCE OF THE SIXTH CENTURY.

(Up to the year 1831, when the "Fragments" of Ruffus were published, the prevailing opinion had been that Procopius, the Greek historian, was the first to give a description of the Glandular Plague of the East. Even after the publication of this remarkable work, such distinguished historians as Hecker, Rosenbaum, Fariset and Navman still gave the honor to Procopius, claiming that the newly-discovered manuscript was spurious. The passage referred to reads as follows: "The buboes called pestilential are most fatal and acute, especially those which are seen occurring about Lybia, Egypt and Syria, and which are mentioned by Dionysius Curtus. Dioscorides and Posidonius make much mention of the plague which occurred in their time in Lybia; they saw it was accompanied by acute fever, pain and prostration of the whole body, delirium, and the appearance of large and hard buboes, which did not suppurate, not only in the accustomed parts, but also in the groins and armpits." According to Adams, the only thing which detracts from the value of this paragraph is the difficulty of determining exactly who the authorities are which are referred to in it. Of Dionysius Surtus nothing is known; indeed, it is more than probable that there is some mistake in the name. There are several medical authors by the name of Dioscorides and Posidomius, and it is difficult to determine to which of them reference is made. Still, Adams finds no reason for questioning the authenticity of the passage. Ruffus flourished in the reign of Trajan, in the beginning of the second Century. The graphic description of this terrible pestilence and other epidemics of the Middle Ages, has been abstracted from the masterly translation of Dr. Dupuy's "Le Moyen Age Medical," by Dr. Thomas C. Minor of Cincinnati. These articles were originally published in the Cincinnati "Lancet-Clinic," of which Dr. Minor is associate editor, and an abstract is published in this volume by special permission.—G. A.)

In the sixth century after Christ, occurred the terrible epidemic known by the name of the "Inguinal Pestilence,"

which, after ravaging Constantinople spread into Liguria, then into France and Spain.

According to Procopius,¹ it attacked the entire earth, striking every race of people, sparing neither age nor sex; differences in habitation, diet, temperament or occupation of any nature did not stop its ravages; it prevailed in summer and in winter—in fact, at every season of the year.

It commenced at the town of Pelusa, in Egypt, whence it spread by two routes, one through Alexandria and the rest of Egypt, the other through Palestine. After this it covered the whole world, progressing always by regular intervals of time and force. In the springtime of 543 it broke out in Constantinople and announced itself in the following manner:

Many victims believed they saw the spirits of the departed rehabilitated in human form. It appeared as though these spirits appeared before the subject about to be attacked and struck him on certain portions of the body. These apparitions heralded the onset of the malady. The commencement of the disease was not the same in all cases. Some victims did not see the apparitions, but only dreamed of them; but all believed they heard a ghostly voice announcing their inscription on the list of those who were going to die.

The fever at the onset of the attack came on suddenly,—some while sleeping, some while waking, some while at work. Their bodies exhibited no change of color, and the temperature was not very high. Some indications of fever were perceptible, but no signs of acute inflammation. In the morning and at night the fever was slight, and indicated nothing severe either to the patient or to the

¹ Procopius, the Greek Historian, born at Caesarea in the year 500, left behind him numerous works, among which may be enumerated *L'Histoire de Son Temps*, in eight volumes (*Procopii Caesariensis Historian sui temporibus*). This history of the times by Procopius gives a full description of the plague, and is one of the chef d'oeuvres of medical literature, one that will never be excelled. In this work, nothing being omitted, not even the different clinical forms, it is truly classical.

physician who counted the pulse. Most of those who presented such symptoms showed no indications of approaching dissolution; but the first day among some, the second day in others, and after several days in many cases, a bubo was observed on the lower portion of the abdomen, in the groin, or in the folds of the axilla, and sometimes back of the ears or on the thighs.

Some patients were plunged into a condition of profound drowsiness; others were victims to furious delirium. Those who were drowsy remained in a passive state, seeming to have lost all memory of the things of ordinary life. If they had any one to nurse them they took food when offered from time to time, and if they had no care, soon died of inanition. The delirious patients, deprived of sleep, were eternally pursued by their hallucinations; they imagined themselves haunted by men ready to slay them, and they sought flight from such fancied foes, uttering dreadful screams.

As nothing was known of this strange disease, certain physicians thought its origin was due to some source of evil hidden in the buboes, and they accordingly opened these glandular bodies. The dissection of the bubo showed sub-adjacent carbuncles, whose rapid malignity brought on sudden death or an illness of but few days' duration. In some instances the entire body was covered by black spots the size of a bean. Such unfortunates rarely lived a day, and generally expired in an hour. many cases died suddenly, vomiting blood.

As to treatment, the effects were variable, following the condition of the victim. Procopius states that, as a fact, no efficacious remedies were discovered that could either prevent the onset of the disease or shorten its duration. The victims could not tell why they were attacked, nor how they were cured.

The epidemic at Constantinople lasted four months, three months of which time it raged with great violence. As the epidemic progressed the mortality rate increased from day to day, until it reached the point of 5,000 deaths per day, and on several occasions ran up to as high as 10,000 deaths in the twenty-four hours.

Evagre, the scholastic, another Greek historian of the

sixth century, recounts in his works the story of the plague at Constantinople. He states that he frequently observed that persons recovering from a first and second attack subsequently died of a third attack; also that persons flying from an infected locality were often taken sick after many days of an incubating period, falling ill in their places of refuge in the midst of populations, free, up to that time, from the pestilence.

In following the progress of this epidemic from the Orient to the Occident, it was noticed that it always commenced at the sea-ports, and then traveled inland. The disease was carried much more easily by ships than it could be at the present time, inasmuch as there were no quarantines and no pest houses for isolating patients. It entered France by the Mediterranean Sea. It was in 549 that the plague struck Gaul. "During this time," says Gregory of Tours, "the malady known as the inguinal disease ravaged many sections; the province of Arles was cruelly depopulated."²

This illustrious historian wrote, in another passage: "We learned this year that the town of Narbonne was devastated by the groin disease, of so deadly a type that when one was attacked he generally succumbed. Felix, the Bishop of Nantes, was stricken down and appeared to be desperately ill. The fever having ceased, the humor broke out on his limbs, which were covered with pustules. It was after the application of a plaster covered with cantharides that his limbs rotted off, and he ceased to live in the seventieth year of his age.

"Before the plague reached Auvergne it had involved most all the rest of the country. Here the epidemic attacked the people in 567, and so great was the mortality that it is utterly impossible to give even the approximate number of deaths. Populations perished *en massé*. On a single Sunday morning three hundred bodies were counted in St. Peter's Chapel, at Clermont, awaiting funeral service. Death came suddenly; it struck the axilla or the groin, forming a sore like a serpent that bit

² Georgius Florentinus Gregorius, *Historia Francorum*, de 417 a 591 A. D.

so cruelly that men rendered up their souls to God on the second or third day of the attack, many being so violent as to lose their senses. At this time Lyons, Bourges, Chalons, and Dijon were almost depopulated by the pestilence."

In 590, the towns of Avignon and Viviers were cruelly ravaged by the Inguinal Disease.

The plague reached Marseilles, however, in 587, being carried there by a merchant vessel from Spain, which entered the port as a center of infection. Eight persons who bought goods from this trading vessel, and who all lived in the same house, were carried off by this plague. The spark of the epidemic did not burn very rapidly at first, but after a certain time the smouldering fire of the pest burst out in a blaze that almost consumed Marseilles.

Bishop Theodorus isolated himself in a wing of the cloister of Saint Victor, with a small number of persons, who remained with him during the plague, and in the midst of their general desolation continued to implore Almighty God for mercy, with fasting until the end of the epidemic. After two months of calm, the population of the city commenced to drift back, but the plague reappeared anew and most of those who returned died.

Anglada,³ who derives most of his citations from Gregory of Tours, thinks that the plague that devastated Strasbourg in 591 was only the same inguinal disease that ravaged Christendom. He cites, in support of his assertion, that passage from the historian-poet Kleinlande, translated by Dr. Boersch:

"In 591 there was a great mortality throughout our country, so that men fell down dying in the streets, expiring suddenly in their houses, or even at business. When a person sneezed his soul was apt to fly the body; hence the expression on sneezing, '*God bless you.*' And when a person yawned they made the sign of the cross before their mouths."

Such are the documents we possess on the great epidemic of Inguinal Plague of the fourth century, documents furnished by historians, to whom medical history

³ Anglada: Etude sur les Maladies Eteintes et les Maladies Nouvelles.

is indebted, and not from medical authors, who left no records of the pestilences of that period.

THE BLACK PLAGUE.

The Black Plague of the fourteenth century was more destructive even than the bubonic pest of the sixth century, and all other epidemics observed up to the present day. In the space of four years, more than twenty-five millions of human beings perished—one-half the population of the world.

Like all other pestilences, the Black Plague came from the Orient—from India, and, perhaps, from China. Europe was invaded from East to West, from South to North.

After Constantinople, all the islands and shores of the Mediterranean were attacked, and successively became so many foci of disease, from which the pestilence radiated inland. Constantinople lost two-thirds of its population. Cyprus and Cairo counted 15,000 deaths. Florence paid an awful tribute to the disease, so great being the mortality, that the epidemic has often been called *Peste de Florence*. According to Boccaccio, 100,000 persons perished. Venice lost 20,000 victims, Naples 60,000, Sicily 53,000 and Genoa 40,000. In Rome, the dead were innumerable.

In Spain, Germany, England, Poland and Russia, the malady was as fatal as in Italy. In London they buried 100,000 persons. It was the same in France. Avignon lost 150,000 citizens in seven months, among whom (1348) was the beautiful Laura de Noves, immortalized by Petrarch. At Marseilles, 56,000 people died in one month; at Montpellier, three-quarters of the population, including all the physicians, went down in the epidemic. Narbonne had 30,000 deaths and Strasbourg 16,000 in the first year of the outbreak.

Paris was not spared. The *Chronique de St. Denis* informs us that, "in the year of Grace 1348, commenced the aforesaid mortality in the Realms of France, the same lasting about a year and a half, increasing more and more, until Paris lost each day 800 inhabitants; so that the

number who died there amounted to more than 500,000, while in the town of St. Denis the number reached 16,000."

Among the victims were Jeanne de Bourgogne, wife of Philip VI; Jeanne II, Queen of Navarre and grandchild of Philip the Beautiful. In Spain, died Alphonso XI., of Castille.

Happily for the human race, during the years which followed the plague, the births were greatly in excess of the deaths, as though Nature desired to repair the ravages wrought by the pestilence.

According to the records of that time, many persons died the first day of their illness. These bad cases were announced by a violent fever, with headache, vertigo, drowsiness, incoherency in ideas, and loss of memory; the tongue and palate were black and browned, exhaling an almost insupportable fetidity. Others were attacked by violent inflammation of the lungs, with hemorrhage; also gangrene, which manifested itself in black spots all over the body; if, to the contrary, the body was covered by abscesses, the patients seemed to have some chance for recovery.

Medicines were powerless, all remedies seeming to be useless. The disease attacked rich and poor indiscriminately; it overpowered the robust and debilitated; the young and the old were its victims. On the first symptom the patients fell into a profound melancholy and seemed to abandon all hope of recovery. This moral prostration aggravated their physical condition, and mental depression hastened the time of death. The fear of contagion was so great that but few persons attended the sick.

The clergy, encouraged by the Pope, visited the bedsides of the dying who bequeathed all their wealth to the Church. The plague was considered on all sides as a punishment inflicted by God, and it was this idea that induced armies of penitents to assemble on the public streets to do penance for their sins. Men and women went half naked along the highways, flagellating each other with whips, and, growing desperate with the fall of night, they committed scandalous crimes. In certain places the Jews were accused of being the authors of the plague by poisoning the wells; hence the Hebrews were prosecuted,

sometimes burned alive by the fanatical sects known as Flagellants, Begardes and Turlupins, who were encouraged in their acts of violence by the priests, notwithstanding the intervention of Clement VI.

Physicians were not only convinced of the contagious nature of the disease, but also believed that it could be transmitted by look and word of mouth. Such doctors obliged their patients to cover their eyes and mouth with a piece of cloth whenever the priest or physician visited the bedside.

Guillaume de Machant, poet and *valet de chambre* of Philip the Beautiful, mentions this fact in one of his poems :

“They did not dare, in open air
To even speak by stealth,
Lest each one’s breath might carry death
By poisoning the other’s health.”

And, in the preface of the “Decameron,” Boccaccio remarks in his turn: “The plague communicated direct, as fire to combustible matter. They were often attacked from simply touching the sick; indeed it was not even necessary to touch them. The danger was the same when you listened to their words or even if they gazed at you.”

One thing is certain—those who nursed the patients surely contracted the disease.

All the authorities of the Middle Ages concur in their statements as to the contagious nature of the plague. The rules and regulations enforced against the afflicted were barbarous and inhuman. “Persons sick and well, of one family, when the pest developed,” says Black⁴, were held, without distinction, in close confinement in their home, while on the house-door, a red cross was traced, bearing the sad and desperate epitaph:

*Dieu, ayez pitie ne nous!**

“No one was permitted to leave or enter the plague-stricken house, save the physician and nurse, or other persons who might be authorized by the Government.”

⁴ Black: Histoire de la Medecine et de la Chirurgie.

* Lord, have mercy on us!

We can well judge of the terror inspired by the pestilence by the precautions which the physicians who attended the sick took. In his treatise on the plague, Mauget describes the costumes worn by those who approached the bedsides of patients :

“The costumes worn were of Levant morocco, the mask having crystal eyes and a long nose filled with subtle perfumes. The nose was in the form of a snout, with an opening on each side. These openings served as respiratory passages and were well-filled at the anterior portion with drugs, so that at each breath they contained a medicated air. Under a cloak, the doctor also wore buskin made of morocco; closely-sewed breeches were attached to the bottines above the ankles; the shirt, the hat and the gloves were also of soft morocco.”

Thus accoutered, the doctor resembled a modern diver clad in a suit of leather.

All this sounds ridiculous at the present age, but it must be understood that the great epidemics of plague were of a nature to terrify ignorant populations. The narratives of historians of that epoch show them to be imbued with the superstitious ideas of antiquity. This attack of an invisible enemy, whose blows fell right and left, paralyzed and terrified every one. “In the midst of this orgy of death,” remarks Anglada, “the thought of self-preservation absorbed every other sentiment. Dominated by this selfish instinct the human mind shamelessly displayed its cowardice, egotism and superstition. Social ties were rudely sundered, the affections of the heart laid aside. The sick were deserted by their relatives; all flew with horror from the plague-breathing air and contact with the dreadful disease. The corpses of the victims of the epidemic, abandoned without sepulture, exhaled a horribly putrid odor, and became the starting point of new infectious centres. The worse disorder overthrew all conditions of existence. Human passions raged uncontrolled; the voice of authority was no longer respected; the wheels of civilization ceased to revolve.”

LE MAL DES ARDENTS.

Towards the end of the tenth century a new epidemic appeared in Europe, the ravages of which spread terror

among the people of the Occident; this disease was known by the name of *Mal des Ardents*, Sacred Fire, St. Anthony's Fire, St. Marcell's Fire, and Hell Fire.

This great epidemic of the Middle Ages is considered by many modern writers as one of the forms of ergotism, notwithstanding the contrary conclusions arrived at by the Commission of 1776, composed of such men as Jussieu, Paulet, Saillant, and Teissier, who were ordered to report as to the nature of the disease by the Royal Society. According to the work of this Commission the *Mal des Ardents* was a variety of plague, with buboes, carbuncles and petechial spots, while St. Anthony's fire was only gangrenous ergotism. This is a remarkable example of the confusion into which scientific facts were allowed to fall through the fault of careless authors. It is in such instances that we may estimate the importance of history.

We find in the "Chronicles of Frodoard," in the year 945, the following:

"The year 945, in the history of Paris and its numerous suburban villages, a disease called *Ignis Plaga* attacked the limbs of many persons, and consumed them entirely, so that death soon finished their sufferings. Some few survived, thanks be to the intercession of the Saints; and even a considerable number were cured in the Church of Notre Dame de Paris. Some of these, believing themselves out of danger, left the church; but the fires of the plague were soon relighted, and they were only saved by returning to Notre Dame."

Sauvel, the translator of Frodoard, remarks that at this epoch the Church of Notre Dame served as a hospital for the sick attacked by the epidemic, and sometimes contained as high as six hundred patients.

Another historian of the time was Raoul Glaber,⁵ who mentions that "in 993 a murderous malady prevailed among men. This was a sort of hidden fire, *Ignis Occultus*, which attacked the limbs and detached them from the trunk after having consumed the members.

⁵The "Chronique de Raoul Glaber," Benedictine of Cluny, covers the period between the year 900 and 1046. It may be found translated in the collection of memoirs on the History of France by Guizot.

Among some the devouring effect of this fire took place in a single night."

"In 1039," continues our author, "divine vengeance again descended on the human race with fearful effect and destroyed many inhabitants of the world, striking alike the rich and the poor, the aristocrat and the peasant. Many persons lost their limbs and dragged themselves around as an example to those who came after them."

In the *Chronicle of France*, from the commencement of the Monarchy up to 1029,⁶ the monk Adhemar speaks of the epidemic in the following terms: "In these times a pestilential fire (*pestilential ignis*) attacked the population of Limousin; an infinite number of persons of both sexes were consumed by an invisible fire."

Michael Felibien, a Benedictine friar of Saint Maur, also left notes on the epidemic of gangrene. He states in his *History of Paris*: "In the same year, 1129, Paris, as the rest of France, was afflicted by the *maladie des ardents*. This disease, although known from the morality it caused in the years 945 and 1041, was all the more terrible inasmuch as it appeared to have no remedy. The mass of blood, already corrupted by internal heat which devoured the entire body, pushed its fluids outwards into tumors, which degenerated into incurable ulcers and thus killed off thousands of people."

We could make many more citations, derived from ancient writers, but we think we have quoted enough to prove that the *Mal des Ardents* was only the plague confounded with the symptoms known as gangrenous ergotism. Could it not have been a plague of a gangrenous type? We cannot positively affirm, however, that it had no connection with poisoning by the *sphacelia* developed in grain, particularly on rye. Its onset was sudden and often very rapidly followed by a fatal termination.

THE ERUPTIVE FEVERS OF THE SIXTH CENTURY—VARIOLA, MEASLES, SCARLATINA.

Before the sixth century, the terrible period of the plague, one never heard of the eruptive fevers. Small-

⁶ Nouvelle Bibliothèque des Manuscrits.

pox, measles and scarlet fever were unknown to the ancients. Neither Hippocrates nor Galen nor any of the Greek physicians who practiced in Rome make mention of these diseases. The historians and poets of Greece and Italy who have written largely on medical subjects remain mute on these three great questions in pathology. Some authors have endeavored to torture texts for the purpose of throwing light on the contagious exanthemata, but they have not been repaid for their fresh imagination.⁷ It is admitted to-day that the eruptive fevers are comparatively new diseases, which made their appearance in the Middle Ages.

The first document that the history of medicine possesses on this point is that left by Marius, Bishop of Aventicum, in Switzerland, who says, in his chronicle, "*Anno 570, morbus validus cum profluvio ventris et variola, Italiam Galliamque valde affecit.*"⁸

Ten years later, Gregory of Tours described the symptoms of the new disease in the following terms:⁹

"The fifth year of the reign of Childebert, 580, the region of Auvergne was inundated by a flood and numerous weather disasters, which were followed by a terrible epidemic that invaded the whole of Gaul. Those attacked had violent fevers, accompanied by vomiting, great pain in the neighborhood of the kidneys, and a heaviness in the head and neck. Matter rejected by the stomach looked yellowish and even green, many deeming this to be some secret poison. The peasants called the pustules corals.¹⁰ Sometimes, after the application of cups to the shoulders

⁷ Satirical writers would not have failed to have spoken of the marks left by small-pox. Such authors as Martial, who frequented the public baths in order to write up the physical infirmities of his fellow-townsmen, to the end of divulging their deformities in biting epigram, would only have been too happy to have mocked the faces of contemporaries marked by the cicatrices of small-pox.

⁸ In the year 570, a violent disease, with running of the belly and variola, cruelly afflicted Italy and France.

⁹ Gregorii Turonensis, Opera Omnia, Liber V.

¹⁰ Latin corallum, which signifies heart, lung, intestines, and by extension of meaning, the interior of the body.

or limbs, blisters were raised, which, when broken, gave issue to sanious matter, which oftentimes saved the patient. Drinks composed of simples to combat the effects of the poison were also very efficacious.

"This disease, which commenced in the month of August, attacked all the very young children and carried them off.

"In those days Chilperic was also seriously afflicted, and as the King commenced to convalesce his youngest son was taken with the malady, and when his extremity was perceived he was given baptism. Shortly afterwards he was better, and his eldest brother, named Chlodobert, was attacked in his turn. They placed the prince in a litter and carried him to Soissons, in the chapel of Saint Medard; there he was placed in contact with the good Saint's tomb, and made vows to him for recovery, but, very weak and almost without breath, he rendered his soul to God in the middle of the night.

"In those days, Austrechilde, wife of King Gontra, also died of the disease; while Nantin, Count of Angouleme, succumbed to the same malady, his body becoming so black that it appeared as though calcined charcoal."

It will thus be seen that smallpox came from the Orient—that eternal centre of pestilence and curses. From the seventh century the Saracen armies spread the malady wherever they passed—in Syria, Egypt and Spain; in their turn, the Crusaders, in returning from the Holy Land, brought the disease into France, England and Germany; from these foci spread the great epidemics of the twelfth and thirteenth centuries, after which smallpox became periodically epidemic, appearing and disappearing without causation, but always destroying myriads of victims.

"In 1445," says Sauvel, "from the month of August to St. Andre's Day (November 30) over 6,000 infants died in Paris from smallpox."¹¹ The physicians knew neither the nature nor the treatment of the disease.

The measles was first noted at the same time as the

¹¹ Sauvel: *Histoire et Recherches des Antiquites de la Ville de Paris.*

small-pox, making its first appearance as an epidemic in the sixth century.

It is more than probable that the measles originated in Egypt, and, according to Borsieri, it had such an extension throughout Western Europe that there were but few persons who had not suffered attacks. The history of measles, however, is less clearly defined than that of small-pox, although Anglada says that it figured among the *spotted diseases*, of which Gregory of Tours speaks. But it was only in the sixteenth century that Prosper Martian exactly describes the disease.

Says Martian, "It is a disease of a special type, peculiar to children. It commences with a violent fever, followed, towards the third day, by an eruption of small red spots, which become elevated by degrees, making the skin feel rough to the touch. The fever lasts until the fifth day, and when it has ceased, the papules commence to disappear."

Measles was designated in the middle ages under the name *Morbilli*, which signified a petty plague, the same that *Morbus* meant a special plague. It is then fair to presume that the type of disease was no more serious than it is at the present day.

It is probable that the measles of the sixth century included at the same time small-pox, measles and scarlet fever, of which the ancients made no differential diagnosis. Anglada affirms the co-existence of all forms of eruptive fevers and gives the following reasons:

"The contemporaneous appearance of variola and rubella represents the first manifestation of an epidemic constitution, resulting from a collection of unknown influences as to their nature, but manifest by their effects. The earth was thence prepared to receive scarlatina, and it soon came to bear its baleful fruits. We do meet some mention of scarlet fever in the writings of the Arabian School, but it is merely suspected and only vaguely indicated. But when we remember how difficult it often is to diagnose at first between variola and measles, we are not astonished at the indecision manifested in adding another exanthematous affection to the medical incognito. It was only after innumerable observations and the ex-

perience of several centuries that the third new disease received its nosological baptism. There is nothing to prove that it did not co-operate with earlier epidemics of variola and rubeola, remaining undistinguished as to type, however."

What clearly proves that there was confusion between the various fevers of exanthemata is that Ingrassias describes scarlatina in 1510, under the name of *rosallia*, adding, "Some think the measles and *rosallia* are the same malady; as for me, I have determined their differences on many occasions."

These facts appear conclusive enough to admit that measles and scarlet fever are, like variola, the products of the epidemic constitution developed during the sixth century, as contemporaries of the bubonic plague, all these maladies representing the medical constitution of the first centuries of the Middle Ages.

THE SWEATING SICKNESS.

The name of *Sweating Sickness* was given to the great epidemic of fever that appeared in England in the fifteenth century, and thence extended over Continental Europe. This epidemic broke out in the month of September, 1486, in the army of Henry VII., encamped in Wales, and soon reached London, extending over the British Isles with frightful rapidity. Its appearance was alarming and while it lasted, which was only a month, it made a considerable number of victims. "It was so terrible and so acute that within the memory of man none had seen its like."

This epidemic reappeared in England in 1513, 1517, and 1551. It was preceded by very moist weather and violent winds. The mortality was great, patients often dying in the space of two hours; in some instances half the population of a town being carried off. The epidemic of 1529 was surely murderous; King Henry VIII was attacked and narrowly escaped death. Although flying from village to village the nobility of England paid an enormous tribute to the King of Terrors. The Ambassador from France to London, L. du Bellay, writing on the 21st of

July, 1529, remarks: "The day I visited the Bishop of Canterbury eighteen of the household died in a few hours. I was about the only one left to tell the tale, and am far from recovered yet."

This same year the sweating sickness spread all over Europe. It made terrible ravages in Holland, Germany, and Poland. At the famous synod of Luther and Zwingle, held at Marburg, the Reformed ministers seized by fear of death prayed for relief from the pestilence. At Augusburg in three months eighteen thousand people were attacked and fourteen hundred died.

This epidemic did not extend as far as Paris, but it developed in the north of France and Belgium.

Fernel, physician to Henry II., who practiced in Paris, likewise speaks of this suderific sickness in one of his works.¹²

It prevailed generally in summer and autumn, especially when the weather was moist and foggy. Contrary to what is seen in other epidemics, it was observed that the weak and poor and the old and infants were not attacked as often as robust persons and those in affluent circumstances.

The symptoms noted by physicians, such as Kaye and Bacon, may be classed into three distinct periods:

1. The period of chill, characterized by pains and itching in the limbs, an extraordinary prostration of the physical forces—a tremulous, shaky period.

2. The period of sweat, preceded by a burning heat all over the body and an unquenchable feverish thirst. The patient was agitated, disquieted by terror and despair. Many complained of spasms in the stomach, followed sometimes by nausea and vomiting, suffocation and lumbar pains, headache, with palpitation of the heart and precardial anxiety. This period was announced by a high delirium, sometimes muttering, sometimes loquacious; a fetid sweaty odor, irregular pulse, coma, and, in the last named condition, death always occurred.

3. The duration of the disease was most frequently but a few hours, rarely exceeding a day, whether the termination was favorable or fatal.

¹² Ferneli: *Universa Medico*

Convalescence was always long, often being complicated by diarrhoea or dropsy. It has been remarked in this connection that the malady might be confounded with the miliary sweat observed in Picardy and central France, but in the first named disease no cutaneous eruption was observed. Fernel clearly affirms this statement, as he says: "In this affection there is no carbuncle, bubo, exanthema or eczema, but simply a hypersecretion of sweat."

Such was the sweating sickness of the sixteenth century, which made so few victims in France, but which destroyed so many people in England and Germany.¹³ The origin of this disease has been often discussed, and also its nature; but all theories expounded by various authors partake of the doctrines of other days and are too antiquated to be revamped.

THE SCURVY.

It has been supposed by many that Hippocrates described scurvy under the name of *Enlarged Spleen*, an affection attributed to the use of stagnant water and characterized by tumefaction of the gums, foul breath, pale face, and ulceration of the lower limbs. But the study of the Hippocratic passage leads us to think that these symptoms were more of the character of scrofula than of scurvy. The recital by Pliny of the disease of the Roman soldiers while on an expedition to Germany seems to indicate scurvy, which Coelius Aurelianus, and after him the Arabian physicians, claims presented only a slight analogy to that affection.

Springer thinks that we may find the first traces of scurvy in the expedition of the Normans to Wineland, in

¹³ According to the Climatologist, vol. 1, p. 63, 1888, the "Sweating Sickness" appeared in epidemic form in 1887. It broke out in the Department of Vienne, Haute Vienne, in March of that year. The French Government promptly sent a commission of prominent sanitarians, with Prof. Brouardel at their head, into the infected districts, with power to take measures for the restriction of the disease. Strict isolation and disinfection soon brought the outbreak to an end.—G. A.

the first years of the eleventh century. In admitting that the men commanded by Eric Thorstein were obliged to winter on the western shores of Wineland and almost all succumbed to an epidemic malady of that country, proves that it was nothing but scurvy, although the word's only signification, in Danish, is ulceration of the mouth.

We have, besides, another document, which has great authentic value, a proof transmitted to us by our earliest and best chronicler of the Middle Ages, Joinville, the friend and companion of Saint Louis in his Crusade into Palestine. In his memoirs he gives a very succinct recital of the epidemic of famine and scurvy which attacked the French army on the banks of the Nile in 1248, just after the battles of Mansourah.¹⁴

The relation of Joinville leaves no doubt as to the nature of the epidemic that attacked the Crusaders. He gives a minute pen picture of the debility, and hemorrhages, the livid ecchymosis of the skin, the fungous tumefaction and bleeding of the gums, which characterize the disease known as scurvy.

According to the writings of some German physicians of the fifteenth century, this malady was endemic in the septentrional portions of Europe upon the shores of the Baltic Sea. In Holland numerous epidemics of scurvy were observed among the lower classes of the population, coinciding with bad conditions of public hygiene, such as food consisting of salt and smoked meats, dwellings located on marshy ground, cold atmospheres charged with fogs, etc.

This was the same infection that attacked our colonies in Canada, but at that time we had no knowledge of the therapeutic indications in such emergencies. A proof of this remarkable observation is inscribed on the registers of Cartier on his vessels during his sojourn in Canada.¹⁵

LEPROSY.

Leprosy is a disease originating in the Orient; Egypt and Judea were formerly the principal infected centres.

¹⁴ Joinville: *Histoire de Saint Louis*.

¹⁵ Cartier. *Bref Recit et Succincte Narration de la Navigation Faite aux Ysles de Canada*. Paris, 1545.

It was the return of an expedition to Palestine, under Pompey, that imported the malady to Italy. In the first years of the Christian Era it is mentioned by Celsus, who advised that it should be treated by sweating, aided by vapor baths. Some years later Areteus used hellebore, sulphur baths, and the flesh of vipers taken as food, a treatment adopted by others, as, for instance, Musa and Archigenes.

In the second century the disease was in Gaul; Soranus treated the lepers of Aquitaine, who were numerous.¹⁶

According to Velley, leprosy was common in France in the middle of the eighth century, when Nicholas, Abbot of Corbeil, constructed a leper hospital, which was never much frequented until after the Crusades of the eleventh and fourteenth centuries. At this period the number of lepers, or *ladres*, a name given to the unfortunates in remembrance of their patron saint, St. Lazarus, became so great that every town and village was obliged to build a leper house in order to isolate the afflicted. Under Louis VIII. there were 2,000 of these hospitals; later the number of such asylums reached 19,000.

According to the historians of this time, when a man was suspected to be a leper he could have no social relations without making full declaration as to what the real nature of his complaint might be. Without this precaution his acts were void, from the capitulary of Pepin, which dissolved all marriage contracts with lepers, to the law of Charlemagne, that forbade their associating with healthy persons. The fear of contagion was such that in places where no leprosy existed they built small houses for any one who might be attacked; these houses were called *bordes*.¹⁷ A gray mantle, a hat and wallet, were

¹⁶ Gregory of Tours says that in Paris they had a place of refuge, where they cleaned their bodies and dressed their sores

¹⁷ They designated by the name of *borde*, *bordeau*, *bordell*, *bordette*, *bourde*, or *bourdeau*, a small house or cabin built on the edge of town; a cabin intended to contain lepers. The word *bordell*, a house of ill-fame, as used even in modern days, takes its origin from *borde*, an asylum for lepers

also supplied the victims, also a *tartarelle*, a species of rattle, or a small bell, with which they warned all passers near not to approach. They also had a cup placed on the far side of the road, in which all persons might drop alms without going near the leper.

Leper houses were enriched, little by little, by the liberality of kings and nobles and the people, and to be a leper became less inhuman and horrible than at the beginning.

After entering a leper house the victim was considered as dead under the civil law, and in order to make the patients better understand their position the clergy accompanied them to their asylum, the same as to their funeral, throwing the cemetery dust on them while saying: "Enter no house save your asylum. When you speak to an outsider, stand to the windward. When you ask alms, sound your rattle. You must not go far from the asylum without your leper's robe. You must drink from no well or spring save on your own grounds. You must pass no plates or cups without first putting on your gloves. You must not go barefooted, nor walk in narrow streets, nor lean against walls, trees, or doors, nor sleep on the edge of the road," etc.

When dead they were interred in the lepers' cemetery by their fellow-sufferers.

It is true that each time that sanitary measures were relaxed by the authorities—such, for instance, as the perfect isolation of the patients—an increase in the number of lepers was noticeable. When this was observed the old-time ordinances were enforced again with vigor. It was thus in 1371 the Provost of Paris issued an edict enjoining the lepers to leave the Capital within fifteen days, under heavy corporal and pecuniary penalties; and in 1388, all lepers were forbidden to enter Paris without special permission; in 1402 this restriction was renewed, "under penalty of being taken by the executioner and his deputies and detained for a month on a diet of bread and water, and afterwards perpetual banishment from the kingdom." Finally, in April, 1488, it was announced "all persons attacked by that abominable, very dangerous and contagious malady known as leprosy, must leave Paris

before Easter and retire to their hospitals from the date of issuance of this edict, under penalty of imprisonment for a month on bread and water; and, where they had property, the sequestration of their houses and jewels and arbitrary corporal punishment; it was permitted them, however, to send things to them by servants, the latter being in health."

We can understand from this how these poor wretches, at different epochs, were accused of horrible crimes, among other things, poisoning rivers, wells, and fountains. As regards this accusation, says the author of the *Dictionnaire des Mœurs des Français*, Philip le Long burned a certain number of these poor wretches at the stake and confiscated their wealth, giving it to the Order of Malta and St. Lazare.

A minute description of this disease will be found in the works of Barbarin.¹⁸

The physicians of leper hospitals have left behind a great number of medical documents bearing on the characteristics of the disease, but their observations are so confused that we can only conclude that they considered all cutaneous maladies as belonging to the same constitutional vice.

In 1543, leprosy was so widespread in France, as to be beyond sanitary control, and the edict of Francois I., re-establishing leper hospitals, amounted to nothing. There were too many affected people. The Hospital of Lourcine, which was specially devoted to these cases at Paris, contained 600 patients in 1540, and in the wards of Trinity Hospital and the Hotel Dieu there were many more. It was the same in the Provinces, notably at Toulouse, which had the merit of creating the first hospital of its kind ever instituted. Finally, fifty years later, in 1606, for want of lepers, the leper asylums were officially

¹⁸ Etienne Barbazin, erudite and historian, born in 1696, author of a number of works on the History of France: "Recueil Alphabetique de Pieces Historiques"; "Tableaux et Contes Français, des XII., XIII., XIV., et XV., Siecles"; "The Orders of Chivalry, etc." He also left numerous manuscripts on the origin of the French language. See "Bibliothèque de l'Arsenal."

closed. Henry IV., in a proclamation, gave those remaining "to poor gentlemen and crippled soldiers."

Thus ended the epidemic of leprosy in France, which had prevailed from the second century, observing the same progress in other countries of Western Europe during the same period of time.

CHAPTER IV.

INSECTS AS PROPAGATORS OF DISEASE.

How Pestilence is Spread by Flies, Mosquitoes, Fleas and Other Insects.—Instances Where Disease Was Conveyed by Bed-Bugs and Ants.—The Role played by the Cattle-Tick and the Tsetse-Fly.—Summary of the Mosquito Doctrine.—Bibliography.

In the medical part of this volume will be found a detailed scientific account of the mosquito theory. For the benefit of the lay reader, however, who is either too busy to digest the views expressed in these instructive observations, or who does not care to tussle with medical phraseology, we will give a short talk regarding the role played by insects in the propagation of disease.

There is no novelty in the doctrine of insect or animalcular origin of disease. Many of the older writers, most conspicuous amongst whom are Linnaeus, Kircher and Lyander, have promulgated such an opinion, and it has been vaguely presented to the notice of the medical profession in the past; but it was not until after the publication of Eberenberg's great work on Infusoria (1838) that its bearings were fully appreciated.

It will no doubt be news to many to learn that the mosquito theory of the transmission of yellow fever came very nearly being expounded over half a century ago. Dr. Nott, of Mobile, in a paper published in 1848,¹ reviews the situation in a scholarly manner and attributes the specific cause of yellow fever to "some form of insect life." He does not mention the mosquito as the active agent of transmission, but, in a long and carefully-prepared paper, dwells upon the fact that "certain insects" are capable of transmitting the disease.

Among other things, Dr. Nott makes the following assertion (*loc. cit.* p. 40), which certainly is prophetic of the theory fathered by Dr. Finlay:

"It would certainly be quite as philosophical (as the malarial theory) to suppose that some insect or an animalcule, hatched in the lowlands, LIKE THE MOSQUITO,² after

¹ Nott: *New Orleans Medical and Surgical Journal*. 1848, vol. 4, p. 563.

² The emphasis is ours. G. A.

passing through its metamorphoses, takes flight, and either by preference for a different atmosphere, or impelled by one of those extraordinary instincts which many are known to possess, wings its way to the hill top to fulfil its appointed destiny."

Twenty-two years later (1870), Dr. Nott was commissioned by the Board of Health of the City of New York to prepare and present to the Board a report upon the outbreak of yellow fever at Governor's Island that year. In an elaborate paper, in which the Doctor touches upon the causes of the outbreak and its progress, he comments at length upon the insect hypothesis. The following extract from Dr. Nott's paper is the nearest approach to the present accepted doctrine of transmission we have yet seen in opinions of the past:³

"It is possible," observes Dr. Nott, "that even insects may exist a million times smaller than any the microscope has yet reached. While the slow and steady progression of yellow fever from a point, as I have described it, should be received as an indisputable fact, on the other hand we confess that the fact is at present inexplicable; it must be some form of living organism, which multiplies and extends by organic laws. If in insects form, it is easy to understand its progress, and, if a fungus, we are not without examples in the larger fungi, of a manner of progression from a given spot more rapid than that of yellow fever. Moreover, it is the business of some insects to distribute certain seeds of plants far and wide; to carry the pollen of one plant to another to fructify it; and it may be the duty of others to disseminate diseases. It is well known, on the authority of Murchison and others, that the malignant pustule is taken by gnats from the animal and communicated to man by its bite. So there are many ways that diseases might be carried and communicated by insects or fungi.

"I will here mention a fact which I have often noticed myself with regard to MOSQUITOES,⁴ but have never seen it alluded to by others. These insects are so abundant in

³ Nott: Annual Report of the Board of Health of the Health Department of the City of New York, 1870, p. 363.

⁴ The emphasis is ours. G. A.

Mobile, New Orleans, and other Southern cities, that it is impossible to sleep at night without the protection of mosquito nets. Fair-skinned persons from more northern climates, and particularly young children recently introduced, suffer greatly from the bites of this insect, the bites often inflaming, and even making tedious, troublesome sores; whereas the children of parents who have lived a generation or two in the climate suffer comparatively little; they seem to become acclimatized against the poison of these insects as they do against the poison of yellow fever. On rising from my own bed in the morning I have many times seen my little children lying in a trundle-bed covered by mosquitoes, after, as Mrs. Jackson said, 'kicking the kiver off.' The insects had been biting at them for hours, and yet by breakfast-time every mark had disappeared. Such would not be the case with children of fair-skinned parents recently brought into the clime. Some Southern children, it is true, are more susceptible to the poison of mosquitoes than others, and so it is with regard to susceptibility to yellow fever."

If Dr. Nott had simply gone a little further and directly accused the mosquito of being the active agent of transmission, yellow fever would have been eradicated from the American Continent years ago and the illustrious Southerner would have occupied a place in the annals of fame which would have endured for all time to come.

Tiktine, in an article entitled "Contagion through the Influence of Insects,"⁵ relates facts of great interest. In a review of this paper made in the *Bulletin of the Pasteur Institute* for April, 1897, mention is made of an epidemic of relapsing fever which occurred in Odessa, Russia, where the disease is almost unknown.⁶ It seems that a sailor who came from Jaffa was suffering from this malady and was admitted to the hospital. A week later another patient was admitted, and soon after a tremendous epidemic occurred, which affected more than ten thousand individuals. Most of these were sailors, living about the harbor, who usually applied for admission after a de-

⁵ Bulletin Medical (Paris), February 3, 1897.

⁶ This disease is exceedingly rare in the United States, but is quite prevalent in Great Britain.

bauch. Dr. Tiktine went to see a number of them, and was struck by the enormous number of bed-bugs, lice and fleas with which they were covered. He then thought that the contagion might have arisen from these parasites going from one individual to the other. One of these insects, passing from a sick man to a healthy one, might inoculate the latter by its sting, still smeared with blood, or else the sleeper, abrading his skin by scratching, might become infected by crushing the parasite, full of septic blood, over the sore places.

The Doctor collected some bed-bugs and allowed them to fast, after which he placed them upon the skin of patients suffering from an attack of relapsing fever. They rapidly filled themselves with blood which, upon microscopic examination, was found to contain large numbers of spirilli still in motion. He was able to show that their vitality persisted, within the insect, for more than eighteen hours. Besides this, bed-bugs were fed upon the blood of a monkey that had been inoculated with spirillum fever. They were then placed upon a healthy monkey, and the latter soon had a characteristic attack of the disease.

"We can therefore see what a preponderating place is taken by insects in the spreading of contagious diseases," concludes the reviewer. "We know that flies often carry about the bacilli of tuberculosis, of cholera, of purulent ophthalmia, and of anthrax. Finlay of Havana, believes that flies are the principal agents in the dissemination of yellow fever, and Hammond shares this view. Texas fever, according to Smith and Kilborne, is propagated by ticks which spread about a hæmatozoa, belonging, like that of the malarial infection, to the class of protozoa."

Howard, whose great work on the natural life of the mosquito is a standard, thus describes how typhoid fever is propagated by the common house-fly:⁷

"The principal insect agent in this spread is the common house fly and this insect is especially abundant in country houses in the vicinity of stables in which horses are kept. The reason for this is that the preferred food of

⁷ Howard: Farmers' Bulletin No. 155, U. S. Department of Agriculture, 1902, p. 12.

the larvæ of house flies is horse manure. House flies breed in incredible numbers in a manure pile largely derived from horses. Twelve hundred house flies, and perhaps more, will issue from a pound of horse manure. Ten days completes a generation of house flies in the summer. The number of eggs laid by each female fly averages 120. Thus, under favorable conditions, the offspring of a single over-wintering house fly may in the course of a summer reach a figure almost beyond belief. With an uncared-for pile of horse manure in the vicinity of a house, therefore, flies are sure to swarm. Their number practically will be limited only by breeding opportunities. They are attracted to, and will lay their eggs in, human excrement. Under favorable conditions they will breed, to some extent, in this excrement. They swarm in kitchens and dining rooms where food supplies are exposed. They are found commonly in box privies, which sometimes are not distant from the kitchens and dining rooms. Therefore, with an abundance of flies, with a box privy near by, or with excremental deposit in the neighborhood, and with a perhaps unsuspected or not yet fully developed case of typhoid in the immediate neighborhood, there is no reason why, through the agency of contaminated flies alighting upon food supplies, the disease should not be spread to healthy individuals. That it is so spread is not to be questioned. That under the unusual conditions of the army concentration camps in the summer of 1898 it was so spread to a shocking extent has been demonstrated by the army typhoid fever commission. And the remedy is plain. It consists of two courses of procedure: (1) Proper care of excreta; (2) the destruction of flies."

The same authority says,⁸ that while in malaria and typhoid we have the two principal diseases common to the United States which may be conveyed by insects, the agency of these little creatures in the transfer of disease germs is much more widespread in warm countries, and it is by no means confined to human beings. In Egypt and in the Fiji Islands there is a destructive eye disease of human beings the germs of which are carried by the com-

⁸ Loc. cit., p. 17.

mon house fly. In our Southern States an eye disease known as pink-eye is carried by certain very minute flies of the genus *Hippelates*. In certain tropical countries a disease known as filariasis, which somewhat resembles certain forms of leprosy, is transferred among human beings by certain mosquitoes. There is good reason to suppose that the germs of the bubonic plague may be transferred from sick people to healthy people by the bites of fleas. The so-called Texas fever of cattle is unquestionably transferred by the common cattle tick and this was the earliest of the clearly demonstrated cases of the transfer of disease by insects. In Africa a similar disease of cattle is transferred by the bite of the famous biting fly known as the tsetse fly. The germs of the disease of cattle known as anthrax are carried by gadflies, or horse flies, and when these flies subsequently bite human beings malignant pustules may result; and other discoveries of this nature are constantly being made. Even the common bedbug is strongly suspected in this connection.

Jeliffe, in speaking of flies as carriers of disease, gives the following example:⁹

To prove that flies as well as men and animals were able to contract the plague, a certain number of insects were allowed to feed on the crushed organs of an animal that had died of it, while an equal number of flies were fed on similar organs of a healthy animal. In several repetitions of this experiment all the infected flies were dead at the end of six or seven days, while nearly all the other flies were alive. All the dead flies had the living germs of the plague in their intestines. In plague stricken countries where there are no sewers, no garbage laws, and no sanitation, where dead animals lie unburied, where families live and eat and sleep in the same room, it is logical to conclude that the flies, the only natural scavengers, should become infected, and should, in the few days that elapse before they die, infect all the food they light on.

The following experiment is also related by Jeliffe:

"Flies are not the only insects that carry the plague. Ants and fleas are just as dangerous. In India, when a

⁹ Jeliffe: *Munsey's Magazine*, 1901, Vol. 25, p. 707.

rat dies of the plague, his body is promptly eaten by ants. To prove that the insects contract the infection, an experimenter dipped the point of a needle in their excreta, and with it pricked some living rats and mice, which he kept carefully in cages. They in turn died of the plague. That such a slight thing as a pin prick is enough to allow the germs to enter the body of a human being is shown by the case of the two Japanese physicians who scratched themselves with the points of their instruments while making autopsies on plague patients, and immediately took the disease."

It will thus be seen that not only flies and mosquitoes, but "all insects that bite" should be looked upon with suspicion and destroyed.

The earliest reference to mosquitoes in connection with yellow fever that we have been able to discover, is made by Benjamin Rush in his *Medical Inquiries and Observations*, (Vol. 5, p. 18), edition of 1798. In speaking of the yellow fever epidemic at Philadelphia in 1797, he says:

"In addition to the register of the weather, it may not be improper to add, that mosquitoes were more numerous during the prevalence of the fever than in 1793. An unusual number of ants and cockroaches were also observed; and it was said that the martins and swallows disappeared from the city and its neighborhood."

The presence of mosquitoes during the prevalence of yellow fever was also noted by an early writer, Dr. John Vaughan,¹⁰ in his observations on the epidemic at Wilmington, Delaware, in 1802. "Myriads of mosquitoes," says this writer, "infested the lower parts of the town from July until frost, having gradually diffused themselves over the borough in September. The eldest of our inhabitants do not recollect this insect being so troublesome here in any previous season; while the unanimous report of persons from the fenny counties of Kent and Sussex, the annual haunts of these winged pests, was that they were unusually free from them."

It is also worthy of note that the fever did not spread

¹⁰ Vaughan: *Medical Repository*, N. Y., 1803, vol. 6, p. 299.

to Kent and Sussex counties, but spent all its virulence in the district where the mosquito was more abundant.¹¹

The idea that yellow fever could be transmitted by mosquitoes originated with Dr. Carlos Finlay, of Havana, in 1881. The doctor noticed a correspondence between the abundance of mosquitoes and a period of increase of yellow fever in the autumn, while during the summer yellow fever had not prevailed to any extent and mosquitoes had also been less numerous. This set the doctor to thinking and a suspicion lurked in his mind that these pestiferous insects were probably responsible for the spread of the disease. He immediately began a series of experiments, which resulted in the great discovery which has revolutionized the antiquated theories concerning the propagation of yellow fever and which are detailed in the medical part of this volume.

We will end this summary by giving the conclusions of Reed, Carroll and Agramonte, taken from their masterly essay on the etiology of yellow fever, which sums up the whole situation in a nutshell:¹²

1. The mosquito—*C. fasciatus*—serves as the intermediate host for the parasite of yellow fever.
2. Yellow fever is transmitted to the non-immune individual by means of the bite of the mosquito that has previously fed on the blood of those sick with this disease.
3. An interval of about twelve days or more after contamination appears to be necessary before the mosquito is capable of conveying the infection.
4. The bite of the mosquito at an earlier period after contamination does not appear to confer any immunity against a subsequent attack.
5. Yellow fever can also be experimentally produced by the subcutaneous injection of blood taken from the general circulation during the first and second days of this disease.
6. An attack of yellow fever, produced by the bite of the mosquito, confers immunity against the subsequent

* ¹¹ See Chapter on "Yellow Fever in Maine," in this volume.

¹² The Etiology of Yellow Fever, By Walter Reed, James Carroll and Aristides Agramonte, 1901.

injection of the blood of an individual suffering from the non-experimental form of this disease.

7. The period of incubation in thirteen cases of experimental yellow fever has varied from forty-one hours to five days and seventeen hours.

8. Yellow fever is not conveyed by fomites, and hence disinfection of articles of clothing, bedding, or merchandise, supposedly contaminated by contact with those sick with this disease, is unnecessary.

9. A house may be said to be infected with yellow fever only when there are present within its walls contaminated mosquitoes capable of conveying the parasite of this disease.

10. The spread of yellow fever can be most effectually controlled by measures directed to the destruction of mosquitoes and the protection of the sick against the bites of these insects.

11. While the mode of propagation of yellow fever has now been definitely determined, the specific cause of this disease remains to be discovered.

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The bibliography of the transmission of yellow fever by the mosquito will be found in another part of this volume.

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PART SECOND.

YELLOW FEVER.

PRELIMINARY OBSERVATIONS.

CHAPTER I.

PERTINENT POINTS ABOUT YELLOW FEVER.

Geographical Limits of Yellow Fever and Other Pestilential Diseases.—Mortality of Yellow Fever in September, Compared with Other Months.—Historic Mortalities from Yellow Fever.

GEOGRAPHICAL LIMITS OF YELLOW FEVER.

No disease possessing such pestiferous proclivities as yellow fever is confined within such restricted limits. In America, it has never prevailed further north than Quebec (latitude $46^{\circ} 50'$) nor has it been noticed further south than Montevideo (latitude $34^{\circ} 54'$). In the Eastern Hemisphere, Swansea, in Wales (latitude $51^{\circ} 37'$) has been its northernmost limit, while St. Paul de Loanda, in Africa (about 9° S.) has been the southernmost habitat. Its western limits have been the shores of the Pacific from Montevideo to Lower California, except on one occasion (1883) when an imported case died in San Francisco, Cal. In Europe, it has never been seen further East than Leghorn, in Italy ($7^{\circ} 56'$). In Africa, Egypt and Madagascar are said to have been invaded by the disease, but the report lacks authenticity. The same may be said of the alleged prevalence in Asia Minor during the campaigns of Napoleon.

The present foci of yellow fever are still more restricted than formerly. Juan Guiteras recognizes the following three areas of infection:

1. The *Focal Zone*, in which the disease is never absent, including Havana, Vera Cruz, Rio Janeiro and other South American ports.

2. The *Perifocal Zone*, or region of periodic epidemics, including the ports of the tropical Atlantic in America and Africa.

3. The *Zone of Accidental Epidemics*, between the parallels of 43° north and 35° south.

To better understand the meaning of this eminent authority, the reader is referred to the map of the world, where he will observe three great regions of pestilential disease: First, of the plague; secondly, of cholera; thirdly, of yellow fever.

These regions are distributed as follows:

From the equator to 20° North may be regarded as the true yellow fever region. This includes the West Indies, the coast towns of Mexico, the Isthmus of Panama, Columbia, Venezuela, the eastern shores of South America as far south as the Rio de la Plata, and the western coast of Africa, embracing Sierra Leone and the Gold Coast.

From 30° to 40° North, in the Eastern Hemisphere, is the region of the plague, including Arabia, Egypt, Turkey and Asia Minor.

From 20° to 40° North, in the Eastern Hemisphere, is the Valley of the Ganges, the principal centre of the cholera region.

MORTALITY OF YELLOW FEVER IN SEPTEMBER.

A study of the statistics of yellow fever demonstrates the peculiar fact that the disease is connected in its epidemic appearance with certain seasons of the year. The months of July, August and September are those in which epidemics are more prevalent and the disease seems to attain its greatest mortality in the latter month. A resume of nine epidemics in New Orleans, made by Chaille, and completed (so far as 1905 is concerned) by the compiler of this work, shows that in six of these visitations, the mortality was greatest in September, viz:

¹ Some Yellow Fever Data, by S. E. Chaille, New Orleans Medical and Surgical Journal, 1905, vol. 58, p. 191.

MORTALITY IN NINE NOTABLE EPIDEMICS IN NEW
ORLEANS.

	1847	1848	1853	1854	1855	1858	1867	1878	1905
May			2						
June.....		4	31	2	5	2	3		
July	74	33	1521	29	382	132	11	26	42
August	965	200	5133	532	1286	1140	255	1025	217
SEPTEMBER..	1000	467	982	1234	874	2204	1637	1780	111
October.....	198	126	147	490	97	1137	1072	1065	61
November.....	12	20	28	131	19	224	103	147	6
December.....	10		4	7	7	15	26	3	0
Months Unknown....	445	22							
TOTAL	2804	872	7848	2425	2670	4854	3107	4046	

A glance at the above figures proves that in only three instances (1853, 1858 and 1905) August proved more fatal than September. In 1853, the mortality reached the appalling aggregate of 5133 in August, against 892 in September and a grand total of 7848 for the entire year.

A search into the records of nearly every place where yellow fever has been epidemic reveals the same state of affairs, with the exception of Havana, where July seems to be the most fatal month.

Even as far back as 1793, Currie,² in speaking of the great epidemic at Philadelphia that year, says:

"In September, the disease increased amazingly. In the course of the month, about 1400 citizens were added to the list of mortality; towards its close, from 50 to 90 were buried of a day, though the mercury now seldom rose above 80°."

"After the first of September, there was no disease to be seen but yellow fever."³

² A Treatise on the Synochus Ictericus, etc., by William Currie (1794), p. 15.

³ Epidemic at Philadelphia of 1797, Rush, vol. 5, p. 19.

In 1822, when New York was visited by the disease, the deaths in September mounted up to 110, against 58 in August and 90 in October.⁴

The excess in mortality in September over the other months during the prevalence of yellow fever, has also been noted in the following epidemics:

New York, 1799; Providence, R. I., 1797; Baltimore, 1819; Wilmington, (Del.) 1798; Charleston, (S. C.) 1807, 1817, 1819, 1824, 1827 and 1838; Natchez, 1823 and 1825; Mobile, 1839; New Haven, (Conn.), 1794; New Orleans, 1819, 1820, 1824 and 1833.

La Roche⁵ notes that the mortality has occasionally been greatest in August, as was the case in Charleston in 1838 and in New Orleans in 1817, 1839 and 1853. But these were isolated exceptions.

The apparent reason for the greater mortality in September seems to be that the disease, beginning early in summer, has had time to spread and to attack a larger number of persons; also, the virulence is greater because by that period the infected mosquitoes are more numerous and, everything else equal, exposed persons receive more bites and consequently a larger dose of poison.⁶

This did not follow in 1905, because by September the effect of the active anti-mosquito campaign was showing itself by diminishing number of cases as well as by lower mortality.

HISTORIC MORTALITIES FROM YELLOW FEVER.

Whenever yellow fever has spread its sombre mantle over a community, it has left in its wake countless hecatombs.

"The reader need scarcely be informed," says LaRoche, in his monumental work on yellow fever, "that the yellow fever, wherever it has assumed the epidemic form, has fully established its claims to being classed among the

⁴ Proceedings Board of Health of the City of New York (1823), p. 123.

⁵ Vol. i, p. 545.

⁶ See Article by Dr. Chassaignac, in the medical part of this volume.

most formidable diseases to which the human body is liable."

The island of St. Lucia, in the West Indies, furnishes the earliest authentic example of great mortality from yellow fever. In 1664, according to Keating,⁷ it killed 1,411 out of a population of 1,500 soldiers, being in the ratio of 1.06 of the whole number. In 1665, in the same locality, out of 500 sailors, 200 died, being one in 2.5; and again, in 1666, the unfortunate island was invaded by the disease, when every man, woman and child, 5,000 in all, died.

In 1793, in Grenada, West Indies, yellow fever appeared among the sailors, the proportion of deaths in cases amounting to 1 in 3; and of a total of 1,130 soldiers, 630 died.

In 1794, the disease attacked Sir Charles Gray's Army, in the Windward and Leeward Islands, and of an estimated population of 12,000, there was a mortality of 6,012.

In Guadeloupe, in 1796, out of an estimated population of 20,000, there was a mortality of 13,807. That same year, out of 367 artillerymen stationed at the island, 129 died. In 1802, Guadeloupe was again decimated, 5,057 deaths occurring in a population of 16,363.

In 1802, at San Domingo, in a population estimated at 40,000 (principally soldiers), there were 27,000 cases and 20,000 deaths. The mortality among French troops in the West Indies in 1802 amounted to 57 per cent.

Quebec, Canada, was invaded by yellow fever for the first and last time in 1805. Of one company of 55, belonging to an English regiment, all but six died.

The greatest mortality ever recorded in Havana was in 1819, when 5,162 died. As yellow fever had visited Havana almost every year since 1620, this mortality is especially worthy of note.

In 1852, at Barbadoes, West Indies, out of 1,380 soldiers, there were 879 cases and 173 deaths.

At Martinique, during a period of five years, 1802 to

⁷ Keating: History of the Yellow Fever of 1878, p. 77.

1807, in a population of 11,085 soldiers, there were 8,673 cases and 2,891 deaths.

According to Joseph Jones,⁸ the total deaths from all diseases in New Orleans from 1838 to 1883, a period of forty-five years, amounted to 272,649, of which 31,207 were from yellow fever, 10,009 from cholera and 6,436 from smallpox. It will thus be seen that of the 47,642 deaths from contagious and infectious disease, the mortality from yellow fever reached the appalling figure of 31,207, or a yearly average of 693 for the period above mentioned.

The greatest mortality from yellow fever in a single year in New Orleans took place in 1853, when 7,848 died. From 1853 to 1858, a period of six years, the mortality was as follows:

1853	7,848
1854	2,425
1855	2,670
1856	74
1857	200
1858	4,845
<hr/>	
Total for six years	18,062

Since 1858, there have been only two great epidemics in New Orleans: 1867, when 3,107 died, and 1878, when the pestilence made 4,046 victims.

The North also presents a melancholy record.

In his summary of the epidemics which devastated Philadelphia in the past, La Roche states that during the visitation of 1699, when the city was only 17 years old and the population did not exceed 3,800, the mortality from yellow fever was 220, or one in 17.3 of the entire number of residents. Ninety-four years later (1793), when the population of Philadelphia amounted to 60,000, occurred the "great epidemic," commencing in August and ending in December, and causing a fearful total of 4,041 deaths. Four years later (1797), a severe epidemic

⁸ Jones: "Medical and Surgical Memoirs, vol. 3, part 2, Table "C."

visited the city, the mortality amounting to 1,300. The year following (1798), yellow fever again assumed a virulence which caused such a widespread terror, that nearly the whole population fled. The epidemic of that year made 3,645 victims. It will thus be seen that in the short space of five years (1793 to 1798), yellow fever made the melancholy record of 8,986 victims in that scourge-ridden city.

In New York, Boston, Baltimore, Portsmouth (Va.) and on the North Atlantic seaboard, the disease has at times assumed pestilential proportions, the details of which will be found in that part of this volume devoted to the history of yellow fever.

Europe furnishes an appalling list of mortalities. According to LaRoche, Spain has been the principal sufferer on occasions of this kind, experiencing, in the course of nine epidemics—1800, 1801, 1803, 1804, 1810, 1813, 1818, 1819 and 1821—the immense loss, by yellow fever, of upwards of 130,000 individuals. During one single season—that of 1800—not less than thirty places in Andalusia were visited, and in them the loss amounted to 61,363.

The year 1804, according to LaRoche, was another of great calamity. On that occasion, twenty-five places in Spain, with a combined population of 427,228, lost 52,559 souls, or one in 8.12.

The disease also prevailed epidemically in some parts of France, England, Italy and Portugal during the eighteenth and nineteenth centuries, but Spain seems to have been the most fertile spot for the propagation of yellow fever in the Old World.

CHAPTER II.

NOMENCLATURE OF YELLOW FEVER.

Peculiar Names given the Disease by Medical Writers.—A List containing One Hundred and Fifty-two Synonyms.

NAMES IN VOGUE AT THE PRESENT DAY.

English: Yellow Fever.
 French: Fievre Jaune.
 Spanish: Fiebre Amarilla.
 Portugese: Febre Amarella.
 German: Gelbes Fieber.
 Italian: Febbre Gialla.
 Latin: Febris Flava.

SYNONYMS.

No disease under heaven has had more synonyms than yellow fever. Beginning with 1494, when it was generally designated by the name of *Contagion*, and ending with the Year of Grace 1907, when the term *Mosquito Fever* seemed decidedly appropriate, the nomenclature of the disease has been stupendous. The subjoined list, which has been carefully prepared from the writings of American, English, Spanish, Italian, Portugese and Spanish chroniclers, will convey an idea of the peculiar names which were used in former times to designate the yellow scourge, the nature and origin of which we are no wiser to-day than were those worthy and illustrious observers.

1. AMERICAN BILIOUS MALIGNANT FEVER.
 Moultrie, 1749.

2. AMERICAN FEVER.
 Ceresa, 1829.

3. AMERICAN PESTILENCE.
 Haygarth, in a work published in 1801, theorizes on the "prevention of infectious fever, especially the American Pestilence."

4. AMERICAN TYPHUS.
Term used by the disciples of the school of Bally.
5. AMERICAN YELLOW FEVER.
Lining, in his "Essays and Observations;" also Jolivet, 1831, and others.
6. ARDENT FEVER.
Fermin thus mentions it in his work on "Traite des Maladies les Plus Frequentes a Surinam," published in 1763.
7. ARDENT SUMMER FEVER.
English writers, middle of Eighteenth Century.
8. ATAXIC TYPHUS.
Bally and his followers.
9. AUTUMNAL ENDEMIAL EPIDEMIC FEVER.
Davidge, in a work published at Baltimore, in 1798.
10. AUTUMNAL EPIDEMIC FEVER.
Shaw, 1804.
11. AUTUMNAL FEVER.
Vaughan, in his "Concise History," etc., 1802.
12. BARBADOES DISTEMPER.
American and English writers, in the beginning of the Eighteenth Century.
13. BARBADOES FEVER.
Philadelphia, in 1699, because the pestilence of that year was imported from Barbadoes, West Indies.
14. BARCELONA FEVER.
Rochoux, 1822, and those who advocated the theory that the epidemics which ravaged Spain in the beginning of the last century, were endemic to that country.

15. BILIOUS FEVER.
Gamble, Rochefort, Hughes, Chanvalon, Bajon and Fermin.
16. BILIOUS EPIDEMIC FEVER.
Yates, 1813.
17. BILIOUS FEVER OF WARM CLIMATES.
English and American writers in the middle of the last century.
18. BILIOUS MALIGNANT FEVER.
Joseph Brown, 1797.
19. BILIOUS PUTRID FEVER.
Hillary.
20. BILIOUS REMITTENT FEVER.
Arnold.
21. BILIOUS REMITTENT PUTRID FEVER.
Rush and his disciples.
22. BILIOUS REMITTENT YELLOW FEVER.
Rush and his school.
23. BILIOUS REMITTING FEVER.
Rush, 1793.
24. BILIOUS YELLOW FEVER.
Williams.
25. BLACK VOMIT.
Popular name adopted by old English writers and derived from the Spanish *Vomito Negro*.
26. BRONZE JOHN.
Chambers' Encyclopedia, article on "Yellow Fever."
27. BULAM FEVER.
Pym, Chisolm, and their disciples, who propagated the visionary doctrine that the fever had been imported from the Island of Bulam, West Africa.

28. CALENTURA.
This name had its origin in the dogma that heat was the prime cause of yellow fever. It was only in the beginning of the nineteenth century that this designation was abandoned by the Spaniards, who substituted "Fiebre Amarilla," a term which is used to this day in Spain and in Central and South America.
29. CALENTURA AMARILLA.
Cibat, 1803.
30. CALENTURA MALIGNA CONTAGIOSA.
Gonzales, in his dissertation on the yellow fever in Cadiz, published in 1801.
31. CALENTURA AMARILLA DE AMERICA.
Jose Fernandez de Madrid, 1821.
32. CALENTURAS PUTRIDOS Y MALIGNA.
Masterall, 1797.
33. CALENTURAS TIFOIDEAS.
Burdin, 1820.
34. CALENTURAS THERMO-ADYNAMICA Y THERMO-ATAxia.
Jose Fernando de Madrid, 1821.
35. CARDITE AMARILLE.
Mentioned by Berenger-Feraud.
36. CAUSOS OR ARDENT FEVER.
Desperriere, Gillespie.
37. CAUSUS.
Name used by Fermin, in his work above quoted, and by Miller, McArthur and others.
38. CAUSUS MALIN D'AMERIQUE.
Berenger-Feraud is authority for this expression.

39. CAUSUS TROPICUS ENDEMICUS.

Moseley, in his "Treatise on Tropical Diseases," etc., 1795.

40. CHAPETONADA.

Coreal and Ulloa. This name, which signifies "brigand" in the Peruvian language, was originally given to the followers of Pizarro by the natives and was subsequently adopted by the inhabitants of Martinique to mean all Europeans who landed on their shores. These unfortunate colonists dying by the thousands from the endemic fever of the country, the name was finally applied to the disease itself.

41. COCOLITZLE.

Herrera, in his famous work published in 1601, says that this name was given by the Carib Indians to the disease.

42. CONCENTRATED ENDEMIC FEVER.

Jackson, in a work published in Edinburg, 1789.

43. CONTAGION.

This name is quite prevalent in the writings of early Spanish and French authors from 1494 to 1634. After that date and up to the end of the Seventeenth Century, the disease was designated as *Coup de Barre* by the French and *Calentura* by the Spanish.

44. CONTINUA PUTRIDA ICTERODES CAROLINIENSIS.

Macbride.

45. CONTAGIOUS FEVER.

Rochedort, Bajon, Fermin, Chanvalon, Hughes, Schotte.

46. COUP DE BARRE.
Labat and other early Antillian chroniclers. The literal meaning of the word is: "I am struck with a whip-stock," and is expressive of the suddenness of the onset of the malady and the muscular pains which accompany it.
47. ELODES ICTERODES.
Vogel.
48. ENDEMIAL CAUSUS, OR BURNING FEVER.
Mentioned by Moseley in his treatise on Tropical Diseases.
49. EPAUCTUS MALIGNUS FLAVUS.
Goode.
50. EPIDEMIC.
Sahagun, Salgado, Salamanca and other early writers.
51. EPIDEMICAL DISTEMPER.
Sandiford.
52. EXAMTHEMA EXTERNUM CONTAGIOSA.
According to Jackson (1821), this name was applied to the disease by Spanish physicians during the great epidemics in Andalusia in the beginning of the last century.
53. FEBBRE GIALLA PESTILENZIALE D'AMERIQUE.
Palloni and other Italian writers, in the beginning of the nineteenth century.
54. FEBBRE LIVORNO.
Palloni and Tomasini, in their descriptions of the epidemic at Livorno in 1804.
55. FEBRE ENDEMIKA INDIARUM OCCIDENTALUM.
Latin writers.

56. FEBRE FLAVA INDIAE OCCIDENTALES.
Cullen, 1778.
57. FEBRE FLAVA REGIORUM CALIDARUM.
Fisher, 1795.
58. FEBRE HISPANAE FLAVA.
Fago, 1818.
59. FEBRE INDLAE OCCIDENTALIS.
Mackittrick, 1766.
60. FEBRIS ARDENS AESTIVA.
Roupe, 1772.
61. FEBRIS ARDENS BILIOSA.
Towne, 1726.
62. FEBRIS CUM NIGRO VOMITO.
Name adopted by Dowell.
63. FEBRIS FLAVAE AMERICANAE CAUSIS.
Ferrello, 1825.
64. FEBRIS ICTERODES.
General term adapted by medical men from 1791 to
1815.
65. FEBRIS MALIGNA BILIOSA.
Moultrie.
66. FEBRIS PUTRIDA COLLOQUATIVA.
Roupe, 1772.
67. FEBRIS TYPHUS ICTERODES.
Dowell.
68. FIEBRE AMARILLA HISPANORUM ET HISPANO-
AMERICANUM.
Early Spanish writers.

69. FIEVRE DES LACS.
Berenger-Feraud.
70. FIEVRE GASTRO-ADYNAMIQUE.
Pinel.
71. FIEVRE JAUNE.
Modern French writers.
72. FIEVRE JAUNE D'AMERIQUE.
Valentin.
73. FIEVRE MATELOTTE.
Early French writers. This expression owed its origin to the belief that seamen were especially susceptible to yellow fever.
74. FIEVRE PUTRIDE CONTINUE.
Pugnet.
75. FIEVRE SPASMODIC-LYPIRIENNE DES PAYS CHAUDS.
Chabert, 1821.
76. FLAVA FEBRE TROPICA.
Bartholemaei, 1822.
77. FLAVA INDIARUM FEBRE.
Hunter, 1798.
78. GASTRO-CEPHALITE.
Vatable, 1828.
79. GASTRO-ENTERITIS.
LeRiveraud.
80. GELBE FIEBER.
Longermann, 1804, and German writers to the present day.
81. GIBRALTAR FEVER.
Term used by medical writers in the beginning of the Nineteenth Century.

82. HAEMAGASTRIC PESTILENCE.
Copland, "Dictionary of Practical Medicine."
83. HAEMELITIC EPIDEMIC.
Nicholson.
84. INFLAMMATORY ENDEMIC.
Dickson, 1819.
85. JAIL FEVER.
So called by the inhabitants of the island of Bermuda, West Indies, in 1779, because the fever first manifested itself among the prisoners of war.
86. KENDAL'S FEVER.
Humboldt and Hughes.
87. MALADIE DE LA SAISON.
Early Antillian writers, who propagated the theory that the disease only occurred at certain seasons of the year.
88. MALADIE DU DIABLE.
Falligant. The word which means "The Devil's Illness," was inspired by the terror it created.
89. MALADIE DU PAYS.
Early Antillian Chroniclers. This signifies, literally, "endemic disease," and is, in our opinion, decidedly appropriate.
90. MALADIE MATELOTTE.
Early French writers. Companion expression of "Fievre Matelotte."
91. MALADIE SPECIALE DU FOIE.
Berenger-Feraud.

92. MAL DE SIAM.
So called because of the general belief in early colonial days that the disease had been imported from Siam. It is mentioned by Labat, Chavalon, Desportes, Moreau de Saint-Mery, and other chroniclers of the period and was known by this name in Martinique and San Domingo near the close of the seventeenth century. It is found designated by this name in the old Government and local records of these islands.
93. MALADIE SPASMODICO-LYPERIENNE DES PAYS CHAUBS.
Chabert.
94. MALIGNANT FEVER.
Walsh.
95. MALIGNANT ATAXIC FEVER.
Disciples of the School of Bally.
96. MALIGNANT CONTAGIOUS FEVER.
Cathrall.
97. MALIGNANT FEVER.
Warren, 1740; Blanchini, 1750.
98. MALIGNANT AND NERVOUS FEVER.
Berenger-Feraud.
99. MALIGNANT PESTILENTIAL FEVER.
Chisolm, 1795.
100. MALIGNANT PUTRID PESTILENTIAL FEVER.
Berenger-Feraud.
101. MALIGNANT REMITTENT FEVER.
McDiarmid, London Med. Gaz., vol. 2, p. 444.
102. MALIGNANT YELLOW FEVER.
Berenger-Feraud.

103. MATLAZAHUATL.

Humboldt says that the Aztecs thus called the disease and claims that their records speak of the pestilence as ravaging Mexico even as far back as the Eleventh Century.

104. MEDITERRANEAN FEVER.

Burnett, 1816.

105. MENINGO-CEPHALO-GASTRITE.

Maher.

106. MOSQUITO FEVER.

This expression was first used by New Orleans newspapers in 1905, to commemorate the most glorious victory over pestilential diseases which has ever been achieved.

107. NAUTICAL TYPHUS.

Adonard, Faget, Gamgee, and adherents of the ship origin of yellow fever.

108. NOVAE PESTIS AMERICAE.

Elsner, 1805.

109. NERVOUS GASTRIC FEVER.

Berenger-Feraud.

110. NEW DISTEMPER OF 1791.

American writers, beginning of Nineteenth Century.

111. OCCIDENTAL PESTILENCE.

Berenger-Feraud.

112. OCHROPYRA.

From "Ochre," yellow, and "Pyra," fire, meaning, literally, a burning or ardent fever.

113. PALATINE FEVER.
Name originally given to the pestilence which reigned at Philadelphia in 1741, owing to the popular notion that it had been brought to the City by some German emigrants from the Palatinate.
114. PESTE OR PESTILENCIA.
Early Spanish chroniclers.
115. PESTE CARAIBE.
Early French and Spanish writers.
116. PESTILENTIAL FEVER.
Rochefort, Bajon, Hughes, Fermin, Chauvalon, Chirac.
117. PESTIS TROPICUS.
Hosack.
118. POULICANTINA.
Carib Indians.
119. PUTRID INFLAMMATORY SYNCOPE.
Berenger-Feraud.
120. PUTRID FEVER.
Hughes, 1750.
121. PUTRID MALIGNANT FEVER.
Berenger-Feraud.
122. PUTRID SYNCOPE.
Berenger-Feraud.
123. SHIP FEVER.
Audouard and his school.
124. SPANISH FEVER.
Cadet, 1822.

125. STRANGERS' FEVER.
Simons, 1839. So called in Charleston, S. C., as the disease was thought to attack only newcomers.
126. SYNOCHUS.
Young.
127. SYNOCHUS ATRABILIOSA.
Schotte, 1782.
128. SYNOCHUS ICTERODES.
Currie, 1794.
129. SYNOCHUS MALIGNA.
Cathrall, 1794.
130. TANARDILLA.
Moreau de Saint-Mery says this designation was quite prevalent in San Domingo and Spanish America. It is derived from the Spanish and means a febrile illness followed by jaundice.
131. TIFUS ICTERODES.
Flores, 1813.
132. TRITOPHELA AMERICANA.
Sauvages.
133. TROPICAL FEVER.
Berenger-Feraud.
134. TROPICAL CONTINUED FEVER.
Lempriere.
135. TROPICAL ENDEMIC FEVER.
Dickson; Belcher.
136. TYPHO-ICTERODE ANIMADVERSIONES.
Leiblin, 1815.

137. TYPHUS.
According to Laroche, yellow fever has been regarded as a hybrid form of typhus by such eminent authorities as Blane, Lempriere, Dickson and Chisolm.
138. TYPHUS ACCIDENTEL OU ICTERIQUE.
Savaresy.
139. TYPHUS AMARILLA.
This term came into general use shortly after the War of 1812. It was then that the great discussion about the contagiousness of yellow fever reached its zenith.
140. TYPHUS ICTERODES PADECIDO.
Moreno, 1813.
141. TYPHUS CUM FLAVEDINE CUTIS.
Cullen.
142. TYPHUS D'AMERIQUE.
Bally.
143. TYPHUS ICTERODES.
Sauvages.
144. TYPHUS TROPICUS.
English and American writers, beginning of last century.
145. TYPHUS MIASMATIQUE ATAXIQUE PUTRIDE JAUNE.
Bally.
146. VOMITO.
From 1709 to 1790, Yellow Fever was popularly known as "Vomito."
147. VOMITO AMARILLA.
According to Chambers' Encyclopedia, article on *Yellow Fever*, the disease is designated by the above name in Central America.

148. VOMITO NEGRO EPIDEMICO.
Gastiblondo, 1755.
149. VOMITO NEGRO.
Early colonial writers. The word is Spanish and means "Black Vomit."
150. VOMITO PRIETO.
Spanish writers. Same meaning as "Vomito Negro."
151. YELLOW FEVER.
At the present day the name *Yellow Fever* and translations is used by all writers, to the exclusion of all other names. The term was first used by Griffith Hughes in 1750, in his "Natural History of Barbadoes."
152. YELLOW JACK.
A popular name for the disease in England and the United States.

CHAPTER III.

HISTORICAL SUMMARY.

Where was the Cradle of Yellow Fever?—The Theory of American Origin.—The African Theory.—The Asiatic Theory.—The Gulf Stream Theory.—Observations by the Author on the above Theories.

WHERE WAS THE CRADLE OF YELLOW FEVER?

There is no subject in medicine upon which there has been such a diversity of opinion as the origin of yellow fever. From the time of Bally, in the seventeenth century, when the controversy can really be said to have begun, to the present day, medical writers and historians have been theorizing and conjecturing on the matter, but nothing has been adduced which can, in the remotest way, be said to have thrown any new light on the vexed and seemingly unending question. As soon as one writer would launch a doctrine which, in his opinion, was plausible and incontestable, another would come to the front and adroitly dissect it, laying bare its imperfections to the glaring light of logic, and inaugurate a theory of his own, which, in turn, would be mercilessly denuded of every semblance of common sense by a third disputant, who would bring columns of statistics and page after page of denunciatory arguments to prove that no one but himself was on the right track and that every previous writer holding a contrary view had either erred owing to gross ignorance of what he was proclaiming or had intentionally juggled with the facts.

Some authors assert that yellow fever has affected mankind from pre-Christian times, citing in support of their contention the writings of ancient observers and philosophers; others claim that it is a purely American product and deny its existence before the discovery of America, laying the blame for its importation into Europe and Africa to the slave trade and indiscriminate commerce of colonial days.

A careful search into the voluminous literature on the origin of yellow fever naturally leads to the query:

Where was the cradle of yellow fever?

The problem is as difficult of solution as the *Syllogismus Crocodilus* of Aristotle. After centuries of discussion, we are no nearer the truth than our forefathers were. Such eminent observers as Bancroft, Cornilliac, Bally, Moreau de Jonnes, Physick, Chaille, Toner, Saint-Mery, Finlay, Cullen, Sternberg, Ferreira, Rochefort, Audouard, Beranger-Feraud, Valdez, Rush, La Roche, Jones, Faget and others, have conjectured *ab libitum* upon the origin of the disease, but their conclusions have only left us a divergence of opinion which no amount of conjecture can bridge and which defies the most abstruse laws of common sense and logic.

That great American philosopher, Humbolt,¹ admirably sums up the situation in the following words:

“In all climates men appear to find some consolation in the idea that a disease considered pestilential is of foreign origin. As malignant fevers easily originate in a numerous crew cooped up in dirty vessels, the beginning of an epidemic may be frequently traced to the period of the arrival of a squadron; and then, instead of attributing the disease to the vitiated air contained in vessels deprived of ventilation, or to the effects of an ardent and unhealthy climate on sailors newly landed, they affirm that it was imported from a neighboring port, where a squadron or convoy touched at during its navigation from Europe to America. Thus we frequently hear in Mexico that the ship-of-war which brought such-or-such a viceroy to Vera Cruz has introduced the yellow fever which for several years had not prevailed here; and in this manner during the season of greatest heat the Havana, Vera Cruz, and the ports of the United States mutually accuse one another of communicating the germ of the contagion. It is with the yellow fever as with the mortal typhus known by the name of ‘Oriental pest,’ which the inhabitants of Egypt attribute to the arrival of Greek vessels, while in Greece and Constantinople the same pest is considered as coming from Rosetta or Alexandria.”

Let us now consider these theories *seriatim*.

¹ Humboldt: Political Essay on the Kingdom of New Spain, vol. 1, p. 219.

1. THE ORIGIN OF YELLOW FEVER.

A search through musty archives, time-yellowed tomes and worm-eaten volumes two or more centuries old, reveals the fact that the first epidemic of yellow fever in the New World, took place in the West Indies in 1647, the details of which are faithfully chronicled in Ligon's *History of Barbadoes*. Outbreaks of the fever are noted by other observers as having caused much mortality before this, among which is the pestilence which mowed down the followers of Columbus in 1494 and the series of epidemics in Brazil which lasted from 1688 to 1694.²

We shall now proceed to give the views of the best authorities upon the subject, believing with Quintilian that "searching into every particular, we sometimes discover truth where we least expected to find it."

The earliest authentic description of yellow fever is that of the Portuguese physician Ferreira da Rosa, who observed the epidemics which prevailed at Olinda, in Brazil, from 1687 to 1694, shortly after the Portuguese army had made the conquest of Pernambuco. Humboldt notes the fact that it is known with certainty that in 1691 yellow fever manifested itself at the Island of Barbadoes, West Indies, where it went by the name of "Kendal's Fever," without the slightest proof that it was brought there by vessels from Pernambuco. The natural conclusion is that the disease must have been epidemic in the locality at that time.

Ulloa,³ speaking of the *Chapetonadas*, or fevers to which Europeans were exposed on their arrival in the West Indies, relates that according to the opinion of the people of the country, the *romito prieto* was unknown at Santa Martha before 1729 and at Cartagena previous to 1740. The first epidemic at Santa Martha is described by de Gastibondi,⁴ a Spanish physician. Since that time, the inroads of yellow fever have been almost universal

² Ferreyra da Rosa: *Traitado da Constitucion Pestilencial de Pernambuco*, by Joam Ferreira da Rosa (1694).

³ Ulloa: *Voyage, etc.*, pp. 41 and 149.

⁴ Gastibondi: *Lazuriaga de la Calentura Biliosa*, p. 7.

and are given in detail under proper classifications in other portions of this volume.

The *Twentieth Century Practice*, a work which occupies a foremost place in medical literature, in an article on the history of yellow fever, says:⁵

"It would afford the student of the disease a great deal of satisfaction if he could locate its first habitat, but that privilege is denied him. As far as we moderns are concerned, we date the disease from the time of Columbus and his followers. The disease, no doubt, existed in pre-historic times, and is buried in that nebulous past that envelopes so many infectious and contagious diseases."

La Roche⁶ adheres to the belief that the West Indies, and part of the coast of North and South America, constitute the proper soil of yellow fever.

Herrera, Oviedo and other early Spanish writers, relate that shortly after the arrival of the Europeans in America, they were decimated by a sudden and very fatal pestilence, which committed fearful ravages. Columbus himself was stricken by the malady on his second voyage while at the island of Mona, West Indies, and was in great danger, escaping death by immediately sailing for the high seas.

Berenger-Feraud,⁷ one of the ablest and most conscientious authorities on the subject, tells us that the first attempts to colonize Porto Rico were frustrated by the prevalence of this unknown pestilence and notes the fact that of the 1500 men which had been left by Columbus at Monte Cristo in 1493, there remained, two years afterwards, only two hundred foot soldiers and twenty cavalrymen. The attempts to colonize St. Domingo (1494 and 1504), Porto Rico (1508 and 1513), the Isthmus of Darien (1509 and 1514), were also retarded by the ravages of the same disease. So fatal was this malady, especially in Saint Domingo, that the Spanish Government, loth to lose this coveted possession, but not wishing to expose its soldiers to annihilation, sent as colonists to the

⁵ Page 401.

⁶ La Roche: Vol. 1, p. 219.

⁷ Gazette des Hapitiaux, 1884, vol. 57, p. 660.

island two hundred convicts. These criminals can be said to have been the pioneer settlers of the island.

At Darien, in 1509, the expedition commanded by Davila lost seven hundred men in a single month. Panama had the same experience.⁸

Fathers Breton and Dutertre,⁹ who describe the epidemic of 1635, in Guadeloupe, says that it was known among the Caribs by the name of *Poulicantina*, a word which signifies "I am struck with a switch," which meant to describe the suddenness which characterized the onset of the fever. These same observers say that the disease was considered so infectious by the natives, that those stricken were often abandoned to their fate and whole villages were deserted when the first cases appeared, the torch being applied by the terror-stricken Caribs, so as to prevent the further spread of the infection.

Ziemssen's *Cyclopedia of the Practice of Medicine*,¹⁰ that wonderful storehouse of medical lore, which is edited with that careful attention to accuracy and to the minutest details which characterize the German mind, has the following observations on the subject:

"We are entirely without trustworthy information regarding the first appearance of yellow fever. It is highly probable, that the communication of various authors, which inform us of the prevalence of the disease in the Antilles since the memory of man, really refer to yellow fever. The theory is much more tenable that the disease was first developed after the immigration of Europeans into the West India Islands; at least, it agrees better with many facts, which have been since observed, to consider yellow fever as an acclimation disease (of the tropics), to which immigrants are liable, than to assume that it originally prevailed as an epidemic disease among the natives, and afterwards underwent a complete alteration of its character. The Antilles were probably the cradle of yellow fever; at least, accurate observations of the disease in question were first made here."

The Board of Experts authorized by Congress to in-

⁸ Ibid.

⁹ Du Tertre: *Histoire General des Antilles*, vol. 1, p. 30.

¹⁰ Vol. 1 (1874), p. 489.

investigate the yellow fever epidemic of 1878, after thorough and minute investigations, reached the following conclusions:¹¹

“Yellow fever was not known to the people of the Eastern Hemisphere until after the discovery of America by Columbus. The earliest epidemics of which we have any historical information occurred during the first half of the seventeenth century, in the West India islands.”

Joseph Jones, one of Louisiana's most distinguished physicians, whose works on fevers are acknowledged authorities, makes the following observations:¹²

“After a critical examination of the works of Herodotus, Strabo, Justin, Cornelius, Nepos, Eutropius, Plutarch, Titus, Linus, Thucydides, Homer, Sallust, Virgil, Flores, Vallerius, Particulus, Cæsar, Horace, Cicero, Xenophon, and Tacitus, we have failed to recognize the disease now called yellow fever, in any descriptions of particular plagues or allusions to any pestilence; and in like manner, while in the writings of the middle ages we have descriptions of wide-spread and mortal plagues, amongst which may be recognized the oriental glandular plague, small-pox, measles, typhus and typhoid fevers, the sweating sickness, elephantiasis or leprosy, cholera, dysentery, and cerebro-spinal meningitis; yellow fever finds no place in these annals of general history, or of medicine, previous to the discovery of America by Columbus. As we have failed to find any history or record of yellow fever before the voyage of Christopher Columbus, the first question of importance which presents itself is, whether yellow fever had ever prevailed among the aboriginal inhabitants of North and South America and the West Indies previous to the discovery of America and the explorations of the Spanish adventurers, and the establishment of the Spanish, French, Portuguese, Dutch and English colonies?”

Dr. Jones then goes on to say that the West India Islands and certain portions of North and South America, as the Valley of the Mississippi, Mexico, Central

¹¹ See Report, p. —

¹² Jones: Proceedings Louisiana State Medical Society, 1879, p. 54.

America and Peru, appear to have been, at the time of their discovery by Europeans, peopled with a sufficiently dense population for the existence of those conditions upon which the origin and spread of certain diseases depend. The wholesale destruction of the native population by cruel wars, and by still more cruel slavery, and by the introduction of certain diseases, as the small-pox, as well as the wanton destruction of the pictorial works by which the hieroglyphics of the more advanced nations of America might have been deciphered, and the sudden and utter subversion of the systems of religion and science peculiar to these people, and the rapid disappearance of the royal families and priests who were, as in ancient Egypt, the custodians of the national science and art, have involved in obscurity many subjects of great and lasting interest to the medical historian.

The medical historian has only imperfect and doubtful data upon which to found any opinion as to the nature of the epidemic and contagious diseases which afflicted the aborigines previous to the discovery of the Western Hemisphere.

That the more populous nations of America were not exempt from diseases of an epidemic and pestilential nature, has been well established.

The pestilence called by the Mexicans "Matlazahuatl" desolated the cities of the Toltecs in the eleventh century, and forced them to abandon Mexico, and to continue their migrations southward, and to the west and northwest; it invaded the populous cities of Central America, and a similar disease committed great ravages amongst the Indian tribes which occupied the country between the mountains and the Atlantic coast a few years before the landing of the Pilgrim Fathers.

The Matlazahuatl, a disease closely resembling yellow fever, but which is said to be peculiar to the Indian race of America, has seldom appeared more than once in a century; it raged in the eleventh century amongst the Toltecs, it made great ravages amongst the Mexicans in 1545, 1576, 1736, 1737, 1761 and 1763, and amongst the Indians of the Atlantic coast in 1618 and 1619.

According to Alexander Humboldt, the Matlazahuatl,

although pestilential in its nature, and attended with hæmorrhage from the nose and stomach, was distinct from the Vomito Prieto, and was peculiar to the aborigines of America. The Spanish authors call this disease a plague. The following passage from Humboldt's "Political Essay on New Spain" appears to embody all that is known with reference to the nature of the Matlazahuatl of the Mexicans:

"The Matlazahuatl, a disease peculiar to the Indian race, seldom appears more than once in a century. It raged in a particular manner in 1545, 1576 and 1736. It is called a plague by the Spanish authors. As the latest epidemic took place at a time when medicine was not considered as a science, even in the capital, we have no exact data as to the Matlazahuatl. It bears certainly some analogy to the yellow fever or black vomiting; but it never attacks white people, whether Europeans or descendants from the natives. The individuals of the race of Caucasus do not appear subject to this mortal typhus, while, on the other hand, the yellow fever or black vomiting very seldom attacks the Mexican Indians. The principal site of the Vomito Prieto is the maritime region, of which the climate is excessively warm and humid; but the Matlazahuatl carries terror and destruction into the very interior of the country, to the central table-land, and the coldest and the most arid regions of the kingdom.

"Father Forribio, a Franciscan, better known by his Mexican name of Motolina, asserts that the small-pox at its introduction in 1520, by a negro slave of Narvaez, carried off half the inhabitants of Mexico. Toquemada advances the hazardous opinion that in the two Matlazahuatl epidemics of 1545 and 1576, 800,000 Indians died in the former, and 2,000,000 in the latter. But when we reflect on the difficulty with which we can at this day estimate in the eastern parts of Europe the number of those who fall victims to the plague, we shall very reasonably be inclined to doubt if the Viceroy's Mendoza and Almanaza, governors of a recently conquered country, were able to procure an enumeration of the Indians cut off by the Matlazahuatl. I do not accuse the two monkish historians of want of veracity, but there is very little

probability that their calculation is founded on exact data.

"A very interesting problem remains to be resolved. Was the pest which is said to have desolated from time to time the Atlantic regions of the United States before the arrival of the Europeans, and which the celebrated Rush and his followers look upon as the principle of the yellow fever, identical with the Matlazahuatl of the Mexican Indians? We may hope that this last disease, should it ever reappear in New Spain, will be hereafter carefully observed by the physicians."¹³

Humboldt further states that long before the arrival of Cortez there had almost periodically prevailed in New Spain an epidemical disease called by the natives Matlazahuatl, which several authors have confounded with the Vomito or yellow fever. This plague was probably the same as that which in the eleventh century forced the Toltecs to continue their emigrations southwards. It made great ravages amongst the Mexicans in 1545, 1576, 1736, 1737, 1761, and 1763; but as has already been observed, it differed essentially from the Vomito of Vera Cruz. It attacked few except the Indians or copper-colored race, and raged in the interior of the country on the central table-land, at twelve or thirteen hundred feet above the level of the sea. It is true, no doubt, that the Indians of the valley of Mexico who perished by the thousands in 1761 of the Matlazahuatl, vomited blood at the nose and mouth; but these hæmatemeses frequently occurred under the tropics, accompanying bilious ataxical (*atariques*) fevers; and they were also observed in the epidemical disease which in 1759 prevailed over all South America, from Potosi and Oraso to Quito and Popazan, and which, from the incomplete description of Ulloa, was a typhus peculiar to the elevated regions of the Cordilleras.

In summing up the result of his investigations, Dr. Jones says:

"It is evident, therefore, that the origin of the American plague or typhus (*vomito prieto, fièvre jaune, yellow*

¹³ Humboldt: Political Essay in the Kingdom of New Spain, vol. 1, p. 117.

fever) is involved in doubt, on account of the prevalence in the tropical and sub-tropical regions and temperate zones, both amongst the natives and foreigners, of some forms of malarial fever, often attended with jaundice, passive hæmorrhages, and black vomit. If it could be determined at what time this terrible disease was clearly recognized by the medical profession and historical writers as distinct from paroxysmal malarial fever, and as dependent upon a specific cause or upon a combination of causes peculiar to itself, a firm ground for the discussion of its origin and of its relations to the native population, as well as to the foreign elements, would be established. But it is well known that many of the descriptions given by various authors will apply as well to the severer forms of paroxysmal malarial fever as to yellow fever, and also that the distinction of the one from the other has been the result of comparatively recent labors, and even at the present time there are not a few physicians who hold to the identity of both diseases in their origin and essential nature.”

Clemow¹⁴ says that so far as a somewhat imperfect knowledge of the history of the disease enables us to judge, it seems certain that originally yellow fever was essentially an American disorder, and that though the infection has to some extent become domiciled on the African shores, it is more than probable it was originally brought there from South America or the West Indies. “It is to be noted,” continues this author, “that some writers have held exactly the contrary view and believed that yellow fever was originally imported to the West Indies by means of infected negroes from Africa.¹⁵ The facts of history are, however, against this view, and there is much evidence to show that this fever was known in those part of America where it still prevails, even before the discovery of the continent by Europeans, and long before the trans-

¹⁴ Clemow: *The Geography of Disease*, by Frank J. Clemow, (1903), p. 520.

¹⁵ In 1699 an English vessel carrying slaves transported yellow fever to Mexico from the Atlantic coast of Africa. But the disease was already endemic along the shore of the Gulf of Mexico. G. A.

port of negroes from Africa to the West Indies began to be practised.”

Toner believes that the conceded home of yellow fever is the West Indies.¹⁶

Stille¹⁷ asserts that yellow fever unquestionably originated in the West Indies, where it was observed at St. Domingo at the end of the fifteenth century. It was then carried to Mexico and other localities bordering on the Gulf of Mexico, where it prevailed to a great extent in the seventeenth century.

Finlay,¹⁸ in commenting on the history of the disease, asserts that the remotest records about epidemic disease in the Old World fail to show that yellow fever, or any other malady presenting similar epidemiological features, had ever been observed previous to the discovery of America in 1492; while in the newly-discovered lands it soon became apparent that every expedition of European settlers that came to the Antilles or to the Spanish Main had to pay a heavy tribute to an unknown pestilence, during the first summers of their residence, suffering thereafter no further trouble from the climate.

About fifteen years ago, Drs. Finlay and Berenger-Feraud,¹⁹ independently of each other, undertook minute historical researches regarding this “unknown pestilence,” and came to the conclusion that the disease mentioned in the old Spanish chronicles as the “peste,” “contagio” or “epidemia,” was no other than our modern yellow fever. They also reached the conclusion that at the time of the discovery of America the disease was endemic on the coast of Mexico, at the present site of Vera Cruz, as well as on the Atlantic site of the Isthmus of Panama, and on the Spanish Main along the coast of Colombia and Venezuela, inhabited by the Carib Indians.

¹⁶ The Distribution and Natural History of Yellow Fever in the United States, by J. M. Toner. American Public Health Association Reports, 1873, vol. 1, p. 359.

¹⁷ Stille: Medical Record, N. Y., 1879, vol. 15, p. 193.

¹⁸ Finlay: Reference Handbook of the Medical Sciences, Vol. 8, p. 322.

¹⁹ *Ibid.*

This view is also concurred in by Anders,²⁰ who states that yellow fever first appeared at Barbadoes (West Indies) in 1647 and was subsequently conveyed along the channels of commerce, until it became widely disseminated.

Even the old stand-by of every American school-boy, the venerated and verbose Noah Webster,²¹ has something to say on the subject. He tells us in all seriousness that yellow fever prevailed among the Indians of Canada and New England in 1618, was again epidemic in 1746 and made spasmodic appearances among the noble sons of the forest at various stated periods.

According to the report of Beyer, Parker and Pothier,²² yellow fever has been endemic in Vera Cruz since 1509.

Manson, whose work on *Tropical Diseases* is one of the classics of medical literature, does not consider the matter of much importance, summing up the situation in a few words, simply stating that it is impossible to determine from existing records whether it was originally an African or a West Indian disease.²³

One of the strange freaks of yellow fever visitations is recorded by Stille,²⁴ who claims that the disease was introduced into Dutch Guiana in 1793 from the West Indies. For a period of 37 years after this, it never invaded that province. At the end of this long period of immunity the colony suffered from a new importation of the disease, which visited it annually thereafter for ten successive years, when it ceased and for the six following years failed to occur. It was then reintroduced by an infected vessel and spread more widely than before.

At the time spoken of by Stille, Spain possessed by far the best and largest portion of the American continent, extending from the north of California to the Straits of Magellan—a space between 6,000 and 7,000 miles—and

²⁰ Practice of Medicine, by James M. Anders, (1899) p. 119.

²¹ History of Epidemic and Pestilential Diseases, by Noah Webster, vol. 1, p. 177.

²² Report of Yellow Fever Party No. 1, Yellow Fever Institute, p. 12.

²³ Tropical Diseases, by Patrick Manson (1903), p. 187.

²⁴ Medical Record, N. Y., 1879, vol. 15, p. 193.

the system of commerce which prevailed then appeared to be eminently favorable to the origin and spread of yellow fever. The Spanish galleons dotted the seas and, during times of peace (which were not frequent in that age of buccaneering and aggressive colonization) visited the principal ports of the Spanish Empire, where they were always royally entertained. It was therefore easy for them to carry disease from one port to another, a fact which is attested by the melancholic record of the fearful epidemics which visited the New World in the early days of its history.

Joseph Jones²⁵ thus interestingly describes the usual programme followed by the galleons:

"They sailed from Cadiz to the Canaries, thence for the Antilles, and after reaching this longitude they bore away for Carthagena. As soon as they came in sight before the mouth of Rio de la Hacha, after having doubled Cape de la Vela, advice of their arrival was sent to all parts, that everything might be prepared for their reception. They remained a month in the harbor of Carthagena, and landed there whatever was designed for *terra firma*. They then sailed to Puerto Velo, where, having stayed during the fair, which lasted five or six weeks, they landed the merchandise intended for Peru, and received the treasures and commodities sent from thence. The galleons then sailed back to Carthagena, and remained there till their return to Spain, which usually happened within the space of two years. When orders for returning home arrived, they sailed first to the Havana, and having joined the flota, and what other ships were bound to Europe, they steered northward as far as Carolina, and then, taking the westerly winds, they shaped their course to the Azores, when, having watered and victualed afresh at Terceira, they thence continued their voyage to Cadiz."

What a glamour of romance and interest invariably surrounds the writings of this great son of Louisiana! The paragraph above cited almost carries one back to the good old days when men lived only to fight, eat, drink

²⁵ Jones: Transaction Louisiana State Medical Society, 1879, p. 64.

and write sonnets to their lady-loves and cared naught for the morrow.

But my enthusiasm makes me forget my task. Let us return to our mutton.

In an interesting paper read by LeBeuf before the Orleans Parish Medical Society, and published in the Transactions of that Society for 1905 and also in the New Orleans Medical and Surgical Journal for December, 1905, a thorough review of the history of yellow fever is given. In commenting on the probable origin of the disease, the doctor says:

"The Aztecs called the disease *Matlazahuatl* and Humboldt tells us that it existed as early as the eleventh century. In 1545, 1576, 1736, 1737, 1761 and 1777, it greatly decimated the native Mexican race in a number of places. Before the advent of the white colonists it was not general. The natives travelled very little, on account of the lack of roads and the high mountain ranges. They had no vessels large enough to make the voyage to the West Indies and did not have free communication with outsiders. When the white colonists came, they were more susceptible to the dangers of the disease, as they were unacclimated, and were quickly the transmitting agent of it through all the low austral regions. It was also more fatal to them than to the natives, and it retarded the settlement of many colonies on account of the panics it caused."

The same writer, quoting Prescott, says that it seems that European civilization carried with it the germ of the poison. The moment a town was founded or a commercial centre created, it was certain to cause the explosion of the latent malignity of this poison in the air.

We will conclude this resume of the American origin of yellow fever by quoting from that inexhaustible source of information, Dr. Joseph Jones:²⁶

"If it were possible to determine with accuracy the nature of the severe and fatal forms of fever which afflicted the first explorers and colonists of the tropical and subtropical regions of America, and even the very companions of Columbus, the question of the origin of yellow

²⁶ Trans. Ia. State Med. Society, 1879, p. 63.

fever would be relieved of much uncertainty and doubt. If we are to credit the accounts of some authors, the first trace of yellow fever was observed at the end of the fifteenth and beginning of the sixteenth century at San Domingo and Porto Rico, in the Continent of South America, and in the Gulf of Darien, at which latter place it is said to have prevented the Spaniards from settling. In November, 1493, Columbus landed at San Domingo with 1500 Spaniards, in order to found the city of Isabella. A severe and fatal fever carried off the greater part of them within a year after their arrival, and the disease is described as being 'yellow as saffron or gold.' From 1544 to 1568 there is no record of the disease having prevailed as an epidemic until 1635, when it appeared in Guadeloupe, and thenceforward it occurred at regular intervals. In the seventeenth century it spread along the Continent of South America to latitude 8° south, and in North America to latitude 42° , but only on the eastern coast of both. The first appearance of the disease in the United States was at Boston in 1693, and in Charleston and Philadelphia in 1699. It is said first to have appeared in the Gulf of Mexico, at Biloxi Bay in 1702, and Mobile in 1705; but Humboldt held that it had prevailed from the very foundation of Vera Cruz, and was indigenous to this city. It prevailed at Pensacola and Mobile in 1765.

"In the eighteenth century it appeared on the west coast of South America in latitude 2° south. On the North American Continent it spread to latitude 42° ; it extended even to Europe, and reached the Pacific and Madagascar. At the beginning of the nineteenth century it penetrated deeper into the North American Continent than formerly; reaching as high as latitude 47° north, and in Europe it extended to latitude 48° , and prevailed in the Canary Islands and Leghorn.

"Ever since yellow fever attracted attention it was recognized as a distinct disease from the remittent autumnal fevers of the temperate zone. It has prevailed as an endemic in Havana, raging epidemically from April to December, and occurring sporadically during the rest of the year. From time immemorial it has been endemic at Vera Cruz, in the Gulf of Mexico, where its chief victims

are strangers who come from cold regions during the hot season, as well as Europeans and those native who exchange the more elevated and cool regions of Mexico for the coast."

AFRICAN ORIGIN OF YELLOW FEVER.

The doctrine that Africa was the original home of yellow fever has been promulgated by many writers.

As early as 1815, Pym, in his "Observations on Bulam, or Yellow Fever," propagated the doctrine that yellow fever was endemic to Africa, had always existed there and that the world was indebted to that continent for the spread of the disease to the four points of the compass. This theory was warmly espoused by Audouard in the *Revue Medicale* (Paris, 1825), who thickened the plot by fastening the onus on the slave trade of colonial days and asserting that the disease also developed spontaneously in the holds of ships packed with living cargoes of slaves, reeking with filth and germ-propagating material. These views were seriously championed by many writers, one of them being that distinguished Louisiana authority on yellow fever, Faget, who, in his work entitled *Etudes Medicales de Questions Importantes pour la Louisiane*, published in 1859, speaks in eulogistic terms of the views of Pym and Audouard and gives as his opinion that the theory advanced by these famous contagionists is the only rational solution of the problem.

In support of his contention, Dr. Faget claims that when the traffic in slaves was interfered with by the United States government and the channels of this commerce changed to sub-tropical ports, yellow fever, for the first time, broke out in Brazil. The learned doctor, in making this assertion, evidently overlooked the great epidemic which broke out in Pernambuco in 1688 (according to Ferreira da Rosa) and which ravaged the Brazilian coast for several years afterwards.

In an interesting little book published in 1898, Coleman (*History of Yellow Fever, etc.*) revives the doctrine enunciated by Audouard, citing many examples in an effort to prove that the French observer was correct, but advances nothing decidedly novel or convincing.

According to Byrd,²⁷ the disease was introduced into Southern Europe, the West India Islands and the continent of North and South America from the West coast of Africa, "where it originally flourished." This author blames the importation of the disease into Europe upon the ambition for extended territory which dominated the Caucasian race in the Middle Ages and holds the view that if the avarice and cupidity of the New England slave-trader had not tempted him to invade the jungles of West Africa, to kidnap the unwary and guileless aborigines, there is reason to believe that the hecatombs which have marked the visitations of the pestilence in the West Indies and the shores of the American Continent, would never have been known. The natives of those lands knew nothing of the disease until brought to them by ships engaged in a most unholy commerce.

Rocheftort, one of the earliest writers on the subject, alluding to the West Indies, says: "This noxious air was brought by vessels coming from the African Coast."²⁸

Another disciple of the African origin of the disease is found in Turpinseed,²⁹ who says that the great difference of temperature between day and night in the great desert, the air being 174° by day and 24° by night, undoubtedly had an influence in furnishing the embryonic conditions necessary to the origin and propagation of the disease. The infection was then carried by the desert winds to the coast towns of West Africa and thence scattered to susceptible foci throughout the world.

Strobel,³⁰ who also blames Africa for having been the original source of infection, furnishes considerable information concerning the origin and spread of yellow fever, but his views are, unfortunately, too biased to be of any reliable historical value. The learned essayist cites only events which lend color to his rabid views on contagion and he eludes facts which prove the contrary in such

²⁷ Philadelphia Medical Times, 1872, vol. 3, p. 726.

²⁸ Ce mauvais air y avait été apporté par des navires qui venoient de la Côte d'Afrique. Histoire Naturelle et Morale des Isles Antilles d'Amérique (1658), vol. 1, p. 3

²⁹ Turpinseed: Medical Record, N. Y., 1878, vol. 14, p. 304.

³⁰ Strobel: An Essay on the Subject of Yellow Fever, 1840.

a tactful and unconcerned way, that it is a pity his efforts should not have been directed to a better purpose. He deploras the fact that the French Academy awarded Monsieur Chervin a premium of 10,000 francs for his admirable (this is our word, not Strobel's) treatise on the non-contagiousness of yellow fever, and holds up Dr. Bahi as a martyr because the latter was chased out of Barcelona for having propagated the doctrine that the fever which prevailed in that city in 1821 was contagious. "They execrated and threatened with death those physicians sufficiently well-informed to recognize this character of the disease," continues Strobel; "they called them, by way of insult and derision, the *authors of yellow fever.*"³¹ (The italics are Strobel's.)

But it is not our purpose to quarrel with the views of the respected and departed disciple of Bally, who was, we feel certain, honest in his opinion. We simply desire to say, *en passant*, that Monsieur Chervin earned those 10,000 francs by a large margin, for it is of record that he not only put on the linen of patients that had died of yellow fever and slept in their beds, but that he also ate of the black vomit and inoculated himself with it, in order to prove the non-contagiousness of the disease.³²

Dowell³³ speaks in positive terms concerning the source of yellow fever, giving Africa as the undoubted original focus. He also states that it existed in Africa, Eastern Asia, and Southern Europe, long before the establishment of the Greek and Roman Empires, even running back a thousand years before Christ.

Chisolm was an advocate of the African importation of the disease, as will appear by a perusal of his work published in 1799.³⁴

³¹ *Ibid.*, p. 8.

³² *Lancet*, 1849, vol. 2, p. 433.

³³ Dowell: *Yellow Fever and Malarial Diseases, etc.*, 1876, p. 13.

³⁴ Chisolm: *An Essay on the Malignant Pestilential Fever introduced into the West India Island from Bouliam, etc.*, 1799.

Sternberg³⁵ says that the early history of the disease is involved in obscurity and it is not possible to determine whether, as maintained by some, it was endemic at certain points on the shores of the Gulf of Mexico at the time of the discovery of the New World, or whether it was imported to the West Indies from the African coast, as advanced by others.

In commenting on the African theory of the origin of the disease, Sternberg adds that it seems very probable that the pestilential malady which prevailed for a time in these usually healthy islands (the West Indies) and then disappeared, was in fact yellow fever, and that it was introduced by ships from the west coast of Africa is not at all incredible. "Indeed," continues this authority, "it almost seems necessary to look for an endemic of the disease outside of the West Indies, for the reason that in the comparatively few places in which it is now endemic, there is historical evidence to show that there was first importation and a previous period of exemption; while, on the other hand, the conditions upon which endemicity at the present day seems mainly to depend, were formerly unknown—conditions arising from the aggregate of population at seaport cities, as in Havana, Vera Cruz and Rio Janeiro."³⁶

Elliott,³⁷ in commenting on the endemic diseases of West Africa, says: "There is an old doctrine that yellow fever had its original home on the West African coast, and that its existence in the tropical regions of the American continent and in the West Indies is the result of the slave traffic. On the other hand, certain French authors, notably Berenger-Feraud, contend that the disease was first imported into Africa from America. However this may be, there is no doubt about the fact that yellow fever has frequently shown itself in epidemic form in Senegambia, and that the British possessions on the West African littoral are liable to outbreaks of a peculiar malignant

³⁵ Sternberg: Reference Handbook of the Medical Sciences, vol. 8, p. 583.

³⁶ *Ibid.*, p. 584.

³⁷ Elliott: Journal of Tropical Medicine, London, 1899, vol. 1, p. 317.

form of fever which is confined to the European residents, and which, after thinning their numbers to an appalling degree, and within a brief period, suddenly disappears."

It is a matter of history, and cannot therefore be contradicted with any degree of safety, that in December, 1493, when Columbus reached St. Domingo, bringing with him the first Europeans who had ever set foot on American soil (about fifteen hundred, according to Cornilliac³⁸) that a pestilential disease broke out in the village of Ysabella (then in process of construction), and nearly annihilated the venturesome little band that had braved the terrors of a long voyage through unknown seas to colonize a strange and wonderful land, where, according to the fabulous stories then current, "gold grew on trees and diamonds strewed the ground."

Poupe-Des-Portes,³⁹ a French surgeon, who practiced at St. Domingo from 1732 to 1748, says that yellow fever was quite prevalent in the West Indies at that time and was called *Mal de Siam*, from the tradition that it had first been observed at St. Domingo during the visit of a French man-of-war coming from the kingdom of Siam in the seventeenth century.

No one who has read the works of Bally will dispute the fact that he is generally reliable and accurate in his statements, but his unalterable belief in the doctrine of contagion and importation made him blind to the true state of affairs in this particular instance. Even such an eminent authority as LaRoche criticizes the great apostle of contagion, observing that the course he pursued in the controversies about his pet theory was assuredly not commendable.⁴⁰

In this connection, it is opportune to remark that up to 1793, a majority of American physicians were believers in the contagiousness of yellow fever, but during the epidemics occurring between that date and 1825, the practical experience so changed the mind of the medical world, that, while five hundred and sixty-seven were against the

³⁸ Pierre Martyr, in his "Decades," says the number was 1200.

³⁹ Histoire des Maladies de A. St. Domingue, vol. 1, p. 191.

⁴⁰ American Journal of the Medical Sciences, April, 1853, p. 317.

doctrine of contagion, twenty-eight only remained in favor of it.⁴¹

The physicians of two hundred years ago were just as bitter and acrimonious when it came to discussing the subject of yellow fever as those of our present enlightened age. A glance over the pages of the *Medical Repository*, the *Edinburg Medical Review*, the *British and Foreign Medico-Chirurgical Review*, and other old-time medical journals, reveals page after page of decidedly personal remarks directed by some venerable Esculapius against a brother who held a contrary view to those which were, in his opinion, the only tenable way of explaining certain things. The amount of vituperative ammunition which those ancient disputants possessed certainly puts all modern efforts in that line in the shade. The terms "medical buccaneers," "malignant drivelers," "inexperienced and transient practitioners," etc., were among the lukewarm expressions used in these amiable diatribes.

Sometimes, finding discussions through the medical press too tame or monotonous, the disputants abandoned the quill for more strenuous modes of clinching an argument and we find mention here and there of violent personal encounters between opponents of contending theories. One of the most remarkable ways of settling a dispute concerning the diagnosis of yellow fever, took place at Kingston, Jamaica, between Drs. Williams and Bennett, who met on the field of honor on the 29th of December, 1750, and fought so ferociously that they finally succeeded in killing each other.⁴²

ASIATIC ORIGIN OF YELLOW FEVER.

An anonymous writer, more audacious and original than his contemporaries or those who lived before him, and whose identity, unfortunately, we have been unable to unravel, asserts that the ancient and malodorous city of Smyrna, in Asia Minor, was the original focus whence yellow fever infected the world, and cites in support of his theory certain passages of history referring to the re-

⁴¹ Dowell, p. 107.

⁴² *Medical Repository*, N. Y., 1805-06, vol. 9, p. 187.

mittent fevers which devastated the Grecian Archipelago and the shores of Asia Minor as far back as the age of Pericles.

French writers of the seventeenth century adhered to the theory that the *Typhus miasmaticus ataxicus putride jaune*, the name by which the disciples of Bally designated yellow fever, had its origin in Siam. Bally⁴³ assures us that the disease was brought to the island of Martinique by the ship of war *l'Oriflamme* in 1682, in which year "the French people who had settled in Siam fled from the insurrection in that country and established themselves at Fort Royal." Bally also states that the *Oriflamme* stopped at some Brazilian port on its way to Martinique. According to Ferreira and others, yellow fever was epidemic in Brazil at the time spoken of by Bally, and if such was the case, how could the disease have been imported from Siam, when it was already implanted on American soil? There is certainly a historical *faux-pas* somewhere.

Moreau de Saint-Mery, one of the most reliable and learned chroniclers of his time, in commenting on the alleged Siamese importation, makes certain observations which leave no doubt that the disease brought to Martinique by the *Oriflamme* was yellow fever, no matter where the original infection of the vessel took place. According to this authority, the ship was a hotbed of disease when it reached Martinique. Spotted fever (*le pourpre*, to use his exact expression) and an unknown pestilential fever had committed fearful ravages among the officers and crews of the ill-fated *Oriflamme*, the mortality exceeding one hundred souls, among the victims being Monsieur de Lestrange, the commandant of the expedition. Saint-Mery also speaks of the bloody uprising which took place in the Siamese Empire and the flight of the French settlers on board the ships *l'Oriflamme*, *Le Loutre* and the *St. Nicholas*, which set sail for France with all possible haste. When the miniature flotilla entered the Atlan-

⁴³ Description Topographique, Physique, etc., de l'île de St. Domingue, by Victor Bally (1814), p. 700.

⁴⁴ The distinguished contagionist evidently got his dates mixed, as the insurrection in Siam took place in 1688. G. A.

tic Ocean, it was diverted from its course by storms, compelling the ships to make for the west. The *Oriflamme* arrived safely at Fort Royal, Martinique, but the fate of her sister ships is left in doubt. Nowhere does Saint-Mery speak of the vessel having touched at any port in Brazil, as asserted by Bally and those cited by him. The date given by Saint-Mery (1690) is certainly more accurate than that stated by Bally (1682), as a reference to the political history of Siam, reveals the fact that the massacre of the handful of Englishmen in the factory at Ayuthia, then capital of the kingdom, which was the signal for the anti-foreign demonstration which put an end to the intrigues of the French court, took place in 1688.

Cornilliac⁴⁵ gives 1690 as the date of the arrival of the *Oriflamme* at Martinique.

Father Labat, a Dominican friar, who arrived in Martinique in January, 1594,⁴⁶ tells of the ravages of the disease, which he claims was imported by the warship *l'Oriflamme*, which had touched at a Brazilian port on its way from Siam.

What led additional color to the story of the disease having been imported from Siam, was the fact that, in 1691, two vessels arriving from Pondichery, capital of the French East Indian settlement of that name, in Siam, were found to be nests of yellow fever, which caused an appalling mortality among the crews of both vessels. It was afterwards proved, however, that the infection had been contracted at Fort Royal.

Whether or not the disease was imported to the West Indies from Siam, or *vice versa*, is a point which we will leave for others to dispute and theorize upon; but the importation, if it ever happened, certainly did not take place for the first time either in 1682 or 1690, as the reliable and unassailable records of such historians as Oviedo y Valdez, Gomora, Coreal, Humboldt, Ulloa, Cornilliac, and Rochefort, give details of epidemics which devastated the West India Islands as far back as the

⁴⁵ Recherches Chronologiques et Historiques sur l'Origine et la Propagation de la Fievre Jaune dans les Antilles, by Cornilliac (1867), vol. 2, p. 72.

⁴⁶ *Ibid.*, p. 73.

fifteenth century. We are more inclined to lean to the theory that the disease was first brought to the East from the tropical coasts of America.

Moseley⁴⁷ speaks at length of the ravages committed by the fever at Martinique in 1665 and the majority of authors of the time concur in saying that, although yellow fever prevailed in the West Indies ever since the voyages of Columbus, there is no authentic instance of the disease having been noticed on vessels previous to 1690, when the *Oriflamme* incident set the whole medical world agog. On the contrary, these ancient writers agree in the opinion that yellow fever prevailed as an endemic in the seventeenth century in all the localities in the New World bordering on the Gulf of Mexico and the Atlantic shores of South America, almost as far South as the Rio de la Plata.

We will conclude by quoting from Hillary (*Observations on the Changes of the Air, etc.*, London, 1759), p. 144: "We observe no trace of this scourge in the descriptions given by ancient writers, not even by the Arabian observers, who practiced in warm climates."

So far as history informs us, yellow fever has never been observed in Asia, although this vast continent is studded with regions which possess all the requirements for engendering and spreading the disease, including the *Stegomyia*. Let the Panama Canal be pierced, however, thus reducing time of commercial intercourse between the West Indies and the East to a few days, and we shall, in all probability, see yellow fever transplanted to these ancient shores and commit fearful ravages among its billions of souls.

This is not a fanciful flight of the imagination, but simply a "look forward," a calm, dispassionate prophecy, based upon experiences of the past and whose ultimate truth will thrill humanity with horror and despair when the mists which veil the future have melted away.

THE GULF STREAM THEORY.

Professor P. Stille, of Mobile, differs from all the preceding authorities, and advances a novel theory to ac-

⁴⁷ A Treatise on Tropical Diseases, p. 421.

count for the origin of yellow fever. He attributes it to the Gulf Stream. Calling attention to the equable atmospheric conditions of the tropical lands of both hemispheres, he says: "Coming up the south-east, across the torrid zone, is an ocean current which, where it sweeps around the north coast of South America, is called the Guiana Current. It makes its way directly into the Gulf of Mexico, where it takes the name of the Gulf Stream. After washing the smaller islands of the West Indies, it forces itself with great strength through the narrow channel between Cuba and Yucatan, and rushes all around the shores of the gulf, taking its turn towards the east, and quitting the land immediately after passing the southern point of Florida. Within the gulf its temperature stands at from 85° to 89° , but soon after having passed Florida its temperature goes suddenly down to 65° , and finally to 54° , and 50° . Now, if we examine every part of the sea we shall find no other spot where a warm current washes the land at anything like so high a temperature as is exhibited in the Gulf of Mexico. A goodly portion of the time the temperature of the water stands entirely above that of the air, consequently a heavy mist is taken up. In other words, the atmosphere is completely saturated with moisture to such an extent as to render it too heavy to rise in obedience to the usual laws governing evaporation, the high temperature of the land preventing condensation. As a result, there lies upon the surface of the low country a thin stratum of air so heavy and so damp as to tempt us strongly into coining subaqueous as a designation by which to represent its condition. For proof that such conditions do arise in all cases where the water stands at a temperature higher than that of the air, we refer you to Fitches' Physical Geography, page 152; and for proof that they exist in the West India Islands, see Humboldt's Island of Cuba, page 172. And here, in my humble judgment, we have arrived at a knowledge of the main conditions necessary to the propagation of the yellow fever: A stratum of atmosphere saturated with moisture to such an extent as can only occur under like circumstances as exist in the West Indies, and a tropical clime such as prevails there, and is

every now and then, as I contended, carried into regions far above its natural lines. This thin stratum of heavy atmosphere is carried from the ocean equator and thrown upon our shores from the gulf breezes, so called, but in ordinary seasons the low temperature of the earth condenses the moisture permanently before it has passed far inland. In seasons like the present, however, when there have been two summers together, as it were, the earth with us is too warm to admit of permanent condensation. A portion of the moisture may fall as heavy as dew, but the rising temperature of the morning will take it up again, and hence it will be carried on, wave after wave, as it were, until it has reached its final stopping place, possibly many degrees above the shore of the Gulf of Mexico. The immediate agent working in yellow fever (be it living atom or fungus) is semi-aquatic in its nature, perhaps, and therefore always finds itself a home in this peculiar character of heavy and wet atmosphere; hence it flourishes wherever a footing can be secured in it; and fattens upon its human victims the more the further it gets from its nursery bed and finds them the less acclimated against its effects. This heavy atmosphere theory would explain why yellow fever is mainly confined to the low grounds—in all cases waves of heavy atmosphere, like currents of water, find their ways through the depressions upon the surface of the earth. If our Gulf breezes should drive them inland, they would very naturally roll up the valleys of our rivers.”

Prof. Stille was without doubt one of the South's famous sons and a scholar of recognized ability, but his theory is decidedly untenable, especially when viewed through twentieth century spectacles. A reference to the medical part of this volume, where will be found practical and scientific arguments concerning the origin and spread of yellow fever, will be sufficient to remove any doubt which the skeptical reader may entertain in the premises. We have given a place in this work to Prof. Stille's theory, not because we endorse or admire it, but simply to put it on record among the many odd views advanced concerning the origin of yellow fever. It is a

close second to the views of the College of Physicians of Paris, published in a preceding chapter.

OBSERVATIONS BY THE AUTHOR.

Emerging from the heterogenous avalanche of opinions promulgated by sedate and learned chroniclers of ages past and present, bewildered by the positiveness of each and every argument advanced to prove that yellow fever originated anywhere except in the natal land of the observer, we pause for a moment on the threshold of trepidation before making a digest of the theories advanced in the foregoing pages. We stop just to take a breath, rivet the wobbling places in our armor, and then rush into the fray with the satisfaction that we will at least make the situation still more unintelligible.

THE WEST INDIAN THEORY.—We are free to confess that we see much to admire and theorize upon in the doctrine that yellow fever is a West Indian product. Look into the history of every notable epidemic and you will see that “a ship from the West Indies” carried the infection. Of course there are exceptions, but they are few.

A search through the works of Oviedo, Pierre Martyr d'Anghiera, Fernand Columbus (a son of the great discoverer), Herrera and other early writers, reveals the fact that yellow fever attacked the Spaniards, English, French, Dutch and Portugese wherever they tried to establish themselves in the New World. In the following table, we give the first four historic outbreaks of yellow fever in the West Indies. We have purposely selected examples where the scourge manifested itself within a few months after the landing of the colonists, as this is all that is needed to illustrate the point we wish to emphasize:

FIRST RECORDED OUTBREAKS OF YELLOW FEVER IN THE WEST INDIES.

Island	Locality	Date of Settlement by Europeans	Date of First Outbreak of Yellow Fever	REMARKS
San Domingo	Ysabella	1493	1493	Ysabella was the first town established in the Western Hemisphere by Europeans, being founded by Christopher Columbus in December 1493, fourteen months after the discovery of America. That same month the colonists were attacked by a pestilential disease (now known as yellow fever) which raged until 1496, when the town was abandoned.
Porto Rico	Capara	1508	1508	Capara, founded by Ponce de Leon in 1508, was abandoned the same year, owing to the ravages of the "unknown pestilence."
Jamaica	Sevilla Melilla Oristan	1509	1509	Sevilla was founded by Diego, a son of Columbus, in 1509. The Yellow Spectre soon invaded the place and the inhabitants fled in terror to the north of the island, where they built the town of Melilla. The pestilence pursued the colonists into their new abode and they again fled, this time to the southern part of the island, where, for a third time, they launched a new town (Oristan). Like its predecessors, Oristan was soon laid waste by the same terrible disease which has to this day been the curse of the Antilles.
Gau- loupe	St. Pierre Grande Anse	1635	1635	In 1635, L'Olive and Duplessis, agents of the French Government, with a following of 550, founded the towns of St. Pierre and Grande Anse. Three months after the arrival of the colonists, yellow fever made its appearance. Duplessis himself dying of the scourge. The epidemic devastated the island from 1635 to 1652, a period of seventeen years.

Some doubtful Thomas will probably shrug his shoulders and ironically ask us to explain how it is that Columbus and his intrepid sailors were not attacked by yellow fever when they set foot on the Island of San Salvador, if the theory of Antillian endemicity of the disease is correct.

It is not necessary to call into action Rooseveltian powers of reasoning to explain this.

The discoverer of the New World and his followers escaped an attack on their first voyage for the reason that they landed on the Island of San Salvador during the cool season (October 12, 1492), at a time when mosquitoes

were inactive; that they did not mingle much with the natives and, finally, that they confined their explorations to the coasts and did not venture into the interior of the "unknown country" which was destined to change the whole political aspect of the then known world.

On the second voyage of Columbus things were different. The Europeans landed hundreds of miles further South (San Domingo), at a place where the breath of Boreas is never felt, and found all the conditions necessary to contract the disease, including the *Stegomyia Calopus*. Frequent intercourse with the natives, fatigues, privations and exposure, rendered the newcomers easily susceptible to the germs which were only awaiting new fuel to kindle the fires of pestilence anew. And, from that date, wherever the Spaniards went, the jaundiced handmaiden of death—yellow fever—was awaiting their arrival.

THE AFRICAN THEORY.—It does not require a profuse waste of gray matter to relegate the African theory of the origin of yellow fever to the oblivion it richly deserves.

In looking over the literature on the subject, we notice that even such a learned author as Berenger-Feraud was nearly converted to the doctrine of African endemicity, being somewhat inclined to believe that the epidemics in Senegal were of spontaneous origin. But he guarded his views with the statement that he was not totally convinced and, in a later article, showed the absurdity of this doctrine.

We believe, like Berenger-Feraud, that the African theory is untenable and easily disproved. The West Coast of Africa has been known to Europeans ever since the sixth century Before Christ, when, Hanno, a Carthaginian, made a voyage along that coast and is said to have got as far as the Bight of Benin. The Portugese, however, were the first people of modern times to undertake the exploration of the Dark Continent. In 1433, they doubled Cape Bojador, in 1441 reached Cape Blanco, in 1442, Cape de Verde, and in 1462 discovered Sierra Leone. In 1484, Diego Cam, an audacious Portugese navigator, discovered the mouth of the Congo. That same nation established the first European settlement in

Africa at Angola about the year 1500, eight years after the discovery of America by Columbus.

From the inception of its colonization, the commerce between Africa and Europe was an active one, and had yellow fever been endemic in the Dark Continent at the time it was first visited by Europeans, the disease would certainly have been imported by the ill-ventilated and unsanitary craft engaged in this primitive intercourse and would have caused memorable epidemics in Europe, which would have been noted by the historians of the period, who had a knack of writing about everything and everybody, no matter how trivial or private. It is a matter of history, chronicled by many writers, that it was only after the discovery of America that yellow fever was observed in Africa. The first authentic account is that of the voyagers Windham and Pinteado, who speak of having observed yellow fever on vessels off the coast of Benin in 1558. This is not at all improbable, as slave-hunters from the Spanish colonies in the New World frequented the coast of Africa as early as the middle of the sixteenth century, to replace with negroes the dearth of labor caused by their massacres of the Indians in Cuba, Mexico and South America. After stealing the gold which the Aztecs and Incas had taken centuries to amass, the Spaniards forced their victims to work their mines and till their plantations. Unused to such toil, which was rendered still more onerous by the cruelties practiced upon them by their conquerors, the Indians perished by millions. Historians tell us that more than half the population of Peru were consumed in the mines.

Wafer, an English surgeon (according to Moseley⁴⁸), says that he and some others landed at Vermejo, in Peru, in 1687, and marched four miles up a sandy bay, "all of which," he says, "we found covered with bodies of men, women and children, which lay so thick, that a man might, if he would, have walked half a mile and never trod a step off a dead human body. These bodies, to appearance, seemed as if they had not been above a week dead; but if you handled them, they proved as dry and light as a sponge, or piece of cork." The voyagers soon came upon

⁴⁸ Moseley: A Treatise on Tropical Diseases, 1792, p. 155.

a Spanish Indian, who was picking up dried sea-weed, and asked him how those dead bodies came there? To which he answered that, in his father's time the soil, "which now yielded nothing, was green, well-cultivated and fruitful; that the city of Wormia had been well inhabited by Indians; and that they were so numerous, that they could have hauded a fish, from hand to hand, twenty leagues from the sea, until it had come to the Inca's hands; and that the reason of those dead bodies was, that when the Spaniards came and blocked up and laid seige to the city, the Indians, rather than lie at the Spaniards' mercy, dug holes in the sand and buried themselves alive."

When the Spaniards saw that the natives were about to become extinct, and that the majority of those that were left had fled to caverns and mountain fastnesses, they had recourse to Africa, and negroes were imported by the thousands to take the places of the Mexicans, Peruvians and West Indians. This was the beginning of the slave trade, and the constant voyages to and from Africa in quest of new victims, gave a semblance of truth to the theory that yellow fever had been imported from Africa to America.

Let us now juggle with dates and obtain some poignant conclusions:

A glance at the table on page 112 will show that the first epidemic of yellow fever in the world of which there is any record took place at Ysabella, San Domingo, in December, 1493, fourteen months after the discovery of America. According to Lind, the first outbreak of yellow fever on the mainland of Africa took place in Senegal in 1759, two hundred and sixty-six years after the Ysabella incident. As the mainland of Africa was colonized by Europeans about the year 1500, and yellow fever was never observed prior to 1759, or two hundred and fifty-nine years after its colonization, it is not necessary to indicate with a pointer on the map of the world where the natural home of yellow fever was, is and will continue to be for all time to come—unless our Southern neighbors stop long enough launching new revolutions and attend to

intelligent preventive measures against a disease which science has proved can be conquered.

Another noteworthy fact before we conclude:

The epidemics of yellow fever in the West Indies followed one another in rapid succession and hardly a year has passed since 1493 without the disease manifesting itself, either sporadically or as an epidemic, in one of the Antilles. In Africa, the record is different.

Let us take Senegal to illustrate our point:

From 1759 to 1882, a period of one hundred and twenty-three years, there were six epidemics in Senegal. Between the first and second epidemics (1759-1778), nineteen years elapsed; between the second and third (1778-1830), fifty-two years; between the third and fourth (1830-1867), thirty-seven years; between the fourth and fifth (1867-1878), eleven years; between the fifth and sixth (1878-1882), four years.

By reference to the chronological tables in another part of this volume, it will be seen that during this same period of one hundred and twenty-three years, there is a record of nearly two hundred outbreaks of yellow fever in the West Indies.

A soil which can *produce* yellow fever will do so annually; the long intervals between the epidemics in Africa gives the palm to the West Indies.

THE SHIP THEORY.—The theory that yellow fever originates on shipboard was based on the fact that, in several noteworthy instances—such as the outbreaks at St. Nazaire, Brest, Falmouth, etc.—it was noticed that so long as the hatches remained closed, the disease did not manifest itself, but as soon as the scuttles and hatches were opened, the fever invaded the vessel and often spread to the port where she was riding at anchor.

This is easily explained: The infected mosquitoes, which had fed on yellow fever patients at the port of sailing, had been imprisoned in the hatches during the long voyage across the seas, with no chance of gaining access to the upper parts of the ship. When the vessel reached her destination and the hatches were opened, the insects were liberated and swarmed with famished haste all over the vessel, inoculating with the poison of yellow fever

every susceptible person they bit. These persons, in turn, were so many new foci of infection and served to spread the disease.

In the present light of the mosquito transmission of yellow fever, nothing can be more simple; but, when we come to think over the matter, we can hardly blame Audouard and his distinguished champions for having blundered, as they were groping in the dark and launched the theory which seemed, under the circumstances, the most plausible and intelligent.

THE GULF STREAM THEORY.—This doctrine cannot for a moment be seriously entertained and does not need to be dissected here to lay bare its imperfections. It explains nothing and is dismissed without further comment.

THE ASIATIC THEORY.

There is a theory, however, which takes our fancy and which we are prone to espouse—the opinion that yellow fever originated on the western shores of Asia centuries before the advent of Christianity. The city of Smyrna, in Asia Minor, is just the sort of place where a pestiferous disease could originate *de novo*. Since the date of its foundation, in pre-historic times, it has been renowned for its filthiness and pestilences, a fame which clings to it to this day.

Smyrna occupies the unique position in history of being the only great city of the west coast of Asia Minor which has survived to the present day. Unlike good wine, however, it does not seem to have improved with age, from a sanitarian point of view. It is as insalubrious to-day as it was in distant past, when it cradled Homer and was the glorious capital of Antigonus. The appearance of the city at the present day is very attractive when viewed from the harbor, but a closer inspection dispels the illusion. The houses, mostly built of wood, are mean and fragile looking; the streets close and filthy and filled with intolerable stenches, proceeding from illy-constructed sewers and drains. Having thus all the necessary conditions present to harbor and propagate pestilence, it is within the reasonable bounds of probability that it could

have been the original nidus of yellow fever. How yellow fever was engendered there, what special atmosphere constitutions precipitated its origin or how it sprung spontaneously into existence, our feeble powers of imagination cannot conjecture, but, for the purpose of propping up the doctrine we advance, we shall admit that it did spring from somewhere within the walls of the malodorous oriental town—in fact, *grew*, like the immortal Topsy—and was thence disseminated by the mosquito-infected vessels of the Phenicians and other ancient adventurers throughout the then known world.

The immigration of the Phenicians to the Mediterranean coast of Asia took place in remote antiquity. When the Children of Israel settled in Canaan, they found the Phenicians already established in the country, and history tells us that the tribes of Naphtali, Asher and Dan, to which that section of Syria was assigned, did not conquer Phenicia, but occupied only a small portion of it. The Phenicians were a commercial and not a warlike race and their policy from the onset towards the Chosen People was one of conciliation and the two races afterwards became stalwart friends.

From the earliest period the Phenicians occupied themselves in distant voyages and their skill in shipbuilding is a matter of history. Lebanon supplied them with abundance of timber and Cyprus gave them all necessary naval equipments, from the keel to the topsails. In the reign of Pharaoh-Necho, these daring navigators even circumnavigated Africa. The commerce of Tyre extended all over the ancient world, from India to England, and the maritime knowledge and experience of the Phenicians led to the founding of numerous colonies in Cyprus, Rhodes, Sicily, Sardinia and even in distant Spain, where they founded the famous city of Gaddir, now known as Cadiz, eleven centuries before the Christian Era.

With Smyrna as a nidus, yellow fever could thus easily have been imported to the seaports of the Mediterranean by the active commerce in which these remarkable people were engaged in. Mosquitoes are plentiful in Western Asia and Southern Europe and the great plagues which history recounts as having almost depopulated the world

at certain epochs in the distant past, were possibly yellow fever epidemics, spread far and wide through the medium of mosquito-infected ships, which sailed from infected points to countries free from the disease. These countries, in their turn, proved so many foci of infection, whence yellow fever radiated to susceptible localities. In course of time, the disease was imported to America by the early voyagers who visited this country centuries before the time of Columbus and gradually spread over the continent, until it found a home suited to its permanent hibernation in what is now known as the yellow fever zone. Simple, is it not? We shall undoubtedly find scoffers and unbelievers, but we advance the theory with the same assurance that all previous theories have been promulgated and can safely challenge anyone to prove the contrary. This is the beauty of theories. You may not be able to prove what you say by what lawyers call "documentary evidence," but the burden of proving the contrary is on the other fellow, and he is generally in the same fix when it comes to trotting out facts to prove that you are talking through your *chapeau*.

"Admitting your theory to be correct," observes my astute friend, Mr. Doubting Thomas, "why has yellow fever ceased to visit Smyrna?"

For the same reason that it is no longer prevalent in Spain, Philadelphia, Boston, New York,* and scores of other places where it was, at some time or other, considered endemic.

What has brought about this change? "The disappearance of the *Stegomyia Calopus* from these localities," would be the logical answer. But such is not the case. The yellow fever mosquito has been banished from New York, Boston, Philadelphia and other Northern places,

* See the very interesting theory advanced by Col. W. C. Gorgas concerning the disappearance of the *Stegomyia* from Philadelphia, New York and other Northern localities, published in another part of this volume, under the caption "The Effect that the Completion of the Panama Canal Will Have Upon the Probable Extension of Yellow Fever to Asia."

but, according to Theobald,⁴⁹ these insects are still to be found in Spain at the present day. And yet, yellow fever, except in a few isolated instances, has been unknown in that kingdom since the great epidemics which ravaged it in the beginning of the last century.

Theobald does not designate Smyrna as one of the habitats of the *Stegomyia Calopus*, but mentions the fact that the insects are prevalent in Tyre, Sidon and Palestine, neighboring localities. "Where the climate is not too dry," observes Howard,⁵⁰ "*Stegomyia Fasciata* will, with little doubt, upon close search, be found." The climate of Smyrna is an ideal one for the propagation of the insect under discussion and it has no doubt been domiciliated there from time immemorial.

But here comes the clincher: "If *Stegomyia* flourished in Smyrna ages past and yellow fever was an endemic, how is it that, with all the conditions which were then present existing at the present day, the disease no longer manifests itself?"

The only way to get rid of this Gordian Knot is to treat it a-la-Alexander:

Let us suppose that the great pestilences which devastated Europe, Asia and Africa centuries before the Christian Era were yellow fever epidemics. History tells us that these outbreaks caused fearful mortalities and that at times "nearly half the population of the world" was swept away. As the years went by, new generations were attacked by the disease, which became milder and less murderous for want of fresh material, until it came to pass that those who remained became immune through acclimatization or because they had withstood a previous attack, and the disease gradually disappeared from its old-time haunts. Immigration, one of the most fertile feeders of endemic disease, was no longer a factor in the Old World after the twelfth century of the Christian Era, for the nomads of that period had penetrated as far as they dared to go, and with the whole population of the

⁴⁹ Theobald: A Monograph of the Culicidae of the World, 1891.

⁵⁰ Howard: Concerning the Geographic Distribution of the Yellow Fever Mosquito, 1905.

world immune from yellow fever, it is natural that the scourge should cease to manifest itself.

It is a remarkable truth that persons born in a community where a disease is endemic, seldom, if ever, experience an attack. Humboldt notes the fact that a person born and brought up in Vera Cruz is not subject to the disease. The same observation has been made in regard to Havana. And yet, the natives of Havana are often attacked with yellow fever when they visit Vera Cruz in August and September; while, on the contrary, natives of Vera Cruz, who were known to have passed unscathed through violent epidemics in their natal place, have died of yellow fever in Havana, Jamaica and the United States.

“New sources of disease are developed by civilization,” observes Gouverneur Smith,⁵¹ “new measures of prophylaxis germinate simultaneously with each genesis. Many of the poisons with which we are familiar, and which were known to our ancestors, are not as yet to be extinguished, but are to continue to harass posterity. Posterity will encounter ills which have not afflicted us, and the medical literature of future centuries will relate the outcrops of novel disorders, and record the successful means by which they were held in abeyance. If the chemists are capable of producing new compounds, it can be inferred by analogy, and even inferred from a study of past ages, that in the mutations of society new forms of aerial contaminations and new zymotic affections will be developed by reason of the overcrowdings of population, by the influences of new occupations and of new relations of life. The opening of new territories to civilization will be attended with its dangers. Indigenous germs of disease may exist in unexplored Africa and in other secluded parts of the globe, which are in time to be conveyed to marts of commerce, and thence to be still more widely diffused.”

Gouverneur Smith's observations, made thirty years ago, upholds the point we wish to elucidate.

What has kept alive the fires of pestilence in the West Indies? War and the Spanish soldiery. For hundreds of years, Spain was engaged in putting down insurrections in

⁵¹ Trans. N. Y. Academy of Medicine, vol. 2, 1876, p. 362.

Cuba, and for hundreds of years has yellow fever mowed down her soldiers by the thousands.

During the period of ten years, from 1870 to 1879, there arrived, at the port of Havana, 154,423 Spanish soldiers. During that same period, out of a total death-rate of 92,231 from all diseases in Havana, there were 11,837 fatalities from yellow fever alone, of which 4,439 were newly-arrived soldiers, or nearly half the total mortality from yellow fever.

Look over the long list of epidemics in the West Indies since the beginning of the last century, and you will see that in almost every instance the disease was either imported or attacked the newly-arrived. The natives (that is, descendants of the original settlers of the islands), if they had not been contaminated by this susceptible element from a foreign clime, would never have contracted the disease.

According to the views of the Havana Yellow Fever Commission,⁵² the pure-blooded American red Indian annually proves at Vera Cruz his present susceptibility to yellow fever; hence there is no reason to disbelieve that the aborigines of San Domingo and other Antilles were susceptible, but had, in 1492, acquired immunity from the disease by the same process and to the same general extent now enjoyed by the white, black, and yellow or red natives of habitually infected localities in Cuba and elsewhere.

The same reasoning holds good for Smyrna, Spain and other old-world localities. Natives of susceptible climes not having emigrated to these countries for centuries past, the occasional visitor of to-day is safe from attack, as the infected mosquitoes and their immediate posterity have long since "passed in their checks" and their descendants content themselves in disseminating malaria and kindred transmissible diseases. But let a single case of yellow fever be imported into the heart of Spain, Smyrna or any presumably former habitat of the disease, and the world will witness a repetition of the terrible ravages of the past.

Previous to 1793 yellow fever was unknown in Dem-

⁵² Annual Report National Board of Health, 1880.

erara, British Guiana, which is noted for its low, swampy soil, abounding in vegetable matter in a state of decomposition, the whole constituting a true hot-bed of pollution, where *Stegomyia* breed by millions. Yellow fever could not, and never would have, developed itself in that region; but, according to Bally,⁵³ it was introduced by the schooner *Fanfan* in the year above mentioned, and finding an habitat suited for its propagation, became established there, and Demerara is to-day one of its focal points.

Diseases, like fashions, have their whims. A locality may for years—aye, even centuries—be afflicted with a certain ailment and then, sometimes suddenly, sometimes with such gradual decadence as to be scarcely noticeable, the endemic disappears, to manifest itself in places where it was unknown before and create the same havoc, inspire the same terrors and display the identical idiosyncrasies which characterized it in its old habitat.

According to Muhry,⁵⁴ if we except the admirable and accurate descriptions of diseases contained in the writings of the Arabian physicians, we have scarcely any of an earlier date than the beginning of the sixteenth century, sufficiently full and correct to enable us, by comparing the phenomena of the diseases which now prevail with those by which the same diseases were accompanied at former periods, to detect their points of resemblance or discrepancy. Judging, however, from the few and imperfect details furnished us by medical writings of former days, we believe that there are good reasons for concluding that the more prominent diseases to which the human organism is now liable, are essentially the same, in all their leading features, with those to which it was subject as far back as medical history leads us.

Muhry further asks if it is true, however, that diseases which formerly prevailed have entirely disappeared? This is by no means improbable. The history of endemics proves very clearly that certain forms of disease depend upon cases of a strictly local character, and no longer occur when these local causes are removed. It is equally

⁵³ Bally: Typhus d'Amerique, p. 60.

⁵⁴ Muhry: Historical Immutability of Nature and Disease, 1844.

reasonable to suppose that morbid causes of wider extent may become extinct either spontaneously or through the agency of man, and with their extinction would, of course, cease the diseases produced by them. But it is not so very certain, that among the diseases to which the human organism is still subject, some at least of those which are presumed to have disappeared are not to be included, but in a form so far modified that the resemblance between them and their prototypes is overlooked. It is, also, probable that diseases which formerly prevailed as endemics or epidemics, still occur sporadically; isolated cases appearing occasionally and at long intervals, and hence attracting little attention, being viewed as anomalous forms of some one of the more prevalent affections.

Muhry's masterly diagnosis is admirably suited to the subject under discussion in these pages. Take away the *Stegomyia Calopus* and you take away yellow fever. The experience of New Orleans in 1905 is incontestible proof of the truth of this assertion. Although all the conditions which prevailed in 1905 existed in 1906 (with the exception, of course, of the millions of *Stegomyia*), not a case of yellow fever occurred among the vast cosmopolitan population of the Metropolis of the South, and only a single case, undoubtedly imported, is known to have occurred throughout the entire State of Louisiana. And this, thanks to the untiring work of the eminent sanitarians in whose hands were the destinies of the State and City Boards of Health, was soon rendered innocuous.

Let us again look into the fascinating question of Asiatic origin of yellow fever.

Without desiring to be irreverent to the shades of Audouard, Bally, Chisolm and others, we think that there is more in the theory of Asiatic origin than appears on the surface, when one comes to weigh it in the balance of conjecture. How do we know that the pestilential ardent fevers, or *causi*, of which repeated mention is made in the works of ancient writers, were not yellow fever manifestations? In reading descriptions or the *causi*, not only in the *Epidemics* of Hippocrates, but also in the writings of his contemporaries, Thucydides and Isocrates, one is struck by the similarity of the diagnosis given and the

present accepted symptoms of yellow fever. The writings of Galen, Paulus Egineta, Aretus, Avicenna, Hippocrates (First and Third Books on Epidemics), Procopius (*l'Histoire de Son Temps*), Gregorius (*Histora Francorum, de 417 a 591 A. D.*), Anglada (*Etudes sur les Maladies Eteintes et les Maladies Nouvelles*), Black (*Histoire de la Medicin et de la Chirurgie*), and others, also lead to the presumption that a disease possessing all the peculiarities of yellow fever was epidemical long before the Christian Era.

"In the works attributed to Hippocrates," says Bancroft, "mention is made of violent febrile disorders, which sometimes proved fatal on the fourth day, and even sooner,⁵⁵ and were attended with incessant vomiting, sometimes of black matters, yellowness of skin, and other affections so similar to those which are frequently observed in the Yellow Fever, that I am disposed to believe that they could be no other disease."

Lyons,⁵⁶ commenting on the above, says: "At what historic period yellow fever became an established epidemic, it may perhaps be not possible now to determine. Some writers, and amongst them Bancroft, seem to think that certain of the fevers described by Hippocrates as being attended with black vomiting and yellowness of the skin, were of the same nature as the yellow fever of later times. I doubt much that the question admits of absolute solution, so meagre are the accounts left us in the fragments of the works of the great Father of Medicine."

Had Hippocrates any knowledge of yellow fever? At first thought, this looks like a startling and foolhardy question, but a careful perusal of the works of the Father of Medicine certainly leads to the conclusion that yellow fever, or some distemper possessing almost the identical symptoms of the disease, prevailed among the Greeks and their neighbors in the nebulous past. According to that learned and well-posted observer, Dr. Samuel Latham Mitchel, who edited the *New York Medical Repository* in the beginning of the last century, this inference is readily

⁵⁵ This fact is noted by Alcee Chastant, of New Orleans, in his *Observations on Yellow Fever*, published in 1878.

⁵⁶ Lyons: *A Treatise on Fever*, 1861, p. 249.

drawn from the observations which Hippocrates makes of the pestilential distempers of Persia and Greece. Dr. Mitchell holds the opinion that it is much to be lamented that the Grecian sage has not left to posterity an account of this distemper, and of the methods he took to guard against it. We might, in all probability, have derived some information that would be of priceless value to us at the present time. However, although he has not left us the history of the disease which afflicted the Persian army, and which gave so much concern to the Greeks, there are several passages in his works which show that the southern parts of Europe and the western countries of Asia were visited by disorders marked by yellow skin and black vomiting, at least four hundred years before the Christian era. One cannot help noticing that the writings of Hippocrates contain evidence enough of morbid yellowness; and that, although the different kinds are meant by the same word, the yellow suffusion incidental to fevers is clearly distinguishable from the yellow tincture caused by an absorption of bile when the liver is obstructed.

Black vomit is also alluded to in the works of the Father of Physic. In the twelfth section of his *Prognostics*, he affirms that if the matter vomited be of a livid or black color, it betokens ill. In the first section of the first book of his *Coan Prognostico*, he enumerates black vomiting among a number of the most desperate symptoms. In the fourth section of the same book, he considers leek-green, livid and black vomiting as omens of sad import. The passage in the eleventh paragraph of the first book of his *Predictions*, indicates strongly the unfavorable issue of a fever after black vomiting. The connection between black vomiting and death is noticed likewise in the third paragraph of the second section of the *Coan Prognostico*. The same symptom is mentioned in the first paragraph of the first section of the same book. And the like will be found to recur in the fourth paragraph of the third section of the same book.

From the above, it will be seen that this alarming symptom was frequent among the ancient Greeks laboring un-

der fevers, was well-known to their physicians, and was noticed by Hippocrates as a familiar occurrence.

It must not be forgotten, however, that this symptom frequently occurs in the late stages of other dangerous septic conditions.

Littre, whose famous work is one of the classics of medical literature, denies that Hippocrates had any knowledge of yellow fever and asserts that the *causi* were merely remittent fevers, the same as is observed in our days in the countries bordering on the Mediterranean.

But Littre, in our humble opinion, is not infallible. It is a matter of history that yellow fever was unknown by that name previous to 1694, when Ferreira da Rosa published his admirable treatise on the pestilential diseases of Pernambuco. The fact that the disease was not mentioned in ancient times by the name we now know it, however, does not mean that it did not prevail throughout the world then or at any other time. The works of noted chroniclers, from the time of Aretus⁵⁷ to Guyzot,⁵⁸ abound with accounts of pestilences which ravaged Europe, Asia and Africa at specified epochs, depopulating cities, decimating armies and creating widespread terror and demoralization.

Even as far back as 1184 B. C., during the Trojan war, it is said that Podalirius, a son of Esculapius, was invited by the Greeks to their camp "to stop a pestilence which had baffled the skill of the physicians."⁵⁹ This disease is said to have resembled yellow fever.

Certain authors, among them Marius de Bamberg, assert that the plague of Athens described by Thucydides and Lucretius, was nothing less than yellow fever. Berenger-Feraud tries to dispose of this theory by saying that although the malady which afflicted the ancient Greeks during the Peloponesean wars was characterized by a sudden onset, great pain in the head, injection of the eyes, rapid respiration, etc., symptoms which may appear to denote yellow fever, it is also worthy of notice that Thucydides speaks of the red appearance of the facies of those affected, black and putrid ulcers, gangrene of the ex-

⁵⁷ Adams' translation.

⁵⁸ See his "History of France."

⁵⁹ Lepriere's Classical Dictionary, p. 543.

tremities and the cicatrices which remained after the patients had been cured. These latter characteristics seem to indicate that the Greeks were either attacked by the plague or by malignant smallpox, or, at all events, a malady totally different from yellow fever.

Sydenham, the greatest epidemiologist of modern times, describes the Plague of London, in the summer and autumn of 1665, as having been ushered in by a malignant fever, and also alludes to a disease similar to yellow fever which prevailed in Moscow in 1771, where it destroyed 80,000 persons. According to Mertins, one of the physicians appointed by the Empress of Russia to attend the infected, the pestilence was introduced in Moscow by Turkish prisoners.

In Hume's *History of England* (page 33), occurs the following passage: "The reign of Oswy was rendered memorable by a most destructive pestilence called the *Yellow Plague*, which, commencing in 664, ravaged the whole island during twenty years, with the exception of the Highlands of Scotland."

A fever similar to yellow fever has been observed in England and Ireland. Dr. Hamilton describes its appearance at Norfolk and Drs. Graves and Stokes⁶⁰ speak of its prevalence in Dublin in 1826, though the latter expresses some doubts as to the disease being yellow fever. Dr. Graves, however, avers that the symptoms and anatomical characters were the same as those laid down in cases of yellow fever by the best authorities.

Anstie,⁶¹ in comparing English epidemical disease with yellow fever, says: "In truth, it is difficult to read carefully the histories of West Indian epidemics of yellow fever without being tempted to believe that the disease has strong affinities with our English typhus; and the peculiar symptoms (jaundice and black vomit) of which so much has been made, are in truth phenomena which are not infrequently witnessed in typhus and relapsing fever

⁶⁰ Lectures on Fever, by Wm. Stokes (1876), p. 37.

⁶¹ Notes on Epidemics, by Francis Edmund Anstie (1866), p. 86.

in Britain.⁶² So often has this been the case, that one can hardly avoid thinking that, were these latter fevers transported to the peculiar tropical regions which have been mentioned, they would develop these features with constancy, instead of occasionally, and would then be indistinguishable from true yellow fever."

The great American historian and philosopher, Humbolt, makes the following observations: "It is certain that the *vomito*, which is endemic at Vera Cruz, Carthage, and Havana, is the same disease as the yellow fever, which, since the year 1793, has never ceased to afflict the people of the United States. This identity, against which a very small number of physicians in Europe have started doubts, is generally acknowledged by those of the Faculty who have visited the Island of Cuba and Vera Cruz, as well as the coast of the United States, and by those who have carefully studied the excellent nosological descriptions of M. M. Makitrick, Rush, Valentin, and Luzuriaga. We shall not decide whether the yellow fever is perceptible in the *causus* of Hippocrates, which is followed, like several remittent bilious fevers, by a vomiting of black matter; but we think that the yellow fever has been sporadic in the two continents since men born under a cold zone have exposed themselves in the low regions of the torrid zone to an air infected with miasmata. Wherever the exciting causes and the irritability of the organs are the same, the disorders which originate from a disorder in the vital functions ought to assume the same appearances."

CONCLUSION.

As previously observed, we lean to the doctrine of Asiatic origin of yellow fever, but we are in no wise unalterably wedded to the hypothesis. We have tried hard to be convinced, but the bewildering mass of evidence, *pro et con*, has raised a lingering doubt in our mind, which, no amount of reasoning has been able to eradicate.

⁶² The differential diagnosis between typhus and yellow fever in this country is too well established to need commenting upon.—G. A.

We now bring this historical summary to an end, thinking it unnecessary to burden these pages with further quotations and observations. We feel we have proved nothing new concerning the origin of yellow fever and, taking you into our confidence, patient reader, we must confess we never had the remotest idea of launching a new theory. We simply culled from the best observers and trust to the intelligence of the reader to make whatever deductions may seem proper or reasonable in the premises. So far as we are personally concerned, we beg to express our opinion of the whole business by the following quotation from Peisse, taken from his great work, *La Medecine et Les Medecins*:

“Quand, par l'observation directe du regne animal, etudie dans son organization interieure la plus delicate, Cuvier eut fini son travail, il trouva qu'il etait arrive a peu pres aux memes divisions qu'Aristote avait etablies, il y a plus de deux mille ans.”

To paraphrase the above: After carefully sifting the opinions of the most noted writers on the origin of yellow fever, we have arrived at the same conclusions reached by all of them—that the disease either was endemic in America centuries before the arrival of Columbus, or was imported from some transatlantic country by the hordes of nondescript personages who swarmed to the New World in search of riches and adventure. But where the invaders primarily contracted the disease, is a question which reminds us of the immortal question of the small boy, propounded ages ago to his preceptor:

“Which was born first, the egg or the chicken?”

We find no record of the learned gentleman's explanation, and the problem will undoubtedly remain forever unsolved. We cheerfully relegate the yellow fever brain-racker to the same fate.

PART THIRD.

HISTORY
OF
YELLOW FEVER,

BY LOCALITIES.

YELLOW FEVER
AS IT
CONCERNS ASIA.

THE EFFECT THAT THE COMPLETION OF THE
PANAMA CANAL WILL HAVE UPON THE
PROBABLE EXTENSION OF YELLOW
FEVER TO ASIA.

BY COL. W. C. GORGAS.

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Officer, Panama Canal Zone.*

To get a basis for the discussion as to what will be the probable effect of commerce through the Panama Canal upon the introduction of yellow fever into Asia, it will be necessary to review roughly the past and present habitat of yellow fever, and its method of extension in the past.

Yellow fever has only been recognized as a disease since the discovery of America, and its principal habitat since that time has been the West India Islands, and the main lands of both North and South America bordering the Gulf of Mexico and the Caribbean Sea. It has, however, extended at time very widely from these localities, on the eastern and western coast of North and South America, and the western coast of Africa, and the southwestern coast of Europe. It seems to have had its widest extension during the latter part of the eighteenth century and the earlier part of the nineteenth. It has been as far North as Quebec in North America and as far South as Montevideo in South America. There have been several epidemics in Spain, and minor epidemics in France and Wales. In Europe a few cases have originated as far east as Genoa, Italy. It has never extended farther east in Europe than Genoa, nor has it at any time affected Asia, or the islands of the Pacific.

With our present knowledge of its means of propagation one can readily understand why it has not spread beyond these limits. The great road of travel during the old days of sailing ships, between Europe and America on the one hand, and Asia on the other, was around the Cape of Good Hope. This took four or five months. The only possibility of such a ship transmitting yellow fever would be that the ship itself would become infected, and

continue to have a succession of cases, and thus keep alive infected mosquitoes during the whole voyage. She would have to be breeding *stegomyia* mosquitoes aboard and have a case of yellow fever introduced, and infect these mosquitoes, and then have a succession of cases of yellow fever among her non-immunes that would keep up the disease for several months. The probabilities are greatly against this. The probabilities are that within the first two months all the non-immunes aboard would contract the fever, and at the end of a couple of months, we would have a ship peopled by immunes. Every probability is that the infected mosquitoes left at the end of two months would die from natural causes within the following three months, and by the time the ship reached India, she would be entirely free from infection. Another great means of protection was the fact that the vessel was exposed to freezing weather for several weeks in passing the Cape. Before the days of the Suez Canal there was not a great deal of traffic through the Mediterranean Sea to Asia, and what there was, was carried on by means of pack trains of various kinds. One can readily understand the improbability of transmitting yellow fever in this way. I think our experience points to the fact that yellow fever is nearly always transmitted from place to place by a sick person going from an infected point, and infecting the mosquitoes in an uninfected place. It apparently takes pretty frequent communication to transmit the disease.

In the earlier days of yellow fever in the United States it was almost entirely confined to the littoral and was looked upon as a disease of the sea coast. As the country became settled up and river traffic became great, it was found that it would spread up the rivers, but it was still looked upon as a disease confined to the sea coast and large rivers. When railroads were introduced, it was found that it spread with equal facility along railroad routes.

The small amount of commerce and the great length of time that it took for a sailing vessel to cross the Pacific would readily account for yellow fever not having spread across the Pacific. With the introduction of steam vessels one would have expected that yellow fever would

have been more likely to spread to Asia, but a steam vessel breeds many less mosquitoes than a sailing vessel. The sailing vessel, for her long voyage, had to carry large quantities of fresh water, which were prolific breeding places for the stegomyia. A steam vessel, while she can and does breed mosquitoes, does not do so to anywhere near the extent that the sailing vessel does. Her expenses being large, she cannot afford to spend such length of time in port as the sailing vessel does, and is, therefore, less likely to become infected. And then again, the routes of commerce do not extend directly from infected ports to Asia. It is very seldom that a vessel goes directly from Havana or Rio de Janeiro to Asia. The exchange is almost entirely carried on by means of London or Hamburg, or some other European port.

The effect that the Suez Canal has had as a means of the introduction of infectious and contagious diseases from Asia to Europe, would be some indication of what effect the Panama Canal will have upon the introduction of such diseases from America to Asia. The probability, while remote, of the introduction of yellow fever from America to Asia, was certainly increased by the opening of the Suez Canal. The city of Para, in Brazil, is the port in America nearest to Asia going east by the Suez Canal, which is at present permanently infected with yellow fever. The time by steamer from Para to India has been reduced by the Suez Canal more than half. The whole route via the Suez Canal lays in tropical and subtropical latitudes. The likelihood of the introduction of yellow fever from Para to India via the Suez Canal is at present just about the same as it is for the transfer of the same disease from Guayaquil to Hong Kong. Both Guayaquil and Para are permanently infected with yellow fever and have been for years. The steaming distance from Para east through the Suez Canal to India is about the same as that west from Guayaquil over the Pacific to Hong Kong.

While we would have to acknowledge the possibility of the conveyance of yellow fever to Asia by either of these routes, it is evidently extremely improbable. The Suez route has been in use for a generation, and the Pacific route for some three centuries, with never a single in-

stance of yellow fever getting to Asia. But it is probable that in that time there has never been a single instance of a vessel going directly from either Para or Guayaquil to Asia. As commerce goes on increasing they may, however, occur.

A very good example of a large commerce between ports infected with yellow fever, without the transmission of the disease, is that between the ports of Rio de Janeiro and Para, infected ports on the eastern coast of South America, and England. Also that between Guayaquil, an infected port on the west coast of South America and San Francisco. Commerce is very intimate between these infected ports south of the equator and the non-infected regions mentioned north of the equator. Vessels sail between these ports oftener than weekly, and the steaming time is less than a month, yet, to my knowledge, yellow fever has never been carried either to England or San Francisco from these sources.* But, before the opening of the Suez Canal, one, in discussing the probable dangers, would have thought that plague and cholera would be much more likely to be introduced from Asia to Europe than yellow fever from Europe to Asia. The commerce is large and the trip not more than three weeks. infection from this source. Europe has, however, taken Yet there has been little, if any, trouble in Europe with the precaution to establish an International Board of Health which has sanitary supervision over the Canal and guards this route very carefully.

I think the above fairly satisfactory reasons why yellow fever in the past has not spread to Asia. It is interesting here to note the fact that the yellow fever zone had greatly decreased before we knew that it was transmitted

* In one isolated instance (1883), yellow fever was imported into San Francisco, but did not spread. In 1897, 1898, 1902 and 1903, vessels coming from South American ports infected with yellow fever, or on which cases had had developed, died or convalesced, were detained at the San Francisco Quarantine Station, but no new cases developed while the ships were in the harbor. For full particulars, see detailed account under "California," in another part of this volume. G. A.

by the mosquito, and before any general measures of any kind were taken for its extinction. It extended most widely about the beginning of the nineteenth century. At this time, Philadelphia, New York, Boston, Baltimore and Charleston were all liable to yellow fever and had frequent epidemics. From this time it has become less and less frequent on the Atlantic Seaboard of the United States and in the United States itself. At present, I do not think the stegomyia is found farther north than Norfolk, and she probably had the same habitat a hundred years ago, and it is hard to understand how New York and Philadelphia could have ever had yellow fever. But the probable explanation is that before they had water supplies they used wells and cisterns generally as a means of storing water and thus had excellent means of breeding stegomyia. Sailing vessels frequently came in with numbers of stegomyia aboard. When these arrived in the summer time, the ships continued to breed mosquitoes for weeks at a time while they were tied up to the wharves. Many of these mosquitoes wandered off to the neighboring houses where they found ready means of breeding, and thus, in a few weeks, the town became well stocked with stegomyia. Quarantines were very lax and a case would be introduced from an infected ship and find a good ground for spreading the disease through the city. As the cold weather came on all the stegomyia would be killed, but in some other year the same thing would occur over again. At present in Philadelphia they have no tanks or cisterns and very few places where the stegomyia would breed, but communication with ports where stegomyia breed is almost altogether through steamers which are not likely to bring many stegomyia, and she has a good quarantine which stops the large majority of yellow fever cases. These are the causes, I think, that have led to the contraction of the zone of yellow fever.

The same statements would apply to Spain and England. They are not countries where the stegomyia breed, and these mosquitoes could only flourish there when introduced during the summer time, and when the condi-

tions as to water receptacles were favorable to their breeding*.

In our Southern Gulf States the stegomyia has its natural habitat. The weather during the winter is not sufficiently cold to kill off all the adults, so that we are still liable to an occasional epidemic when the disease is introduced from the neighboring West Indian ports. But even in these localities the winters are so cold that the mosquito becomes dormant and yellow fever disappears, even no sanitary measures are taken. As we go farther south and get into the tropics we find that the stegomyia breeds as well, as far as temperature is concerned, in one season as in another, and varies principally according to rain fall, or conditions that give more or less numerous breeding places.

Now let us consider a moment the distribution of yellow fever at the present time and the possibility of its transmission to Asia. It is at present in Cuba, Mexico, Central America, and on the east and west coast of South America. At present I do not think there is any direct communication between an infected port and Asia. The West Indies and the eastern coast of South America exchange their wealth with the wealth of Asia principally through the European ports, and Guayaquil, which is the only infected port of any consequence on the west coast, carries on whatever commerce she has with Asia through San Francisco.

In Southern Asia and the Philippines the stegomyia is a very common mosquito. The population in China and India is very dense and non-immune; the Chinaman and Coolie being just as liable to yellow fever as the European, and as far as we can see, it will only require the introduction of a case of yellow fever to cause a very devastating epidemic, which, in the state of civilization existing in Asia, would be entirely uncontrollable.

If the Canal were opened to-morrow I do not think the chances of carrying yellow fever to Asia would be one whit increased over what they are to-day. At the present

* According to Theobald (Monograph of the Culicidae of the World, published in 1891), stegomyia have been found in Spain. G. A.

time such danger is very remote. It is only a possibility. On the Pacific side we have only one infected port, Guayaquil. It is within the bounds of possibility for a steamer to sail directly from Guayaquil to an Asiatic port, become infected at the time of leaving Guayaquil, continue the infection by means of a succession of cases during the two months it would take her to reach an Asiatic port and implant the infection at such port. But it is extremely improbable. If a weekly steamer sailed from Guayaquil to a tropical Asiatic port the probabilities would be increased. The chances of a ship remaining infected for two months are small. Take, for instance, the relations between Cuba and Spain. For the twenty years before the American occupation of Cuba frequent steamers sailed from Havana to the ports of Spain. They were crowded with passengers, civil and military. Havana, during these years, always had yellow fever, summer and winter. Spain, as previous history has shown, was capable of becoming infected. But such intimate commerce could go on for twenty years without establishing yellow fever in the country. Small local epidemics have been established two or three times in Spain by this commerce since the introduction of the steamship. But it is rare. Now if the time of transit were made eight weeks, instead of two, the probabilities of carrying the disease would be greatly decreased. I think that if such had been the case, Europe would have remained as free from yellow fever as has Asia.

The Commission which was appointed by the United States to examine and report upon routes across the Isthmus, and which finally recommended the Panama route, discussed at considerable length as to what would be the probable amount of commerce through the Canal and as to where it would come from. They quote the commerce of the great canals of the world at present in operation and its rate of increase yearly from the opening of these canals. From this data they conclude that ten millions tons per year, will be a large tonnage for the first ten years.

Assuming that commerce will always follow the shortest and quickest routes between two points, they show

that almost all European ports are nearer Asiatic ports via the Suez Canal than via the Panama Canal, and that, therefore, Panama will get very little trade from Europe. They conclude that the traffic through the Suez Canal will not be interfered with by the Panama Canal; that this traffic will come principally from the United States; some from the West Indies and South America and a very little from England. Accepting this as a basis for discussion, we see, that, if yellow fever infection is distributed, at the time of the opening of the Canal, as it is at present, ships passing through the Canal and going to Asia from Vera Cruz, Havana and Rio de Janeiro, would be the only ones which could possibly carry infection. A half a dozen ships a year would be a large average for these ports. The other ports at present infected will probably never send a ship through the Canal to Asia.

How will the opening of the Panama Canal affect the chances of this introduction? It will, no doubt, increase somewhat the commerce between infected ports and Asia, and vastly increase the commerce between North America and Europe, on the one hand, with Asia on the other. Ships in passing through the Canal will touch at Panama and Colon and be some twelve or fifteen hours crossing the Isthmus. If this territory is infected with yellow fever at this time it will greatly increase the chances of some of these numerous vessels becoming infected, and therefore, the possibility of yellow fever spreading to Asia. If we could bring about such conditions, therefore, that no vessel in passing through the Isthmus would be liable to become infected with yellow fever, and so that no vessel from an infected port would be allowed to go through the Canal, with any possibility of her carrying infection, Asia would be no more liable to get yellow fever from us than she is at present.

To bring this happy condition about, we would have to keep the Isthmus itself free from yellow fever, and to guarantee, by means of rigid quarantines, that no infected vessel passed through the Canal. Both these things are possible of accomplishment. Modern sanitary measures have demonstrated the fact that even in the tropics it is possible to rid a locality of yellow fever and keep it

free. This has already been done at Panama. It has been over a year since a case of yellow fever has occurred in the city of Panama, and only one case has occurred on the Isthmus in the year 1906. There is a much larger non-immune population on the Isthmus at present that was ever here before, and that probably ever will be here after the construction of the Canal.

The same system of quarantine that has kept yellow fever for the past three years from being introduced by shipping from the neighboring infected ports, into the Zone, will also in the future prevent an infected ship from passing through the Canal.

Whether the Panama Canal, when completed, will be a menace to the health of Asia all depends upon the efficiency of the government which controls the Zone through which it passes. If the Zone remains an endemic focus, as in years past, the probabilities of transmitting yellow fever to Asia, by the largely increased direct traffic, will be augmented. If the Zone is kept free from yellow fever, and the last three years of sanitary work by the United States Government at Panama has shown that this is entirely possible, then the liability of the introduction of yellow fever into Asia will not be at all increased by the opening of the Canal.

SYRIA.

Geographical and Historical.

Syria forms part of Asiatic Turkey, south and south-east of Arabia and borders on the Mediterranean. It has a population of about 1,500,000, and area of about 70,000 square miles. In ancient times, Syria formed a part of the Byzantine Empire, and was successively conquered by the Persians, the Greeks and the Romans. Since then, its political history has been varied and sensational. It was taken by the Arabs in 636 A. D., by the Sedjuk Turks in 1078, by the Crusaders, by the Mamelukes and by the Ottoman Turks, who added it to their empire in 1517. In 1833, it was conquered by Mehemet Ali and annexed to Egypt, but was restored to Turkey in 1840 by the intervention of the great powers of Europe. Bethlehem, the birth-place of our Savior, is located in Syria.

Alleged Outbreak of Yellow Fever in 1800.

Yellow fever has never invaded Asia, so far as history informs us. The probability of the disease being carried to the Ancient Continent is ably and comprehensively discussed by Col. Gorgas in the preceding Chapter. We do not believe that the incident related below was an outbreak of yellow fever, but give it a place in this volume to complete our records of reported eruptions of the disease.

According to Dr. Larrey, who was Surgeon-in-Chief in the Army of Napoleon during the campaigns in Egypt and Syria, yellow fever prevailed in Western Asia among the troops under General Kochler, in the summer and autumn of 1800. Dr. Larrey gathered his facts from the medical journal of Dr. Witman, a physician who was with the English military commission. We culled the following from Dr. Larrey's observations:¹

Dr. Witman relates that, in the autumn of 1800, while

¹ Memoirs of Military Surgery and Campaigns of the French Armies, etc., by D. J. Larrey (Hall's Translation), 1814, p. 234.

the military commission remained on the coast of Jaffa—a maritime town of Palestine, 31 miles northwest of Jerusalem—where it was encamped with the army of the Grand Vizier, a malignant bilious remittent fever made its appearance. It commenced about the middle of August, and continued with much severity through the months of September and October, lasting until December. The weather was foggy, and very warm, the temperature ranging from 90° to 98°. The nights, however, were cool and moist. The first victims of this disease were two of the artificers attached to the English forces; the malady soon extended to the camp of the Turks, where it caused great mortality.

The symptoms that appeared in this disease, according to Dr. Witman, were at first chilliness, pains in the head and prostration of strength; after these a burning pain of the stomach and abdomen, nausea, a bitter taste in the mouth, and copious vomiting of bloody and bilious matter, with a diarrhea of the same appearance; the tongue of a yellowish black, an ardent thirst, the pulse quick and strong, the skin yellow and hot, the respiration hurried. When the fever assumed an unfavorable character, it was attended by delirium; the eyes were inflamed, and the skin often affected with dark colored spots. This disease advanced with more or less rapidity, according to the state of the mind and body, age, and particular regiment; also with many circumstances connected with the place and the atmosphere.

The wife of General Kochler, commandant of the English forces, was the first to be stricken with the disease after the artificers had been attacked, and died on the seventh day. The general, who had faithfully nursed his consort during her illness, also contracted the disease. He died on the third day after being taken ill.

The disease caused much mortality among the soldiers. In the months of November and December it subsided and was replaced by the plague, which was brought into Egypt by the invading armies and raged with unusual violence in that already much afflicted country.

It is to be regretted that Dr. Larrey could not collect

more circumstantial details relative to this outbreak, especially as regards the pathology of the disease. The results of the dissections which were undoubtedly made by Dr. Witman and his fellow physicians would have proved a valuable addition to the history of this epidemic.

HISTORY
OF
YELLOW FEVER
IN
AFRICA.

ANGOLA.

Description.

Angola is a Portugese colony on the west coast of Africa, south of the Congo Free State. It consists of four districts—Congo, Loanda, Benguela and Mossamedos. Angola was for a long time the radiating point of the slave-trade. Capital, St. Paul de Loanda.

YELLOW FEVER YEARS.

1860; 1862; 1863; 1865.

SUMMARY OF EPIDEMICS.

1860.

Although the coast of Angola was discovered by the Portugese in 1486 and colonized soon after, we find no mention of yellow fever having prevailed in that locality previous to 1860. As Angola was the most active centre of the slave-trade in the past, there is no doubt that the disease was imported and flourished there often, although official confirmation is lacking on this score. But we come across the same hiatus almost everywhere in Africa. All the colonies along the Atlantic seaboard are controlled by European governments, whose policy of concealment and suppression has been instrumental in closing every avenue of research in that direction, so as to throw dust in the eyes of their own people and put down the bars to immigration.

The outbreak of 1860, according to Berenger-Feraud* (page 136) was quite severe; but, beyond the mere mention of this fact, the noted epidemiologist is as silent as the proverbial bivalve.

*Berenger-Feraud: *Traite Theorique et Clinique de la Fievre Jaune*, Paris, 1891.

1862.

St. Paul de Loanda was again visited by yellow fever in 1862 (Berenger-Feraud, page 139). No details are obtainable.

1863.

The epidemic which had its inception in 1862, continued in 1863 (Berenger-Feraud, page 140). It was brought that year from Angola to Grand Bassam (q. v.).

1865.

The year 1865 furnishes the last record of yellow fever in Angola. According to Mackay (cited by Berenger-Feraud, page 141), it was quite severe at St Paul de Loanda.

ASCENSION ISLAND.

Description.

The Island of Ascension is a mere speck near the middle of the South Atlantic Ocean, about 750 miles northwest of the historic Island of St. Helena, and belongs to Great Britain. It is only 36 miles in circumference, 8 miles at its widest part, is of volcanic origin, and is chiefly celebrated for its turtle, which are the finest in the world. The capital, George Town, located on the west side, has a population of about 150, and is governed under the admiralty by a naval officer. The total population of the colony is about 400.

YELLOW FEVER YEARS.

1818; 1823; 1838; 1847; 1859; 1873.

SUMMARY OF EPIDEMICS.

1818.

According to the *Second Report on Quarantine*,¹ page 197, a fever called "bilious remittent," but which was, no doubt, yellow fever, prevailed on the Island of Ascension in 1818. The fever attacked "every man on the island," but the mortality was small. In the journal kept by Mr. Robert Malcolm, who was stationed at George Town in 1818, appears the history of a case of the disease, which commenced on the first day of June and was terminated by death the next day, "with all the symptoms of yellow suffusion and black vomit."

The fever was, no doubt, imported from America by

¹ *Second Report on Quarantine: Yellow Fever, with Appendixes, by the General Board of Health; Presented to Both Houses of Parliament by Command of Her Majesty. London, 1852. The First Report is a general treatise on epidemic diseases; the Second Report deals principally with yellow fever.*

some of the many trading ships which stopped at Ascension on their way to African ports, but the framers of the "Second Report" vehemently deny this, claiming that the fever was engendered "by an unusually wet turtle season, when the men are much exposed by watching at night to turn these animals."

This explanation seems amusing and absurd when viewed in the light of our present knowledge of the transmission of yellow fever, but the statement was undoubtedly accepted as gospel truth by the learned men of the period. It must also be remembered that the "Second Report" was written under direction of the British Government, and as England's merchant marine dotted the seas at that time, the interests of her vast commerce demanded that the theory of importation be tabooed and ridiculed, even at the sacrifice of truth. According to an old saying of the ante-bellum Louisiana negro, *Racet pa gaignin raison divan poule*² and the astute and narrow-minded compilers of this "Report" resort to all sorts of ingenious metaphors in their attempt to refute every proved instance of importation of yellow fever, twisting facts with amazing cold-bloodedness and striving with every fiber of their prejudiced minds to prove that everybody but themselves are falsifiers.

We regret not being able to give a detailed account of this outbreak, the first on record in the epidemiological history of Ascension. Even our old reliable friend, Berenger-Feraud, disposes of the subject with barely two lines, referring the reader to the unsatisfactory account contained in the "Second Report on Quarantine," which, as we have seen, is historically incomplete.

1823.

*An Heirloom in the Annals of Medicine.—The Case of the
"Bann."*

In 1823, the diminutive islet of Ascension, which looks like a pin-head in the vast wastes of waters which surround

² The roach has no voice in an argument with chickens.

it, assumed the magnitude of a continent in the imagination of the hoary-headed chroniclers who catered to public opinion in the beginning of the last century. This anomalous state of things was brought about by an occurrence which led the medical men of the period into a renewal of the acrimonious and endless controversies concerning the contagiousness or non-contagiousness of yellow fever—a war of words which had been waged with more or less fierceness since 1793, and which furnished material for discussion in the lay and medical press for fifty years afterwards. This noteworthy event was the arrival, on April 25, 1823, of the British sloop *Bann* in the harbor of George Town, the lava-fringed capital of the Island.

The case of the *Bann* is an heirloom in the annals of epidemiology. To publish all that has been said, discussed and written about this “celebrated case,” would take, at least, half a dozen volumes of several hundred pages each; so we will merely confine ourselves to a recital of the incidents which led to the infection of the Island of Ascension, as abstracted from the report of Sir William Burnett, in his comprehensive work published in 1849.³

Owing to the universal interest which was evinced in the case of the *Bann* during the last century, we have seen fit to go into details which will doubtless seem unimportant—and, mayhap, tiresome—to the lay reader, but which are absolutely essential to a faithful narration of the historic event.

The British sloop *Bann* anchored in the Sierra Leone river, West Africa, on the 11th of January, 1823, after having cruised in the Bight of Benin. She remained at Sierra Leone until the 25th of March, part of her crew being employed in her tender, the *San Raphael*. The men were greatly exposed in refitting the rigging of both vessels, and the schooner having been sent up the river to Bounce Island to have her bottom repaired, she was there laid on the beach, and the men exposed on shore in one of the most unhealthy spots in the colony.

On the 1st of March, Mr. Higgon was seized with fever while on the *San Raphael*, where he had been for some

³ Burnett: A Report upon the Diseases of the African Coast, 1849.

days with a party of men actively employed getting her ready for sea. On the morning of the second he was better, but became worse in the evening. He had more fever, which increased until the 3rd, when in the evening he remitted. On the 4th and 5th it appears to have been moderate, and on the 6th he was free from all complaint but debility. His eyes were slightly yellow.

On the 10th of March four cases occurred in the same vessel, the *San Raphael*, while at sea. In only one of the cases, which is detailed at length, there were slight remissions, as in the preceding. On the 15th the skin assumed a yellow tinge, but the patient recovered, and was discharged to duty on the 24th. On the 25th another man was attacked in the tender, which had returned to the anchorage of Freetown. He had been only three days on board. On the 26th there was a slight remission, followed by an accession of fever. On the 27th there was a second remission, followed by an accession. On the 29th he began to sink, and died early on the 30th. The integuments, which were slightly yellow, assumed a very deep color after death. This was the first fatal case that occurred amongst the crew of the *Bann*. Three men, two on the *San Raphael* and one on the *Bann*, were attacked on the 26th, but they all recovered.

The *Bann* sailed on the 27th of March, but remained about the mouth of the river until the 29th. Three cases occurred on the 27th, but they were all of an ephemeral nature, the whole of the men having returned to duty within a week. On the 31st there was a case of more severity, the patient having been on the sick list for nineteen days. On the 3rd of April, there were four attacks. These, with one exception, were all slight cases. On the 7th of April, eleven days after the *Bann* left Sierra Leone, there was a severe case, which terminated fatally on the 12th. From this time the disease assumed a greater degree of malignity and the deaths became more frequent. Only one of the cases which occurred about this period is detailed in the surgeon's journal. The patient was attacked on the 14th, but had felt unwell for a few days previously. He had the usual symptoms of fever, which

were relieved by bleeding. Early on the 15th, he suffered less from pain, the skin was hot, but moist and the pulse was full and quick. At 9 a. m. he was again bled, which seemed to relieve him, but at noon the bad symptoms returned. The skin became very hot, the pulse 120 and strong. There was, in fact, an accession of fever. On the evening of the 16th slight stupor supervened, and the fever continued to be high. On the 17th the symptoms were more favorable and there was a decrease of pyrexia, but on the 18th, about noon, the patient became suddenly worse and died almost immediately afterwards. Neither black vomit nor yellowness of skin is mentioned.

It was intended to proceed with the vessel to the Island of St. Thomas, in the Bight of Biafra, but on account of the rapid increase of the fever and the bad state of the weather, a run was made for the Island of Ascension, which was reached on the 25th of April, the *Bann* having lost thirteen men by fever up to that period. The virulence of the fever was most marked about the third week in April, a few days after the vessel crossed the equator, and when within a few hundred miles of Ascension. On April 22d eight men were attacked, not one of whom survived; three died on the 26th, two on the 27th, two on the 29th and one on the third of May. The total number of cases on board the *Bann* was 99 and the mortality 34.

The fever was carried by the officers and crew of the *Bann* to the detachments of Royal Marines stationed at George Town, the capital of Ascension, and spread throughout the island. There were altogether 28 cases and 15 deaths, a mortality of over fifty per cent.

The theory of importation in the above instance is viciously assailed by the "Second Report on Quarantine," pages 89 and 196, but the arguments advanced are decidedly rapid and irreconcilable with strict veracity and common sense.

1838.

The Case of the "Etna."

From 1823 to 1838, the Island of Ascension was free from yellow fever. In 1837, there was a severe epidemic

in Sierra Leone and the infection was finally brought to the island in 1838 by one of the many English war vessels which were constantly cruising about the South Atlantic waters, ready to pounce upon the enemy and annex everything reachable. The source of infection was finally traced to three vessels, but which one of the three was the active cause of the epidemic is a mooted question to this day.

The facts, according to the literature of the period, are as follows:⁴

The ship *Etna* arrived from Gibraltar in the roads off Sierra Leone in November, 1837. The fever at the time was committing great ravages among the prize crews and merchant seamen. On the 3rd of December, the *Etna*, having watered, and taken on board some African boys and Kroomen, sailed from Sierra Leone. On the 8th, one of the African boys was taken ill with a slight feverish attack, which did not attract any attention. On the 10th (December) two serious cases of yellow fever occurred in two Europeans, who had been on shore and much exposed. On the 12th two more cases occurred, and of these four cases, three died of black vomit. On the 20th two other cases occurred and five on the 21st. The disease then attacked officers and men indiscriminately. On the 20th of January, when the vessel anchored at Ascension, 99 cases had occurred and 25 deaths. Only five of the ship's crew entirely escaped.

Shortly after the departure of the *Etna*, the *Forester* left Sierra Leone for Ascension, with the fever raging on board. On the way to Ascension, she fell in with the *Bonetta*, bound also for Ascension, and sent on board a prize crew. Immediately after this, yellow fever appeared on board the *Bonetta* and was extremely fatal. Both vessels arrived at Ascension simultaneously and shortly afterwards yellow fever appeared among the residents of the Island. Now, whether the infection was brought by the *Etna*, the *Bonetta*, or the *Forester*, or by all three vessels, which arrived at Ascension about the same time, is a problem which nearly made driveling idiots of the honor-

⁴ British and Foreign Medico-Chirurgical Review, 1849, vol. 4, p. 467.

able medical men who fought over the momentous question, and which the writer is too modest to presume to unravel.

The evidence further goes to show that the *Waterwitch*, arriving at Ascension from a healthy port, with a healthy crew, contracted yellow fever at Ascension and carried it to sea, losing 15 men out of 60 within a period of 40 days. But, to the credit of the astute disputants of the period, the *Waterwitch* was never accused of having brought the pest to Ascension.

1847.

Importation by the "Eclair."

Eight years elapsed without a single case of yellow fever being noticed at Ascension, but an epidemic was narrowly averted in the beginning of 1847, when two cases developed on board the British ship *Rosamond*, formerly the *Eclair*, which vessel had played such a sensational role in the transmission of yellow fever to Boa Vista, Cape Verd Islands, in 1845, and to Woolwich, England, the following year (1846). The history of the inception and progress of the disease on board the *Eclair* is interesting. To avoid repetition, we refer the reader to the comprehensive account given elsewhere in this volume of the memorable epidemic which devastated Boa Vista in 1845.⁵

The facts of the outbreak of 1847 are as follows:

From the account given by the *Second Report on Quarantine*, page 98, the *Eclair* was completely overhauled and fitted out anew at Woolwich, where she was commissioned for the Cape of Good Hope on November 5, 1846, under the new name of *Rosamond*, as the old name was looked upon as a "hoodoo." It is of record that during the time of fitting out, four cases of typhus fever occurred on the ship and were sent to the hospital, where two of them died; but it is also known that typhus prevailed at Woolwich at that time. The steamer left England for the Cape on February 23, 1847. Three days after sailing, one of the men was affected with slight febrile symptoms and he continued more or less indisposed for a number of days, but

⁵ See "Cape Verd Islands."

occasionally felt so well that he returned to his work. After the ship entered the tropics, however, the disease began to assume a new and alarming character; and when off the Island of St. Nicholas, and almost in sight of Boa Vista, the man died, having had for two days previous black vomit and other characteristic symptoms of yellow fever. Within a few days afterwards, the *Rosamond* arrived at Ascension, where two other cases developed. The infection did not spread to the inhabitants of the Island, and no mention is made in the *Report* of any additional cases on board the ship, so we take it for granted that there were none.

The great point of interest, however, is the persistence with which the spectre of yellow fever hovered over the *Eclair*, and the only explanation which we can make at this latter day, is that infected mosquitoes were imprisoned in the hold of the vessel and were the active agents in the distribution of the poison which caused the sporadic outbreaks which followed in the wake of the vessel.

1859.

Yellow fever was carried to Ascension by the British war vessels *Trident* and *Sharpshooter*, in 1859, under the following circumstances:⁶

Yellow fever was quite severe at Sierra Leone in 1859. In the middle of May, the war-vessel *Trident* was infected at Freetown. The disease spread rapidly to the officers and men and the ship was put to sea, with a view of arresting the progress of the malady, but without the wished-for result. She returned to Sierra Leone on June 10 and sailed for Ascension on June 17, where she arrived on June 27, having lost 17 men since the eruption of the fever. Fifty-two cases were then on the sick list, 31 of which were sent on shore to the garrison hospital, and the remainder to the convalescent hospital on the Green Mountain. The remaining part of the crew was landed and placed under canvass in a small bay about two miles from the garrison, with which all communication was inter-

⁶ Statistical Report of the Health of the Navy of Great Britain for 1859 (London, 1862), p. 83.

dicted. The disease continued to extend among the crew on shore until the middle of July, when it entirely ceased. Of 143 of all ranks and ratings on board, namely, 110 Europeans and 33 Africans, 109 were attacked and 44 died.

Eleven cases of yellow fever occurred on the *Sharpshooter*, which lay off Sierra Leone from the 9th to the 16th of December. Disease is said to have originated thus: On December 12 the *Sharpshooter* was taken alongside a schooner for a supply of coal; in this vessel the body of a seaman, who had died on the *Surprise* of yellow fever, was deposited previous to interment; and though the fever was supposed to have ceased in the town it was still prevalent in merchant vessels. The *Sharpshooter's* men, who were employed in the coal vessel, complained of the effluvium of bilge water, and said it gave them headache. On December 21 the *Sharpshooter* sailed, and on that day a boy who had been complaining the day before of severe headache was attacked; the fever ran a rapid course, and he died on the morning of the 22nd. Other cases followed rapidly. The ship then stood out to sea for a few days and kept about 90 miles from land. This seemed to check the progress of the fever. On December 27 several new cases occurred and the ship sailed for the Island of Ascension. In neither of the above instances was the disease communicated to the inhabitants of Ascension.

1873.

The Case of the "Amethyst."

For fourteen years, Ascension had a respite from yellow fever, and would have enjoyed immunity to this day, had not importation again threatened to kindle anew the dormant fires of pestilence. It does not appear that any cases of yellow fever were observed among the British war vessels or the land forces in the vicinity of the Island, yet the ship *Amethyst* is accused of having brought the fever to Ascension from Cape Coast, Africa.

This war steamer, according to Smart,⁷ was despatched from the coast with a large number of invalids, many of whom were from Elmina. After five days at sea, she reached Ascension on the 20th of December, and landed her invalids. Among these there was a case of continued fever with great nervous tremor, who died on the seventh day after landing. Another case was moribund when sent ashore, dying in thirty-six hours. The symptoms were great anxiety, intense headache with deafness, epigastric pains, dry red cylindrical tongue, rapid pulse and respiration, injected eyes, a yellow surface, ecchymosed as death approached, relaxed bowels, vomiting of dark tar-like fluid, and suppression of urine—symptoms closely allied to those of yellow fever.

On the third day after being landed, one of the invalids, after a few hours of slight discomfort, fell down almost lifeless, and vomited and purged at the same moment a dark tar-like fluid mixed with pure blood; the features were deathlike, the surface cold and of a dirty yellow color, pulse scarcely perceptible, respiration slow and sighing. Under treatment by stimulants, with opiates, he rallied, vomiting ceasing after a few hours, when a typhous state supervened, lasting to the end of the second day, after which he convalesced.

Another case was similarly attacked on the fourth day after landing, went through an analogous course of symptoms, convalescing from the end of the following day.

The train of symptoms and events in the above cases, according to Dr. Smart, were sufficiently diagnostic of severe bilious remittent fever of the English nosology, and of the gastro-enteric type of algide pernicious fever of the French nosology; from which the Doctor infers that the disease carried from Cape Coast to Ascension in the *Amethyst* was of the remittent, and not of the yellow fever type. Be that as it may, we think the cases sufficiently diagnostic of yellow fever to class them as such and place this outbreak among our records.

⁷ Smart: Transactions Epidemiological Society of London, vol. 3, p. 508.

BANANA ISLANDS.

Description.

The Banana Islands are a group of small islands off the coast of Sierra Leone, Africa. They are seldom visited by white men, which no doubt accounts for the fact that only a single outbreak of yellow fever is recorded as having taken place there.

YELLOW FEVER YEAR.

1847.

SUMMARY OF EPIDEMIC.

Our authority⁸ does not give the source of infection, but relates the following facts: On the 26th of July, 1847, the British brig *Syren* detached a party of three officers and twenty-seven men to the Banana Islands, for the purpose of blockading the Sherbo River. On August 14, a case of fever occurred, and, subsequently, scattered cases appeared till September 20th, when the blockade was abandoned. The first cases were said to be of a purely endemic character. The disease then assumed a worse form, until it merged into yellow fever, with its characteristic symptom, black vomit.

The number of cases and deaths is not given.⁹

⁸ Bryson: British and Foreign Medico-Chirurgical Review, 1849, vol. 4, p. 470.

⁹ This is unfortunately the case in about every account of yellow fever in Africa.

BENIN.

Description.

Benin is a negro kingdom of West Africa, in Upper Guinea, on the Bight of Benin, extending along the coast on both sides of the Benin River, west of the Lower Niger, and some distance inland. It has no political unity and has no commercial importance. Benin, the principal town, has a population of about 15,000. In the days gone by, it was the great slave emporium of the district. The religion is fetichism. Human sacrifices are numerous and cruelty, in its most atrocious forms, is characteristic of the people.

YELLOW FEVER YEARS.

1520; 1553; 1558; 1588; 1828; 1852; 1853; 1854; 1855; 1856; 1857; 1862; 1873.

SUMMARY OF EPIDEMICS.

1520.

Berenger-Feraud,¹⁰ quoting Valkanaer,¹¹ gives an account of an epidemic, said to be yellow fever, which attacked the crews of the Portugese explorers in the Gulf of Benin in 1520. No information as to the origin of the disease is given.

1553.

In August, 1553, an Englishman named Windham and a Portugese, Antoine Pinteado, sailed from Plymouth, England, for the West Coast of Africa, to explore and colonize the country. The expedition consisted of two ships, manned by a crew of 140 men. Shortly after reaching the Gulf of Benin, the vessels were attacked by a malignant fever, which proved so fatal that it was found neces-

¹⁰ Berenger-Feraud: *Traite Theorique et Pratique de la Fievre Jaune* (Paris, 1890), p. 27.

¹¹ Vol. 1, p. 370.

sary to burn the ships, there not being enough men left to man them. Only 39 of these adventurers returned to Plymouth, making a death-rate of 70 per cent. This "malignant fever" is said to have been yellow fever, but how, where and by what means the infection was contracted, our source of information¹² does not say. As Windham's vessels originally sailed from a port where fever has never prevailed *de novo*, communication was evidently had with some of the slave-ships which then did quite an extensive business between Africa and Cuba, Mexico and South America—for even at that early period the Spaniards stole negroes by the thousands to work their plantations in the New World—and the sturdy sons of a northern clime proved easily susceptible to the bites of the stegomyia.

1558.

In 1558, an explorer named Torwson and his companions were stricken with yellow fever while in the Gulf of Benin.¹³ The data as to this outbreak are very meagre.

1588.

Bird and Newton,¹⁴ intrepid voyagers in search of adventure and wealth, and their companions are said to have experienced yellow fever while in the Gulf of Benin in 1588.

1828.

From 1588 to 1828, a period of two hundred and forty years, there is no record of any yellow fever outbreak in the Gulf of Benin. This seems almost incredible, but even such a careful observer as Berenger-Feraud has failed to find any data for these "silent years." In 1828, however, the disease broke out afresh,¹⁵ being imported from Sierra Leone by the ship *La Bordelaise*, and ravaged all the coast towns from the Gulf of Benin to Gambia.

¹² Gazette des Hopitaux, Paris, vol. 57, p. 661.

¹³ Berenger-Feraud, loc. cit., p. 27.

¹⁴ Berenger-Feraud, loc. cit. p. 27.

¹⁵ Berenger-Feraud, loc. cit., p. 105.

1852 to 1857.

After an interval of twenty-four years, yellow fever was again imported to the Gulf of Benin in 1852 and cases occurred sporadically every year from that date until 1857. Our authority¹⁶ does not give any details.

1862.

In 1862, yellow fever was imported to Benin and other countries on the West Coast of Africa (presumably from Havana or South America) by some of the nondescript craft engaged in the slave-trade between Africa and the Spanish-American countries. Early in May, the fever broke out among the natives huddled in the towns and hamlets located along the banks of the Bonny River, and spread rapidly to the officers and white porticers of the crews of the palm-oil vessels in the river. The contagion then successively attacked the crews of vessels lying at anchor in the numerous rivers flowing into the Gulf of Biaffra,¹⁷ more especially the Old and New Calabar and Brass rivers. It was particularly fatal at Bonny, then a notorious slave-mart, where it mowed down natives and Europeans alike. The epidemic, although of a vicious and generally fatal type, was of short duration, disappearing from all the rivers and bordering villages by the end of June.

The source of this epidemic has never been clearly established. That section of Africa was then one of the most active centres of the slave trade and, although British war vessels blockaded the coast and were on the lookout for slave-traders, the high rate of speed possessed by the vessels engaged in this nefarious trade and the thorough knowledge the marauders had of the many inlets where they could find a safe hiding place when the scout-ships were sighted, enabled them to navigate the many rivers of that section almost unmolested. As most of these slave-ships came from Cuba or South America, where yellow

¹⁶ Berenger-Feraud, *loc. cit.*, p. 122.

¹⁷ Statistical Report of the Health of the Navy for the Year 1862 (London, 1865), p. 157.

fever reigns at almost any season of the year, the yellow fever mosquitoes could easily be imported. The only matter of surprise is that the disease has not been more frequently propagated by these vessels.

1873.

In 1873, yellow fever was imported to the island of Sal, one of the Cape Verds, from Brazil, and thence to Benin. Small vessels, laden with grain from South America were then in the habit of first stopping at the Cape Verd Islands on their way to West Africa, and as yellow fever has been epidemic in Brazil almost every year since 1849, this visitation can surely be attributed to importation from that country.

The first knowledge at Cape Coast Castle of the presence of yellow fever in the Bights was late in November, on the arrival of the mail packet *Ambriz*, having the disease among her crew.¹⁸ The vessel was at once quarantined, her mails being put on board the *Biafra* and both vessels steamed off. The *Ambriz* lost thirteen of her crew before she reached the Cape Verds, and the *Biafra* six. From the meagre report furnished, this outbreak does not appear to have been either extensive or attended with much mortality.

BOA VISTA.

(See Cape Verd Islands.)

¹⁸ Smart: Trans. Epidemiological Society of London, vol. 3, p. 507.

BONNY.

Description.

Bonny is a town of West Africa, on the Bonny River. It is surrounded by a pestilential swamp and is inhabited by degraded savages. It does a good exporting business in palm oil. It was once the most notoricus slave-port in Africa.

YELLOW FEVER YEARS.

1862; 1891.

SUMMARY OF EPIDEMICS.

1862.

The epidemic of 1862 almost decimated Bonny and was as fatal among the blacks as among the few white settlers of the colony. The fever was originally introduced by some of the trading vessels plying between Bonny and the Cape Verd Islands. Two-thirds of the inhabitants of Bonny are said to have perished. Out of a population of 140 Europeans, 70 were attacked in the space of a month. In one day, as many as twenty bodies were taken out of the same house.

The mortality in the shipping was heavy. The bark *Phrenologist* lost its captain, pilot, first mate and two sailors. The ship *Gran Bonny* lost four men. Between April 4 and May 5, there were 62 deaths among the crews of vessels at Bonny.¹⁹

¹⁹ Landa: *La Espana Medica*, 1863, vol. 8, p. 427; also: *Statistical Report of the Health of the Navy for the Year 1862* (London, 1865), p. 157.

1891.

The second recorded outbreak of yellow fever at Bonny occurred in 1891. The epidemic lasted from February to April.²⁰ Cases and deaths are not given. As this is the only locality in Africa where the fever prevailed in 1891, it was probably imported from that prolific source of infection—Brazil. A glance at the consular reports and reports of quarantine officers published in the *Weekly Abstracts of Sanitary Reports* for 1891, brings out the fact that almost every vessel reported as “infected with yellow fever” during that year originally sailed either from Bahia, Rio de Janeiro, Santos, Para, Pernambuco, or other infected Brazilian ports. It is surprising that, owing to the lax quarantine methods then in vogue in Africa, that the whole coast was not infected. An explanation will no doubt be found in the absence of the festive *Calopus* from the localities which escaped a visitation.

²⁰ Weekly Abstracts of Sanitary Reports, U. S. P. H. & M. H. S., 1891, vol. 6, pp. 266, 298.

BULAM.

Description.

Bulam or Boullam (now called Bulam or Bølama), is one of the Bisagos, a group of about thirty islands near the west coast of Africa, opposite the mouth of the Rio Grande, between lat. 10° and 12° N. The largest of the archipelago, Orango, is about 25 miles in length, and most of the islets are inhabited by a rude negro race, with whom some desultory trade is carried on. Most of the islands are under native chiefs, nominally vassals of Portugal. At Bulama, once a British settlement, but abandoned as unhealthy in 1793, there is a Portuguese town, a thriving and pleasant place, the seat of government for the Portuguese possessions in this quarter.

The earliest description of Bulam is given by the Chevalier de Marchais, in Father Labat's *Voyages du Chevalier de Marchais en Guinee et aux Iles Voisines*, vol. 1, p. 68, of which the following is a translation: "The bed of that river (Sierra Leone) contains a quantity of islands, densely wooded; the soil is rich and produces all that is necessary to life. The air is very pure and one is not subject to those violent and dangerous diseases which prevail on the Coast of Guinea and which are so fatal to Europeans."

Dr. Lind, in his *Diseases of Hot Climates*, p. 56, also speaks favorably of these islands.

According to Chisolm,²¹ the most correct description of the Island of Bulam can be found in the African Plot, a paper published by Capt. Norris in 1796 (or thereabouts), in which it is stated that "Boullam" is located in "latitude 11° N. and longitude 3° W. from Farro, almost in the mouth of the Rio Grande, having Hen Island between it and the ocean. It appears to be nearly circular, about 15 miles long and 15 broad; and, consequently, about 45 round."

²¹ An Essay on the Malignant Pestilential Fever introduced into the West India Islands from Boullam, etc., by C. Chisolm (1799), p. 85.

YELLOW FEVER YEAR.

1792.

A VENERABLE MEDICAL HEIRLOOM.

The alleged importation of yellow fever by the British ship *Hankey* from Bulam to the island of Grenada, West Indies, in 1793, is one of the mustiest heirlooms in the annals of medical history. Together with the case of the *Bann* (Island of Ascension, 1823) and that of the *Eclair* (Boa Vista, 1845-6), it forms a triumvirate which, for nearly a century, was the cause of most acrimonious conflicts between medical men and gave rise to controversies which remain unsettled to this day. The believers in the specific nature of yellow fever, headed by Sir William Pym, and the "other side," composed of men who upheld the theory that the disease should be placed in the same category as malarious fevers, wrote books and brochures by the score and burdened the columns of the medical press of the period with articles which are brimful with personalities of the most volcanic type. When through sheer exhaustion, partisans abandoned the fray, fresh recruits would take up the gauntlet and, imbued with seemingly irrepressible hatred, would "sail in" with fiendish fury and renew hostilities, scattering vituperation right and left, without the least regard for age, official position or facts.

A specimen of this mode of warfare will prove interesting. According to the *British and Foreign Medico-Chirurgical Review*,²² we find Sir William Pym stating that Sir William Burnett and Dr. Bryson, his antagonists, "have gone unnecessarily and wantonly out of their way, to make unfounded and malicious statements," and giving utterance to a pious wish that these gentlemen may profit by the information he has given them, and may "pray forgiveness for their inconsistencies and misrepresentations." He informs us that he has been induced to take up the gauntlet again, by the "wanton, false, abusive, and unfounded attack" made by Sir William Burnett upon him

²² Vol. 4, 1849, p. 459.

in reference to the *Eclair*. On the other side, Dr. Bryson accuses Sir William Pym of attacking him "in most unjustifiable and unprofessional language;" of making use "of garbled and unfair extracts;" of "disingenuously mixing up facts and statements in a confused manner, for the purpose of making out charges of inconsistency;" and he regrets that Sir William Pym's review of his "Report of the Diseases of the African Station" "is written in a style which prevents his replying to it with the respect due to a man of Sir William Pym's age and position in society."

Other equally amiable diatribes are of record, but we will pass them by and revert to the fossilized case under discussion.

HOW BULAM BECAME FAMOUS.

Up to 1792, Bulam was an unknown quantity in the affairs of men. It is true that it occupied a place in the charts of the bold, but cautious navigators of the time, but insofar as its climate and the people which inhabited it were concerned, it was as deep a mystery as the North Pole is to us at the present writing. How it suddenly sprang into world-wide prominence and achieved a notoriety which clings to it to this day, and which gave the name of "Bulam Fever" to the nomenclature of yellow fever, is faithfully chronicled in Dr. Chisolm's immortal work, from which the information which follows is excerpted.

SUMMARY OF EPIDEMIC.

According to Dr. Chisolm,²³ the *Hankey* sailed from England, in company with the *Calypso*, both chartered by the Sierra Leone Company, loaded with stores and adventurers for the projected colony at Boullam, about the beginning of the month of April, 1792. When these ships sailed, the crews and passengers were all healthy and continued so until they reached their destination. These adventurers, who were mostly the well-to-do middle class, had been induced to settle in this "new country" more

²³ Chisolm: loc. cit., p. 83.

from the delusive prospect of wealth held out to them and the fanatic enthusiasm for the abolition of the slave trade, than by any deprivation of the means of subsistence in their own country. Boullam had been depicted to them as an ideal place. When the *Hankey* arrived off the island, it was found to be uninhabited and lurid tales were told by some of the sailors who had been in the neighborhood before concerning the aborigines who inhabited the mainland. They were pictured as being ferocious to an extraordinary degree and some were even said to be rabid cannibals. These rumors unnerved the prospective settlers and hindered them from making a permanent landing on the island. For nine months they lived on board the *Hankey*. "The rainy season coming on almost immediately after their arrival," observes Dr. Chisolm,²⁴ "and the heat being at the same time excessively great, they endeavored to shelter themselves from both by raising the sides of the ship several feet, and covering her with a wooden roof."

Amid such cramped and unsanitary surroundings, it is not surprising that the worst forms of disease should be engendered. We shall continue the recital of this famous case, as culled from the *Second Report on Quarantine*, pages 71 to 83:

According to the estimate of Dr. Chisolm, the settlers and crew, numbered in all upwards of 200 people, including women and children. These persons, he says, confined in a sultry, moist atmosphere, inattentive to cleanliness, and neglecting to sweeten the ship and to destroy the clothes, bedding, etc., of those that died, were seized with a malignant fever which produced such havoc among them that when the time for which the *Hankey* was chartered had expired, there were no seamen left to navigate the ship; and consequently they were obliged to proceed to sea having on board only the captain, who was sick, the mate, one of the settlers (Mr. Paiba), and two seamen. It is stated that with much difficulty they arrived at St. Jago, where they found the *Charon* and *Scorpion*, ships of war, from each of which they received two men to assist them in navigating their vessel; that with this aid

²⁴ Loc. cit., p. 85.

they proceeded to the West Indies—a voyage to England being impracticable in their state; and that on the third day after leaving St. Jago, the four men transferred to them from the ships of war, were themselves seized with the fever, two of whom died, and the remaining two were put on shore at Grenada, “in the most wretched state possible.”

Dr. Chisolm further states that Captain Dodd of the *Charon*, having occasion about that time to come to Grenada, and hearing of the mischief of which the *Hankey* had been the cause, mentioned that several of the *Charon's* and *Scorpion's* people were sent on board the *Hankey* at St. Jago to repair her rigging, etc.; that from this circumstance and the communication which his barge's crew had with the ship, the pestilence was brought on board both ships; and that of the *Charon's* crew thirty died; and of the *Scorpion's* about fifteen.

The *Hankey* arrived at the port of St. George on the 19th of February. The first person who visited the ship after her arrival in St. George's Bay was Captain Remington an intimate acquaintance of Captain Coxe, the captain of the *Hankey*. This person went on board of her in the evening after she anchored, and remained three days, at the end of which time he left St. George's and proceeded in a drogher (a coasting vessel) to Grenville Bay, where his ship, the *Adventure* lay. He was seized with the pestilential fever on the passage, and the violence of the symptoms increased so rapidly as on the third day to put an end to his existence. The crew of the *Defiance*, in Blythe Port near Newcastle, were the next who suffered by visiting this ship; the mate, boatswain, and four sailors went on board the day after her arrival; the mate remained either on deck or in the cabin, but the rest went below and stayed all night there. All of them were immediately seized with the fever, and died in three days. The mate was also taken ill but recovered. The crew of the ship *Baillies* were the next who suffered; these communicated the infection to the ships nearest them, and so it gradually spread from those nearest the mouth of the carenage, where the *Hankey* for some time lay, to those at

the bottom of it, not one escaping in succession whatever means the captains took to prevent it.

About the middle of April the disease began to appear on shore. The first house it showed itself in was that of Messrs. Stowewood and Co., situated close to the wharf; and the infection was evidently introduced by a negro wench who took in sailor's clothes to wash. The whole of the family were successively afflicted with it; and by them communicated to all those with whom they had any intercourse. All who from friendship, business, or duty, communicated with the diseased were themselves infected, and no instance occurred wherein the contagion could not be traced to its particular source. A few who sedulously avoided the houses where the infected actually were, escaped.

That part of the garrison quartered nearest to where the *Hankey* lay, were the first of this class of men who received the infection. A barrack containing nearly one-half of the 45th regiment, was situated exactly to leeward of the *Hankey* and distant from her about 200 yards. One of the officers visited the *Hankey*, and with two or three soldiers who rowed his boat, remained on board some time. The consequence of this imprudence was fatal to himself almost immediately after, and in a little time, to many of the men. All the officers and men were successively seized with the disease; but it proved fatal only to recruits who had lately joined.

About the beginning of May the disease made its appearance in the detachment of Royal Artillery; a circumstance rather extraordinary; as that corps were quartered in a situation far removed from the focus of infection. It was evidently produced, however by the communication which the gunners, doing duty in Fort George, had with the 45th regiment. Of 84 people belonging to the ordnance department at that time, about 56 were seized with the disease before the 1st of July, and of these 5 died; a trifling mortality, considering the nature of the complaint. All these men, however, had been about three years in the country, and consequently suffered less from the disease, than about 27 recruits who joined the artillery in July.

Of 26 of these unfortunate men who were infected, 21 died before the middle of August.

About the 1st of June, the disease began to appear among the negroes of the estates in the neighborhood of the town, but it did not spread much among them, nor was it marked with the fatality which attended it, when it appeared among the whites.

About the middle of June, the disease broke out in the 67th regiment, and among the artificers and laborers on Richmond Hill. The infection was communicated by some of the latter, who had visited their friends in town laboring under it. All were successively seized with it; but it fell heavier on the officers than the men, several of the former being young men lately arrived from Europe.

The disease in the course of the months of May, June, and July, appeared in several distinct and distant parts of the country, where the infection was carried by persons²⁵ who had imprudently visited infected houses in town.

But the infection was not confined to Grenada alone; from this, as a focus, it spread to the other islands; to Jamaica, St. Domingo, and Philadelphia, by means of vessels on board of which the infection was retained by the clothes, more especially the woollen jackets of the deceased sailors.²⁶

Such are the facts of this celebrated legend, on which whole libraries have been written. That the *Hankey* was ravaged by yellow fever, there is not the slightest doubt; but the disease did not and could not originate at Bulam, for the simple reason that it had never prevailed there before and has never been observed there since. As yellow fever was epidemic at Fernando-Po in 1792, the *Hankey* was in all probability visited by the commanders and crews of the innumerable tramp and semi-piratic ships which then infested these waters and, once contaminated, acted as firebrands in propagating the pest.

The statement made by the venerable Chisolm that the disease which raged on the *Hankey* while the ship was in

²⁵ It is needless to add that we dissent from this view.

²⁶ Dr. Chisolm evidently had not been introduced to the *Stegomyia Calopus*. G. A.

the harbor of George Town was "unknown in this country"²⁷ is easily refuted by history. A reference to our chronological tables and also to the history of yellow fever at the island of Grenada, will show that the saffron scourge made its first appearance among the inhabitants of that island in 1694, antedating by almost a hundred years the alleged importation so graphically outlined by Chisolm.

²⁷ Chisolm: *Loc. cit.*, p. 89.

CALABAR.

Description.

Calabar is a maritime district of West Africa, in Upper Guinea, between the bights of Benin and Biaffra. The native population consists principally of slaves. The climate is extremely unhealthy and, with the exception of missionaries, there are no white men in the district.

YELLOW FEVER YEAR.

1862.

SUMMARY OF EPIDEMIC.

There is a solitary instance of yellow fever having visited Calabar. In 1862, according to Berenger-Feraud,²⁸ the disease was introduced into the district, but no details are given. As the fever ravaged the whole African coast that year, from the Congo to Sierra Leone, it was no doubt imported into Calabar by the palm-oil vessels trading along the coast.

²⁸ Berenger-Feraud, loc. cit., p. 139.

CANARY ISLANDS.

Description.

Canary Islands, or Canaries, are a cluster of islands in the Atlantic Ocean, about 60 miles northwest of the African coast, and belong to Spain. They are thirteen in number, seven of which are of considerable size, namely, Palma, Ferro, Gomera, Teneriffe, Grand Canary, Fuerteventura and Lancerota. The other six are very small: Graciosa, Roca, Allegranza, Santa Clara, Inferno and Lebos. The population of the islands, which is a mixture of Portugese and Spanish, is estimated at 300,000. Santa Cruz de Teneriffe, with a population estimated at 46,000, is the capital of the group. Las Palmas, with a population of about 12,512, is the next city in importance.

Historical Summary.

Two years after the discovery of America, or, to be more explicit, in 1494, yellow fever is said to have made its debut in the Canaries. No previous record of the appearance of the disease among the Guanches, the mysterious tribe which originally peopled the islands, is in existence. This, of itself, is sufficient to forever set at rest the theory that yellow fever is an African product, for were this the case, the Canaries, which are only about 60 miles from the mainland and directly in the path of vessels plying between Western Africa and Europe, and were no doubt visited by the mediaeval freebooters using this route, would certainly have been infected long before 1494.

The Canaries, which are supposed to be the "Fortunate Islands" of the ancients, were known to Europeans from time immemorial. The elder Pliny speaks of them, but, by one of these strange freaks which characterize history, they were lost sight of for many centuries and not rediscovered until 1313, when they were invaded by the Spaniards, who retained possession of the islands until 1334, when they passed into the hands of the Portugese. In 1402, the Norman adventurer, Jean de Bethencourt, fitted out an

expedition for the purpose of conquering the archipelago. He was assisted by the Spanish Crown and succeeded in mastering four of the group. After his death, his successor sold all his rights to Spain. In 1477, the King of Spain sent out a large force to subdue the Guanches, but the natives put up such a brave and stubborn fight, that it was not until 1495 that the islands were completely subjugated. The aborigines were nearly extirpated by the conquerors and have long ceased to exist as a separate people. Of this mysterious race, little is known. They are supposed to have been of Lybian or Berber stock, but this is only a conjecture. They are said to have been a brave, intelligent race, of large stature, and comparatively fair and to have been proficient in the making of pottery ware. Specimens of their craft are preserved in the British museums.

It is a significant fact that the first recorded introduction of yellow fever into the Canaries should be coincident with the exodus of the panic-stricken Spaniards from the "New World," fleeing from a *nova pestis*, engendering a dread which even overshadowed their innate greed for gold and conquest. The terror which the new hemisphere inspired began to be manifest about 1494 and not only caused hundreds of the adventurers to return to their native land, but hindered others from attempting the voyage. "Not a single vessel," says Oviedo,²⁹ "left Spain during the third voyage of Columbus,³⁰ because the men who had returned with him from San Domingo were of such a sickly hue, that they resembled corpses."

Such was the curse of God in atonement for the atrocities perpetrated by these merciless conquerors upon an inoffensive and peace-abiding race, whose only crime was that they defended their native land. What the poor Guanches could not do, however, was wrought by the pestilence, and the countless hecatombs which mark the advent of the Spaniards in the New World, bear silent witness to the merciless work of the avenging spirit.

²⁹ Goncalo Oviedo: La Historia General de las Indias, 1547, vol. 2, chap. 4.

³⁰ March, 1496.

YELLOW FEVER YEARS.

1494; 1495; 1496; 1512; 1531; 1582; 1599; 1601; 1606;
1707; 1771; 1772; 1773; 1810; 1811; 1828; 1846; 1847;
1862; 1888; 1905.

SUMMARY OF EPIDEMICS.

1494.

According to Finlay,³¹ a pestilential disease, said to be yellow fever, appears to have been carried from Hispanola (San Domingo) to the Canary Islands in 1494, either by the vessels of Antonio Torres, or, more probably, by the three which returned to Spain after having landed Don Bartolome Colon at Ysabella, San Domingo. What makes this assertion seem still more plausible, is the fact, recorded by Humboldt³² and Bonpland,³³ that what remained of the Guanches on the island of Teneriffe perished mostly in 1494, in the terrible epidemic called the "Mordora."

1495.

Oviedo³⁴ informs us that the island of Teneriffe, one of the Canaries, was visited by a great pestilence in 1495, presumed to have been imported from Hispanola by the fleeing Spaniards, who stopped at the island on their homeward voyage. This epidemic was undoubtedly yellow fever, for the adventurers who returned home were of a "sickly saffron color"³⁵ and were so permeated with terror-

³¹ Finlay: Reference Handbook of the Medical Sciences (New York, 1904), p. 323.

³² Ibid.

³³ Aime Bonpland, French botanist, 1773-1858. While pursuing his studies in Paris, he made the acquaintance of Alexander von Humboldt, the famous historian, and agreed to accompany him in his celebrated expedition to the New World. During this expedition, he made many valuable botanical discoveries.

³⁴ Goncalo Oviedo: La Historia General de las Indias, 1547, vol. 2, chapter 15.

³⁵ Oviedo: Loc. cit., vol. 2, chap. 4,

that neither promises of gold nor assurances of lordly power in the "New World" could tempt them to cross the seas again.

1496.

Teneriffe seems to have been again infected in 1496, according to Cornilliac,³⁶ but whether it was a recrudescence of the epidemic of 1495 or a new importation, is left to conjecture.

1512.

Berenger-Feraud is of the opinion that the epidemic which reigned in the Canaries in 1512, and which was designated by the name of *peste*, was an invasion of yellow fever.³⁷

1531.

This year was also characterized by an outbreak of the *peste* in the archipelago. The authority quoted in the preceding paragraph thinks it was yellow fever.³⁸

1582.

Half a century elapsed without yellow fever being observed in the Canaries. It was introduced that year, presumably from the West Indies, and is designated by the name of *peste* by the Spanish chroniclers. Berenger-Feraud, however, says it was undoubtedly yellow fever.³⁹

1599.

In 1599, a pestilential disease, designated by the Spaniards by the name of *calentura*, ravaged the Canaries. Towards the end of 1599,⁴⁰ the squadron commanded by

³⁶ Cornilliac: Recherches Chronologiques et Historiques sur l'Origine et la Propagation de la Fievre Jaune dans les Antilles (Fort-de-France, 1867).

³⁷ Berenger-Feraud, loc. cit., page 38.

³⁸ Ibid.

³⁹ Ibid.

⁴⁰ Cop: Histoire de la Medecine Navale Hollandaise.

Admiral Van der Does, of the Dutch Navy, consisting of 75 vessels and 8,000 men, made an attack on the Spanish vessels at Corunna, Spain, but meeting with poor success, set sail for the West Indies. The vessels stopped at the Canaries to harass the Spanish colonists located on the islands and were soon afterwards infected by the disease then raging in the archipelago. On the admiral's flag-ship alone, 15 died. The fever is said to have been brought to the Canaries by Spanish vessels returning from San Domingo.⁴¹

1601.

The year 1601 witnessed another outbreak of pestilential disease in the Canaries. Some chroniclers says it was the plague, but Berenger-Feraud⁴² is of the opinion that it was yellow fever.

1606.

The Canaries were again afflicted in 1606. Opinions are divided as to whether this epidemic was yellow fever or the Oriental plague, but Berenger-Feraud thinks it was yellow fever.⁴³

1701.

For nearly one hundred years—1606 to 1701—the Canaries were free from yellow fever. No explanation of this extraordinary immunity for such a long period is given by historians, even our old stand-by, Berenger-Feraud, whose writings we always consult when “up a tree,” being as mum as the proverbial clam. Of course, we could venture an opinion, but as same could not be based upon even a scintilla of fact, it would be valueless.

In 1701, yellow fever was epidemic in Havana, Barbadoes, Martinique and the English Antilles, and according to Arejula,⁴⁴ was brought from Havana to the Canaries,

⁴¹ Berenger-Feraud, loc. cit., p. 27.

⁴² Berenger-Feraud, loc. cit., p. 38.

⁴³ Berenger-Feraud, loc. cit., p. 38.

⁴⁴ Arejula: Archives de Medecine Navale, Paris, vol. 7, p. 251.

where it caused a great mortality. As is the case with every mention of epidemics of yellow fever during colonial days, no details are given. In speaking of this outbreak, Berenger-Feraud informs us that *elle fit de grands ravages*,⁴⁵ but says nothing of the number of victims nor of the extent of the disease.

As will be seen by consulting our Chronology, yellow fever was also present in Spain in 1701.

1771.

Another prolonged lapse of time took place before yellow fever again visited the Canaries. In 1771, a vessel from the West Indies, where yellow fever prevailed, infected the islands.⁴⁶ The outbreak was attended with much mortality.

1772.

A Spanish regiment is said to have brought yellow fever from Havana to the Canaries in 1772. Though not as general as the year previous, the epidemic was quite severe.⁴⁷

1773.

A mild epidemic of yellow fever prevailed in the Canaries in 1773.⁴⁸ The source of infection could not be ascertained.

1810.

The year 1810 witnessed another murderous eruption of yellow fever on the island of Teneriffe.

The history of this outbreak is interesting, and goes to show how steadily and treacherous is the advent of this terrible disease. What makes the circumstance still more remarkable, is the fact that the Canaries escaped unscathed during the great epidemics which devastated Spain

⁴⁵ "It caused great mortality."

⁴⁶ Berenger-Feraud, loc. cit., p. 55.

⁴⁷ Berenger-Feraud, loc. cit., p. 55.

⁴⁸ Berenger-Feraud, loc. cit., p. 56.

in 1800 and 1804—an immunity which one can only ascribe to Divine Providence, for communication between the islands and their Mother Country was free and frequent during the above mentioned years.

To Spain belongs the credit of having imported the fever to Teneriffe in 1810. The disease was almost general in Andalusia, causing much mortality in Cadiz, Barcelona, Carthagena, Seville and Gibraltar. In the beginning of October of that year,⁴⁹ a *pantone*, or prison-ship, sailed from Cadiz with French prisoners on board and landed at Santa Cruz de Teneriffe, where the human cargo was disembarked and lodged in the town barracks. It is said that the prison-ship was a hot-bed of yellow fever, but this fact was withheld from the port authorities, and as the disease had not been observed on the island since 1773, they were lulled by a false sense of security. About the middle of October, the practitioners of Santa Cruz de Teneriffe noticed that there was an unusual number of cases of malignant bilious fever and the fact was reported to the health authorities. The warning was at first unheeded, but the malady soon became so widespread, that an investigation was ordered and it was found by experts—men who had already gone through epidemics of yellow fever—that the prevailing sickness presented the identical symptoms which had characterized the disorders of Andalusia in 1800 and 1804. The authorities awoke from their lethargy, but it was too late. The disease had spread indiscriminately to several quarters of the town and preventive measures were unable to check its destructive progress. To prevent the pestilence from being carried to the other towns of the island, a sanitary cordon was established around Santa Cruz de Teneriffe and instructions were sent to the other islands of the archipelago to take the necessary precautions to prevent the introduction of the fever. These prompt and rigid measures limited the epidemic to its original site.

This is the first epidemic in the Canaries where definite details could be obtained. In each of the other instances, chroniclers speak of “the great mortality” caused by the

⁴⁹ Fellowes: Reports of the Pestilential Disorders of Andalusia (London, 1815), p. 230.

disease or that the inhabitants "died by thousands," but here we have cold-blooded statistics, carefully compiled, which give an intelligent and comprehensive resume of the visitation.

The total number of cases in the epidemic of 1810 at Santa Cruz de Teneriffe is said to have been 5,000; deaths, 1,450. The estimated population of the town at the time of the outbreak was 12,000.

1811.

The epidemic of 1811 was still more disastrous than that of 1810. How the disease originated, our sources of information (Moreau de Jonnes,⁵⁰ Fellowes⁵¹ and Berenger-Feraud⁵²) fail to enlighten us, but the mortality is said to have been great. In San Juan Orotava, on the island of Teneriffe, which had then a population of 3,000, there were 500 fatalities. In the island of Grand Canary, there were over 3,000 deaths.

1828.

During the summer of 1828, yellow fever was brought from Spain to the Canaries.⁵³ The outbreak was not general, but it claimed many victims.

1847.

In 1847, we must look to America for importation of yellow fever to the Canaries. The outbreak does not appear to have been virulent, however, for out of a total of 5,000 cases, a mortality of only 60 is recorded.⁵⁴

We doubt that this was yellow fever.

⁵⁰ Moreau de Jonnes: *Monographie Historique et Medicale de la Fievre Jaune des Antilles* (Paris, 1820), p. 342.

⁵¹ Fellowes: *Loc. cit.*

⁵² Berenger-Feraud: *Loc. cit.*, p. 83.

⁵³ Berenger-Feraud, *loc. cit.*, p. 106.

⁵⁴ *Ibid.*, p. 116.

1862.

The Spanish frigate *Nivaria* sailed from Havana on June 30, 1862, after being in port thirty days. The vessel arrived at Vigo, Spain, in the beginning of July. The authorities were informed that there had been a death from yellow fever on the frigate shortly after her departure from Havana, and as the disease was known to be epidemic at that port and it was feared that other cases would break out, the captain was ordered to proceed to the quarantine station, where the vessel was thoroughly fumigated and retained eight days. She was then permitted to proceed to her destination and arrived at Santa Cruz de Teneriffe, where she was imprudently admitted to free pratique. There had been no new cases since the death on the way from Havana and the health authorities of the island thought that all danger was over. The crew had hardly started discharging the cargo, when two of them were taken ill and died shortly afterwards, with all the symptoms of yellow fever. Stringent precautions were taken, and, for some time, no other cases manifested themselves; but on October 2, Valentin Zamora, who had communicated with the vessel, was stricken and died after an illness of seven days. Cases began to show themselves here and there in the immediate neighborhood of the shipping and then suddenly spread throughout the town. A panic ensued. Almost the entire population fled to the interior of the island, only about 3,000 remaining. The epidemic lasted until the beginning of 1863, resulting in 2,600 cases and 380 deaths.⁵⁵

The *Nivaria* was engaged in transporting arms to Cuba.

1863.

The epidemic which began in 1862 did not subside until the beginning of 1863, after which the public health resumed its normal state.

⁵⁵ Landa: *Espana Medica*, Madrid, 1863, vol. 8, pp. 377, 395, 411, 427, 442, 475, 491.

Interesting accounts of this epidemic are given by Do Valle,⁵⁶ Berenger-Feraud⁵⁷ and Landa.⁵⁸

1888.

In 1888, Santa Cruz de las Palmas, capital of the island of Palma, experienced a stubborn epidemic of yellow fever, which, though not attended with much mortality, caused great uneasiness throughout the archipelago, owing to the difficulty which the authorities encountered in their attempts to stamp out the disease. Even as late as December 17, 1888, the island of Palma was still under strict quarantine, having been totally isolated from the rest of the group by the Spanish Government.⁵⁹ These precautionary measures confined the disease to Palma. We have been unable to obtain more definite details concerning this outbreak.

1905.

The melancholy history of yellow fever in the Canaries, extending over a period of four hundred and eleven years, closes with a case of the disease on board the Spanish steamship *Montevideo*, June 30, 1905, in the harbor of Santa Cruz de Tenerife.⁶⁰ Fortunately for the islanders, who had paid dearly in the past for neglecting precautionary measures, the vessel was not allowed to communicate with the shore, not even her mails being landed, but was remanded to Port Mahon quarantine station, where she remained until all danger of contamination was past. The patient recovered and no other cases developed on board the steamship. The *Montevideo* had been infected at Colon, Isthmus of Panama, from which port she originally sailed.

⁵⁶ Do Valle: *Echoliaste Medicale*, Lisbon, 1864, vol. 15, p. 6.

⁵⁷ Berenger-Feraud, p. 139.

⁵⁸ Landa: *Siglo Medical*, Madrid, 1863, vol. 10, pp. 339, 375, 403, 418, 434, 451.

⁵⁹ *Weekly Abstracts of Sanitary Reports*, 1888, vol. 3, p. 296; *Ibid.*, 1889, vol. 4, p. 2.

⁶⁰ U. S. *Public Health Reports*, 1905, vol. 20, pp. 1511, 2770.

Another infected vessel arrived at Santa Cruz de Tenerife on November 1, 1905.⁶¹ The captain reported the death from yellow fever of a passenger who had taken passage for Spain at Sabanilla, Colombia, and who was buried at sea three days after the vessel had left San Juan, Porto Rico. On arrival at Tenerife, the steamer was not admitted to pratique, but proceeded to Spain for quarantine and fumigation. No other cases occurred on board.

⁶¹ Ibid., p. 2628.

CAPE VERD ISLANDS.

Description.

The Cape Verd Islands (Portugese *Ilhas Verdes*, i. e., "green islands") are a group of fourteen volcanic islands and rocks, situated off the coast of Africa, in the Atlantic Ocean, 320 miles west of Cape Verd. The archipelago consists of the following islands: Sal, Boa Vista, Mayo, Santiago, Fogo, Brava, Grando, Bombo, Sao Nicolao, Santa Luzia, Branco, Razo, Sao Vincente and Santo Antonio; also, several smaller islets. Area, 1680 square miles. The group belongs to Portugal and together with the Portugese possessions on the mainland of Africa, constitute the province of Cape Verde, the capital of which is Porto Praya.

Historical Summary.

The Cape Verd Islands were discovered in 1441 by the Portugese, who colonized them. The population is quiet and docile, but extremely indolent. The first invasion of yellow fever is said to have taken place in 1510, and to have lasted for several years after that date; but the report does not bear the seal of authenticity. Although within the geographical limits of yellow fever, the archipelago has been visited by the disease only at infrequent intervals, and but for the epidemic of 1845, would have been sufficiently disposed of with half a dozen lines. It has been thought very extraordinary by observers that these islands, situated in the direct path of vessels coming from localities where yellow fever is perennially present, should not have been frequently ravaged by the scourge; but, with the exception of the islands of San Iago and Boa Vista, the group has been remarkably free from the disease.

YELLOW FEVER YEARS.

1510; 1511; 1512; 1513; 1514; 1515; 1639; 1807; 1821; 1822; 1827; 1837; 1838; 1845; 1847; 1862; 1864; 1868; 1873.

SUMMARY OF EPIDEMICS.

1510 to 1515.

Berenger-Feraud,⁶² quoting Valkenaer (vol. 1, p. 370), says that yellow fever prevailed at the Cape Verd Islands from 1510 to 1514. No details as to how the disease was brought to the islands or the extent of the invasion, could be obtained. The mortality is said to have been considerable on the vessels stopping at the archipelago during these years, on their way from Europe to the West Indies and *vice-versa*.

1639.

One hundred and twenty-four years elapsed without yellow fever being noticed at the Cape Verd islands. In 1639, the Spanish fleet, on its way to Brazil, stopped at the islands and is said to have been contaminated by a pestilential disease, which carried off 3,000 soldiers. (Berenger-Feraud, p. 27.) The disease is said to have been yellow fever, but how it reached the Cape Verds, history does not inform us. It is worthy of note, however, that yellow fever made its initial appearance in Brazil in 1640 and it is plausible to incriminate the Cape Verds in this outbreak.

1778.

According to Boudin, yellow fever prevailed in the island of Santiago in 1778. He gives the testimony of Dr. Rochard, surgeon of the French frigate *Consolante*, who states that his ship stopped for a week at Santiago in the latter part of 1778. He was told by the inhabitants that they were just recovering from an invasion of yellow fever. What gives additional credence to this statement, is the fact that, a few days after leaving the island, yellow fever broke out on board the *Consolante*, resulting in the death of 150 seamen in the short space of five weeks.⁶³

⁶² Berenger-Feraud, loc. cit., p. 26.

⁶³ Boudin: *Traite de Geographie et de Statistique Medicales des Maladies Endemiques*, Paris, 1857; Cornilliac, *La Fievre Jaune Dans le Antilles*, 1886, p. 445.

The report does not state how and whence the disease came to Santiago, but as yellow fever was epidemic in Senegal, Sierra Leone, the Gold Coast and Gambia in 1778, we can safely incriminate Africa.

1821.

From 1778 to 1821 the islands were free from epidemic disease. In 1821, according to McWilliams,⁶⁴ an outbreak of the fever took place, but was not attended with much mortality.

1822.

In 1822, another mild outbreak took place.⁶⁵ No details are obtainable.

1827.

Yellow fever was imported to Santiago in 1827, presumably by a ship from America. The mortality was very great. Among the victims were the British Consul and some of the members of his family. The American Consul, who was then just recovering from an attack of the fever, took charge of both consulates. The British ship *Tweed*, which was on its way to the Cape of Good Hope Station, touched at San Jago and a party of junior officers went on shore. These were all attacked with fever and, with one exception, died. The Portuguese troops were decimated.⁶⁶

1833.

There was a mild outbreak in 1833.⁶⁷

1837.

In 1837, yellow fever ravaged the whole coast of Guinea and was imported to the Cape Verds,⁶⁸ where it caused much mortality.

⁶⁴ Second Report on Quarantine (1852), p. 110.

⁶⁵ McWilliams: Second Report on Quarantine, p. 110.

⁶⁶ *Ibid.*; also: *Lancet*, London, 1848, vol. 1, p. 52.

⁶⁷ Berenger-Feraud, p. 108.

⁶⁸ *Ibid.*, p. 109.

1845.

The Famous Case of the "Eclair."

The epidemic of 1845 furnishes the first intelligent and comprehensive report of yellow fever in the Cape Verd archipelago. This outbreak, which was confined to the island of Boa Vista, was considered at the time the cardinal point in the discussion of the contagiousness of yellow fever. All the acrimony which had been smouldering broke out afresh and the honorable and dignified medical men arrayed on both sides renewed the conflict with greater frenzy and venom. The controversy, which had begun with the epidemic of Philadelphia in 1793, had bobbed up again when the Spanish disorders of 1800-1804 took place, had been once more rejuvenated by the *Bann* episode at Ascension in 1823, was gone all over again and made still wider the breach between the rabid contagionists and their opponents.

As this is another *cause celebre* in the annals of epidemiology, we will give it generous space. The facts are as follows:⁶⁹

On July 23, 1845, the British ship *Eclair* sailed from Sierra Leone, which seems to have been the natural source of infection during the last century, and reached Boa Vista in August of the same year. During the voyage, 60 of the crew died of yellow fever. According to the testimony of Dr. Xavier de Almeida, who went to practice medicine in Boa Vista in 1809 and was the only resident physician of the island for thirty-eight years, yellow fever had not been seen in the vicinity for nearly fifty years previous to the arrival of the *Eclair*. The disease was, therefore, undeniably imported by the infected ship.

While at Boa Vista the officers and crew of the *Eclair* mingled freely with the inhabitants and when the ship finally weighed anchor, she left the nucleus of the epidemic in the towns of Rabil and Porto Sal Rey. Of the three soldiers who constituted the guard at the fort when the vessel left the island, two, a corporal and a private,

⁶⁹ British and Foreign Medico-Chirurgical Review, 1848, vol. 2, p. 164.

were stricken with the disease. They died on September 22d, after an illness of five or six days. The surviving private of this guard, being attacked with a high fever some days after this, was removed, together with a sick comrade, to a small hut at Pao de Verelia. Here the stricken men were visited and nursed by a woman named Anna Galinha, who also contracted the disease and died on the 16th of October. The scourge subsequently spread through the town and committed much havoc.

The case of Louis Pathi, a laborer of Rabil, who was taken ill after having worked for two days on board the *Eclair*, is of pathetic interest, even at this late date, sixty-three years after the occurrence. We quote the following from the report of Dr. McWilliams, who was sent by the British Government to investigate the origin and cause of the epidemic:⁷⁰

Testimony of Louis Pathi.

- Q. How long were you employed on board the *Eclair*?
- A. About eight days.
- Q. What family have you?
- A. I have none left.
- Q. What family had you?
- A. I had a wife and three children.
- Q. Did they all die of fever?
- A. Yes, all of them.
- Q. Were you attacked?
- A. Yes; I was first attacked.
- Q. When were you attacked?
- A. Three days after I went to Rabil from the ship.
- Q. You were with your family when you were taken sick?
- A. No; I was at Moradinha.
- Q. How long did you stay at Moradinha?
- A. I was there eight days, sick.
- Q. What did you complain of?
- A. I had general fever, headache, pain of back and limbs; very sick.

⁷⁰ Report on the Fever at Boa Vista, by J. O. McWilliam, London, 1847.

Q. How long were you sick after return to your own house?

A. Nearly three weeks.

Q. Who, after yourself, was first taken ill?

A. My daughter, 12 years of age.

Q. How long after your return from the *Eclair*?

A. It was in the beginning of October.

Q. Who was next attacked?

A. Another girl, 7 years of age, four days after the first died.

Q. Who was next?

A. My boy, 11 years of age. He was taken ill eight days after the second girl died.

Q. And your wife last?

A. Yes; my wife was taken ill the same day as the last of the children died.

A melancholy sequel to the above happened in the home of Manoel Fachina, who lived next door to Pathi and who, together with his wife, nursed the stricken family. After the death of Pathi's wife, the Fachinas were taken sick with the fever, but recovered. Their child caught the disease and died in three days.

We find the *Eclair* again playing the role of importationist in 1846. After the melancholy experience she had undergone in 1845, the ship was sent to the navy-yard at Plymouth, England, where she was thoroughly cleaned and repainted and given the name of *Rosamond*.⁷¹ She was put in commission and left England for the Cape of Good Hope in February, 1846.

1847.

Yellow fever is said to have prevailed at the Cape Verdes in 1847, but whether it was a recrudescence of the previous visitation or a new importation, our source of informa-

⁷¹ For fuller details, see notice of epidemic at Island of Ascension in 1846, page 152 of this volume.

tion⁷² does not say. It is claimed that the British ship *Groveler* was contaminated at the Cape Verds and brought the disease to Barbadoes.

1862.

1862 was a disastrous yellow fever year in Africa. Almost the entire coast, from Senegal to St. Paul de Loanda and the Cape Verd and Canary Islands, suffered from the disease.⁷³ The outbreak was not very severe at the Cape Verds.

1864.

The Cape Verds were again invaded in 1864,⁷⁴ but no details are obtainable.

1868.

In 1868, yellow fever was imported to the Cape Verds from French colonies of the West Coast of Africa, Goree and Senegal, and made its first appearance in Bissam.⁷⁵ The epidemic was most severe in the city of Praia, in the island of Santiago. Commencing in the middle of July, 1868, the disease spread with such rapidity that a very large proportion of the European inhabitants became successively or simultaneously affected, so much so, that during the month of August there were received into the Military Hospital at Misericordia no less than 285 cases, of which, by September 1, 41 had proved fatal. During the month of October, there was a considerable decline of the epidemic, the affected persons being those who came from the interior of the island of Santiago or other points. The disease, however, spread to the island of Braza, one of the first victims being the medical officer, Theophilus Joaquim Vieira. There were also some cases in individuals who had fled from the city of Praia to other

⁷² Berenger-Feraud, p. 118.

⁷³ *Ibid.*, p. 139.

⁷⁴ *Ibid.*, p. 141.

⁷⁵ *Medical Times and Gazette*, London, 1869, vol. 1, p. 119.

points of the island of Santiago. Nearly the whole medical staff stationed on the island suffered, *Senor Pimenta*, of the Pharmaceutical Branch, succumbing from the disease.

1873.

In 1873, yellow fever was imported to the Cape Verds, presumably from Brazil.⁷⁶ The invasion was confined to the island of *Sal*, where the fever ran a mild course during the summer months. *Sal* was put under strict quarantine, the authorities prohibiting any communication whatever with the rest of the archipelago, and to this sanitary precaution is no doubt due the small extent of the outbreak. The mortality was small.

There is no other record of any invasion of yellow fever in the Cape Verd archipelago after 1873. The general use of steam-power and the strict attention given to ventilation and hygiene in the construction of vessels at present, has done much to destroy the breeding places of the mosquitoes in the holds of sea-going craft and thus given a quietus to the importation of the saffron pestilence.

⁷⁶ Smart: Transactions Epidemiological Society of London, vol. 3, p. 508.

CONGO COAST.

Description.

The Congo Coast was formerly understood to embrace all the countries on the West coast of Africa between the equator and latitude 18° South, but is now restricted to the northernmost district of the Portugese colony of Angola. Cabinda, with a population of 8,000, is the capital.

YELLOW FEVER YEARS.

1816; 1860; 1862; 1900.

SUMMARY OF EPIDEMICS.

1816.

A Memorable Expedition and its Disastrous End.

The history of the first invasion of the Congo by yellow fever reads like a romance. We have been much interested in the quaint account of the famous Tuckey expedition, published in an old hybrid French medical journal long since defunct and forgotten, and give in the following lines a faithful translation.⁷⁷

In the beginning of 1816, the British Government fitted out an expedition to explore the Congo River, under the leadership of Captain J. K. Tuckey, an experienced navigator. Among those who cast their fortunes with the undertaking, were Dr. Tudor, Messrs. Smith, Lockhart and Cranch, naturalists, a few less noted gentlemen in search of adventure, and a crew of twenty picked men.

The expedition consisted of the schooner *Congo* and the transport *Dorothea*, and left England about the middle of March, 1816. On account of contrary winds, slow progress was made. The vessels touched at Porto-Praya, one of the Cape Verd Islands, where they remained a few

⁷⁷ Moreau de Jonnes: *Nouveau Journal de Medecine, Chirurgie, Pharmacie, etc.*, Paris, 1822, vol. 44, p. 330.

days, and then proceeded to the mouth of the Congo, where they anchored in the beginning of July, three months and a half after their departure from England.

On July 8, 1816, the explorers entered the Congo. Progress was slow, as the current was rapid and treacherous and when about 30 miles up the stream, the *Dorothea*, being found too unwieldy to attempt the ascent unassisted, was taken in tow by the *Congo*. When the village of Embomma was reached, about 75 miles from the mouth of the river, Captain Tuckey concluded that this mode of voyaging was too slow and dangerous and decided to leave the vessels at anchorage near the town, and to proceed by row-boat or by foot in quest of the source of the river.

On August 5, the little party left Embomma. They were in fine spirits and splendid health and for the first eleven days of the arduous journey experienced no mishap. On August 9, they reached the cataract of Yellala, which extends across the entire bed of the river, and the boats had to be abandoned. It was then that the explorers encountered their first set-back. Dr. Tudor, the youngest member of the party, was taken ill with fever. He insisted on going on, but had to be carried by his companions. On the 16th the naturalist Cranch and several other members of the party having been attacked by fever, Captain Tuckey sent all the sick, including Dr. Tudor, back to Embomma, which place they reached on August 22, or fourteen days after the doctor had experienced the first symptoms of his illness. With only a handful of men left, Captain Tuckey bravely persevered in his quest, but on September 9th, when about 160 miles from the mouth of the river, he was forced to turn back, as nearly every member of the little band was sick with fever and further progress was impossible. When the footsore travelers finally reached Embomma, they found that Dr. Tudor had died on August 29 and that the balance of their companions had either perished or were in a dying condition. When the epidemic had subsided, it was found that out of sixty-one robust men who had left England on this fateful expedition, only forty were left alive, twenty-one having fallen victims to the terrible malady, including Captain Tuckey, Dr. Tudor and the three naturalists who had

braved the dangers of a tropical climate in the interest of science.

Thus came to an end the historic Tuckey expedition, on which England had counted so much and which cast such a gloom over the civilized world, that fifty years elapsed before the Congo was again navigated by white men.⁷⁸

An interesting question presents itself: Was the sickness which made such ravages among the little band of adventurers led by Captain Tuckey yellow fever, or the endemic pernicious fever of the Congo region?

Let us analyze the situation: When the *Dorothea* and the *Congo* anchored off the mouth of the great African river, there was no sickness on either vessel; the health of the party was also excellent on August 5, nearly a month afterwards, when the vessels were left at anchorage at Embomma. Some historians claim that the vessels were infected at Porta-Praya.⁷⁹ Admitting, for the sake of argument, that an epidemic disease was raging at the Cape Verd Islands when the vessels stopped at Porto-Praya, the long period which elapsed between that time and the day young Tudor was taken ill (almost four months), precludes beyond doubt the theory of infection from these islands.

Dr. Tudor, the first of the party to be attacked, was taken ill on August 9 and died on the 29th of the same month. Admitting that the young man died of the disease which showed its first symptoms on the 9th, it will be seen that he fought against its insidious inroads for twenty days, which is far beyond the usual run of the violent tropical fevers endemic to West Africa; but if we simply admit that he was originally attacked by the local fever on the 9th and that, while still weak and prostrated, contracted the pestilential fever which then reigned at the mouth of the Congo on his arrival there on August 22d, it will be seen that only seven days elapsed between his arrival on board the *Congo*, where several deaths had already occurred from a disease resembling yellow fever, and his

⁷⁸ Livingstone, 1867.

⁷⁹ According to the various authors we have consulted, yellow fever was never observed in the Cape Verd Islands from 1516 to 1821.—G. A.

death, August 29th. As yellow fever is generally fatal on the sixth day, it does not require volumes of argument to arrive at the conclusion that the pestilential fever which almost annihilated the intrepid explorers, was yellow fever.

“But,” we hear some astute disputant observer, “as it has never been proved that yellow fever ever originated in Africa, but was always imported to its shores, whence the infection in this particular instance?”

The services of a medical Sherlock Holmes are not needed to solve this problem.

The theory of infection from the Cape Verd Islands has already been disposed of. We must look elsewhere, and experience leads us to that natural hot-bed of yellow fever, the West Indies. Let us see what were the hygienic conditions of the Antilles in 1816:

A cursory reference to the works of Moreau de Jonnes, Amic, Berenger-Feraud, Musgrave Keating, and numerous other chroniclers who have written on the subject, shows that yellow fever was quite prevalent in the West Indies in 1816. It prevailed with much severity at Martinique and also ravaged Antigua, Barbadoes, Guadeloupe, and St. Thomas.

Here we have a repetition of what has happened again and again since the discovery of America.

The traffic in slaves was quite extensive in 1816, the agents of the Spanish Government making bold and frequent raids on the African coast in quest of unfortunate blacks to work their plantations in the West Indies and South America. In spite of the vigilance of the English scout-ships, these marauders, coming from countries infested with yellow fever, sailed up the many wide estuaries which indent the coast and acted as a firebrand in disseminating the seeds of pestilence.

We have spoken of this in relating the histories of the epidemics of the Canary and Cape Verd islands and hope the reader will pardon us if we prove irksome in our efforts to take advantage of every fact we can gather to prove that yellow fever is not an African product, but has always been imported to that continent.

Let us now return to the unfortunate adventurers:

It will be remembered that the explorers finally reached the Congo in the beginning of July. According to Moreau de Jonnes,⁸⁰ seven persons on board the *Dorothea* and one or two on the *Congo* were ill with fever during the long journey from England to the Congo Coast, due to exposure. No serious after-effects ensued and the health of the voyagers continued excellent.

We have read every line of the exhaustive article by Moreau de Jonnes in the *Journal de Medecine* above cited—seventeen pages—but nowhere find mention that the explorers met with any vessel, stopped at any port or mingled with any strangers from the time they left England until they entered the Congo, save the solitary instance of the brief stay at Port-Praya. As the vessels could possibly not have been infected at that port, we were at a loss to locate the original focus, when we came across a short account of the epidemic in the scholarly work of Berenger-Feraud, which clears the mystery. It is certainly peculiar that such a close observer as Moreau de Jonnes makes no mention of this fact, but as the authorities quoted are unassailable, it deserves a tardy, but merited place in history.

A perusal of the article by Berenger-Feraud⁸¹ reveals the fact that while riding at anchor at the mouth of the Congo, Captain Tuckey's vessels were in frequent communication with the officers and crew of a foreign vessel flying the American flag, but which was afterwards found to be a Spanish slave-ship from Brazil. There were some suspicious cases of fever on board the stranger, but, being informed that the craft had come direct from the United States, Captain Tuckey had no suspicion of the nature of the illness prevailing on board and allowed free communication between the complement of the three vessels, as he was anxious to obtain all the information he could about the mysterious river he was about to explore and did not wish to offend the newcomers, who seemed to be well-versed in the topography of the country. Alas for human short-sightedness and ambition! This want of caution undoubtedly paved the way for the terrible affliction which afterwards annihilated the little band of

⁸⁰ Loc. cit., p. 332.

⁸¹ Berenger-Feraud, loc. cit., p. 87.

pioneer explorers and deprived science of some of its most enthusiastic devotees.

1860.

Yellow fever prevailed quite extensively along the Congo Coast in 1860 and was particularly severe at Angola and St. Paul de Loanda.⁸² The source of importation is not given.

1862.

In 1862, yellow fever invaded almost the entire African coast from Sierra Leona to Saint Paul de Loanda. (Berenger-Feraud, p. 139.) The epidemic, though widespread, was not very severe.

1865.

The epidemic of 1865 was mild and was not attended with much mortality. Berenger Feraud (page 141) only makes a brief mention of the incident.

1900.

In 1900 yellow fever was imported from Senegal to the French Congo.⁸³

On May 26, the steamship *Ville de Pernambuco*, plying between France, West Africa and Brazil, stopped at Dakar, where yellow fever was prevailing. While riding at anchor, three sisters of charity who were on board the vessel exchanged greetings with members of their order who had come to the wharf to see them. It is claimed that no other communication was had with the inhabitants of Dakar, but the statement must be taken *cum granis salis*. The vessel left Senegal for the usual voyage down the coast and arrived at Loango, one of the ports of the French Congo, on June 15th, where the sisters disembarked. They were all successively taken ill. One of the sisters died on June 20th and another on July 2d. The third recovered.

⁸² Berenger-Feraud, p. 136.

⁸³ Kermorgant: Recueil des Trav. du Com. Con. d'Hyg. Pub. de France, 1901 (Paris, 1903), vol. 33, p. 394.

Autopsies revealed the fact that the two deaths had been caused by yellow fever.

The fourth case at Loango manifested itself in the person of a young negress aged 16, who had nursed the sister of charity that recovered. The patient died a few days later, with black vomit. The port physician took extraordinary precautions to prevent a spread of the disease, which was confined to the cases above mentioned.

A remarkable feature of this invasion, is that the only person infected by the sisters was a native African and that the few whites in the town escaped an attack. The natives of Western Africa are generally immune and the rare occurrence of a case among them certainly deserves special mention.

This is the fifth and last authentic instance of yellow fever on the Congo Coast; but other visitations of the disease no doubt took place before, between and after the dates chronicled in this history, for it is a notorious fact that St. Paul de Loanda was one of the most infamous centres of the slave-trade in by-gone days and was frequented by the worst class of trans-oceanic freebooters.

DAHOMEY.

Description.

Dahomey is a negro kingdom of Western Africa, in Guinea, with a coast-line only 35 miles in length, nearly the whole of which is composed of islands and swamps. The natives are all pagans and their worship fetishism. Population, 250,000, of which 230,00 are said to be slaves.

YELLOW FEVER YEARS.

1905; 1906; 1907.

SUMMARY OF EPIDEMICS.

1905.

Yellow fever had never been observed in Dahomey previous to 1905. The immunity of this negro kingdom from the disease is easily understood, when one reflects that it is hardly ever visited by white men. How the fever was imported, we were unable to ascertain, owing to the difficulty of obtaining information from a region governed by savages and only exploited by white men when in quest of wild animals for circuses and zoological gardens. Communication between the European settlements on the coast-line of Dahomey and other African ports are frequent and uninterrupted. The fact that the first cases were observed in the persons of customhouse employes at Grand-Popo, gives weight to the hypothesis that the disease was contracted on shipboard, as the duties of these officers also include the sanitation of vessels coming from foreign ports. They were thus compelled to spend much of their time on "suspicious vessels" and were thus exposed to infection.

According to the report of the "Gouvernement General de l'Afrique Occidentale Francaise," published in the *Annales d'Hygiene et de Medecine Coloniales*, Paris, 1907, vol. 10, page 449, the first case erupted at Grand-Popo in January, 1905, in the person of an old customhouse in-

spector. The patient died four days after the onset of the fever.

Fifteen days later, another customhouse inspector, a young man aged 28, who had recently arrived from France, was stricken. Death ensued in a few days.

The third case, a nun, also ended fatally.

The bishop of the colony, who had nursed the nun, was next attacked and furnished the fourth victim. His death occurred at Ouidah, where he had gone when he felt indisposed.

In less than a month, nine additional cases erupted in Grand-Popo, six of whom died.

Thrown into consternation by the rapid and malignant nature of the fever which was decimating their ranks in such a short space of time (six weeks), the handful of Europeans which had been spared by the scourge (about 14), fled to France. Only six or seven whites, whose official duties prevented them from deserting their posts remained in the town. Great precautions were taken by this little band against infection. The Colonial Government had their living apartments thoroughly screened and they were especially instructed to wage an incessant warfare against mosquitoes. These precautionary measures put an end to the epidemic, as no other cases erupted after the exodus of the colonists.

If one takes into consideration the comparatively limited population of Grand-Popo and its environs (30 or 35), the number of cases (13, followed by 10 deaths), shows that the fever was decidedly malignant and would certainly have been more fatal had the segregation of the population not taken place.

1906.

One of the strange characteristics of yellow fever is the fact that when an epidemic is especially severe in a locality, it is almost certain to recrudesce the following year. We were therefore not surprised to note, in the report above cited (page 451), that the disease under discussion re-appeared in Dahomey in 1906.

The first case erupted at Ouidah, April 12. The patient,

the wife of a German subject, died a few days after being attacked.

Between April 23 and May 3, 4 deaths were reported from Togo.

May 5, 2 cases were observed in Grand-Popo. One of the victims died. The patient recovering was the husband of the German lady, mentioned above.

On May 10, a fatal case was observed at Ouidah. This was followed, on May 20, by another case, which terminated fatally on June 3.

May 21. Cotonou, until then immune, became infected. One case, followed by death on the 29th, is recorded.

May 29. One case at Grand-Popo. Recovered.

June 5. One case, a nun, at Ouidah. Died June 8. Another case at Ouidah on the 5th, imported from Toffo, where unconfirmed cases had been observed. Recovered.

June 16. One death at Ouidah.

June 23. One case at Ouidah, followed by death on 25th.

This was the last case of the epidemic. There were altogether 15 cases, with 12 deaths, distributed as follows:

Locality.	Cases.	Deaths.
Cotonou	1	1
Grand-Popo	3	1
Ouidah	7	6
Togo	4	4
Total	15	12

The origin of the epidemic is unknown.

1907.

In January, 1907,⁸⁴ Dahomey was still under the ban of quarantine, yellow fever having made its appearance at Grand Popo in the beginning of the year. Up to the time of the closing of this report, no details could be obtained.

⁸⁴Kermorgant: *Annales d'Hygiene et de Medecine Coloniales*, 1907, vol. 10, p. 299.

EGYPT.

Description.

Egypt is a country in the northeastern part of Africa, governed by a viceroy (khedive), who pays tribute to the Sultan of Turkey, but is otherwise independent. Egypt is bounded on the north by the Mediterranean Sea, on the east by Arabia and the Red Sea, on the south by Abyssinia and other unimportant countries, and on the west by the Desert of Sahara. Capital, Cairo.

“THE PLAGUE SPOT OF THE WORLD.”

According to the opinion of medical writers, we have to accept Egypt as the country whence pestilence most frequently originated and extended itself. This is why that ancient land has been christened “The Plague Spot of the World.” From time immemorial, the terrible Oriental Plague and epidemic cholera were, in almost every instance, first observed in Egypt before they began their journey of death and desolation. Cairo and the villages of the Delta were generally attacked first; thence the whole civilized world was infected.

HOW MEHEMET ALI REDEEMED EGYPT.

A little historical causerie, to relieve the mind from the array of cold-blooded statistics which are part and parcel of a work of this kind, will be found refreshing and interesting.

The Egyptians are the earliest people known to us as a nation. When Abraham entered the Delta from Canaan, they had long been enjoying the advantages of a settled government. They had built cities, invented hieroglyphic signs, and improved them into syllabic writing, and almost into an alphabet. They had invented records, and wrote the names of their rulers and their heroic actions on the massive temples which they raised. More than 2000 years B. C., the Egyptians had duodecimal as well as decimal numbers, and weights and measures. The masonry of the

passages in the Great Pyramid has not been surpassed at any age. In mechanical arts, the carpenter, boat-builder, potter, leather-cutter, glass-blower and others, are often represented on their ancient monuments. They were also adepts in other arts too numerous to mention. The social and domestic life of the ancient Egyptians is depicted on the walls of their temples and tombs.

Cairo, the capital of Modern Egypt, is situated on the right bank of the Nile, 12 miles above the apex of its delta, and 150 miles by rail from Alexandria, and has a population of 374,838 souls. The character of the town is still mainly Arabic, though in modern times the European style of architecture and other matters has become more and more prevalent. The city is partly surrounded by a fortified wall, and it is intersected by seven or eight great streets, from which runs a labyrinth of narrow crooked streets and lanes. There are several large squares, or places, the principal being the Ezbekiyeh. To the south-east of the town is a citadel, on the last spur of the Mokattam Hills, overlooking the city. It contains the fine mosque of Mehemet Ali, a well 270 feet deep called Joseph's Well, cut in the rock, the palace of the Viceroy, and other things of interest to tourists. There are upwards of 400 mosques. The finest is that of Sultan Hassan. There are also some forty Christian churches, Jewish synagogues and other denominations. The tombs in the burying-grounds outside of the city also deserve mention, especially those known as the tombs of the Caliphs. The trade of Cairo is large, and the bazaars and markets are numerous. Of these the Khan el Khalibi, in the north-east of the town, consists of a series of covered streets and courts in which all kinds of eastern merchandise are displayed in open stalls. Cairo has railway communication with Alexandria, Suez, and Siout.

Before the watering and sweeping of the streets of

Cairo was introduced by the Viceroy, Mehemet Ali,⁸⁵ in the beginning of the last century, they were full of filth. A canal running through the city received all kinds of refuse, and was much neglected; its borders had always been considered as most unhealthy, and most frequented by the plague. Moreover, Cairo was surrounded with an almost complete circle of hills, one hundred and fifty to three hundred feet in height, and where these ceased, by a projection of the Mokattam mountains. Thus purifying winds were cut off from the city. The disease always appeared after the receding waters of the Nile had left much animal and vegetable matter decaying, producing miasmata under the combined influence and moisture, and after raging several months, disappeared with the nucta (a heavy dew) and the scorching rays of the June sun.

Mehemet Ali gave orders to clean the city, and to water and sweep the streets every morning, but the state of health did not materially improve. It had already been

⁸⁵ Mehemet Ali, Viceroy of Egypt, born at Kavala, in Macedonia, in 1769. He entered the Turkish army, and served in Egypt against the French; rose rapidly in military and political importance; became Pasha of Cairo, Alexandria, and subsequently of all Egypt. In 1811 he massacred the Mamelukes to the number of 470 in Cairo, and about 1200 over the country. He then commenced, by the orders of the Porte, a war of six years' duration against the Wahabees of Arabia, which was brought to a successful conclusion by his son Ibrahim, and secured him the possession of Hejaz. Ibrahim also aided in bringing a large part of the Soudan under Egyptian rule. By means of a vigorous domestic policy Mehemet reduced the finances to order; organized an army and a navy; stimulated agriculture, and encouraged manufactures. In 1824-27 he assisted the Sultan in endeavoring to reduce the Morea, which led to the destruction of his fleet by the allied European powers at Navarino (1827). Subsequently he turned his arms against the Sultan, and in his efforts to secure dominion over Syria by armed invasion, he was so far successful that the European powers had to interfere and compel him to sign a treaty in 1839, which gave him the hereditary pashalic of Egypt in lieu of Syria, Candia, and Hejaz. This remarkable personage died in 1849 at the age of eighty.

remarked by physicians of the army, at the time of the French-Egyptian expedition, that the encircled position of the city, combined with other unfavorable circumstances, must be very unhealthy. Advisers of Mehemet Ali repeated the remark, and the Viceroy, who was a tyrant, but seldom shrinking from the extent of an enterprise, took the bold resolution of carrying down a large portion of the hill into the fields, which, after having sufficiently elevated, he intended to water artificially and to convert into beautiful gardens. As once the Pharaohs dragged thousands of men to the erection of temples and pyramids, so Mehemet Ali forced thousands of fellahs (Egyptian peasants) to execute his plans. Many died under the excessive labor, but the ranks were filled by others, and the work itself was always advancing. Thus a long chain of hills was carried down, and miasmatic marshes converted into charming olive and fruit gardens. And as the work progressed the health of Cairo improved.

The disease, no longer brought from Egypt to other parts of the Turkish Empire, disappeared. Mehemet Ali has proved what can be done, even under the most unfavorable circumstances, by his grand and energetic measures, in improving the health of one city; and by thus destroying the germ of this most destructive of all diseases, he has unconsciously saved the lives of millions.⁸⁶

ALLEGED YELLOW FEVER YEAR.

1800.

SUMMARY OF EPIDEMIC.

With the exception of the alleged epidemic depicted by Dr. Larrey,⁸⁷ we fail to find anywhere any mention of yellow fever in Egypt. We have ransacked the works of ancient, medieval and modern writers on epidemiology, but only find the solitary instance narrated by Baron Larrey. In our opinion, this was not yellow fever, for

⁸⁶ Dowell: *Yellow Fever and Malarial Diseases* (1876), p. 25.

⁸⁷ Larrey: *Memoirs of Military Surgery and Campaigns of the French Armies, etc.*, (Hall's Translation), 1814, p. 230.

that disease could not originate in Egypt, and nowhere in Larrey's account do we find any mention of importation. We would have passed this account by without giving it any attention had the author been an irresponsible or less distinguished personage, but Baron Larrey was one of the most noted surgeons of his day, holding the post of Surgeon-in-Chief of the Army of Napoleon in his foolhardy invasion of Egypt, and was the author of notable surgical works. His post naturally afforded him abundant opportunities for practical study and a careful perusal of his writings shows that he studiously availed himself of his astute powers of observation and deduction by collecting numberless important and interesting facts.

Dr. Larrey was a close and intelligent observer, and his descriptions of the several phases of the disease he had to deal with, even if antagonistic to the tenets of this enlightened age, are so replete with interesting detail, that we will quote at length from his views on the cause, pathology and treatment of the malady which decimated the army of the great Napoleon in the campaigns which proved so disastrous to the French arms.

"The fatal consequences which took place in a great number of our men who were wounded in the battle of Heliopolis," observes Dr. Larrey, "and at the siege of Cairo in 1800, led our soldiers to believe that the balls of our enemy were poisoned. It was not difficult to deceive them; but not so easily could we arrest the progress of the disease."

This eminent authority further asserts that the malady presented all the symptoms of the yellow fever observed in America during the campaigns of the French armies in the West Indies and which, according to the report of Dr. Gilbert, his former colleague, who was physician-general of the army of St. Domingo, reappeared among the French troops during the expedition to that island in the last decade of the eighteenth century.

A peculiarity noted by Dr. Larrey in Egypt was that the fever attacked none but the wounded, and more particularly those who had been injured in the articulations, or had fractured bones, with injuries of the nerves, of the head, of the abdomen or thorax. The disease appeared

about the 5th of April, 1800, and disappeared about the last of May. Dr. Larrey gives the following details of the principal symptoms which the malady presented:

“The wounded had scarcely received the first assistance, or submitted to an operation, when they fell into a state of faintness and anxiety; rigors were felt over the whole body, and especially in the inferior extremities. At the first attack the eyes were heavy, the conjunctiva yellow, the visage copper colored, and the pulse slow and contracted. The patient felt pain in his right hypochondrium, and his wounds were dry, or discharged a red serum. These symptoms were followed by much general heat, burning thirst, violent pains of the intestines and head, sometimes accompanied by delirium, frenzy, oppression, and frequent sighing.”

Speaking of the causes of the epidemic, Dr. Larrey says:

“I think that many causes concurred in producing the yellow fever among our wounded. The first was, crowding the hospitals; as insurmountable difficulties opposed the formation of other establishments, we could not remedy this. Besides, the wounded occupied the wards on the ground floor, the moisture of which increased the disease. It did not appear in the elevated and airy wards to any considerable extent. Moreover, the troops, of which these wounded were formerly a part, were encamped on the west of Cairo, between this city and Boulaq, in a situation low and moist, more especially after the waters of the Nile had receded from a place where they had undergone decomposition, by remaining long exposed to the heat. The sudden transition from the scorching heat of the day to the moisture of the night, to which the troops were exposed, necessarily tended to weaken them and predispose to the disease. The atmosphere, in the season of khamsyn, is hot and moist, and consequently injurious to health. At this time also the plague prevails, and we might say that the yellow fever, from the similarity of its effects, and its speedy termination, bears some analogy to this scourge.

“To the causes already enumerated, we might add the excessive fatigue of the soldiers, the deficiency of good ali-

ment: of cooling remedies and acid drinks, and the want of cloaks to cover them during the night."

The surrender of Cairo having re-established communication with the outside world, the French were enabled to establish new hospitals, and to procure good aliment, medicines, linen and bed furniture. They removed a great part of their sick to more sanitary quarters. These circumstances, and the return of the wind to the north, in the judgment of Dr. Larrey, soon caused the disease to disappear.

The following mode of treatment followed by Dr. Larrey is certainly unique:

"When yellow fever was acute, and presented the symptoms of an inflammatory fever with jaundice, spasmodic vomiting, delirium, etc., dry scarifications of the ligamentum nuchae and on the hypochondria, produced very good effects, or in lieu of them, a small quantity of blood was taken from the arm. But copious blood letting was fatal, and it was even necessary to use the greatest circumspection in the first detraction of blood. Nitrated tamarind water, sweetened with honey or sugar, or a few glasses of nitrated and anodyne camphorated emulsions taken at night, relieved thirst and moderated intestinal irritation. If, in conjunction with these remedies, the bowels were moved in the first twenty four hours, we had hopes. We then continued the use of cooling medicines, of anodynes, of antispasmodics, followed by laxatives of neutral salts, and calomel, tonics, and antiseptics by degrees. Emetics would have been pernicious. But if in an opposition to these means the symptoms increased, the disease terminated fatally. When, on the contrary, the disease commenced with ataxic symptoms, such as prostration of strength, faintness, chilliness, blackish tinge of the tongue, and constipation, emetics in gruel removed the spasm, re-established the powers of the stomach, and facilitated the actions of the tonics and antiseptics; we then exhibited these latter with some success; chinchona, camphor combined with opium, Hoffmann's mineral liquor, and bitters in suitable doses. The cortex appeared to be less effectual than good wine brewed with sweetened

lemonade, and to which a portion of ether was afterwards added.

"Coffee was to us highly useful, and we employed it to great advantage when the disease had passed the second stage, when suppuration was re-established in the wounds, and the patient was about to recover. It expedited in these cases the return of the vital powers and gave nourishment. These means were persevered in, and their use modified at every stage of the disease. Spurge-laurel and mustard, pounded with vinegar, and applied to the hypochondria or back, co-operated greatly with these remedies. In this disease, I remarked the injurious effects of caltharides; therefore, I seldom used them.

"Wounds complicated with bilious fevers, were dressed according to the particular indication. They were sprinkled with camphor and bark, when they were threatened with gangrene, and we used the vegetable acids, chiefly of the lemon, which is abundant in this country. If they assumed the symptoms of putridity, I also ordered lotions of vinegar strongly camphorated, to be used on the head and over the surface of the body.

"Those who survived the yellow fever, had a tedious convalescence; some even had relapses and died in a few days. The yellow fever did not spare the Turks who were wounded. Being requested by the commander-in-chief, after the surrender of Cairo, to afford them assistance, I had them all collected in a mosque, to dress them more conveniently.

"A large proportion of the Turks who were attacked by this disease fell victims to it. We may attribute these unfortunate results to the bad treatment to which they were subjected, and to the privations which they underwent during the siege."

The following remarks on the pathology of the disease are interesting:

"The effects of this disease appeared on opening the dead bodies. We found a reddish serum in the cavities of the chest and abdomen, inflation and inflammation of the intestines; obstruction of the liver and spleen; the gall bladder contained but little bile, and this was thick and of a black color; gangrenous affections were seen in differ-

ent parts of the body, and especially in the adipose substance. The organs of the thorax presented nothing remarkable; all the soft parts of the wounded limb were gangrenous, and emitted a nauseous and fetid odor. Two hundred and sixty out of six hundred, who were wounded at the siege of Cairo and the taking of Boulaq, died with a complication of this disease."

An exhaustive review of Dr. Larrey's work is given in the *Edinburg Medical Review*⁸⁸ and the epidemic described by him is commented upon by Gamgee in his treatise on yellow fever.⁸⁹ We find no mention of the incident in other works on epidemiology.

A curious passage occurs in Dr. Larrey's book, which throws some light upon the peculiar beliefs of the time. It seems that before Napoleon's army left Syria, a great number of the soldiers were attacked by the plague. "It seldom attacked the wounded men," observes the doctor, "and scarcely an instance occurred of anyone being affected by it whilst the wounds were in a state of suppuration, though many were infected as soon as the wounds were healed."

According to the *Edinburg Medical Journal* of 1804 (page 217), the above observation was made by all writers on the plague, and it was currently reported at the time that Europeans who were established in Egypt and Syria guarded themselves from this pest, or at least seemed to be less disposed to be affected by it, by means of habitual illness.

Whether the sporadic outbreak depicted by Baron Larrey was yellow fever or not, we cannot say, as no corroborative evidence can be found to sustain the eminent Frenchman's views; but if the disease was yellow fever, it certainly could not have sprung from the soil or from climatic conditions, but must have been imported by the French war vessels, either from Spain, where the disease was widespread in 1800, or from Mexico or the West Indies, where yellow fever was ever present in the past. From the West Indies or Mexico to Egypt is a long jour-

⁸⁸ 1804, p. 213.

⁸⁹ Gamgee: *Yellow Fever and Nautical Diseases*, 1879, p. 105.

ney, to be sure, but *Stegomyia* have been known to live for months in the holds of vessels and to be just as active in inoculating the germs of yellow fever on being liberated as if they were fresh from the nidus of infection.

FERNANDO-PO.

Description.

Fernando-Po forms one of a group of four islands in the Bight of Biafra, West Africa, 20 miles off the coast of Guinea. The other islands of this group are Annobon, Princess Island and St. Thomas. The two last named belong to England; the others to Spain. Fernando Po and Annobon were discovered by the Portugese navigator, Fernao de Poo, in 1496, and annexed to the crown of Portugal. The islands were colonized by that country in 1592, but proving an unprofitable venture, were ceded to Spain in 1777. In 1827, the islands had become merely a nominal Spanish possession. English intrigue having almost absorbed them; but Spain suddenly woke up to the state of things and filed a vigorous protest against the machinations of the English court. The British Government, balked in its scheme to surreptitiously annex the islands, offered to purchase them for \$300 000. This proposition, after being considered and debated for nearly fourteen years, was finally rejected by the Cortes in 1841. England reluctantly disgorged the prize, recalled its governor-general and the Spanish flag has been floating over the islands to this day. But John Bull, whose land-grabbing policy has won for him a niche in the hall of diplomatic intrigue, no doubt still looks with covetous eyes upon those two islets and we may wake up one of these fine mornings and read of England being sole owner and dictator of this quartette of islands nestling like huge rocks deep in the Bight of Biafra.

The population of Fernando Po is about 20,000, being a mixture of negroes, Portugese and other Europeans. The capital is Clarence Town.

YELLOW FEVER YEARS.

1792; 1812; 1829; 1839; 1857; 1860; 1862; 1864; 1866; 1868; 1869.

SUMMARY OF EPIDEMICS.

1792.

The first recorded invasion of yellow fever at Fernando Po took place in 1792. No details are given by our authority.⁹⁰

1812.

In the beginning of the year 1812, the disease was imported by three vessels, the *Caridad*, the *Isabel* and the *Perla*. We have been unable, beyond ascertaining the names of the vessels, to cull any data concerning this outbreak, as our authority⁹¹ has unfortunately neglected to touch upon this important detail. The fever was either imported from the West Indies, as the names of the vessels suggest that they sailed under the Spanish flag and the commercial relations between Fernando Po and the West Indies were frequent and extensive; or, which is no doubt still more probable, these vessels came from Spain or Portugal, stopped on their way to Fernando Po at Sierra Leone, and were infected while at anchor in one of the harbors of that notorious focus of yellow fever propagation.

No mention is made in the account of this outbreak of the cases of mortality at the island, but the statement is given that the total mortality on board the three vessels aggregated 42, including the surgeon-in-chief of the *Perla*.

In this connection, it is to be deplored that such an authority as Dr. Rey, who writes so minutely and interestingly of the history, climate, topography and natural resources of Fernando Po, did not take the trouble to give the details of this "epidemic"—as he terms it—and thus add additional historical value to his work. But he little dreamed that this information would be of immense value to the compiler of this history and overlooked the important function. This is only one of the million illustrations of that trite Americanism, "every little bit helps."

⁹⁰ Berenger-Feraud, loc. cit., p. 60.

⁹¹ Rey: Archives de Medecine Navale, Paris, 1878, vol. 29, p. 407.

1829.

After a lull of fifteen years, yellow fever again made its appearance at Fernando Po. This time, the infection is indisputably traced to Sierra Leone. The facts are as follows:⁹²

At the inception of the epidemic of yellow fever which decimated Sierra Leone in 1829, the British ship *Eden* was anchored in the roads, off Freetown, and, as was the usual custom in those days, her officers were occasionally on shore. On the 3d of May, a man, who two days previously had come aboard the *Eden* from Freetown, was taken ill with yellow fever and died on the 7th. On May 5, two days after this man had been taken ill, a midshipman, who had been on board a detained vessel of which he had charge, returned on board the *Eden*. He had been taken ill on April 29th and died the day following his removal to the *Eden*. On May 12, some other cases occurred among the ship's crew, and on the 20th of May the *Eden* left for Fernando Po. She arrived at her destination on the 11th of June, having lost during this period 25 officers and men. She was thoroughly cleaned, fumigated, and whitewashed at Fernando Po, and then, re-embarking her convalescents, sailed for Princess Island on the 9th of July. After the departure of the *Eden*, the disease broke out at Fernando Po, where it prevailed with great severity. The mortality was not very great.

During the voyage from Fernando Po to Princess Island, the fever reappeared aboard the *Eden*, and the mortality was considerable. The fever continued to rage till August, and the *Eden* lost, between the months of May and December, 110 persons out of a complement of 160.

At the same time that the *Eden* carried the disease to Fernando Po, the *Champion* sailed from Sierra Leone with several bad cases of fever on board and arrived at Clarence Town three days after the *Eden*. As on board the *Eden*, the fever which was ravaging the *Champion* was of a most malignant type and the landing of her sick at the little

⁹² Bryson: Report on the Climate and Principal Diseases of the African Stations, p. 39.

town added fuel to the dormant fires of pestilence already kindled by the *Eden*.

According to Bryson,⁹³ from the time it was first occupied by Europeans, Fernando Po proved a perpetual hot-bed of disease. Most of the people who were located at Clarence Cove during the years 1827 and 1828, were attacked with fever or ulcer, and cut off in the course of a few months after their arrival. But as the medical returns only commence subsequently to the arrival of the *Eden* and *Champion*, the accounts respecting the fevers which prevailed previously, can only be gleaned from other sources, which, although sufficiently authentic as to their fatality, do not give the information requisite to follow them out in full detail. That it had acquired the character of being a most unhealthy locality, the number of medical officers who accompanied the marines and mechanics sent out in the *Champion*, sufficiently attests; and it is a melancholy reflection that only two out of the three reached the anchorage in time to have their bones deposited in that desolate grave-yard.

1839.

Yellow fever was again brought to Fernando-Po in 1839 and was quite severe.⁹⁴

1857.

In 1857, yellow fever again invaded Fernando-Po.⁹⁵

1860.

A ship from the West Indies is incriminated in the infection of Fernando-Po in 1860. The epidemic was quite severe.⁹⁶

⁹³ Bryson: Loc. cit., p. 49.

⁹⁴ Bryson: Loc. cit., p. . .

⁹⁵ Huard: Theses de Montpellier, 1868.

⁹⁶ Yglesias y Pardo (Ferreco), 1874, p. 12.

1862.

In the early days of July, 1862, yellow fever broke out at Fernando-Po amongst the Spanish population. The disease was first observed in one of two convict hulks in Clarence Bay and spread rapidly to the convicts and sailors in the other hulk, whence it attacked the soldiers composing the small garrison and the mechanics on shore. In a very short time, 76, out of 200 composing the entire purely Spanish population, were carried away by the disease. A remarkable phase of this epidemic is that it was confined exclusively to the Spaniards of unmixed blood and did not attack the colored Cuban settlers (*emancipados*), although the latter nursed the sick and visited freely all the foci of infection. This proves conclusively that the disease was the genuine West Indian yellow fever, for the *emancipados*, who evidently had experienced an attack in their own country, escaped unscathed.

The source of importation is disputed. Some authorities claim that the inter-colonial mail steamer *Retriever* brought the disease from Bonny, Africa, while Bourru, Berenger-Feraud and Yglesias y Pardo⁹⁷ assert that the English ship *Ferrol*, which left Havana on June 10, 1862, with 200 *emancipados*, should be looked upon as the nidus of infection.

The French ship *La Zelce* was infected at Fernando-Po in 1862 and brought the disease to Grand Bassam (q. v.).

1864.

Another outbreak of yellow fever occurred at Fernando-Po in 1864. No details are given.⁹⁸

1866.

The epidemic of 1866 continues the chain of importation.

On August 2, 1866, the ship *Rosa del Turia*, having on

⁹⁷ Bourru: *Geographie des Epidemies de Fievre Jaune*, p. 7; Berenger-Feraud, p. 139; Yglesias y Pardo, loc. cit., p. 12.

⁹⁸ Berenger-Feraud, loc. cit., p. 141.

board about 200 convicts, sailed from Havana for Fernando-Po, which was then a penal settlement, arriving at her destination on October 3 of the same year. During the two months the vessel took to make the trip, yellow fever prevailed to a more or less extent among her crew and living cargo, but this did not deter those in command of the vessel from landing the 200 convicts on the island. A disastrous epidemic broke out shortly afterwards, which caused much mortality on the island and lasted until the end of November.

Again we find occasion to criticize the excellent and astute Dr. Rey,⁹⁸ to whom we are indebted for the above narration of the epidemic of 1866. The genial doctor decries the attempts made by certain chroniclers of the period to hide the true nature of this epidemic under the name of bilious pernicious fever, but overlooks the most important information, the statistics of the outbreak. He informs us that the *Perle* lost ten of her crew, but is mute as to what happened to the unfortunate inhabitants of the island.

1868.

On September 24, 1868, the ship *General Alva* arrived at Fernando-Po from Havana.⁹⁹ A few days after the vessel's arrival, yellow fever broke out on the island, but was not very severe.

1869.

On May 22, 1869, the transport *San Francisco de Borja* arrived at Fernando-Po with 250 men deported from Havana.¹⁰⁰ Yellow fever prevailed to some extent on board the vessel, but no mention is made of the disease having reached shore.

* Rey: Archives de Medecine Navale, Paris, 1878, vol. 29, p. 407.

⁹⁹ Bourru: Geographie des Epidemies de Fievre Jaune (Bordeaux, 1883), p. 7.

¹⁰⁰ Penard and Boye: Annales d'Hygiene et de Medecine Coloniales, 1904, vol. 7, p. 509.

FRENCH GUINEA.

Description.

French Guinea, as the name implies, is a French colonial possession on the west coast of Africa, bounded on the north by Senegambia, on the east by the Ivory Coast, on the south by Liberia and Sierra Leone and on the west by the Atlantic Ocean. Capital, Conakry, situated on the Tombo Peninsula. Conakry is of recent origin. It was founded in 1889 and has at present a population of about 12,000, principally natives. The European population is about 350, but is hardly 275 during the sickly season.

YELLOW FEVER YEAR.

1901.

SUMMARY.

French Guinea was in imminent danger of being invaded by yellow fever during the epidemics at Senegal in 1900 and 1901 and at Grand Bassam in 1902 and 1903; but save for a single case, observed December 21, 1901, at Conakry, the territory seems to have been exempt from the disease. It is not known definitely whether or not *Stegomyia Calopus* breed at Conakry, as no special observations have been made in that direction, but the fact that this solitary instance of the appearance of yellow fever in the locality did not cause a general eruption, may be taken as a tentative proof of the non-existence of the insect there.

The case mentioned above was probably imported from Senegal.

GAMBIA.

Description.

Gambia is a British colony of Western Africa, consisting of the island of St. Mary, the town of Bathurst (the capital) and other minor dependencies. Area, 69 square miles. Population about 15,900.

YELLOW FEVER YEARS.

1763; 1764; 1766; 1768; 1769; 1778; 1825; 1828; 1837; 1859; 1860; 1865; 1866; 1878; 1884; 1900.

SUMMARY OF EPIDEMICS.

1763.

The first outbreak of yellow fever in Gambia (1763) is coincident with the first appearance of the disease in Sierra Leone and was no doubt imported from that colony, which since then has played such a notorious role in radiating the scourge to the otherwise healthy stations of the West African coast and the near-by insular colonies. In nearly every instance, the chain of importation has been the same: Sierra Leone, infected by ships from the West Indies or South America, has contaminated Gambia; Gambia has sent the disease to Senegal, and the latter colony has propagated the pestilence to other African settlements.

It is unfortunate that no detailed accounts exist of these first outbreaks on the African coast. Our authority¹ is deplorably uncommunicative on this score.

1764.

Yellow fever again invaded Gambia in 1764. Only a mere mention of the fact is made by our source of information.²

¹ Berenger-Feraud, p. 53.

² *Ibid.*, p. 53.

1766.

Another eruption in Gambia.³ No details obtainable.

1768.

The outbreak of 1768 furnishes us with the first intelligent account of yellow fever in Gambia. According to Lind,⁴ in August, 1768, the British ship *Merlin*, while in the Gambia River, lost several of her crew from yellow fever. Lind would have us believe that the fever was caused by effluvia rising from freshly cut timber, but as yellow fever was then reigning at Bathurst, the capital of Gambia, where the *Merlin* stopped on its voyage up the Gambia, the source of infection is clearly established. How the fever got to Bathurst, is left to conjecture.

1769.

Yellow fever prevailed in Gambia in July, 1769. In the month of August following, the British warships *Weasel* and *Hound* were contaminated at Bathurst and lost many of their crews. The disease is said to have been severe.⁵

1778.

In 1778, yellow fever was almost general on the western coast of Africa.⁶ The memorable epidemic of Senegal, about which so much has been written, occurred that year. Gambia was infected by Sierra Leone and suffered considerably.

1825.

A lull of nearly fifty years took place before yellow fever again manifested itself in Gambia. Although the disease prevailed in Sierra Leone in 1815, 1816 and 1823, it does not appear to have reached Gambia; but, in 1825, it was no

³ Ibid., p. 54; Schotte.

⁴ Lind: Diseases of Hot Climates, vol. 1, p. 250.

⁵ Berenger-Feraud, p. 55.

⁶ Berenger-Feraud, p. 56; Schotte.

doubt imported from Sierra Leone. The disease caused much mortality at Bathurst and the surrounding country, three-fourths of the cases terminating fatally.⁷ Bryson (page 33) informs us that a detachment of one hundred and eight men landed at Gambia in 1825; in the course of four months seventy-four died of fever, and thirteen of other diseases, leaving only twenty-one alive.

1826.

The fever re-appeared in Gambia in 1826 and was very severe. As in 1825, the majority of those attacked died.⁸

1828.

The epidemic of 1828 ravaged the whole African coast from Benin to Gambia.⁹ It was not severe in Gambia.

1837.

After an absence of nearly ten years, yellow fever made its appearance with renewed virulence in Gambia in 1837. The epidemic was attended with a high death-rate.¹⁰

1859.

Yellow fever prevailed at McCarthy Island, in the Gambia River, in 1859, according to Berenger-Feraud (page 136).

1860.

Yellow fever re-appeared in Gambia in 1860. The disease does not seem to have manifested itself on the mainland, but prevailed on McCarthy Island,¹¹ in the Gambia River, 127 miles from its mouth, inhabited principally by liberated slaves.

⁷ Second Report on Quarantine (1852), p. 288.

⁸ Second Report on Quarantine, p. 288.

⁹ Berenger-Feraud, p. 105.

¹⁰ Berenger-Feraud, p. 105.

¹¹ Berenger-Feraud, p. 136.

1865.

Another outbreak of yellow fever caused much mortality in Gambia in 1865. Our authority¹² does not furnish any details.

1866.

Yellow fever reigned with much virulence at Bathurst in 1866. One-half of the European population perished.¹³ No official account of this epidemic exists, as the facts were suppressed by the British Government, for commercial reasons, and only reached the public through a private letter published in the *London Times*. An investigation was demanded by the public, but dilatory measures by the authorities soon caused the episode to be forgotten.

1872.

In 1872 yellow fever was quite severe at Bathurst. Out of a white population of 31, there were 13 deaths.¹⁴

1878.

The yellow fever epidemic of 1878 may truly be called a pandemic. A reference to our chronological tables will show that it prevailed on both sides of the Atlantic, on the Pacific coast and, for the first and last time in the history of the disease, a case was imported to London and died.

The official records of Gambia are silent regarding the prevalence of yellow fever in that colony in 1878, but Berenger-Feraud¹⁵ claims that the facts were suppressed and that the disease was present that year, in a mild form. The noted author takes issue with Lejembre, who tries to prove that the fever could not have been in Gambia in 1878, because that country maintained a strict quarantine against Senegal and that the official reports do not mention yellow fever at all. Berenger-Feraud cites in refuta-

¹² Berenger-Feraud, p. 141.

¹³ London Lancet (New York), 1867, p. 60.

¹⁴ Lejembre: Theses de Paris, 1882, No. 61, p. 22.

¹⁵ Berenger-Feraud, p. 154.

tion of this assertion the fact that in 1872 yellow fever raged fiercely in Sierra Leone and Gambia, yet the official records of the colony are a perfect blank regarding this outbreak. We can verily concur with this eminent chronicler, for, by referring to our own account of the epidemic in Gambia in 1866, it will be seen that the authorities suppressed the fact that a virulent eruption of yellow fever was causing great mortality at Bathurst and the surrounding country and it was only when the *London Times* received private information concerning the state of affairs and gave the matter publicity, that an "investigation" was ordered by the British Government.¹⁶

1884.

In June, 1884, yellow fever was present in Sierra Leone; in August, it invaded Gambia¹⁷ Here we find the same old story of importation from Sierra Leone. The outbreak does not appear to have been severe.

1900.

The year 1900 furnishes the last recorded appearance of yellow fever in Gambia. A sporadic outbreak occurred at Bathurst, but the disease did not gain a very disastrous footing, as the white settlers fled at the first signs of the fever, seeking refuge on board the cargo-boats bound for European ports.¹⁸ As usual, no official records of the outbreak could be obtained.

¹⁶ London Lancet (New York edition), 1867, p. 60.

¹⁷ Berenger-Feraud, p. 190.

¹⁸ U. S. Public Health Reports, 1900, vol. 15, p. 2025.

GOLD COAST.

Description.

Gold Coast is a British crown-colony in West Africa, between the Slave Coast and the Ivory Coast, and comprises that part of the coast of Guinea which extends from 50° W. to 20° E. longitude, stretching inland to an average distance of fifty miles. The climate is very unhealthy. The chief forts and settlements are Cape Coast Castle, Elmina, Accra, Axim, Dixcove and Annamabee. Estimated population, 1,500,000, of whom only about 200 are Europeans.

YELLOW FEVER YEARS.

1778; 1786; 1822; 1823; 1824; 1852; 1853; 1854; 1855; 1856; 1857; 1862; 1898.

SUMMARY OF EPIDEMICS.

1778.

Although the Gold Coast was colonized by the Portuguese in the early years of the seventeenth century, the first recorded invasion of the territory by yellow fever took place in 1778, when an epidemic wave of the disease swept almost the whole West African coast occupied by Europeans. No details of the epidemic are given.¹⁹

1786.

Another outbreak of yellow fever took place in 1786, but the original source of infection is not given. It is stated, however, that the ship *Experiment*, which had been sent by the British Government to assist in the establishment of trading places, lost many of her men by a "malignant fever."²⁰

¹⁹ Berenger-Feraud, p. 56.

²⁰ Berenger-Feraud, p. 58; Valentin, p. 77.

1822 to 1824.

No mention of yellow fever having prevailed along the Gold Coast is made from 1786 to 1822. According to Bryson,²¹ the mortality was great among the detachments which arrived at Cape Coast Castle in 1822, 1823 and 1824.

1852 to 1857.

In 1852 yellow fever was imported to the Gold Coast and sporadic cases were observed every year from 1852 to 1857. The Government records, following the usual custom, give no detail of this series of outbreaks, and Berenger-Feraud²² disposes of the matter in a few words only.

1862.

Yellow fever was almost general along the west coast of Africa in 1862. The Gold Coast suffered considerably. (Berenger-Feraud, page 139.)

GOREE.

(See *Senegal*.)

GUINEA.

(See *Benin, Dahomey, French Guinea, Gold Coast, Grand Basam, Ivory Coast, Lagos, and Sierra Leone*.)

²¹ Bryson, loc. cit., p. 33.

²² Page 122.

IVORY COAST.

Description.

The Ivory Coast is a part of the coast of Guinea, between Cape Appolonia and Cape Palmas, West Africa, Its western portion belongs to Liberia; its eastern half, now counted as part of the Gold Coast (q. v.), is shared between England and France. The French colony comprises three fortified centres: Grand Bassam, Assinie and Dabou. The first two are situated at the mouth of the Grand Basam River, on a narrow tongue of land between the sea and a shallow lagoon. Dabou is sixty miles from Grand Bassam. Since the date of their establishment, these colonial towns have been visited nine times by yellow fever. In every instance, the disease was imported.

YELLOW FEVER YEARS.

1852; 1857; 1862; 1863; 1899; 1902; 1903; 1904; 1905.

SUMMARY OF EPIDEMICS.

1852.

In 1852, many localities on the Gulf of Guinea were invaded by yellow fever.²³ At Grand Bassam the mortality was over fifty per cent. among the French troops stationed at that post.

1857.

Grand Bassam.

Sporadic cases of yellow fever began to be observed at Grand Bassam in February, 1857. The disease pursued an uneventful course until April, when it seemed to have died out. About the middle of April, the steamship

²³ Berenger-Feraud, p. 122.

Panaza arrived from France, having on board many colonists who had been employed to work at the town factory. One man came on shore on April 15, was taken sick the next day, and died on the 19th. Fifteen days later, three more colonists landed. They were all taken ill and died between the 12th and 16th of May. At about the same time, a soldier arrived from Dabou, was taken ill and died. These new cases revived the epidemic and many who had previously been spared were attacked and died.

During the revival of the epidemic, the gunboat *La Tourmente* arrived near Grand Bassam, but could not reach the town on account of shallow water. The Captain was rowed to shore, contracted the disease and died during the first days of June.

We have no data concerning the mortality among the natives, but the fatalities among the white colonists was excessive, for, out of a population of 66, there were 22 deaths.²⁴

The disease did not spread to the other ports of the Ivory Coast, with the exception of two imported cases at Dabou.

Dabou.

In 1857, two employes of a commercial house at Grand Bassam went on a mission to Dabou. Shortly after their arrival, the men were almost simultaneously attacked by yellow fever and died. No new cases resulted.

1862.

The Epidemic on Board the Dispatch-Boat VArcher, at Grand Bassam.

In his account of the epidemic of 1862, Sarrouille gives more elaborate details.²⁵ A reference to our chronological tables will show that yellow fever was widespread along the west coast of Africa in 1862. Rumors of the existence

²⁴ Salis: Archives des Hopitaux du Senegal; Sarrouille, Theses de Paris, 1869, No. 150, p. 14.

²⁵ Sarrouille: Theses de Paris, 1869, No. 150, p. 21.

of the disease reached Grand Bassam as early as the middle of the year, but it was not until November that the first case was observed in the dependency. On the 16th of that month, the French dispatch boat *l'Archer*, which had been infected at Saint Paul de Loanda, by communicating with the *Dialmath*, arrived at Grand Bassam and landed one white and ten native sailors. The white sailor was taken ill on the 17th and died on the 20th, with unmistakable symptoms of yellow fever. None of the blacks who were put on shore at the same time contracted the disease.

The fever did not spread immediately to the mainland, but soon broke out on the vessel. On November 26 the second steersman was stricken. The fever spread rapidly, five deaths occurring between November 28 and December 5. Dr. Sarrouille himself was attacked. On December 7 the commandant, thinking that *l'Archer* had been infected at Grand Bassam, took on board all the white inhabitants of the post which could be spared, and sailed for Dabou. But the disease continued to rage on board and by the time the vessel reached Dabou, December 12, three more sailors had succumbed. The men who had been taken on board at Grand Bassam were landed at Dabou and, strange as it may seem, not a single case developed among them, the pestilence being confined exclusively to the sailors. This immunity, in our opinion, can only be explained on the ground that the landsmen slept on deck, where the infected mosquitoes had no access, while the poor sailors were compelled, in the performance of their duties, to remain below decks most of the time, where they were unprotected from the bites of the insects.

On December 12th, when the ship's mechanic died, only three of the eleven men who comprised the complement of *l'Archer* on November 26, when the first case broke out, remained, namely, the captain, Dr. Sarrouille and a sailor. It was thought that the epidemic had ceased with the death on the 12th, but on the 18th the heroic captain, who had nursed his comrades throughout the terrible ordeal and had seen them die one after the other, was taken ill and was soon added to the list of victims. It will thus be seen that, out of a crew of eleven, we have the appalling record of ten attacks and nine deaths, Dr. Sarrouille being the

only one who survived an attack and the sailor above mentioned being the only member of the crew who proved immune to the pestilence.

Grand Bassam.

Cases begin to appear at Grand Bassam shortly after the death of the sailor landed from *l'Archer*. The outbreak was quite severe, resulting in twelve cases and six deaths, out of a white population of eighteen.

Assinie.

The European population at Assinie in 1862 consisted of only five persons—the governor, the resident surgeon and three soldiers.²⁶ About the 10th of December, two of the soldiers were taken ill and the symptoms diagnosed as yellow fever. Both died a few days later. The governor and the surgeon were then successively attacked, the latter dying on the 27th. The former recovered. The natives of the villages contiguous to Assinie suffered severely, but in the town proper there were only four deaths among the blacks, making a total mortality of eight.

General Summary of the Epidemic of 1862.

The epidemic which began at Grand Bassam in November, 1862, was one of the most virulent on record, for out of 27 Europeans attacked, 18 died. The cases and deaths were as follows:

Locality.	Cases.	Deaths.
On board the <i>l'Archer</i>	10	9
Grand Bassam	12	6
Assinie (white population only 5)	10	8
	32	23

The combined white population of Grand Bassam and Assinie amounted to 23. As will be seen, this small num-

²⁶ Sarrouille, loc. cit., p. 35.

ber furnished 17 cases and 9 deaths. The most appalling mortality, however, was on board of *l'Archer*, where ten cases were followed by nine fatalities.

The disease did not spread to Dabou.²⁷

1863.

Sporadic cases of yellow fever appeared at Assinie and Grand Bassam in 1863, but almost entirely among the natives. We find the record of only one death among the Europeans at Grand Bassam, an agent sent by a French commercial house to establish a factory at this post. He arrived at the "unhealthy season" and remained three months on board a vessel in the harbor. During the month of February, thinking that all danger was past, he went on shore. Fifteen days later, he was stricken with yellow fever and died eight days after the onset of the malady.²⁸

1899.

Through some source which is not given, yellow fever was brought to Grand Bassam in 1899 and for a time threatened to assume epidemical proportions. Strict sanitary measures were adopted, however, and the disease was restricted to the vicinity of the original outbreak, resulting in six cases and five deaths. The infected territory extended from the Gold Coast up to and including Half Jack on the west.²⁹ The other African stations were not affected.

1902.

The epidemic of 1902 broke out suddenly and, although it lasted hardly a month, was characterized by nearly one hundred per cent. mortality.

On July 14, 1902, a sergeant of infantry, who had only been at Grand Bassam two or three weeks, was taken ill

²⁷ Huard: Theses de Montpellier, 1868.

²⁸ Sarrouille, loc. cit., p. 41.

²⁹ U. S. Public Health Reports, 1899, vol. 14, pp. 1336, 1312; Annales d'Hygiene et de Medecine Coloniales, 1903, vol. 6, p. 325.

with fever. He died on the 19th with "suspicious symptoms," but as yellow fever had not been observed in the colony since 1899, the case was diagnosed as "pernicious fever" by the attending physician.

On July 20, an Australian prospector, aged 30, who, together with three other prospectors, had landed at Grand Bassam June 27, died with black vomit, and the authorities concluded that they were face to face with an invasion of yellow fever and cabled the facts to the colonial officials. Orders were received to take immediate sanitary measures and to make war against mosquitoes.

The three other prospectors, room-mates of the case above mentioned, were successively attacked, on the 23d, 25th, and 26th of July; one recovered, the others died on the 30th.

In the four last cases above noted, black vomit was present.

On July 24, a white servant, aged 34, who had been in the colony two months, died at the infirmary, after four days' illness.

On July 24, a notary's clerk, also a new arrival, died after three days' illness. A young couple who occupied the same residence as this young clerk, and who nursed him through his illness, proved immune, although they had arrived from France only six weeks previously.

Two customhouse officers were taken ill on July 23; one died on the 27th and the other on the 28th.

An Englishman, aged 26, who had arrived at Grand Bassam on June 26, furnished the tenth case. He was taken ill on July 25th. He continued to attend to his duties until the 28th, when he was found in a coma by one of his fellow-clerks. Death, preceded by black vomit, took place shortly afterwards. His companion was taken sick in a few days, but suffered only a slight attack, which resulted in an uneventful recovery.

The twelfth case was an Alsatian who had arrived at Grand Bassam on June 27. On the morning of July 27 he left town to "isolate" himself at the village of Abidjan, where he died on July 31 with black vomit.

A second death took place outside of the town limits, at Eloca, a native village near Grand Bassam. This was an

European, aged 33, who had spent a few hours in the house where the Australians had died. He was taken ill a few days after his return to Eloca and died on August 2.

The fourteenth case was furnished by a priest who had been doing missionary work along the west coast of Africa for six or seven years. He was taken ill August 2 and died on the 12th.

The last case, a mulatto, had been a resident of Grand Bassam since 1894 and had gone through the epidemic of 1899. He was taken ill on August 12th and died on the 19th. This is one of the few instances in which a person with African blood has died of yellow fever on African soil. The disease is generally fatal among the white colonists, but the mulattoes are generally immune while the blacks, despite their unsanitary and barbarous mode of living, rarely contract the disease. Such has been the case in almost every epidemic, not only at Grand Bassam, but along the entire coast of the Dark Continent where the saffron scourge has manifested itself.

The epidemic of 1902 may be summarized as follows:

Grand Bassam, 13 cases; 11 deaths.

Abidjah, 1 case, resulting in death. Imported from Grand Bassam.

Eloca, 1 case, resulting in death. Imported from Grand Bassam.

Grand total, 15 cases; 13 deaths.

The source of the epidemic has never been definitely established. Some claim it was imported from the Gold Coast; others incriminate Senegal. Dr. Rousselot-Benaud,³⁰ from whose account this resume is made, believes that the disease was not imported, but was due to extensive excavations made in a lagoon where the debris of the epidemic of 1899 had been thrown and left undisturbed since that time. It is needless to explain why this hypothesis is untenable.

1903.

The epidemic of 1903, following so closely upon the outbreak of 1902, caused widespread panic throughout the

³⁰ Rousselot-Benaud: *Annales d'Hygiene et de Medecine Coloniales*, 1903, vol. 6, p. 319.

colony. According to Gouzien and Le Hardy,³¹ the first suspicious cases occurred in January. On the 24th of that month, a Syrian, who had landed at Grand Bassam in December, 1902, and who lived in the native section of the town with seven or eight of his countrymen, died with black vomit. The corpse was burned by the authorities and the dead man's compatriots were isolated for nine days, during which time a strict watch was kept over them.

On January 29 another case was observed, followed by death in a few days. A third case occurred about the same time in the person of a customhouse employe.

The outbreak seemed to subside, no cases being observed during February. On March 3, a sergeant of infantry died at the infirmary. This death was followed by another on March 11, in the same room where the sergeant had succumbed.

The reappearance of the disease caused consternation in the town. The cabin where the two deaths occurred was burned, as was also the clothes and bed-linen of the unfortunates.

On March 14, a fatal case was observed, followed shortly by two cases, which recovered.

On March 15, a sister of charity died.

About that time, the Government ordered the isolation of the white inhabitants of Grand Bassam. To avoid spreading the contagion, this was done by groups of two or three, until the town was nearly depopulated. On July 17, only 23 Europeans were present.

The fever soon began to show itself at the places where the refugees had been sent. On July 19, a death occurred at Adjeo, followed by two fatalities at Imperie on the 23rd. On the 27th a death was registered at Arriounna.

The sixth death at Grand Bassam was furnished by a city official who had been two months in the colony.

On July 28, a Catholic priest died after an illness of only forty-eight hours.

On August 1, the white population amounted to 13.

³¹ Gouzien and Le Hardy: *Annales d'Hygiene et de Medecine Coloniales*, Paris, 1904, vol. 7, p. 558.

On August 3, case occurred at Schneider Plantation, in the person of a refugee from Grand Bassam, followed by death on the 4th.

The last case at Grand Bassam occurred on August 7th, resulting in recovery.

The cases and deaths may be summarized as follows:

	Cases.	Deaths.
Grand Bassam	10	7
Adjeo	1	1
Imperie	2	2
Arriounna	1	1
Schneider	1	1
	<hr/>	<hr/>
Total	15	12

The epidemic was probably a recrudescence of that of 1902, caused by the renewed activity of the infected *Stegomyia*.

1904-1905.

Yellow fever was brought to the very doors of the colony in 1904 and 1905.

The steamship *Tibet* arrived at Dabou towards the end of October, 1904. Her physician had just died from an attack of "pernicious fever," but subsequent events justify the assertion that it was probably a case of yellow fever.

On the next trip of the vessel to the colony, January 26, 1905, while in the harbor of Grand Bassam, a case of "suspicious fever" was reported on board. This proved to be the ship's physician, who had taken the place left vacant by his comrade's death. The patient was well enough to be on deck that evening, but fell into a coma on the 28th and died on the 29th. He was buried on shore.

A few days later, while the *Tibet* was in the harbor of Cotonou, the hospital steward was attacked by what was pronounced a typical manifestation of yellow fever. The case was a mild one and the patient recovered.

The *Tibet* was then given free pratique and left for Grand Bassam, where she arrived February 24th, and took

a passenger for France. The man was an invalid, of dissipated habits, who had been in the hospital for about a month and was weak from fever. That same night, while at Dabou, he fell into a comatose state and died the day following (February 26th) with black vomit.³²

A perplexing question now presents itself: Where did this man contract yellow fever? No sporadic case had been seen at Grand Bassam before the eruption of this fatal one, and none were observed during the balance of the year. The patient came directly from the hospital to the ship, did not communicate with anyone, and had not left his room for nearly a month. The rapid evolution of the disease precludes the possibility of the patient having been infected on board on the 24th, and as he presented all the symptoms of yellow fever, even the black vomit, there is no gainsaying the fact that he was contaminated *somewhere*. But to take down the map of the world and point out that "somewhere" is the *piece de resistance*. The only loop-hole we see, is the assumption that, when the *Tibet* was in the harbor of Grand Bassam on her first visit (January 26th), the unfortunate Frenchman was bitten by an infected mosquito either at the wharf or on board the vessel and afterward had a mild attack of yellow fever. Being convalescent when transferred to the *Tibet*, the excitement incidental to his removal brought on a relapse, which terminated as above set forth.

This circuitous mode of infection may seem a little far-fetched, but it is plausible, and, in the absence of proof to the contrary, is just as good as any other theory.

³² Vivie: *Annales d'Hygiene et de Medecine Coloniales* (Paris), 1907, vol. 10, p. 121.

JOHANNA ISLANDS.

Description.

Johanna is one of the Comore Islands, in the Mozambique Channel, between Madagascar and the mainland of Africa. Its capital is the walled town of Johanna.

ALLEGED YELLOW FEVER YEAR.

1801.

SUMMARY OF ALLEGED OUTBREAK.

Baneroft, in his *Sequel to An Essay on Yellow Fever* (1817, page 132), tells of an outbreak of "Bulam Fever" on board a sloop of war which had stopped at Johanna in 1801 for provisions, water and fuel. Soon after sailing, symptoms of a fever "of an unusual kind" appeared among those of the crew that had been on the island. The general symptoms were: An oppressed pulse, pungent heat on the surface, bloated countenance, a dull, heavy, inflamed eye, violent headache, pain at the epigastric region, and an invincible irritability of the stomach; the vomiting, in all cases, being of a bilious nature and a yellow-greenish aspect, which, towards the fatal termination of the disease, assumed a dark-brown olive or chocolate color. In none of the bad cases were remissions well marked, and in most of those who died, a yellow suffusion of the skin of a lemon hue, was conspicuous only a short time previous to death; in all, however, after death this appearance was common. The discharges by stool manifested a similar variety, but they were so highly corrosive and acid as to excoriate the anus and nates, and to excite the general dread in the patient on the approach of the evacuation.

Out of twelve men attacked, six died; those who recovered did not have the dark colored vomiting and their convalescence was extremely tardy.

With the exception of the alleged outbreak at Madagascar (q. v.), this is the only record of yellow fever, or a

disease simulating that scourge, on the eastern shores of Africa. Bancroft says that this sloop of war came direct from England, which precludes the theory of importation. We are prone to believe that it was simply a virulent outbreak of paludial fever, aggravated by exposure and fatigue.

LAGOS.

Description.

Lagos is a British colony in Upper Guinea, on the Gulf of Benin. The capital, Lagos, the largest port in Western Africa, has a population of about 40,000. The population of the colony is about 100,000, mostly negroes. Lagos was once a noted slave mart.

YELLOW FEVER YEAR.

1864.

SUMMARY OF EPIDEMIC.

There is a solitary record of yellow fever having invaded Lagos (Berenger-Feraud, p. 141). In 1864, the disease was in Sierra Leone and was brought to Lagos by trading vessels. The outbreak does not appear to have been of much consequence, as it is barely mentioned in the official reports.

MADAGASCAR.

Description.

Madagascar, the third largest island in the world, is situated in the Indian Ocean, 210 miles from the east coast of Africa, from which it is separated by the Mozambique Channel. It is about 1,000 miles long and has an average breadth of 250 miles. Population, 3,520,000. Capital, Tananarive. Chief port, Tamatave. The island is under French protectorate.

YELLOW FEVER AS IT CONCERNS MADAGASCAR.

Berenger-Feraud, in the *Gazette Medical de Nantes*,* and Joseph Jones, in the *Transactions of the Louisiana State Medical Society* for 1879 (page 63), make brief mention of yellow fever having been observed in Madagascar in 1790, but a search through the literature of that year and a careful perusal of the principal works on Madagascar, fails to throw any light on the subject. Bancroft, in his *Sequel of Yellow Fever* (page 135) claims that an English warship contracted a pestilential disease at Madagascar in 1806, but makes no mention of the alleged outbreak of 1790. Bancroft's account is as follows:

In the year 1806, a seventy-four gun ship of the British navy stopped at Madagascar for the purpose of obtaining fresh beef, vegetables, fruit, wood and water. In conducting these duties it was necessary to employ many of the men; and of all the parties thus employed, none remained on shore during the night, except a guard of marines, sent in the evening on purpose for the protection of water casks, etc.; and it was so arranged that no man had occasion to be out of the ship more than one night. Notwithstanding these precautions, a fever of malignant nature appeared among the marines, and of twenty-four attacked in a violent degree, six fell victims to the disease. The symptoms here were not exactly similar to those wit-

* 1883-4, vol. 2, p. 6.

nessed in Johanna;³³ death in several cases was sudden and unexpected, preceded by a violent burning sensation at the epigastrium, which was only a precursor of death by a few hours, and in one case by a few minutes. In these cases neither was a yellow suffusion of the skin constant, nor the eyes so highly inflamed, nor the countenance so much flushed as in the fever of Johanna; but a sallow, dingy, disagreeable aspect of the countenance prevailed. In some of these cases the ship's surgeon was inclined to think the individuals in a state of intoxication, from the very great degree of vertigo and staggering present; but a short time served to convince him of his error. This variety of appearance in the two diseases this officer ascribed to peculiarity of constitution only, and not to any difference of climate; those who were affected at Johanna were young and recently arrived from their native climate; whereas the people subjected to the Madagascar fever had been some length of time in India, and had but lately arrived from a long cruise of four months, the greater part of which they had subsisted on salt provisions, and symptoms of scurvy had appeared among them for some time before their arrival at Madagascar.

This outbreak was certainly not yellow fever. Nowhere can we discover in Bancroft's account any mention of previous contamination of the warship, and, unless the vessel stopped at some infected port on its way from England to Madagascar, the contagion which prevailed on board was not, and could not have been, under the wildest stretch of the imagination, yellow fever. The mode of propagation of this disease is now too well established to need elucidation, and, unless the mosquitoes of Madagascar were imbued with the venom of infection simply for this special occasion, the incident can positively and forever be dismissed as being puerile and chimerical. It is a well known fact, however, that paludial fever reigns with great intensity in the litoral of the island and commits fearful ravages among the whites. In this connection, the historic words of Radama, King of the Hovas, when confronted with invasions by the French, "I have at my service the great General Tago (fever) and in his hands I'll

³³ See article on Johanna Island, in this volume.

leave the whites for a while; I have no fear of the results," proved terribly prophetic, for the shores of the great island are so thickly studded with the gravestones of the invading French, that Madagascar has been christened *Le Tombeau des Français*.

MADEIRA ISLANDS.

Description.

The Madeiras are located in the Atlantic Ocean, about 440 miles off the west coast of Africa and consist of the islands of Madeira and Porto Santo and three islets called the Desertas. The group belongs to Portugal. Population, 123,841. Capital, Funchal, on the island of Madeira.

YELLOW FEVER YEAR.

1738.

SUMMARY OF EPIDEMIC.

Although the Madeiras have been known to Europeans for four hundred and seventy-six years, only once has yellow fever invaded the group. Like the Canary and Cape Verd islands, the Madeiras are directly in the path of commerce between Europe and Africa and were no doubt the rendezvous of the delightfully unsanitary galleons, buccaneers, slave-traders and gentlemanly cut-throats of bygone days; but, strange and inexplicable as the statement may seem, the dreaded *peste*, although it devastated the other islands off the African coast, only found lodgment once on the shores of this salubrious Portuguese possession.

This solitary record of the appearance of the "American Pestilence" in the Madeira Islands may be found in an old Portuguese work published nearly two hundred years ago, by Jose Rodriguez de Avreu,³⁴ physician to King Juan V, of Portugal. No details are given of this invasion, beyond the statement that it caused much mortality in the city of Funchal.

From 1738 to this day, yellow fever has never been observed at the Madeira archipelago.

How can this immunity be explained? Only by hypothesis, and as hypotheses are generally concocted of such volatile ingredients that they collapse of their own weight, we shall not indulge in any, but will sum up the

³⁴ Jose Rodriguez de Avreu: *Historiologia Medica*, vol. 1. p. 620.

whole matter in five little words: *The absence of the Stegomyia*. This, in our opinion, is the true explanation. It is not a hypothesis, but a fact, that the *Stegomyia Calopus*, the only active agent in the transmission of yellow fever, does not flourish in the Madeira group. The insect was imported once to the islands and that solitary instance furnished the delightful little city of Funchal the only epidemic of yellow fever which has ever invaded that locality; and, as soon as the climatic conditions of the island proved hostile to the propagation of the mosquito and the imported insects died, the pestilence which they had produced ceased and the old-time health conditions of the country re-established themselves and have endured to the present day.

MOROCCO.

Description

Morocco is a country occupying the northwest extremity of Africa. Area, about 200,000 square miles. Population, 6,000,000. The empire has three capitals—Fez, with an estimated population of 100,000; Morocco, with 40,000 souls, and Tangier (the diplomatic seat), estimated to contain about 14,200 inhabitants.

YELLOW FEVER YEARS.

1804; 1881.

SUMMARY OF EPIDEMICS.

1804.

Penon de Velez.

The only recorded epidemic of yellow fever in northwest Africa took place in 1804, at Penon de Velez, a fortified Spanish fortress situated on a lofty rock in the Mediterranean, 80 miles southeast of Ceuta, Morocco. In the last years of the eighteenth century, this islet was used as a prison for refractory *presidarios*, or galley slaves. It is now a Spanish penal colony.

In 1804, yellow fever was epidemic almost throughout Spain and the infection was carried to Penon de Velez by tradespeople and soldiers from Malaga, between which port and Morocco there was constant and uninterrupted communication. No detailed account could be found of this epidemic. Fellowes³⁵ and Moreau de Jonnes³⁶ inform us that the disease was imported from Malaga, and was widespread among the garrison and galley slaves which formed the sole population of the islet, but give no information regarding the number of cases or the fatalities.

³⁵ Fellowes: Reports of the Pestilential Disorders of Andulasia which appeared at Cadiz in the years 1800, 1804, 1810 and 1813 (London, 1815), p. 101.

³⁶ Moreau de Jonnes: Monographie Historique et Medicale de la Fievre Jaune des Antilles (Paris, 1817), p. 341.

1881.

Tangier.

The second and last invasion of Morocco by yellow fever took place in 1881, at Tangier, one of the capitals of the empire, situated at the entrance to the Strait of Gibraltar, which had then an estimated population of 15,000. It is unfortunate that only a bare mention is made of this outbreak in the consular reports. There were only a few sporadic cases and no deaths.³⁷ The source of importation is not given.

³⁷ National Board of Health Bulletin, 1881-1882, vol. 3, p. 337.

SAINT HELENA.

Description.

Saint Helena is a volcanic rock in the South Atlantic Ocean, 700 miles south-east of the Island of Ascension, and 1400 miles west of the west coast of Africa. It is 10 1-2 miles in length, 7 miles in breadth and belongs to Great Britain. Population, 4,116. Capital, James Town, on the north-west shore. Saint Helena is famous in history as having been the living tomb of the Great Napoleon from the date of his banishment, 1815, to his death, 1821.

YELLOW FEVER YEAR.

1830.

SUMMARY OF EPIDEMIC.

It is surprising that yellow fever has never invaded Saint Helena, for, previous to the cutting of the Suez Canal, the island was a favorite port of call for vessels bound to and from India by way of the Cape of Good Hope and the inhabitants did a large trade in furnishing these vessels with provisions and other supplies. The only explanation is found in the absence of the *Stegomyia Calopus* from this lonely rock, as vessels infected with yellow fever no doubt stopped long enough at James Town in its palmy days to communicate the disease to the inhabitants.

The outbreak of 1830 was solely in the harbor and did not spread to the shore. It took place on board the British ship *Sybille*, under the following circumstances (Bryson, loc. cit., p. 57) :

The *Sybille* was infected by some vessel attached to the British South Atlantic squadron in 1829 and suffered much from the ravages of yellow fever. On September 1, 1829, she arrived at Saint Helena. The epidemic had ceased and no one was on the sick list. She shortly sailed on a cruise and met with the *Black Joke*, with which she com-

municated. This vessel had just recovered from a severe visitation of yellow fever. The disease again broke out on board the *Sybille*. She returned to Saint Helena and anchored in the harbor of James Town on March 22, 1830. The disease was widespread among the crew, there being 26 cases and 6 deaths while the ship was at Saint Helena. The fever was confined to the *Sybille*.

SAINT THOMAS.

Saint Thomas is an island in the Gulf of Guinea, belonging to Portugal. Area, 145 square miles. Capital, Chaves. Population, 29,441.

YELLOW FEVER YEARS.

1558; 1588.

SUMMARY OF EPIDEMICS.

1558.

We find only two instances of the appearance of yellow fever on the island of Saint Thomas. There is no doubt that the disease has prevailed there on numerous occasions, as the Portugese have never been over-strict in enforcing quarantines in their colonial possessions and the locality has always been a nest-egg of smugglers and lax maritime transactions. But the available sources of information, as is always the case when the colonies of Western Africa are concerned, are either sterile or untrustworthy, so we shall confine our observations to the two outbreaks herein noted.

According to Berenger-Feraud (*loc. cit.*, p. 27), yellow fever was observed among the white settlers of the island in 1558. Beyond this mere mention, no details are given.

1588.

The same authority (p. 27) also informs us that Bird and Newton, English explorers, and their crews, were attacked by yellow fever at Saint Thomas in 1588. Where the disease was contracted, whether it was then prevailing on the island or was brought there by the explorers, our source of information does not reveal.

SENEGAL.

Description.

Senegal is a French colonial dependency in West Africa, in Senegambia, comprising the island and town of Saint-Louis, at the mouth of the Senegal River, the island and town of Goree, Albunda on the Gambia, and other stations south of Cape Verd. It was first settled by the French in the beginning of 1600, taken by the English in 1756, retaken by the French in 1759 and 1779, and subsequently held by the English until 1814, when it again came under control of the French, who have retained possession to this day. Capital, Saint-Louis. Other towns and stations: Goree, Dakar, Rufisque, Thies.

Senegal being one of the most important colonial possessions on the West Coast of Africa, having extensive trade relations with America and Europe, a description of its principal centres of population will not be out of place in this volume. The reader will thus be in a better position to understand the radiations of the many epidemics which have ravaged this distant land.

Saint-Louis.

Saint-Louis, capital of the French possessions in Senegambia, was founded in 1626. It is situated on an island of the same name, at the mouth of the Senegal River. It has fine public buildings and mission schools. The white population occupies the centre of the island, while the huts of the natives are located at both extremities. The streets are large and macadamized in the business section, but the houses, with few exceptions, are of ancient construction. Several bridges over the small arm of the Senegal connect the island with the peninsula of Barbary, a narrow sandbar, on which are located the native villages of Guet N'Dar and N'dar Toute. The cemeteries are located at Sorb, on the mainland and separated from the island by the great arm of the Senegal. A single bridge connects Sorb with the capital.

The natives are exceedingly filthy in their habits. Those residing in the European section of the city occupy the basements, where they operate small stores. In the small court-yards attached to these houses, they keep chickens, hogs, sheep and often cows, and when the yards become overcrowded, which is a common occurrence, these animals are often quartered in the living apartments. Under such conditions, it is not surprising that the health of the city is always on the wrong side of the balance.

Saint-Louis has a population of 15,758, mostly natives. The white population is transient and generally leaves for Europe at the beginning of the rainy season.

Goree.

The rocky island of Goree, which is entirely occupied by the town of the same name, lies in the Atlantic Ocean, south of the Cape Verd Peninsula. It is directly opposite Dakar, with which town it is so closely allied that the name Goree-Dakar is now generally used when alluding to the twin cities. It is claimed to be the healthiest place in West Africa. The native quarter is composed of grass huts, but the houses of the Europeans are of fair construction and decorated with fine flowering plants and shrubs. The elevation of Goree above the sea level varies from 2 metres on the northwest to 31 on the southeast.

Goree was for years the principal port of the colony, making rapid strides in population and commercial importance, but it is now being outstripped by Dakar and Rufisque.

Population, 2,452, mostly natives. The white merchants, as is the case everywhere throughout Senegal, generally sail for Europe every year at the beginning of the warm season.

Dakar.

Dakar is situated on the continent, almost at the extreme point of Cape Verd, and is 1 1-2 miles from Goree, from which it is separated by an arm of the Atlantic Ocean. Up to very recent years, Dakar was an obscure negro village and was simply a vast necrophile, having

been used as a burying ground for the inhabitants of Goree from time immemorial. In the eighties, its natural advantages began to be recognized and European commercial houses established agencies there. The building of modern residences followed and to-day the town occupies a foremost place in the affairs of the colony. It is 163 miles from Saint-Louis, with which it is connected by rail.

Population, 3,417, of which only a few hundreds are Europeans.

Rufisque.

Rufisque, the second city in Senegal from a point of population, is situated on the Atlantic Ocean, opposite Goree, about ten miles from Dakar, and is the principal station on the Dakar-Saint-Louis railroad. Population, 5,280.

YELLOW FEVER YEARS.

1759; 1766; 1769; 1778; 1779; 1828; 1829; 1830; 1837; 1859; 1866; 1867; 1872; 1878; 1879; 1880; 1881; 1882; 1900; 1901; 1905.

SUMMARY OF EPIDEMICS.

1759.

The first appearance of yellow fever on the mainland of Africa, according to Lind,³⁸ occurred at Senegal in 1759. We can find no details of this invasion. It would certainly prove interesting to be able to trace the origin of this outbreak, which planted the seeds of a disease heretofore unobserved on the continent of Africa, and which was destined to commit such fearful ravages among the unfortunate pioneers sent to colonize its shores.

1766.

Goree and Saint-Louis.

The second appearance of yellow fever on continental Africa took place in Senegal in 1766, when the towns of

³⁸ Lind: An Essay on Diseases Incidental to Europeans in Hot Climates, vol. 1, p. 51.

Goree and Saint-Louis lost nearly their entire white population, composed of French soldiers and traders. No detailed accounts of this epidemic are obtainable, our authorities (Lind and Berenger-Feraud) being deplorably uncommunicative on this score.

1769.

Berenger-Feraud (page 55) goes into more explicit details concerning the outbreak of 1769, but is certainly not prolix. We could obtain no statistics, but learn from his account that the French troops sent to capture Galam, on the Senegal River, were so decimated by yellow fever, that there were not enough men left to undertake the task.

1778.

Saint-Louis.

The epidemic of 1778, which is the first on African soil where details are obtainable, was murderous in its intensity and almost depopulated the dependency of its white settlers. Senegal was then in the turmoil of war, the English having wrested the colony from the French. The fever first appeared on the Gold Coast, whence it was brought to Sierra Leone, which, in its turn, infected Gambia. From Gambia, it spread to Goree and thence, according to Hirsch,³⁹ to Saint-Louis.

The progress of the disease in the town of Saint-Louis is one of the saddest pages in the history of the colony.

We cull our information from an old work published by Schotte in 1782, which gives a comprehensive account of the rise and fall of the epidemic.⁴⁰ Schotte, who was surgeon-in-chief of the British garrison at Saint-Louis in 1778, first wrote this treatise in Latin, but was finally prevailed to publish it in English. The work was considered of such

³⁹ Hirsch: Handbuch der Historich Geographischen Pathologie, Stuttgart, 1881.

⁴⁰ Schotte: A Treatise on the Synochus Atrabiliosa, London, 1782.

importance at the time, that it was translated into French and German.

The first case in Saint-Louis was imported from Goree-Dakar and was observed in the hospital on August 3, terminating fatally on the 7th. The last death was that of Governor Clarke, the commandant of the island, on September 18th.

Schotte observes that up to the end of July, 1778, the garrison and the inhabitants of Senegal were, for that time of the year, remarkably healthy. In the beginning of August, "a sudden and most dreadful disease broke out," which, raging until the middle of September, carried off the greatest part of the Europeans and a great number of the native mulattoes and blacks. The whites suffered much more, in proportion, than the mulattoes and the latter much more than the blacks. The few who had escaped the fury of the pestilence were not attacked after September 18th; but those who had recovered were seized with relapse during the following month and some died as late as December.

The course of the disease was frightfully rapid. There was hardly a day between the 9th of August and the 18th of September without one or two deaths. Out of so small a population as 92 Europeans, we find the melancholy record of four deaths on August 23d, four on the 26th, three on the 27th and five on September 5th.

The total number of deaths reached 59. Eight of the convalescents were still too feeble to walk when the French took possession of the island on January 28, 1779.

Schotte, who was a valorous champion of African endemicity of yellow fever, believes that the disease originated spontaneously on the Gold Coast and was then spread by contagion to the localities mentioned in this account. As the French and English were at loggerheads, however, and probably drew on their West Indian fleets for transports and blockade runners, it does not require a gigantic stretch of the powers of observation to see how easily the disease could have been imported to the west coast of Africa.

1779.

Saint-Louis.

The French, undaunted by the many reverses and the ravages of disease which had marked their attempts to colonize Senegal, determined to recapture Saint-Louis, and, in 1779, sent a force of about 200 men, headed by the Duc de Lauzun, to dislodge the British. The soldiers were recruited from the crack Walsh Regiment, the Queen's Regiment and volunteers and were a fine body of men, vigorous and healthy. The invading force arrived at their destination January 29, 1779, in the dead of night, intending to take the garrison by surprise, but they found that not even a solitary sentry guarded the place, and the 33 Englishmen who had survived the terrible epidemic which had just come to a close, too weak and disheartened to offer any resistance, surrendered unconditionally, and were sent to France as prisoners of war. Two were drowned by the upsetting of a boat at the mouth of the Senegal and three died in transit, so that out of 99 men which originally comprised the garrison, only 28 reached Europe alive.

But the bloodless victory achieved by the French was destined to have a terrible sequel. The landing of these unacclimated soldiers in this charnel house of disease acted like oil upon a smoldering fire and the pestilence soon broke out with renewed fury. In the space of a few months, the expedition, which had started out so auspiciously, was almost annihilated. The exact number of the invading force is not given, but Lejemb'e⁴¹ informs us that on the mortuary register of Saint Louis for 1779, kept at that time by the parish priest, appear the names of *one hundred and eighty* soldiers! A melancholy record, to be sure, but what of it? Senegal was once more a French possession, and when the news of the capture of the place from the hated Englishmen reached Paris, there was much rejoicing over the glorious deed. Such is the egoism of the people. Life is short, glory imperishable, and it mattered not if a hundred or so brave men laid down their

⁴¹Lejemb'e: Theses de Paris, 1882, No. 91, p. 19.

lives for the honor of their country, so long as their mission was crowned with the laurel of triumph.

1828.

Goree-Dakar.

For fifty years, Senegal was free from yellow fever. In 1828, the French ship *La Bordelaise*, infected at Sierra Leone, brought the disease to Goree-Dakar (Berenger-Feraud, p. 105). Many soldiers attached to the garrison were attacked, but the outbreak was of short duration and was not followed by much mortality. On the *Bordelaise*, out of a crew of 50, there resulted 34 cases. The number of fatalities is not stated.

1829.

Goree-Dakar.

In the beginning of 1829, a slave-ship and a pirate were captured by the French off the Gold Coast and brought to Goree-Dakar.⁴² The sailors from the pirate ship were taken sick and died at the military hospital at Goree.

The disease soon manifested itself in the town. In three months, out of 113 European residents, 14 died.

1830.

Goree-Dakar.

The epidemic which radiated from Goree-Dakar in 1830, began, without any previous warning, in a most remarkable manner, as will be seen from the account of the outbreak given below, taken from the writings of three eminent French authors, Berenger-Feraud, Duval and Lejemble.⁴³ The facts are as follows:

On June 13, 1830, a religious festival was in progress at

⁴² Berenger-Feraud, p. 107.

⁴³ Berenger-Feraud, p. 107; Ruval, *La Fievre Jaune a Goree* (Bordeaux), 1883, p. 16; Lejemble, *Theses de Paris*, 1882, No. 91, p. 20.

Goree and a great number of people thronged the streets. While the jollification was at its height, a number of Sisters of Charity were taken ill and soon gave unmistakable evidences of yellow fever infection. In a few days, the epidemic was in full sway and between its inception and the first days of August, when the last cases were observed, out of a white population of 150, there resulted 144 cases and 85 deaths.

From Goree, the fever spread to the adjoining negro villages in the Cape Verd peninsula and was especially severe at Gandiole and Guét N'dar.

Saint-Louis.

During the first days of August, a white woman residing at Saint-Louis visited the market-place at Guet N'dar, where a fair was in progress, and returned home the same day. On August 4, she was taken ill with fever and died in a few days. A young mulatress who had nursed this woman was taken ill and succumbed. A notary's clerk, who assisted in taking an inventory of the possessions of the white woman, furnished the next victim. From these cases, the disease propagated itself throughout the town. Saint-Louis, which had a white population of 650, suffered cruelly, for out of 600 cases, there resulted 328 fatalities. Out of ten physicians, eight were attacked and six died.⁴⁴

Probable Cause of the Epidemic.

For a long time epidemiologists were at a loss to account for the cause of this fulminating outbreak, which seemed to have sprung from the ground. No suspicious vessels had been observed in the harbor of Goree at that period and the entire colony was in a perfect sanitary condition. Some tried to prove that it was a re-awakening of the "germs" of the epidemic of the previous season and even

⁴⁴ Berenger-Feraud's statistics say that out of 12 physicians 10 were attacked and 6 died; but Duval and Lejemble attest to the correctness of the figures given in the above account.

Berenger-Feraud half-heartedly espoused that theory. This view was no doubt plausible years ago, but its ludicrousness at the present age is too apparent to need commenting upon. The elusive yellow fever germ may be eaten for breakfast, lunch and supper, yet no ill results will follow; you can take it by its caudal appendage and toy with it from sunrise till moonset, smear it all over your body, bite its head off or swallow it in your milk or *pousse-cafe*—you may do all this and yet remain healthy and frisky. But let a *Stegomyia* which has taken a draught of blood from a yellow fever sufferer in the first stages of the disease bite you, and if you are not an immune, it's a chance out of a thousand that you will contract the disease.

The outbreak at Goree in 1830 can easily and satisfactorily be elucidated. All we have to do, is to take a peep into the past and see what was happening in that far-off land at the time of the outbreak. As we have already seen, the inhabitants were celebrating a religious feast, and, as is usually the case with celebrations of the Catholic church, the whole zeal of the people was concentrated in making the event as gay as the solemn rites of the Church would permit. Flags, decorations and bunting were used with profusion. Berenger-Feraud and Lejemble inform us that, for some days previous to the celebration, the Sisters of Charity were busy making odds and ends with a lot of bunting which had been stored in an out-of-the-way room since the epidemic of the year before. The room had never been aired since the rags were placed there. When the good sisters removed the lot, the mosquitoes, which had been hibernating during the winter, were liberated and, famished after such a long fast, fed eagerly upon the blood of the populace, propagating the germs of the terrible disease far and wide.

1837.

Goree-Dakar.

The epidemic of 1837 was the result of flagrant neglect on the part of the authorities of Goree-Dakar. Since the beginning of June, rumors of the existence of yellow fever

at Bathurst, in Gambia, reached the town. In the beginning of July, the British Government sent to Goree-Dakar for medical assistance and the surgeon-in-chief of the colony, Dr. Dupuis, was sent to the afflicted locality. He returned on July 21 and reported that the fever had subsided at Bathurst, but advised that strict quarantine be maintained. On August 12, a coaster arrived at Goree from Bathurst, having on board three Europeans. In spite of the warning of the colonial surgeon, the vessel was allowed free *pratique* and two of the white passengers, who were ill, were admitted into the hospital. The third passenger was next attacked and all three died with unmistakable symptoms of yellow fever. The disease soon manifested itself in the town and lasted until November 23, during which time, out of a white population of 160, there were 80 cases and 46 deaths.⁴⁵

The French ship *Malouine*,⁴⁶ which had been sent by the French Government to found a town at the mouth of the Casamanza River, in Senegambia, was contaminated at Goree and experienced a severe epidemic. Out of a crew of 57, there were 42 cases.

Saint-Louis.

The fever was introduced from Goree into Saint-Louis late in the year, but did not become epidemic. About a dozen cases were observed.⁴⁷

1859.

For twenty-two years Goree guarded itself against yellow fever invasion. On August 9, 1859, the dispatch boat *Le Rubis* arrived at Goree from Bathurst, where the fever was prevailing, with two sick passengers, the vicar-general and a merchant. The vessel was allowed free *pratique* and the patients transferred to the hospital. The merchant recovered, but the priest died on the 12th. From that date to September 30, no other cases were observed,

⁴⁵ Dupont: Archives de Medecine Navale, 1880, vol. 34, p. 262.

⁴⁶ Duval: La Fievre Jaune a Goree (Bordeaux, 1883), p. 17.

⁴⁷ Berenger-Feraud, p. 111.

when the death of a merchant was recorded. This was followed by another death on October 1st. The physician who attended these two cases contracted the disease and died on October 12. The disease then became widespread and there were 54 deaths in October, 25 in November and 6 in December. Out of a white population of 267, there were in all 244 cases and 162 deaths.⁴⁸

Saint-Louis

The infection spread from Goree to Saint Louis, resulting in 41 cases and 11 deaths.⁴⁹

1866.

Goree.

The epidemic of 1866 is directly traceable to Gambia. News of the existence of yellow fever along the coasts of Sierra Leone and Gambia reached Goree early in May and measures were at once taken to prevent importation of the disease. On August 3, a coasting vessel, the *Marie Antoinette*, arrived from Bathurst and, through false representations, was admitted to pratique. It was afterwards discovered that the vessel did not have a clean bill of health. The captain was arrested and fined heavily, but the evil had already been done. On September 15, a case of yellow fever erupted in the town, followed by sporadic cases. The epidemic lasted until January 27, 1867, resulting in 249 cases and 110 deaths.⁵⁰

The civil population of Goree in 1866 was as follows :

⁴⁸ Berenger-Feraud; Duval; Lejemble.

⁴⁹ Berenger-Feraud, p. 135.

⁵⁰ Cedont: Archives de Medecine Navale, Paris, 1868, vol. 9, p. 334.

Natives (blacks)	2,500
Mulattoes, Males	335
Mulattoes, Females	431
	766
Europeans (whites), Males	55
Europeans (whites), Females	48
	103
	3,369
Military population (white)	165
	3,534

The cases and deaths were distributed as follows:

	Cases.	Deaths.
Whites	242	107
Mulattoes	4	2
Blacks	3	1
	249	110

It will thus be seen that out of a total white population of 268, there resulted 242 cases and 107 deaths. The mulattoes, numbering 766, furnished 4 cases, followed by 3 deaths, while the blacks, 2,500 strong, had only 3 cases, with 1 death. This remarkable immunity has always prevailed among the blacks, not only in Africa, but throughout the world.

Dakar.

The proximity of Dakar to Goree and the unrestrained communication between the two towns, could not fail from resulting in the infection of the latter.

The first case in Dakar was observed on October 12th, followed by death on the 14th. From that date until the end of the epidemic, there resulted 80 cases and 36 deaths, distributed as follows:

	Cases.	Deaths.
Civilian population	24	11
Military population	56	25
	80	36

The last death at Dakar occurred on January 21, 1867.

On the Surprise.

The gunboat *Surprise* was the only vessel which did not take any precautions against infection and it was also the only one to experience a visitation of the disease. On November 5th, while in the harbor of Dakar, the first case manifested itself on board. Nearly the entire crew was attacked, resulting in 14 deaths.

Rufisque and Sedhunion.

From Dakar, the fever spread to Rufisque and Sedhunion, but was not severe. It will be seen below how the infection was carried from Rufisque to Goree the following year (1867).

Saint-Louis

Thanks to the rigid quarantine observed by the health officers, not a single case was observed at Saint-Louis.

1867.

In October, 1866, a clerk employed in Rufisque who had gone on a visit to Dakar, was taken ill on his return home and died in a few days. His employer sent to France for a new clerk, who arrived in January, 1867. The new-comer was given the same room which his predecessor had occupied and soon shared the same fate. In April, another clerk arrived from France, was given the same living room as the two employes who had died of fever. A few days after his arrival, he was taken ill and died. A third unfortunate shared the same fate. A friend of the latter, who had been his room-mate on board the ship which brought him from France, visited him while he was in the first stages of the disease, and, taking pity upon his loneliness, resolved to nurse him. He soon contracted the sickness, and, together with his companion, was transported to the Hospital of Goree, where both patients died a day or two after. The news of the reappearance of yellow

fever in the town created profound consternation and the governor ordered the embarkation of all the troops on board the *Crocodile* and *l'Etoile* and transported them to Saint Louis. Shortly afterwards, the disease broke out in Saint-Louis and lasted until the cool season.

The disease spread to Leybar, Lamj-sar and other military posts of the colony, where many cases and deaths occurred.

The cases and deaths in the localities affected by the epidemic of 1867 are not given by Berenger-Feraud, Lejemble nor Duval, from whose works the above resume is made.

1868.

According to the *London Medical Times and Gazette*,⁵¹ yellow fever was present in Senegal in 1868 and was imported to the Cape Verd Islands (q. v.) by trading vessels from Goree-Dakar. The French authors deny that the disease was in Senegal that year and implicate Sierra Leone in the importation.

1872.

Goree-Dakar.

On October 5, 1872, the ship *Baal* arrived at Goree-Dakar from Bathurst, where yellow fever was raging, with three European passengers, and applied for pratique. This was refused by the health officer in charge, Dr. Berenger-Feraud. The merchants of the town protested against what they considered harsh measures, asserting that there was no sickness on board the *Baal*, but their objections were overruled and the vessel ordered to the quarantine station at Dakar. Much pressure was brought to have the order revoked and the governor was about to yield, when the quarantine officer reported that one of the white passengers had been taken ill with fever. The patient was at once taken to the lazaretto, where he expired on the 9th. A second passenger was taken ill and died on the 10th. The third, a Spaniard, who had had yellow fever at Buenos Ayres the year before, was not affected.⁵²

⁵¹ Medical Times and Gazette, London, 1869, vol. 1, p. 119.

⁵² Berenger-Feraud, p. 147.

Shortly afterward, another vessel from Bathurst furnished a third case, which also resulted in death at the lazaretto. Only one inhabitant of Dakar was attacked, a soldier who had been one of the health-guards around the lazaretto, and who died in a few days after the onset.

It will thus be seen that of the four persons attacked, all died, and the salvation of the colony was no doubt due to the energetic measures taken by the commanding health officer.

1878.

Gorce-Dakar.

We must look to Gambia and Sierra Leone for the seeds of the terrible epidemic which decimated Senegal in 1878.⁵³

During the first five months of 1878, the public health was excellent throughout Senegal. A few cases of dengue were observed here and there, but otherwise there were no febrile disorders. Yellow fever was in Sierra Leone and Gambia and precautions were taken at Goree to prevent its importation, but these sanitary measures were undoubtedly elastic, for nine European refugees from a little settlement near Bathurst were permitted to land at Goree in the beginning of July and mingle with the population. At about the same time, an English vessel arrived at Goree from Sierra Leone and was given pratique.

The criminal imprudence of the authorities in harboring these refugees from localities which had infected Goree again and again in the past, soon bore fruit. On July 11, the chief magistrate of the town was taken ill and died on the 13th. A few days later, other cases were observed, one terminating in death at the hospital on July 22. Another death occurred on the 24th, one on the 26th and three on the 27th. The state of affairs was well-known to the authorities, who were day by day informed of the progress

⁵³ In compiling the history of this memorable epidemic, we have consulted the writings of the following eminent French writers: Berenger-Ferand, Lejembie, Duval, Dupont, Daril, Forne, Kermorgant, and Vincent. The full title of these works will be found in the Bibliography at the end of this volume.

of the outbreak, but the facts were suppressed from the general public and it was only on July 30, when it was seen that the epidemic was getting beyond control, that a proclamation announcing the existence of the disease was published in the *Moniteur Officiel du Senegal*.

Saint-Louis was thrown into a panic. Strict quarantine was maintained against Goree and the pest was temporarily kept away from its doors.

The epidemic made rapid progress at Goree and soon spread to its suburb, Dakar. At the end of July, the barracks were evacuated, as a sanitary precaution, and the soldiers dispersed to minor posts of the colony, being quartered at Hann, M'Bidgen, Bel-Air and Thies. But this exodus did not stop the ravages of the disease. Between the 1st and 15th of August, 30 deaths occurred at Goree-Dakar; between the 15th and 30th, 20. The epidemic then seemed to be on the wane, for only 12 deaths occurred in the months of September and October. Only one death took place from September 28 to October 28, and the epidemic was thought to be ended, when some new arrivals rekindled the spark of contagion and we find a record of 3 deaths on October 29th and 4 on December 9th.

The population of Goree-Dakar in 1878 was about 3243, of which 120 were Europeans. When the epidemic broke out, 21 fled to Europe, leaving a white population of 99. Out of this number, there were 88 deaths,

Saint-Louis.

Saint-Louis remained uncontaminated until September 6, when the dispatch boat *Espelon* arrived from Bakel and was allowed free communication with the inhabitants of the town. On September 9, the ship's surgeon was taken ill with "bilious fever" and transported to the military hospital, where he died on the 13th, with unmistakable symptoms of yellow fever.

The invasion would in all probability have been confined to this case, for Saint-Louis had up to that date successfully baffled the pestilence which was at its very doors, had it not been for an unpardonable imprudence on the part of the health authorities, caused by over-confidence

and commercialism. On September 29, the dispatch boat *Cygne*, which had taken part in the expedition against the natives of the Upper Senegal, returned to Saint-Louis, having on board 51 wounded, of which 17 were Europeans. The *Cygne* was permitted to land her passengers unmolested, although it was known that the vessel came from an infected territory. The soldiers returned to their homes and mingled freely with the population. In a few days, the poison began to diffuse itself through the town and the first death from yellow fever occurred on October 6. The next day, another case terminated fatally. Other cases followed rapidly, proving fatal in almost every instance. On October 8, the disease was widespread. In spite of this deplorable state of affairs, the authorities strenuously denied all knowledge of the existence of yellow fever in the town, even after eight fatalities had taken place between the 9th and 15th of October. About that date, although still refusing to admit that the epidemic was one of yellow fever, the administration began sending the sick and the "suspicious cases" to an improvised lazaretto at the Pointe-aux-Chameaux, a short distance from Saint-Louis.

The truth of the presence of the terrible disease in their midst soon became too apparent to be discountenanced and the stolid optimism of the little group of Europeans suddenly gave place to panic and despair. A rumor was circulated that all the cases transported to Pointe-aux-Chameaux died as soon as they reached the lazaretto and the families of the "suspicious cases" soon began to consider an order for the transportation of a beloved one equivalent to a burial permit.

Lejemble graphically describes the way in which the unfortunates were transferred to the lazaretto. Every morning, about nine o'clock, the patrol would make its rounds and anyone found with fever, or even "suspicious," was taken in tow. It was a gruesome sight to see these wretches dragging their ways through the streets of the town, some clad only in the blanket which had covered them on the sick-bed, some so weak that they had to be propped up and helped along by the native health-guards. But the people, dazed by the terrible havoc which was

going on in their midst, looked on with sullen indifference at the spectacle of their relatives or comrades being driven like cattle to the water's edge, where they would be packed into a small boat hardly able to contain half their numbers and rowed by blacks for two weary hours, under a blazing tropical sun, to the pest-house at the Pointe-aux-Chameaux. No wonder that they were either dead or moribund when they reached their destination. And the terror which the simple word "Lazaretto" caused the people was certainly well-founded, for out of about 150 yellow fever patients transported from Saint-Louis to the Pointe-aux-Chameaux between October 15 and November 17, there were 108 fatalities.

If the mortality at the Pointe-aux-Chameaux lazaretto was excessive, other localities, where the soldiers were sent by the authorities in a frantic endeavor to stop the ravages of the disease, suffered as much. At O'Niaga, Lampsar, N'Dialakkar, Bel-Air, Cape Manuel, Hann, M'Bidgen, Thies, and other posts, we find the same terrible record of fatalities.

The fatalities in Saint-Louis, when the last death took place (December 17), amounted to 36 among the civil population (Europeans) and 39 soldiers.

The Disastrous Logo Expedition

While the epidemic was raging at Goree, the French government ordered that a punitive force be sent to Logo, a district northeast of Sierra Leone, to avenge some fancied wrong committed by the natives. The chief health officer of Saint-Louis, the starting point of the expedition, sent a vigorous protest against such a measure, urging as the principal reason the unsanitary condition of the country, the fact that yellow fever was raging "up the river," and the distance of the territory to be invaded; but his protestations were unheeded. On September 11, a few days before the fever broke out in Saint Louis, the troops were embarked on the dispatch boats *Arabe*, *Cygne* and *Espadon*. The expedition consisted of 535 men, 317 Europeans and 218 native soldiers. The health of the column was perfect.

The first cases on board the flotilla took place in the vicinity of Dagana and Podor and the first death occurred at Bakel, in French Soudan (q. v.), on September 15, four days after leaving Saint-Louis. Previous to the arrival of the vessels at Bakel, where the garrison consisted of only eight Europeans, there had been seven deaths from yellow fever in the village between August 16 and September 11. Including the case which terminated fatally on September 15, and which was imported by the expedition, there were altogether 17 deaths at Bakel between August 16 and October 27. Nine of these deaths resulted from cases landed from the *Arabe* and *Espadon*.

Yellow fever was also prevailing at Salde, a small post on the Upper Senegal River, which had been contaminated by Bakel, for some time previous to the arrival of the fleet. A death occurred on August 22d, one on the 26th, and a third on September 5th. After the "battle" of Sabouciro, the soldiers stopped at Salde on their way to Saint-Louis and we find a record of three deaths on October 3 and one on October 11, making a total of nine deaths between August 22 and October 11.

The "battle" of Sabouciro took place on September 22 and lasted four hours, without accomplishing anything decisive. The column immediately began its journey homeward. For ten days the expedition slowly wended its way down the Senegal River, harassed by disease and fatigue. Unable to proceed further, owing to the widespread prevalence of fever in their ranks, a portion of the retreating column halted at Dagana, while the balance proceeded as far as Richard-Toll, where further progress was found impossible. The intensity of the fever which was decimating the soldiers is proved by the fact that 113 were buried at Dogana and 22 at Richard-Toll.

It will be seen that the ill-advised Logo expedition acted like a firebrand in spreading the pestilence. Post after post was infected during its funereal march and when the remnants of the column finally reached Saint-Louis, after having "punished" the savages in a manner which reflected doubtful honor upon the French arms, yellow fever had claimed one hundred and seventy-six victims.

Statistics of the Senegal Epidemic of 1878.

The yellow fever epidemic of 1878 in Senegal, which began at Goree-Dakar on July 11 and ended at Saint-Louis on December 17, resulted in 749 deaths. This figure only represents the fatalities among the white population, consisting of 274 civilians and 1200 soldiers. The course of the disease among the blacks, who, in nearly every instance, proved immune to yellow fever during epidemics in Senegal, is lightly touched upon by the numerous authors we have consulted and the natural inference is that the natives must either have totally escaped or suffered so little, that it was not thought worth while to go into details.

The mortality among the whites was as follows:

Arrondissement of Goree (Goree-Dakar and neighboring villages)	373
Logo Expedition	176
Arrondissement of Saint-Louis (Saint-Louis, Pointeaux-Chameaux and neighboring villages)	200
	<hr/>
Total deaths	749

1879.

Dagana.

A single case of yellow fever manifested itself in Senegal in 1879, at Dagana, in the person of an army officer. The patient recovered.⁵⁴

1880.

Saint-Louis.

In March, 1880, sporadic cases of yellow fever were observed in a small house adjoining the barracks at Saint-Louis, occupied by tailors attached to the regiment. Sanitary measures were at once taken and the disease restrict-

⁵⁴ Noury: Gazette Medicale de Nantes, 1884, vol. 2, p. 85.

ed to its original site. The genesis of this outbreak has never been clearly elucidated. Berenger-Feraud⁵⁵ notes the fact that the tailors had been occupied in remodeling cloth garments which had been stored since the great epidemic of 1878, and attributes the infection to this fact. But this theory can hardly be seriously entertained. The epidemic of 1878 came to an end on December 17 of that year and the outbreak under discussion took place in March, 1880. It will therefore be seen that the veteran *Stegomyia Calopae* of 1878 must have been endowed with phenomenal powers of endurance to hibernate for fifteen months in a lot of old garments and then be possessed with sufficient pugnacity and vigor to introduce the poison into the systems of the unfortunate wielders of the needle and thread.

That the health authorities of Saint-Louis believed in the theory promulgated by Berenger-Feraud, was proved by the fact that the offending garments were ordered to be incinerated and the vestment makers were put under strict surveillance. The outbreak was stamped out at once and the public health continued to be excellent throughout the winter. In the beginning of November, however, the fever again broke out in the infantry barracks of the garrison of Saint-Louis and lasted until the beginning of 1881, resulting in eighty deaths. The cause of this second outbreak has never been lucidly explained.

1881.

Saint-Louis.

The year 1881 witnessed another terrible epidemic of yellow fever in Senegal. We are indebted to Berenger-Feraud, Duval, de Boisse, Noury and Esclagon for the facts.⁵⁶

The first case was observed on June 26, in a soldier attached to the marine infantry of Saint-Louis, who was ad-

⁵⁵ Berenger-Feraud, p. 169.

⁵⁶ Berenger-Feraud, loc. cit., p. 170; Duval, loc. cit., p. 24; de Boisse: Theses de Paris, 1884, No. 52; Noury: Gazette Medicale de Nantes, 1884, vol. 2, pp. 84; 103; Esclagon; Theses de Paris, 1883.

mitted into the hospital on the 27th, and died July 2d. On July 20, another soldier entered the hospital and died on the 23d, with unmistakable symptoms of yellow fever.

In the interval between these two cases, three others, followed by death, had broken out in different sections of the town—one on July 5th, which proved fatal on the 10th; one death on the 14th and another on the 15th.

On July 23, several cases suddenly manifested themselves all over the city and at the barracks. From that date, the epidemic had full sway and lasted until September 26th. Out of a population of 1,000 Europeans, there resulted 524 cases and 425 deaths.

Makana.

On July 25th and 28th, 108 soldiers were transferred from Saint-Louis to Makana, a village near Lampsar. Almost immediately after their arrival, eight men were stricken with fever and died in a day or two after the onset of the disease. A ninth case manifested itself and died August 14th. On the 20th another case occurred, followed by death on the 23d. This concluded the outbreak at Makana. No cases originated in the village, the attacks being confined to persons who had recently arrived from Saint-Louis. This probably saved the balance of the refugees, for every attack resulted in death.

Pointe-aux-Chameaux.

Ninety-three soldiers were sent from Saint-Louis to Pointe-aux-Chameaux; 92 to N'Diogo and 83 to Richard-Toll. Not a single case occurred at any of these posts.

Bop-Diarra.

On July 30th, 215 men from the Saint-Louis barracks were transported to Bop-Diarra. From that date to September 10th, 21 cases and 13 deaths were recorded in the three camps improvised at this post.

Goree-Dakar.

The *Castor* played a more unfortunate role in the chain of infection than any other vessel in the waters of the Senegal, for it transmitted the disease to Goree-Dakar, which had remained uncontaminated while the pestilence was being carried in every direction by refugees from Saint-Louis and other infected posts. The *Castor* will be remembered as one of the dispatch-boats which helped in the transportation of the Logo Expedition of 1878 and which furnished its quota of victims in the memorable epidemic of that year.⁵⁷

In the beginning of the epidemic of 1881, a case of yellow fever had been brought from the *Castor* to the military hospital at Saint Louis. The vessel was then sent on a mission to the Cape Verd Islands, with the hope that the trip would prove sanitary and prevent further eruptions. No further cases occurred. When the vessel returned to Saint-Louis, it was learned that the disease had assumed grave proportions in the town and she was ordered to Goree. The crew continued healthy and Goree was congratulating itself upon having kept the pestilence away from its doors, when the commandant of the *Castor* was taken seriously ill. On the pretext that it was simply malaria, for if yellow fever had been mentioned the patient would have been turned away, the case was admitted into the hospital at Goree. The patient died on September 5th. The attending physician, Dr. Carpentin, who had seen the disease at Guadeloupe, unhesitatingly pronounced it yellow fever, but refrained from giving publicity to the fact, fearing a panic and thinking no other cases would ensue. A day or so after the death of the officer, a workman on board the *Castor* was taken ill and died in a few days. The news of this second case roused the health authorities from their lethargy and the vessel was put under strict quarantine and sent to Bel-Air. On September 12, another yellow fever death took place on the *Castor*. The crew was transported to tents on shore and the vessel thoroughly fumigated. The crew was then re-embarked,

⁵⁷ See account of the Senegal epidemic of 1878 in this volume.

as the accommodations on shore were miserably deficient. The health of the sailors continuing to be bad, the vessel was ordered to France.

But the evil was already beyond redemption. The germs of infection created by the admission of the commandant of the *Castor* at the Goree military hospital, though slow to manifest themselves, finally gave evidence of their virility. Two physicians attached to the hospital were successively attacked, one of the cases resulting in death. Dr. Carpentin's secretary was the next victim. The doctor himself contracted the disease and died and the young man who had succeeded the first secretary shared the same fate. The disease seemed to be confined to the hospital, when a Sister of Charity attached to the parochial school was suddenly stricken, dying shortly afterwards. After this, sporadic cases were observed here and there throughout the city.

The disease was at no time virulent at Goree-Dakar. There were altogether 16 deaths.

The Fever on the Government Vessels.

While the epidemic was raging at Saint-Louis, five government vessels were moored at the wharves, namely: The *Jaguar*, the *Alecton*, the *African*, the *Cygne* and the *Ecureuil*.

The dispatch-boat *l'Africain*, an "old tub," and at the time seldom in active service, had a crew of forty whites at the inception of the epidemic. It was anchored, or rather tied, to the wharf at Saint-Louis and was used as a sort of floating workshop by the military authorities. It was in continuous communication with the shore. On July 26th, the first case of yellow fever was observed on board, followed shortly after by six others. On August 12th, the old hulk was taken in tow by *l'Ecureuil* and brought to Monit, where her crew was transported to improvised tent-hospitals on shore, a short distance from those occupied by the sick from the *Jaguar*. On August 16, a new case developed in the camp, and from July 26, the date of the first case, until October, there were 33 cases and 23 deaths.

The *Jaguar*, an old wooden gunboat, illy-constructed and badly ventilated, and which had uninterrupted communication with Saint-Louis, had a crew of 60 whites and 25 blacks.⁵⁸ On July 29, the first case broke out on board, followed on the 31st by six others. August 1st, another case. The vessel was ordered down the river to Mouit, where three large tents were constructed for the accommodation of the sick and other members of the crew. In spite of these precautions, up to the first days of October, 43 new cases developed in the improvised hospitals. Total cases, 51; deaths, 23.

The *Cygne* was in dock when the epidemic began. On August 4, the repairs being completed, the vessel was again placed in commission with a crew of 21 whites and 24 blacks, and anchored at the same place where the *Jaguar* had been when the fever first manifested itself on board, where it remained four days. On August 8, the vessel left its moorings and anchored in the middle of the river. On the 9th, four members of the crew were taken ill with fever, but recovered after only three days' illness. These four cases presented no symptoms whatever of yellow fever, but on the 13th, two other members of the crew were taken ill, presenting totally different symptoms, and were sent to the hospital. One of the cases recovered after a brief illness, but the other proved to be a typical case of yellow fever and died three days after the onset. The *Cygne* left Saint-Louis on August 16 for Bop-Diarra, having in tow a barge containing a large number of patients destined for the hospital at that point. On September 26, the *Cygne*, which in the interval had made several voyages from the Point-aux-Chameaux to Saint-Louis, returned to her anchorage at the latter town. Being the only vessel then available, it was immediately pressed into service and sent up the river with a tow of barges containing provisions and medicines for the yellow fever sufferers. It was soon discovered that the machinery of the *Cygne* was not strong enough for such a heavy tow, but the necessity

⁵⁸ All vessels plying in the waters of the Senegal River are equipped with native sailors, who do most of the outdoor work, as the whites cannot stand the fierce rays of the tropical sun.

being urgent, the cargo was transported on board the vessel, which proceeded on its mission. The voyage came to an end on October 8 and the vessel returned to Saint-Louis October 17, where two white army officers from Bop-Diarra, where yellow fever was still present, and one hundred negro workmen from Saint-Louis, were embarked, destined for work on the railroad in course of construction up the Senegal River. During the voyage, which lasted until October 30, not a single case of yellow fever was observed on board the vessel. On its return to Saint-Louis, forty Africans and fifty Moroccans were sent on board and ordered transported to the railroad camps up the river. The Moroccans, who originally numbered 150, had lost one-third of their fellow-men by yellow fever at Saint-Louis. The voyage was uneventful and when the *Cygne* returned to the capital, the epidemic had almost died out. The last death in town took place on November 20th and quarantine was raised December 10th.

We have given a full account of the transactions in which the *Cygne* participated, because the vessel showed a remarkable freedom from infection. Out of 21 Europeans on board, only one attack, followed by death, took place, although the vessel was actively engaged in transporting the sick and the pestilence was raging all around her. The fact that the vessel was fresh from the dock, where she had been thoroughly overhauled and repaired, probably saved her from an invasion of the *Stegomyia Calopus*, and to this must we attribute her immunity after the first case, which had evidently been imported.

The *Alecton*, a dispatch-boat employed in the coast service, was at Dakar when the epidemic broke out at Saint-Louis. She was forbidden communication with the infected town. About the end of August, she left Dakar and sailed up the Senegal River, anchoring a short distance below Saint-Louis, to the windward of two merchant-vessels, the *General Berge* and the *Gabrielle*. There had been yellow fever cases on board both these vessels, but the fact had been withheld from the authorities and the little dispatch-boat remained for a week in the vicinity of the ships, unsuspecting of danger. On September 9, she was sent to the Cape Verd Islands with a dispatch from the Governor

of the colony. While enroute to the islands, suspicious cases began to show themselves among the officers and the vessel was sent to the Saint Vincent Island quarantine station on her arrival at the Cape Verds, but only remained there a few hours, her captain preferring the open sea. On September 14, on the return voyage to Saint-Louis, the first death took place, followed the next day by two others. On the 17th, the vessel re-entered the Senegal River and the crew was disembarked and placed in a tent on Babaguay Island, where the last death took place on October 1. There were altogether 15 cases and 8 deaths.

The *Ecureuil*, a new vessel, with a crew of 40 whites and 25 blacks, arrived at Saint-Louis on the same day that the epidemic broke out. Her officers and crew had uninterrupted communication with the town, and, being the only available vessel for the purpose at the time, it was used to transport the troops to the several towns up and down the Senegal River. No ill effects were observed on board until August 14th, when the cook and the mess-boy presented characteristic symptoms of yellow fever and were transported to the military hospital at Saint-Louis, where they died in a few days. On August 15, the *Ecureuil* was sent on a mission up the Senegal and during a cruise lasting a little over a month, no other cases developed. About the end of September, the vessel returned to Saint-Louis, but profiting by past experience, it did not anchor opposite the town, but proceeded to the Pointe-aux-Chameaux, where it remained until the end of the epidemic.

Statistics of the Epidemic.

The total mortality from yellow fever among the European population during the epidemic of 1881 has been estimated at 700 (Duval). We could only get statistics of transactions at the principal places of the colony. Nowhere do we find a word about the progress of the malady among the natives. The following recapitulation will give an idea of the malignity of the outbreak:

Locality.	White Population.	Cases.	Deaths.
Saint-Louis	1,000	524	425
Bop-Diarra	215	21	13
Makana	108	10	10
Goree-Dakar . . . . .	...	16	14
Unclassified . . . . .	...	362	181
On vessels:			
Jaguar	60	51	23
L'Africain	40	33	23
Alecton	47	15	8
L'Ecureuil	40	2	2
Le Cygne	21	1	1
		1035	700

The number of "unclassified" cases (362) is estimated on a mortality of fifty per cent., based upon the excessive death-rate at every locality where the disease prevailed. For example, Saint-Louis, with a population of 1,000 Europeans, had 524 cases and 425 deaths; Makana had a mortality of one hundred per cent.; the gunboat *Jaguar*, with a crew of 60, had 51 cases and 23 deaths. The "unclassified" mortality being 181, we believe that the cases were certainly not over double that number; they were probably less.

The soldiers, as usual, paid a heavy tax to the pestilence. The following figures speak for themselves:

Total number of soldiers in the colony, 559.

Number attacked, 246, or 44 per cent.

Deaths, 216, or 81.7 per cent. of the number attacked.

Forty-five officers succumbed.

1882.

Goree.

The epidemic of 1882 does not appear to have been imported, but to have been of spontaneous origin. The de-

molition of the old military hospital at Goree is given as one of the causes. This work was to have been done during the winter, but, for some cause or other, was delayed until June. It is natural to infer that the razing of this old pest-house should liberate thousands of mosquitoes and that these insects, still impregnated with the virus of the epidemic of the year before, should engender another outbreak of a disease which has been the executioner of the unfortunate European residents of Senegal for nearly two centuries.

The first case manifested itself on June 12, in the person of Dr. Duval, one of the health officers of the colony, who wrote an elaborate history of his illness and to whom we are indebted for the facts of the rise and progress of the epidemic.⁵⁹

It seems that, while the workmen were engaged in tearing down the old building, Dr. Duval moved his office to a room which had in former years been occupied by the municipal board of health. Owing to the warm weather, the windows were kept open during the business hours, thus allowing full ingress to the dust and mosquitoes from the falling timbers. The doctor states that he began feeling ill about June 12, but did not take to bed before the 15th. He gives a detailed account of the attack, which was a typical case of mild yellow fever. He was confined to his room for eleven days and made an uneventful recovery.

No other case was observed until July 7, when a wash-woman employed in the barracks was taken ill, dying on the 12th. On July 8, a merchant was stricken, recovering after an illness of thirty-four days. The fourth case, July 9 (a clerk), recovered.

The four sporadic cases above noted were not made public by the authorities.

On July 24, the number of cases became so numerous, that the fever was declared officially present, and active sanitary measures were put into execution. On July 26, the other posts in Senegal quarantined against Goree.

When the fever was declared epidemic, there were 1,800 blacks and about 67 whites at Goree. Of these 67, there

⁵⁹ Duval: *La Fievre Jaune a Goree* (Bordeaux, 1883), p. 94.

were 37 who had already suffered an attack of yellow fever in previous epidemics, thus leaving 30 susceptible to infection. The virulence of the epidemic was certainly notable, for of this small number, 27 were attacked and 15 died. The last case manifested itself on September 17; the last death occurred September 22d.

The epidemic of 1882 gave rise to much discussion among the French medical men. Some claimed it was imported from Brazil, others from Gambia, while the majority (among whom we notice Duval and Berenger-Feraud) insist that it originated at Goree. We think the last hypothesis correct, as there was no yellow fever in Gambia in 1882 and no suspicious vessels from Brazil were observed in the waters of the Senegal that year. The demolition of the old military hospital probably hastened the outbreak, but the infected *Stegomyia* would no doubt eventually have ventured into the open and diffused the poison among the susceptibles.

Dakar.

Dakar, a suburb of Goree, separated from the town by an arm of the Atlantic Ocean, observed a strict quarantine, but the harbormaster of the village went on a secret visit to Goree about the end of August and was stricken with yellow fever a few days after his return home. This imprudence cost him his life.

No other cases were noticed in Dakar until the middle of November, when the quartermaster of the dispatch-boat *Albatross*, then anchored opposite Dakar, died at the hospital under circumstances which strongly pointed to yellow fever infection. A soldier at the barracks was the next victim. A panic ensued when the news of these two deaths became known and eight white men engaged in railroad work fled to Yof, some distance from Dakar, where the fever broke out among them. Concluding that they would receive better medical attention at Dakar, they returned to the village, where three of their number died. The fever pursued an erratic course at Dakar and finally came to an end on December 22. There were altogether 40 cases and 30 deaths.

Rufisque.

Rufisque, also located on the continent, opposite Goree, furnished two cases, one on August 10, followed by recovery, and the other in the beginning of September, resulting in death. The source of infection is not given, but the natural inference is to incriminate Goree.

On the Albatross.

The dispatch-boat *Albatross*, newly-built and fresh from France, arrived at Saint-Louis, September 19, 1882. It had a crew of 52 whites, which was increased to 80 by the addition of 28 blacks upon reaching the capital. The quarantine against Goree was raised October 27, 1882. The *Albatross*, which had in the meantime been employed in carrying the mails from Saint-Louis to Dakar, took some passengers from Goree for Saint-Louis on the day the quarantine was raised. These consisted of whites and blacks, who had been in the infected town for some time and who were anxious to return home. On November 7, the vessel returned to Dakar, with passengers for a vessel then about to sail for France. On the way to Dakar, the *Albatross* stopped at the Pointe-aux-Chameaux and took some passengers. One of these men had been ill for some days and was brought on board in a litter. There being no suspicious sickness at the Pointe, no objections were raised to the embarkation of the patient, who was said to be suffering from malaria. Arrived at Dakar, the patient was transported to the hospital, where he died on November 13. An autopsy revealed lesions which raised some doubts as to the nature of his illness and his companions were put under surveillance. No cases developed among them. A few days later, the quartermaster of the *Albatross* was taken ill and transported to the hospital at Dakar, where he died shortly afterward. A soldier was taken ill at the barracks and died.

Yellow fever was then officially declared present on the *Albatross* and at the Dakar hospital. The crew of the vessel were transported to the lazaretto on November 21. Several deaths occurred at the lazaretto. On December

30, the sailors returned on board the *Albatross*, which had been thoroughly disinfected. A few days after the return of the crew, the new cases developed. This was followed by five fatal cases between the 8th and 11th of January, 1883. Orders were then received to return to France and the vessel arrived at Brest on March 15.

The course of the disease on board the *Albatross* was very severe. Out of a crew of 52 whites, there resulted 21 cases and 18 deaths, including two officers.

A perplexing question now presents itself: Where did the *Albatross* contract the infection? Not at Saint-Louis, for not a single case was observed there in 1882; not at the Pointe-aux-Châteaux, for the place is said to have been remarkably healthy at the time and to have had no communication whatsoever with infected localities. These two places being disposed of, suspicion naturally falls upon the only other locality visited by the unfortunate vessel—Dakar. Duval incriminates the Point-aux-Châteaux in the infection of the *Albatross*, basing his accusation on the fact that the first case of fatal illness observed on board was that of the passenger from that hamlet. We do not believe this was a case of yellow fever at all. The fact that none of the other passengers were attacked (except some time afterwards, when the disease had assumed epidemiological proportions at Dakar) leads us to believe that it was simply an aggravated case of paludism.

Now, let us see what were the conditions at Dakar. Duval himself (*loc. cit.*, page 40) relates the case of the harbormaster of Dakar, who is supposed to have made a secret visit to Goree, in spite of the rigid quarantine then existing, and who died of yellow fever at Dakar during the last days of August. It will be remembered that the *Albatross* was in constant communication with that village from the date of her arrival in Senegal (September 19), doing service as mail-packet between that place and Saint-Louis. The quarantine against Goree was raised on October 27. This was followed by an exodus from Goree to Saint-Louis, but none of the refugees infected Saint-Louis and it is natural to presume that they did not carry the contagion on board the *Albatross*. The first case of yellow fever officially observed after the quarantine

against Goree had been raised did not take place on board the *Albatross*, but originated in the barracks at Dakar and it was only after the crew had been transported to the lazaretto at Dakar that the disease manifested itself among the unfortunate sailors. It is true that the death of the quartermaster of the *Albatross* preceded that of the soldier, but the former was oftener on shore than on board while at the village wharf and could easily have been infected while off duty. We make this explanation to escape the charge of inconsistency.

From the end of August, the date of the fatal illness of the harbormaster, to the middle of November, when the first death took place among the sailors, is undoubtedly a long time between cases, but it must be borne in mind that, in 1882, Dakar was peopled principally by negroes, with a sprinkling of whites here and there, most of them immune through having suffered during previous epidemics, and it was only when non-immunes arrived at the village that the *Stegomyia*, infected months previously, proved their virility.

1900.

The First Pre-Epidemic Cases.

The demolition of the old military hospital which had for years been the disgrace of Goree must have given the quietus to the infected *Stegomyia* which had been the bane of Senegal since 1878, for not a single case of yellow fever was observed in the colony from 1882 to 1900, a period of eighteen years.

The focus of the epidemic of 1900 began at Dakar. On April 16, a clerk employed in that village was admitted into the Goree hospital, in the last stages of an illness diagnosed by the attending physician as "diphtheria." He died an hour after admission, with black vomit. The autopsy revealed no trace whatever of diphtheria. Suspicious lesions were observed, but as yellow fever had not been noticed in the colony for years, no thought was given to this malady and a verdict of "death from pernicious fever" recorded.

On April 19, a patient entered the hospital, suffering from headache, dizziness and difficulty of speech. He gradually became worse and died on the 27th. The autopsy revealed unmistakable lesions of yellow fever, but the physicians present scouted the idea. One of those who participated in the autopsy remarked that, at any other time, he would have had no hesitation in pronouncing it a case of genuine yellow fever, but that the health of the colony and the surrounding country was perfect and he joined his confreres in giving a verdict of death from "infectious jaundice."

The first case had already been forgotten and no one thought of connecting the two deaths with a common cause, although they had occurred at an interval of only eleven days and had presented identical pathological lesions.

The third case was admitted into the hospital on April 30 and died on May 3.

On May 8, a man and a woman were transported to the hospital. The first case died the following day; the second, five days later.

All these cases came from Dakar and in each instance presented typical symptoms of yellow fever. The last two deaths awakened a vague suspicion on the part of the authorities that the sanitary conditions of Dakar demanded an investigation, but not wishing to alarm the population, orders were given to proceed with great secrecy. Under such conditions, no open precautionary steps were taken and the slumbering pestilence, untrammelled by preventive measures, gathered fresh fuel each day.

On May 11, a Moroccan, who had left Dakar seven days previously, died at Thies, an army post on the railroad, between Rufisque and Tivaouane.

A mulatto girl, aged 4, was taken ill at Dakar about the same time and died on the 16th.

On May 18, the disease was for the first time officially admitted, the director of public health giving orders that the following be inserted in all bills of health given vessels leaving the colony: *There exists a few isolated cases of suspicious yellow fever at Dakar and its vicinity.*

Dakar was declared infected and placed under quarantine.

The people of Dakar, far from being frightened by this official declaration, indignantly denied that such a state existed. They claimed that the doctors had blundered; that yellow fever, according to the views of the oldest inhabitants, had never been known to proceed at such a snail's pace, but by leaps and bounds. They claimed that the prevailing illness was an aggravated type of malaria, caused by extensive digging operations at Hann, a neighboring village.

The merchants, seeing their trades imperiled, took advantage of the trend of public opinion and vigorously protested against the institution of rigorous sanitary measures. The authorities were hampered, hooted and abused, cases were hidden and the way thus paved for an epidemic which was destined to ravage nearly every city, town and hamlet in Senegal.

On May 22, the troops stationed at Dakar and Rufisque were ordered dispersed along the railroad running between Dakar and Saint-Louis, only about four hundred being left behind. This was done without consulting the authorities of Dakar, and a storm naturally ensued when the news became public. In this connection, it is interesting to note that the first cases were all among the civilians, the military being attacked only in June, two months after the outbreak at Dakar.

On May 22, two cases broke out among the personnel of the railroad company at Dakar, followed the next day by a case in the same house where the first victim of the epidemic had died (April 16). Two of these cases proved fatal.

The railroad hospital, where the two first cases were originally brought, was at once disinfected by the authorities and ordered closed.

On May 17, four workmen arrived at Senegal from Morocco. Two remained at Dakar, while the other two proceeded to Saint-Louis. On May 23, the two who had been left behind were taken suddenly ill and transferred to the town hospital, where they died on the 28th, with undeniable symptoms of yellow fever.

By a peculiar coincidence, one of the Moroccans was taken ill at Saint-Louis on the 23d, the same day his comrades were stricken at Dakar, and died on the 26th. It will thus be seen that, notwithstanding the fact that yellow fever had been present at Dakar since April 16th, and that communications between that village and Saint-Louis was figuratively unrestrained, the capital was only infected on May 23.

May 28, another death at Dakar.

From that date, the situation seemed to improve. Some of the more timid Europeans, however, left the colony, but the majority, thinking the outbreak was at an end, concluded there was no danger and laughed at the fears of their less courageous countrymen.

Recrudescence at Dakar.

The slow progress of the disease is one of the most remarkable features of this epidemic and can only be accounted for by the fact that the Calopae had not yet become active, the weather being still a little too cool to permit them to freely circulate among the population.

From May 28th to June 7th, no cases were observed. Lulled into a false sense of security by this subsidence of the disease, the quarantine against Dakar was raised.

From April 16 to May 28, there had been 14 cases and 11 deaths. This is what Dr. Kermorgant terms the "first, or pre-epidemic period." The progress of the epidemic under discussion showed the identical characteristics which has attended nearly every outbreak of yellow fever in Senegal: First, a few cases, followed at long intervals by others. The disease then seemed to advance by gusts, each time more serious and less removed, until its virulence finally asserted itself and each day brought a case or two or a death.

Up to June 8, the mortality had been 78.6 per cent. On that day, a sergeant of infantry stationed at Camp Madeleine No. 2, near Dakar, was stricken and died on the 10th. Before dying, this officer admitted that he had evaded the quarantine regulations and had slept at Dakar on several occasions.

June 9. The bishop of Saint-Louis, while making pastoral calls at Dakar and Rufisque, was taken suddenly ill and died on the 13th.

June 10. A clerk at Dakar succumbed, after a brief illness.

June 11. Two sisters of charity, one of whom had nursed the bishop, were stricken.

On June 10, Dakar was again quarantined. A military sanitary cordon was placed around Cape Verd peninsula and the terminus of the railroad moved to Rufisque. The authorities had at last awakened to the seriousness of the situation; but it was a sad analogy of the trite expedient of locking the stable after the horse had been stolen—the germs of pestilence were already too widely disseminated and no preventive measures under heaven could check the march of the saffron scourge.

The mass of the people, still unconvinced, looked upon these acts as an uncalled for usurpation of power and continued to clandestinely visit the nidus of infection.

June 15, two new cases at Dakar, followed by one death.

On June 27, a new case at Dakar, followed by another on the 29th. The first case died on the 30th, the second on July 1.

There had been no new cases since June 15.

From that date, the epidemic had full sway. Every place in Senegal became suspicious of its neighbor. Local quarantines were established, every town and hamlet interdicting communication with the other. The panic reached such an acute stage, that armed guards were stationed everywhere and natives who attempted to get within the lines were shot down like dogs.

Panic and Flight.

It was only towards the end of June that the European population of Goree, Saint-Louis and other towns of Senegal began to realize that something unusual was taking place in the health conditions of the colony. The people awoke, as if from a dream, to find itself facing what seemed inevitable death. All the horrors of previous epidemics were suddenly brought to mind. Indifference to

existing conditions gave way to consternation and panic. The physicians were no longer hooted or ridiculed, but were besieged for advice as to the best preventive methods to follow. Hundreds sold their belongings and sought security in flight. The passenger steamers leaving for Europe were taxed to their utmost capacity and when the large mail steamers, fearing to contaminate their crews, refused to take passengers, the refugees were only too glad to escape by means of the filthy coasting vessels, which took them to ports where quarantines were not in force, whence they proceeded by roundabout ways to Europe. Some even took passage on vessels bound for South American ports, trusting to luck to meet some European-bound vessels on the high-seas. The official journals of Senegal, in their accounts of this wholesale exodus, state that nearly 3,000 persons left the colony between June and September.

The following tableau of departure from Senegal by ocean steamers from July 1 to August 16, gives an idea of the eagerness of the people to flee from this plague spot of Western Africa :

		Passengers.
July 1.	By steamer <i>Faidherbe</i>	15
July 1.	By steamer <i>Vauban</i>	160
July 12.	By steamer <i>Ville de Pernambuco</i>	82
July 26.	By steamer <i>Caravellas</i>	435
July 27.	By steamer <i>Santa Fe</i>	223
Aug. 13.	By steamers <i>Ville de Maceio</i> and <i>Macina</i>	278
Aug. 16.	By steamers <i>Richelieu</i> and <i>Campana</i>	473
	Total	1.666

In addition to the above total, must be included the departures prior to July 1st, and the exodus by the coasting vessels and other French and English vessels, of which no record was kept by the port authorities.

That the fears of the owners of these passenger steamers were well grounded, was exemplified by the fact that cases occurred on many of these vessels. The disease did not spread, however, being confined to the original cases.

The disease was even brought to the lazaretto at Paulliac, France, where several cases were treated without creating any focus.

Even Paris—careless, wicked, fun-loving Paris—was wrought to fever heat at the policy of concealment pursued by the colonial authorities. The government had sent 2,000 young soldiers a few months previous to Senegal, to “pacify” the natives in the interior, and the public wanted to know why their countrymen were sent to this barbarous region to die like rats, alleging that these dependencies, whose only products were pestilences and murderous negroes, were not worth keeping. The Paris Soleil, in commenting on the epidemic, thus concludes an inspired article:

“Physicians die like flies. Sisters and infirmarians follow the same road. Mass is no longer said in public on account of contagion. Fortunately, there will always remain a negro priest to absolve the last who die, for it is a curious fact that the negroes are completely immune.”

Consul Strickland, the representative of the United States, at Senegal, from whose reports some of the details of the inception of this epidemic are taken,⁶⁰ gives graphic pen-pictures of the scenes at Goree-Dakar and Saint Louis. “The epidemic has brought the business of the colony completely to a standstill,” he observes, “and all Europeans have got away, who could command the means to do so. The stores are shut, and it is difficult to obtain the necessaries of life.”

Consul Strickland sailed from Senegal during the last days of July, 1900, and the United States Consular reports give no details of the progress of the epidemic after that date. We are indebted to the exhaustive accounts published by Dr. Kermorgant in the *Annales d'Hygiene et de Medecine Coloniales* and the *Recueil des Travaux de Comite Consultatif d'Hygiene Publique de France*, for most of the facts which precede and follow.⁶¹

⁶⁰ Strickland: U. S. Public Health Reports, 1900, vol. 25, pp. 1679; 1866; 2025; 2188.

⁶¹ *Annales d'Hygiene*, etc., vol. 4, pp. 325, et seq.; *Recueil*, etc., Paris, 1903, vol. 31, pp. 369, et seq.

MARCH OF THE EPIDEMIC.

DAKAR.

As already noted, the true epidemic epoch may be said to have manifested itself with the series of cases and deaths at the end of June, 1900. On July 4th, 5th and 6th, cases cropped out everywhere, and it was a question of *sauc qui peut*. The authorities resorted to the tardy expedient of sending the white troops back to Europe, and replacing them with native soldiers.

From the 1st to the 31st of July, there were sixty cases and thirty-one deaths, at Dakar.

The exodus of a majority of the white population does not seem to have done much toward arresting the progress of the pest, for twenty-nine cases were admitted into the hospital, in August. Of these, four cases came from Saint Louis and Thies, and five were taken from the steamships *General Dodds and Vauban*. The nine importations, therefore, leaves the actual number for Dakar at twenty.

The epidemic gradually subsided, for want of material, in September, nine cases and four deaths being recorded for that month.

October, three deaths:

The epidemic finally came to an end in November, with two cases and one death, making a grand total for Dakar, from April 16, to November, of one hundred and forty-two cases and seventy-six deaths.

GOREE.

Goree quarantined against Dakar, May 27th, 1900, but not much attention was paid to the mandate, communication between the two localities being almost uninterrupted.

This lack of precautions soon bore fruit. A soldier of infantry, who had been given a furlough, celebrated the event by making a round of the barrooms of Dakar, on Sunday, June 17th, and returned to camp in a beastly state of intoxication. On the 20th, he was sent to the hospital, where he died with black vomit, on the 23rd.

The white garrison of Goree was immediately transferred to a point near Yof, only a few being retained for emergencies. These were quartered in the Castle, the highest part of the town.

From June 23rd, to July 4th, nothing abnormal was observed. Thinking that the death of the soldier was merely an imported case, and that no others would result, the company which had been sent to Yof, was recalled. The return of their comrades was taken as a pretext for jollification by the soldiers in the Castel, and much carousing and drunkenness ensued. The personnel of the garrison numbered seventy-five.

On July 14th, one of the soldiers who had returned from Yof, was taken ill and died five days later.

From that date, the cases followed each other in rapid succession—three on the 16th, two on the 18th, one on the 19th, two on the 20th, and one on the 21st. Thus it went until the end of July, when a total of nineteen cases and seventeen deaths was recorded.

Three cases were observed in August, the last on the 17th.

The total number of cases at Goree were 22; deaths, 20. Not a native was attacked, this frightful tribute to the scourge being paid only by Europeans.

RUFISQUE.

On May 12th, 1900, a clerk employed by the *Compagnie Francaise de l'Afrique Occidentale* was taken ill at Rufisque, and transported to the hospital at Dakar, where he made an uneventful recovery.

May 17th, two new cases.

For over a month, no other cases. On June 21st, another employee of the *Compagnie Francaise* was taken ill and died shortly afterward.

This case caused some consternation, and the railroad terminus, which had been moved from Dakar to Rufisque, was changed to Thies. A part of the white population of Rufisque became apprehensive, and 68 took passage for France on the steamship *Guytis*.

June 22nd, four new cases, followed by three deaths.

Nothing abnormal until July 9th, when two new cases, followed by death, were observed.

No other cases in July, probably due to the fact that nearly all the non-immunes had fled.

In August, 3 cases and 2 deaths.

In September, no cases in town, but one on board the Steamship *Faidherbe*, followed by death.

October 26th, one case.

No cases in November, but on December 24th, a clerk who had arrived from France on the 10th of the month, died with black vomit.

The total number of cases reached 18; deaths 15.

SAINT LOUIS.

Saint Louis had more cases than all the other localities in Senegal combined, and came within 21, of equaling the combined mortality of all the other afflicted places. The statistics for the colony are 416 cases and 225 deaths; the figures for Saint Louis alone, 218 cases and 102 deaths.

It will be remembered that a sporadic case of yellow fever was observed in Saint Louis, on May 23, 1900, in the person of a Moroccan, who, with a companion, had arrived from Dakar eight days previously. The patient died on May 26th. The physicians of Saint Louis denied at the time that it was a case of yellow fever, but when the disease had become epidemic in the town, they admitted that they had been mistaken in their diagnosis.

The death of the Moroccan was not followed by immediate results and no new cases were observed until July 16, seven weeks later, when the fever manifested itself simultaneously in opposite parts of the town, one case in the Rognat-Sud barracks, located in the center of the island, and the other at No. 14 *Rue de la Mosque*, at the north end.

The case in the *Rue de la Mosque* proved to be the companion of the Moroccan, who had died on May 26th, in this same house. He died on July 17th. Dr. Kermorant attributes this fatal case to emanations from a trunk

containing clothes which had been packed at Dakar, when the foreigners took their departure, and which was opened for the first time at Saint Louis in the beginning of July.

The infection of the Rognat-Sud barracks, according to Dr. Kermorgant, was caused by the opening of hogsheads packed with military garments brought from Dakar by the steamer *Saint-Kilda*, and which had been distributed among the soldiers without being disinfected.

But, why not directly accuse the *Saint-Kilda* of being the active agent of importation? It is of record that the vessel had sojourned five days at Dakar before proceeding to Saint Louis, and that communication between the crew and the inhabitants of the village had been uninterrupted. At Saint Louis, the *Saint Kilda* was subjected to a quarantine of only three days, and her cargo consisting mainly of cases of cotton and woolen goods, was disinfected externally, and only unpacked when it had reached the consignees. Of course, the contention that the infection was carried by these goods is too puerile to admit of argument, but it is a well-known fact that mosquitoes will live for days without water, and even if a solitary infected *Stegomyia* had found lodgment in one of the packing-cases, this was sufficient to spread the contagion. And this is undoubtedly what happened.

There is no doubt in our mind that the infection was brought by the *Saint-Kilda*. During the time the ship was quarantined, the passengers and crew were allowed free intercourse with the shore, and the crew are said to have been quite "chummy" with the soldiers, mingling with them in barrooms and other places generally frequented by sailors. We do not wish to convey the impression that this affiliation could transmit the germs, as they are not disseminated by contact, but relate the incident to show that no precautions at all were taken to prevent the importation of the disease into the capital, although it was a notorious fact that Dakar was at the time a hot-bed of contagion.

The simultaneous explosion of the disease in two widely separated sections of the town can be explained by the supposition that the Moroccan, like all those of his race,

who come by hundreds to Senegal every year, was employed as laborer along the river front, and formed one of the gangs engaged in discharging the *Saint-Kilda*. The opening of a trunk almost two months after the death of the first Moroccan could not create a new focus of infections. No *Stegomyia*, no matter if endowed with phenomenal vitality, could live for that length of time shut out from water and air, and we must look elsewhere for the source of contamination. And, naturally, we incriminate the vessel under discussion.

It is worthy of note that all the customhouse employes who assisted in checking and examining the cargo of the *Saint-Kilda*, were one by one attacked by the disease in the beginning of the epidemic. This, of itself, should suffice to incriminate the vessel. There is no record of the appearance of the disease on board, but as the crew were principally natives, whose immunity to yellow fever is proverbial, and the officers were probably acclimatized, the vessel escaped an invasion.

But here comes our astute friend, Mr. Doubting Thomas, with his over-ready interrogation point, and wishes to know how it is that the case of the first Moroccan, who died on May 26th, did not disseminate the germs far and wide, but that the disease only became epidemic in July? The explanation is just as easy as eating watermelon with a spoon. The case of the first Moroccan was a notoriously imported one. The poison was in his system when he left Dakar for Saint Louis, and the natural sequence was that it manifested itself when the period of incubation had reached its limit. Had he gone to Paris, London or any other place on the face of the earth, which could be reached within the period of incubation, the disease would have asserted itself just the same. And, as at Saint Louis, it would have stopped right there, if the active agent of dissemination, the *Stegomyia*, was not present to convey the poison. And what saved Saint Louis from invasion in May, was the fact that the cold season was not yet over, and the yellow fever mosquito had not yet begun its activity.

In July, when the *Saint Kilda* arrived at Saint Louis, fresh from a nidus of infection, conditions were different. The mosquito season was in its zenith, and a single case of yellow fever was all that was needed to cause an epidemic. And, as we shall see, the capital of the colony provided an ideal field for the propagation of the malady and paid the heaviest penalty.

Although the first death from yellow fever in the Rognat-Sud barracks took place on July 17th, the garrison was only removed from that place on July 25th, up to which time, eleven soldiers had already been attacked. About twenty were left behind, and this imprudence was the cause of successive contaminations, the barracks thus becoming one of the most active foci of infection.

The second focus, created by the case in the Rue de la Mosque, radiated towards the north, successively infecting all that section between the starting point and the native quarters.

A third focus was created in the quarters devoted to colonial affairs, where the goods from the *Saint-Kilda* had been landed, and thence radiated towards the southern part of the city and across the small arm of the Senegal to the native village of Guet-N'Dar, on the Barbary Peninsula.

From July 16th, to August 5th, cases cropped out here and there, which goes to prove that the infection was pretty widely distributed. Most of these cases were fatal.

On August 5th, seven new cases. From that date, the epidemic wave surged over the island with such fierce intensity, that it is hardly possible to keep pace with its progress. Of the twenty soldiers who had remained at the *Rognat-Sud* barracks, fifteen were sent to the military hospital between August 7th and 21st. The majority succumbed.

On August 8th, forty-five soldiers were transferred to the native village of N'Dartoute and twenty to Pointe-Nord. These remained uncontaminated until the end of September, when nineteen of the men at Pointe-Nord were attacked. The troops were then sent to M'Pal and Louga, where they remained until the end of the epidemic.

The epidemic began to subside at Saint Louis, about September 15th. New cases were observed September 20th, 25th, 26th and 27th, and October 5th, 10th 13th and 14th.

There were no cases in November.

On December 31st, one new case, a civilian from Louga.

A civilian who had recently arrived in the colony was taken ill on January 14th, 1901. The epidemic of Saint Louis thus came to an end on that date, after having lasted for nearly six months, if we are to compute the true epidemical period from July 16th, or nearly eight months, if we calculate from May 26th, the date of the first case. During that time, ninety-nine Europeans and three natives had fallen victims to the saffron scourge.

THIES.

On May 11th, 1900, a Moroccan who had arrived from Dakar, a week previously, died at Thies. As in all other instances of "first cases," in other localities, a long interval elapsed before another case manifested itself. On August 27th, more than three months after the case imported from Dakar, an agent and a doctor arrived at Thies from Saint Louis. The agent was taken ill on his arrival and the doctor on the 29th. Both cases were sent to the Dakar hospital. Another case erupted on August 31st. Altogether, seven cases were observed, the last on February 28th, 1901.

Total cases, 7; total deaths, 4.

TIVOUANE.

The first case at Tivouane, took place in August, 1900. This case was followed by recovery. Cases were also observed on October 2nd, November 15th, and November 25th. The last case took place January 18th, 1901.

Total cases, 4; total deaths, 4.

ON VESSELS.

Recalling the fearful ravages made by yellow fever on board the vessels doing service in the colony in 1878, every government vessel was ordered to keep away from the centers of infection during the epidemic of 1900. The only vessels which were retained, were the *Hirondelle*, the *Heroine* and the *Abka*. All three were finally infected.

The *Abka*, which did service as a water-boat, had a crew of eleven natives and six Europeans. It was anchored opposite Saint Louis during the epidemic of 1900, and was used for transferring the troops from one post to another, as they successively became infected. The first case on board occurred on August 14th, followed by three others. Only one death resulted.

The *Heroine*, which was used as a floating hospital, had a crew of twenty-four Europeans. The vessel was anchored opposite Dakar. The first case on board occurred July 25th, the second, August 10th. From August 10th to 14th, five new cases. Between the 14th and 25th, there were only six Europeans on board the pontoon. On the last mentioned date, two new cases, followed by others on the 26th and 27th. In short, from July 25th, the date of the first case, to August 27th, nine cases developed on board, followed by six deaths.

On August 20th, contrary to the wishes of the colonial government, a number of officers were sent on board the *Hirondelle*, with instructions to proceed to French Sudan. Forty-eight hours after the departure of the vessel, yellow fever broke out on board. The facts were immediately cabled to the government, and the *Hirondelle* was ordered to return to the capital, without touching at any point on the river. On her return, the captain reported that five cases and two deaths had taken place during the voyage.

STATISTICS OF THE YELLOW FEVER EPIDEMIC
IN SENEGAL, 1900-1901.

The yellow fever epidemic which ravaged Senegal from April 16th, 1900, to February 28th, 1901, may be considered as one of the most virulent explosions of the dis-

ease on record. Almost the entire non-immune population fled when the disease was officially declared epidemic, and nearly all the white troops were ordered back to France. Notwithstanding this depopulation, one hundred and twenty-nine soldiers were attacked, and sixty died, and of one hundred and sixty-seven civilians attacked, one hundred and three died. The mortality would certainly have been terrible had not three thousand Europeans sought security in flight.

Every walk of life was invaded. Soldiers, ecclesiastics, civilians, and strangest of all, natives paid tribute to the awesome pestilence. For the first time in the history of yellow fever invasions in Senegal, the natives were promiscuously attacked. The black troops alone furnished twenty cases and eight deaths.

The appended tables, compiled expressly for this work from official records, will be found interesting, especially Table B, as it is the first time in the annals of epidemiology that a complete resume of an epidemic in Western Africa has been obtained.

SENEGAL EPIDEMIC OF 1900.

TABLE A. LOCALITIES AFFLICTED, WITH CASES AND DEATHS.

Locality	Source of Infection	Date of 1st Case	Date of 1st Death	Date of Last Case	Date of Last Death	Total Cases	Total Deaths
Carabane						4	4
Dakar	Disputed	Apr. 16	Apr. 16	Nov. —	Nov. —	142	76
Goree	Dakar	June 20	June 23	Aug. 17	Aug. —	22	20
Mehke						1	0
N'Dande ...						1	1
Rufisque	Dakar	May 12	June —	Dec. —	Dec. 24	18	15
Saint-Louis..	Dakar	May 23	May 26	Jan. 14 1901	Jan. '01	218	102
Thies.....	Dakar	May —	May 11	Feb. 28 1901	—	7	4
Tivouane	Rufisque	Aug. —	—	Jan. 18 1901	—	3	3
						416	225

TABLE B. CLASSIFIED RESUME OF CASES AND DEATHS.

			Total	
	Cases.	Deaths.	Cases.	Deaths.
Marines	65	34		
Gunners	29	12		
Spahis	7	5		
Instructors	3	1		
	—	—		
Total among white troops	104	52		
Native sharpshooters..	25	8		
Total among troops	—	—	129	60
Municipal Service:				
Hospital Corps	23	8		
Gendarmes	4	3		
Unclassified	1	1		
Total among municipi- pal employes	—	—	28	12
Colonial Government Service:				
Local Marine Corps ..	16	10		
Department of Fi- nance	2	0		
Department of Public Works	2	2		
Department of Agricul- ture	4	1		
Department of Jus- tice	1	1		
Customhouse Inspec- tors	8	6		
Post-Office and Tele- graph	4	2		
Home Office	6	2		
Unclassified	9	5		
Total among govern- ment employes ...	—	—	52	29

Miscellaneous:		
On board local vessels.	23	13
Ecclesiastics	5	5
School teachers	2	0
Sisters of Charity	10	3
Civilians	167	103
	<hr/>	<hr/>
	416	225

ORIGIN OF THE EPIDEMIC.

When the first case of yellow fever broke out at Dakar, on April 16th, 1900, health conditions were excellent throughout the colony. There had been no outbreak in Senegal since 1882. Under the circumstances, the question naturally propounds itself: What was the cause? It could not have been a recrudescence of the epidemic, for such a thing is impossible after a lapse of eighteen years. It could not have been caused by the digging of the soil and the shifting of earth laden with dejections from previous epidemics, for yellow fever germs do not propagate in this fashion. There is only one door left open: Importation. But whence and how? The answer is as elusive as the honest man whom our old friend Diogenes is no doubt looking for through the trackless regions of the nether world.

Let us see what localities were suffering from yellow fever in 1899 and 1900, and we may find a clue.

In 1899, the French Ivory Coast was the only locality in Africa where yellow fever prevailed. The only other cases in the Eastern Hemisphere were imported from Vera Cruz, and were observed on shipboard in the harbor of Nantes on the western coast of France. The fever prevailed epidemically in Central America, Mexico, the United States, the West Indies and South America.

Could infected mosquitoes have been imported from Grand Bassam to Dakar, in 1899, where they hibernated until the advent of warmer weather? The Ivory Coast is a French possession and communication between the capital of that dependency and Senegal was almost uninter-

rupted, in spite of quarantine regulations. Smugglers infest the coast and they are certainly not respectors of sanitary or any other laws.

In 1900, yellow fever had not been observed in Africa previous to the outbreak at Dakar. We must, therefore, look elsewhere for the source of importation. Epidemics of more or less intensity prevailed that year in Central America, Mexico, the United States, Brazil and Columbia.

The early appearance of the disease at Dakar, precludes any possibility of its having been brought from the United States, for the disease only manifested itself in this country in the middle of the year. It rarely begins before July.

In South America, however, conditions are different. There we find yellow fever in almost any season of the year. The disease was very severe in Brazil, in 1899 and 1900—the death-rate being 731 for the former and 344 for the latter year. South America has been a notorious focus of infection since the early fifties, when the scourge established itself epidemically in Brazil, and it is quite natural to suspect Rio de Janeiro or its sister cities of having contaminated Senegal in 1900. Yellow fever is present in Rio de Janeiro, from January to December, each year. Trade relations between Brazil and the West Coast of Africa is quite brisk. In addition to the independent craft which ply between the two continents, two French steamship companies make regular trips from France to Brazil, and the La Plata region, stopping at Dakar on their return trip. A case of yellow fever, or infected mosquitoes could thus easily be transported from the epidemic foci of South America to the shores of Senegal.

It is of record that two of these French vessels brought yellow fever cases from Senegal to Havre (q. v.) during the epidemic of 1900, the *Caravalles*, August 9th, and the *Santa Fe*, August 10th. These cases were infected at Dakar, where the steamships had touched, to take passengers for France. The fever did not spread, for the simple reason that the yellow fever mosquito does not flourish at Havre, and whatever infected insects had been taken on board the vessels while in Senegal, perished when they

reached an altitude hostile to their existence. Under the same conditions, the fever could be transported from South America to Senegal, but with different results, for the *Stegomyia Calopus* flourishes in nearly every country on the West Coast of Africa, and a single infected female of that species is all that is needed to start a focus, which can eventually contaminate the entire coast.

Dr. Kermorant denies the charge of importation, either from other African stations or South America, leaning to the theory of revivescence of germs from previous epidemics by the disturbance of the soil, a dogma which at the present day has reached the last stages of attenuation.

There is, we repeat, but one possible source: Importation. But whence or how, we can only surmise, having no proofs.

1901.

Sporadic cases of yellow fever were observed in Senegal, during 1901. The first case of the year manifested itself at Thies, on January 3rd. A fatal case was observed at Saint Louis, on January 14th, and one at Trivouane, on the 18th of the same month. Another case erupted at Thies, on February 28th. With the exception of a case at Dakar, on April 10th, no others were observed until late in the year. Between September 21st and October 13th, two cases erupted at Dagana and three at Saint Louis, followed by three deaths.⁶²

Total cases for 1901, 10; total deaths, 5.

Nearly all these cases were new arrivals in the colony. The disease did not become epidemic, for the simple reason that those who had fled in 1900, wisely remained in France.

1905.

For four years we hear nothing about yellow fever in

⁶² Proust and Faivre: Rec. des Trav. du Com. Consult. d'Hyg. Pub. de France, 1901 (Paris, 1903), p. 336; also Kermorgant: Ann. d'Hyg. et de Med. Colon., 1903, vol. 6, p. 626.

Senegal, not even a sporadic case being mentioned in the official reports of the health of the colony.

On May 31, 1905, the startling news was disseminated throughout the colony that an engineer employed at the water works at Dakar had died of a malady officially declared by the physicians, both civil and military, to be yellow fever. As may well be imagined, the announcement caused consternation among the European population, and a general exodus took place. All steamers sailing for Europe were crowded to their utmost capacity, as a repetition of the disaster of 1900 was apprehended and the large number of non-immunes then in the colony concluded that they would be safer with the ocean between them and the seat of contagion.

According to Mr. Strickland,⁶³ American Consul, and Dr. Ribot,⁶⁴ the authorities at Goree-Dakar, warned by the disastrous epidemic of 1900, used the most energetic measures to prevent the disease from spreading. The house where the patient died was burned and his effects destroyed, the government assuming the loss. His family was isolated and all suspicious cases of sickness were closely watched. The chief health officer of Goree purchased two immense woven-wire cages which had been used by Consul Strickland during his sojourn in Senegal, one to sleep in and the other to enclose his writing-table and book-cases. The largest case was capable of accommodating two single beds, a chair and a table, while the smallest could contain a bed, a chair and a table. The cages were mounted in the hospital, and all cases of suspicious fever were placed therein. Our representative says that he has used such cages since 1877, and attributes his immunity from the diseases incidental to the climate to this precautionary measure.

Orders were received by the colonial government from the mother country to wage incessant warfare against the mosquitoes in general and the *Stegomyia Calopus* in particular, as the female of this species, and not dirt, eman-

⁶³ Strickland: U. S. Public Health Reports, 1905, vol. 20, p. 1473.

⁶⁴ Ribot: Annales d'Hygiene et de Medicine Coloniales (Paris), 1907, vol. 10, p. 79.

ations or buried germs were responsible for the spread of yellow fever.

An old and tried proverb asserts that an ounce of prevention is better than a pound of cure, and to the strict sanitary measures adopted by the authorities, Senegal probably owes her escape from an epidemic in 1905. Be that as it may, no other cases developed and the timorous, who had been on the anxious seat and only awaited the eruption of a second case to flee, settled down to their usual avocations, and the business of the colony resumed its normal stage.

It would have been interesting to analyze the genesis of this isolated case; but, unfortunately, beyond the report of Consul Strickland, we have failed to discover any article which could throw additional light on the subject. That the case did not originate *de novo* is certain, for it would have been followed by others. In the absence of proof that it was imported, however, we cannot positively assert that it was of foreign origin, although we are inclined to that belief. We shall leave the question for future theorists to elucidate.

CONCLUSIONS.

1908.

Up to the time this transcript is handed to the printer, October, 1908, we have not heard of any other eruption of yellow fever in Senegal, and with the present known mode of transmission of the disease, there is no reason why yellow fever, should it manifest itself in that far-off land, should not be confined to a few cases.

SIERRA LEONE.

DESCRIPTION.

Sierra Leone is a British crown colony on the west coast of Africa. It is a coaling station for the Royal Navy, and the headquarters of the West Indian regiments, stationed on the African coast. The colony consists of Sierra

Leone proper, Sherbro Island, several small islands and the whole coast region from the lower limits of French Guiana, on the northwest to Liberia on the southwest. Capital, Freetown, where most of the inhabitants live.

HISTORICAL RESUME.

Sierra Leone was discovered by the Portugese, in 1463, but no settlement was attempted, owing to the deadly nature of the climate and the ferocity of the savages who inhabited the interior. From time to time, spasmodic efforts were made to establish colonies along the coast, but the mortality which attended these efforts was such, that Sierra Leone was designated by Europeans as "The White Man's Grave," an appellation which has clung to it to this day.

On May 9th, 1787, about sixty Englishmen and four hundred blacks landed at the peninsula of Sierra Leone, and founded Freetown, which was destined to be the haven of all the escaped, rescued and emancipated slaves of the world. On September 16th, 1787, disease had so decimated the colony, that only two hundred and seventy-five persons remained. These either emigrated to other climes or were murdered by the natives. In 1791, the English Parliament, to encourage the work of the abolitionists, authorized the formation of a powerful company. The year following, this company sent 1200 liberated slaves from Nova Scotia and the Bahamas to rebuild the abandoned town of Freetown. Shortly after, a pestilential disease ravaged the colony and the project was about to be abandoned, when an Englishman named Clarkson, a brother of the originator of the scheme, took energetic control, and induced the pioneers to remain. The ill-starred venture was destined to again suffer destruction. In 1794, a French squadron, not knowing of the philanthropic nature of the settlement, but seeing only a possession of the hated Englishman, completely destroyed the town. The French government severely censured the commandant of the squadron for this action, but it was too late—Freetown was a heap of debris.

With the stubbornness which characterizes the Britisher, and to which is due his eminence in the history of nations, John Bull resolved to again put its pet scheme into execution, and in 1808, purchased all the rights of the Sierra Leone Company, and the territory became an English possession. In 1812, a new mode of colonizing the country was put into execution. All slaves taken from ships captured by the English, were sent to Sierra Leone, and given their liberty. From that date, the colony prospered and became the Mecca of emancipated slaves.

Other towns were founded in rapid succession: Leicester, in 1809; Regent, in 1812; Gloucester, in 1816; Leopold and Kiskey, in 1817; Charlotte, Wilbeforce and Bathurst, in 1818; Kent, York, Wellington, Hastings and Waterloo, in 1819.

The population of Sierra-Leone grew rapidly. In 1811, there were 4,500 persons, half of which were liberated slaves; in 1819, it had more than doubled, being 12,000, including 200 white soldiers; in 1828, it had grown to 17,566, and in 1849, to 46,569. The last census (1891), gave the dependency a population of 74,835, mostly natives and descendants of liberated slaves.

From 1812 to 1835, the liberated slaves sent to swell the population of Sierra Leone, amounted to 27,167.

The European population was more numerous in the first years of the colony than afterwards. This was due to the fact that the insalubriety of the climate is extremely hostile to the whites. In 1818, the town of Regent, alone, had a population of 1300 whites and 1700 blacks. In 1826, only 535 English soldiers could be found in the entire colony. To-day, the population is almost totally black. A few white merchants remain during the healthy season, but as soon as the rains set in, they return to Europe. The white soldiers have been replaced by blacks, and with the exception of a few white officers, the governor and his clerical help, no whites reside permanently in the colony.

THE FEVERS OF SIERRA LEONE.

Sierra Leone may now be considered as one of the en-

demic foci of yellow fever in western Africa. Previous to 1763, when the disease was imported to the colony, it was unknown; but, finding a home suitable for its retention and propagation, it took firm root, and is now one of the natural products of that insalubrious region.

According to Lamprey,⁶⁵ there are three types of fevers commonly met with in Sierra Leone: (1), ague; (2), bilious fever, and (3), pernicious or yellow fever. The first is not of frequent occurrence; the second is the commonest; the third the most fatal. Dr. Lamprey, who made a special study of the yellow fever outbreaks in Sierra Leone, observed that, though, the character of these fevers, when developed, show a distinctiveness of type one from another, yet so alike are they at the incipiency of the attack, that it requires some experience to define them. It is found expedient to carefully watch the various symptoms of a suspicious case, before absolutely pronouncing the disease to be yellow fever.

The unsanitary condition of Freetown is especially adapted to the propagation of pestilence. The city is situated in an amphitheatre, surrounded on three sides by a range of hills rising from 500 to 3,000 feet above the town. In this circumscribed area, a large and dense population are crowded together. The houses are, for the most part, unscientifically constructed and illy ventilated, and are surrounded by privies, cesspits and wells. From the latter the inhabitants obtain their drinking water. During the "wet" season—May to August—it rains incessantly. The natural slope of the land drains this heavy rainfall into the cesspits and vaults, which overflow into the wells, concocting a beverage for the benighted Freetownites, compared to which Carizzo water would taste like nectarine frappe.

From the above conditions, it will readily be understood why the fever is so often epidemic in Sierra Leone, and is productive of such a high rate of mortality.

⁶⁵ Lamprey: British Medical Journal, 1885; vol. 2, p. 594.

A review of the literature on the subject brings forth no evidence of the fever ever having been imported into Sierra Leone, but rather leads to the conclusion that an endemic fever prevails every year in that country, being most prevalent in the lowest and most crowded sections of Freetown. It arises purely from local causes. At certain epochs this fever acquires great development and becomes epidemic, and, although its symptoms remain the same, they are much heightened in intensity; remissions are less common, black vomit is more frequent and the mortality greater.

YELLOW FEVER YEARS.

1763; 1764; 1766; 1778; 1807; 1809; 1812; 1815; 1816; 1819; 1822; 1823; 1825; 1826; 1828; 1829; 1830; 1836; 1837; 1838; 1839; 1845; 1847; 1848; 1858; 1859; 1862; 1864; 1865; 1866; 1868; 1872; 1878; 1884.

SUMMARY OF EPIDEMICS.

1763 to 1766.

According to Lind,⁶⁶ yellow fever prevailed in Sierra Leone, in 1763, 1764 and 1766. The reports lack authenticity.

1778.

The first authentic appearance of yellow fever in Sierra Leone, took place in 1778, according to Schott.⁶⁷ No details are given, probably because the whites were so scarce in the country that only a few cases resulted among them; but it is an historical fact that the fever was carried from Sierra Leone to Gambia, and from Gambia to Senegal, where it decimated the English garrison stationed at Saint Louis.

⁶⁶ Lind: Diseases Incidental to Europeans in Hot Climates.

⁶⁷ Schette: A Treatise on the Synochus Atrabiliosa, London, 1782.

1807 TO 1816.

Yellow fever was present in Sierra Leone, in 1807, 1809, 1812, 1815, 1816, 1819 and 1822, but only sporadically.⁶⁸ The mortality among the Europeans was high.

1823.

The first epidemic of which any details are given, is that of 1823, described by Bryson.⁶⁹ The focus of this epidemic began on December 11, 1822, when an isolated case of "suspicious fever" was observed, followed by death. The patient was the harbor-master of Sierra Leone; and had been on board no infected vessel, nor had been exposed, as far as Dr. Bryson could ascertain, to any other infection except that of the common endemic and local fever. Six weeks afterwards, another case occurred. The third positive case occurred on the 22nd of February, 1823, in the person of a seaman from the ship, *Caroline*, who had been loading timber up the river. Some weeks previous to the diagnosis of this case, the *Caroline* had lost several of her crew from fever contracted while the vessel was being loaded at Freetown. Cases subsequently occurred among the crew of other vessels and among the inhabitants of Sierra Leone, and the fever gradually became widespread.

The epidemic appears to have gradually declined, and finally ceased at Sierra Leone, and, as far as can be ascertained, in the shipping in the adjacent rivers, in June or July. As there had been a first case of a doubtful character preceding by several weeks or a month, the general outbreak, so it might be argued, there was a last case of a similar nature, which followed its general extinction at an equal distance of time. The last case which occurred in June, proved fatal on the 12th of the month, when the heavy rains set in. But there was another, an "isolated

⁶⁸ Berenger-Feraud and Lemprey, loc. cit.

⁶⁹ Bryson: An Account of the Origin, Spread and Decline of the Epidemic Fevers of Sierra Leone (London, 1849), p. 14.

case," that of Mr. Huddleston, a Wesleyan preacher, which occurred about the middle of July; he was then convalescent from an attack of the common remittent, a disease he was subject to during the rains. On returning from his religious duties, he felt indisposed, and became feverish, but it was considered to be merely a relapse of the remittent. On the third day, however, it manifested symptoms of the fatal epidemic. On the evening of the fourth, black vomit made its appearance; and the next evening, the 20th of July, the afflicting scene closed. This gentleman resided in the same house with his brother-in-law, who died of the epidemic fever on the 16th of April; he was besides, during that and the following month, when the disease was at its greatest degree of severity, frequently at the bedside of those who were suffering from it, without being affected himself.⁷⁰

As the epidemic disappeared, the ground was found occupied by the endemic, exhibiting about the same degree of intensity it had when the former threw it into the shade, in the early part of the year; subsequently, it prevailed for several years amongst all classes of Europeans, from the Gambia down to the easternmost point of the Gold Coast, with unprecedented severity. The deaths on some of the cruisers were numerous, but amongst the troops stationed at Bathurst, Cape Coast and Accra, they were truly appalling. To say that upwards of three-fourths of the whole were annually, for several years, cut off by fever, would be far within the mark.⁷¹

The fever was imported from Freetown, in March, 1823, to the Island of Ascension (q. v.) by the sloop of war *Bann*, an incident which gave rise to discussions which remain unsettled to the present day.⁷²

1825.

Yellow fever prevailed in Sierra Leone, in 1825, resulting in a mortality of fifty per cent.⁷³

⁷⁰ Bryson, p. 31.

⁷¹ Bryson, p. 32.

⁷² See "Ascension Island," in this volume, for details of this famous case.

⁷³ Second Report on Quarantine, 1852, p. 288.

1826.

No details are obtainable concerning the outbreak of 1826, as the English medical archives are as silent as the grave on the subject, but according to Dupont and Berenger-Feraud,⁷⁴ the ship, *Sybille* was infected at Freetown, during the summer of 1826, and lost a great many of her crew on the voyage from that port to Saint Helena. The English nosologists denied that the disease on the *Sybille* was yellow fever, claiming that the contagion would have spread to the Island of Saint Helena had such been the case, but it must be borne in mind that the outbreak took place about the end of August, the coldest month in the Southern Hemisphere, and that *Stegomyia* do not circulate when the temperature is below the freezing point.

1828.

Yellow fever reappeared during the summer of 1828. The ship *La Bordelaise* was infected at Freetown, and carried the disease to Senegal (q. v.)⁷⁵

1829.

The year 1829 witnessed another severe outbreak in Sierra Leone. From 1823 to 1829, yellow fever was present almost every year in Sierra Leone. The disease was very fatal, but was not widespread during that period. In April, 1829, however, the fever assumed a most malignant type. As in 1823, the first cases were scattered and were not imported; they seemed to grow out as it were from the endemic fever, from which, indeed, some of the cases appear to have been scarcely distinguishable. Then, gradually increasing, the disease spread as an epidemic among the European seamen and the white population residing along the lower left bank of the river, the very locality in which the fever of 1823, had committed such terrible ravages.⁷⁶

⁷⁴ Dupont, loc. cit.; Berenger-Feraud, p. 104.

⁷⁵ Berenger-Feraud, p. 105.

⁷⁶ British and Foreign Medico-Chirurgical Review, 1849; Vol. 4, p. 465.

According to Boyle,⁷⁷ the first well marked fatal case was that of Mr. Loughman, a writer in the Colonial Office, a young man of "a sensitive mind, but somewhat careless as to his modes of living." He was seized on the 21st of April, and died on the 28th, under all the symptoms of the epidemic, then known. There was no means of tracing this case to imported contagion, or indeed any reasons to presume it was so contracted.

The next case appears to have been that of a midshipman of the *Eden*, who was taken ill in the harbor, on the 29th of April, on board a detained vessel of which he had charge, and died on the 5th of May, on the *Eden*, to which he had been removed. In this vessel there was another subordinate officer, who was attacked the day after the above, as he himself supposed, in consequence of his having "got wet in a tornado." His symptoms were decidedly those of yellow fever. On the 3rd of May, his dejections became black; on the 4th, his eyes and skin were yellow, with a dirty brown tinge on the fifth, his urine was turbid and offensive; on the 6th, he began to sink, and died early on the morning of the 7th, on the detained vessel. Blood was taken from the arm early in the disease, but the wound never closed, and it bled to the last, when the bandages were removed or torn off by the patient when delirious; it resembled the orifice made in the vein of a dead subject.

The next case on record, although there is little reason to doubt that there were others occurring at the same time, is that of a man, who, after wandering for several days about Freetown in a state of destitution, was received on board the *Eden*, on the 1st of May, as one of her crew. On the evening of the 3rd, he was attacked with fever; on the 6th his dejections were of a dark color, and in the evening he vomited a dark colored fluid, in which there were clots and streaks of coagulated blood. On the 7th, his eyes and skin having become yellow, he began to sink, and died at four in the afternoon.

⁷⁷ Boyle: A Practical Medico-Historical Account of the Western Coast of Africa, (London, 1831), p. 255.

The next case was that of a traveler who came down to Sierra Leone in an open boat, and being intoxicated, slept part of the time, although exposed to the fury of the north-east tornado, accompanied with heavy rain. He was seized on the 4th of May, the day after his arrival at Freetown, and died on the 10th.

On the 9th of May, one of the merchants of Freetown was attacked, and died on the 16th. In this instance death was preceded by yellowness of the skin and black vomit.

The cases then became more frequent and almost every European who had not fled from Freetown, suffered an attack. The malady lasted without interruption until 1830, when it gradually subsided and was succeeded by the endemic bilious fever.

The *Eden*, which, as we have seen, had been infected at Freetown, in 1823, an event which caused endless controversies between the medical men of the period, was contaminated at Freetown, in 1829, and lost 110 men out of a crew of 160, besides leaving her sick at numerous ports on the African coast, which were thus infected and suffered much from the ravages of the disease.

The *Champion* was also infected at Freetown, in 1829, and carried the fever to Fernando-Po (q. v.), where it caused much mortality.

1830.

Many cases were observed in 1830, but the disease did not become epidemic, gradually subsiding during the summer and finally blending with the bilious fever annually present in Sierra Leone.

1836.

For six years, nothing is said about yellow fever in Sierra Leone in the official medical reports, although there is no doubt in our mind that the disease, if it did not prevail annually, must certainly have been present at some time or other during these dates.

In December, 1836, the fever broke out suddenly at Freetown, and lasted until January, 1837. The cases and deaths are not given.⁷⁸

1837.

The focus of the epidemic of 1837, began in December, 1836, as mentioned above.

The genesis of this epidemic as set forth by Bryson (page 67) is interesting and shows how fatal to Europeans, especially new arrivals, is the African type of yellow fever.

It appears by a report from Staff-Surgeon Ferguson, then Governor of Sierra Leone, that a vessel called the *Mary*, arrived from England on the 9th of December, 1836, and immediately afterwards proceeded up the Bunce River for a cargo of timber, anchoring six miles above Freetown, close to the marshy mangrove-covered banks of the river. Towards the close of the month, the endemical remittent began to attack the crew in the order exhibited by the following table:

	Cases.	Deaths.
Dec. 27, 1836	1	0
Dec. 29, 1836	5	0
Dec. 30, 1836	5	4
Jan. 4, 1837	2	0
Jan. 6, 1837,	1	0
Jan. 7, 1837	1	1
	15	5

The master of the vessel was attacked on the 30th of December, and died on the 20th of January. Four of the crew were also attacked on the same day as the master, of whom three died. These, with the cases of the 27th and the 29th, were considered to be instances of the endemial remittent. On the 6th of January, there was but one European left on board (the carpenter); he also was in ill health, but refused to leave the ship. He, however, became worse, was brought to town on the 10th of January, and died on the 12th. Thus the whole of the crew

⁷⁸ Bryson, p. 94.

were attacked with the fever within the space of fifteen days, and a third of the number died. In these cases, neither black vomit nor any of the symptoms characteristic of the malignant remittent occurred.

During the period embraced by the foregoing detail, the Europeans of Freetown were healthy. On the 4th of January, a young gentleman, who had not been a month in the colony, was attacked with fever of great severity, which, after it had been protracted beyond the ordinary duration of remittents, proved fatal on the 16th of the month. On the following day, a mulatress, who had been in the colony eighteen years, died of fever of ten days' duration. These two cases, the colony having been previously healthy, excited great consternation, but no other cases developing they were soon forgotten.

One of the two sailors of the *Mary*, who had been attacked with fever in the early part of January, had a relapse on the 9th of February, of which he died on the 13th, having had black vomit on the day of his death. He had not returned to the ship, but remained at sick lodgings at Freetown, taking a walk morning and evening, when the fatal relapse occurred.

The next cases were amongst the crew of a vessel called the *Lady Douglass*, which had arrived at Freetown on the 12th of January, and afterwards went to Melacoorie, a river about forty miles to the northward of Sierra Leone, for timber. Four men from this vessel were unfortunately sent to the same sick lodgings that had been previously occupied by part of the sick crew of the *Mary*. The men were all taken sick, and only one of the four recovered; the others died after having presented the symptoms peculiar to yellow fever.

The malignant fever at length broke out in its worst form among the European residents of Freetown. The first case occurred on the 31st of March. Mr. White, a West Indian, who had resided several years in the colony, Captain Patrick and Mr. Crummens were on that day attacked, and the two last mentioned died on the fourth day of the fever.

The third fatal case occurred on the 16th of April, the

fourth on the 20th and the fifth on the 24th. All these cases terminated with the peculiar symptoms of malignant fever. The duration of the fever in the seven first cases that terminated in death was as follows, viz.: The first and second on the fourth day; the third on the fourth; the fourth on the fourth; the fifth on the third; sixth on the sixth, and the seventh on the ninth.

All these were males; the next case was a Mrs. N., who was the first female who had the disease, and after it had assumed the epidemic character, she recovered. The fever thus, after, as it were, maturing during a period of about two months, established a footing in Freetown, continued with great violence in May and June, and declined in July, the attacks gradually becoming fewer and less severe as the rainy season approached. Nearly all the patients who were attacked in the latter month recovered, and by the end of July, the fever in its epidemic form, was wholly extinct, although sporadic cases manifested themselves until the middle of December.

On Vessels.

In May 1837, according to Bryson (page 94), yellow fever was contracted by the crew of the *Curllew*, either there or in one of the rivers between Sierra Leone and the Gambia, but wherever contracted, it was communicated by the ship's company to the inhabitants of Gambia, and subsequently by the latter to the inhabitants of Goree.

In October and in November, the fever was contracted either at Freetown or off Cape Palmas, by the crew of the *Raven*; but, although a large proportion of the sick of this vessel were landed at Cape Coast Castle, they did not communicate the disease to the inhabitants of that district.

In December, the malady under discussion was contracted at Sierra Leone by two stewards belonging to the English coasting vessel *Etna*; and there is reason to believe it was communicated by them in a most virulent form to

the ship's company, who carried it to the Island of Ascension, where, in a short time, nearly the whole of the crew having suffered, it became extinct in the quarantine tents at Comfort Cove.

In the latter end of December, it broke out amongst the ship's company of the *Forester*, at or shortly after leaving Sierra Leone, but appears to have entirely ceased on the passage to Ascension. At sea, however, prior to its cessation, she communicated with the *Bonitta*, and discharged a prize crew into her, which had been embarked at Sierra Leone. By these men, or by some other means, the fever was communicated to the ship's company, and by them, the malady having suddenly assumed the greatest degree of virulence, it was again carried to Ascension (q. v.)

1838.

In 1838, according to Lamprey,⁷⁹ yellow fever appeared in February, and ended in March. The Island of Ascension (q. v.) was again contaminated by vessels from Sierra Leone in the beginning of the year.

1839.

In 1839, a severe form of "remittent fever" caused the death of six officers of the garrison at Tower Hill barracks. During the months of July, August and September, every man of the Royal African Corps in the barracks at King Toms, Freetown, suffered from the fever, and the mortality amongst that corps is stated to have been appalling. There were seven officers and thirteen men of the Royal Navy attacked with yellow fever, and every one died.⁸⁰

1845.

From 1839 to 1845, there is no mention of yellow fever in Sierra Leone, probably due to the fact that no newcomers arrived during that period.

⁷⁹ Lamprey: British Medical Journal, 1885; Vol. 2, p. 594.

⁸⁰ Lamprey, loc. cit.

In 1845, yellow fever appeared amongst the crew of the squadron at anchor, off Sierra Leone. The *Eclair* sailed from the river on July 23rd, 1845, and sixty of her crew perished from yellow fever. One fatal case occurred in September.⁸¹

The *Eclair* contaminated Boa Vista, one of the Cape Verds (q. v.)

1847.

In 1847, yellow fever was epidemic in Freetown, in June, July and August. The ship *Growler* was contaminated at Freetown, and is accused of having brought the fever to the Island of Barbadoes, in the West Indies.⁸² But as the fever was already prevailing in the Antilles, this importation merely added fuel to the pestilence.

1848.

Another outbreak of the disease took place in 1848, but was not severe.⁸³

1858.

Sierra Leone presumably enjoyed a long immunity from yellow fever, for no cases are recorded during the decade from 1848 to 1858. Whether the fever was present or not, we have no means of ascertaining, as the medical records are silent on the subject, and even our old stand-by, Berenger-Feraud, was unable to unearth any records which could throw light on the question. This extraordinary immunity may be explained on the theory that the whites, tiring of being mowed down like sheep, kept aloof from the colony and the blacks, who are seldom, if ever attacked by yellow fever, furnished no cases.

The reappearance of the fever in 1858 is barely noticed by Berenger-Feraud (*loc. cit.*, page 135), and is mentioned nowhere else. Only two causes are open to conjecture:

⁸¹ Lamprey and Berenger-Feraud.

⁸² Lamprey and Berenger-Feraud.

⁸³ Berenger-Feraud, p. 118.

(1) That the disease had been present during all the time from 1848, to the "official" outbreak of 1858; or, (2) That it was re-introduced by the shipping. We have nothing on which to base any argument which could sustain any of these propositions, but it is self-evident that one of the two must stand. Yellow fever cannot originate from the ground, and mosquitoes could not, under the most extravagant stretch of the imagination, carry the virus for ten years. The introduction of a single case, however, would be sufficient to disseminate the poison and give rise to an outbreak among the non-immunes unprotected from the bites of the insects.

That the fever could easily have been imported to Sierra Leone, in 1858, (admitting, *arguendo*, that importation was necessary), will be evident by consulting our chronological tables for that year. The fever was widely distributed in America, and was especially severe in the West Indies and the eastern coast of South America. The English possessions in the Antilles suffered to a great extent. Ships carried an extensive commerce between Brazil, the West Indies and Sierra Leone and the importation of a single case to Sierra Leone was sufficient to engender an outbreak of the disease under discussion. That this importation took place, we cannot prove, but the natural inference is that it did. Experience has taught us that official reports are not always trustworthy, especially when commercialism is at stake.

1859.

The importation of 1858, must have reinfected the *Stegomyia* of Freetown to quite an extent, for the fever broke out in April, 1859, and became epidemic in May.⁸⁴ There had been an influx of Europeans during the past year, and 106 fell victims to the disease between April, 1859, and January, 1860.

The British war vessels *Trident* and *Sharpshooter* were infected at Sierra Leone in 1859, and carried the disease to the Island of Ascension (q. v.)

⁸⁴ Lamprey, loc. cit.

Two seamen died of yellow fever on the *Surprise*, off Freetown. One of these men, however, belonged to the *Spitiful*, and had arrived at Sierra Leone on a prize vessel. Being at the time unwell, he was sent to the military hospital for treatment, where he recovered and was discharged to the *Spitiful*. A few days afterwards he was attacked with yellow fever, and died after four days' illness. The other patient had deserted from a merchant vessel, and subsequently, after leading an irregular life at Sierra Leone, joined the *Surprise* as a volunteer. Ten days after he came on board, he was attacked and died on the sixth day.

1860.

No mention is made of yellow fever at Sierra Leone, in 1860, but the disease was no doubt at Freetown, as the British warship *Arrogant* was infected in that locality and lost two men.

1862.

The outbreak of 1862 was not severe and was not attended by much mortality.

In the *Statistical Report of the Health of the Navy for 1862* (published in 1865), pp. 155-162, it is stated that the squadron on the West Coast of Africa suffered from yellow fever. Although Sierra Leone is not directly incriminated, the infection was no doubt contracted there. Eleven cases occurred on board of the *Bloodhound*, seven of which died. "At the time of the disease on board, however, many cases of fever of a severe nature were under treatment," writes the medical officer, "but none were classed as yellow fever, except those in whom the symptoms were unmistakable." The disease made its appearance when the ship was lying at Batanga. The first case occurred on September 15th, and died on the 18th. Between the 15th of September and the 16th of October, there were nineteen cases of severe fever (which were not reported as yellow fever for reasons above stated), which, assuming them to have been of the yellow fever type, would give altogether thirty cases under treatment.

1864.

Yellow fever did not "officially" prevail in 1863, and we find no record of any cases. In 1864, an outbreak took place, the facts of which would no doubt have been suppressed, but a merchant vessel brought a case from Free-town to Falmouth, England (q. v.), and the facts could not be hidden from the English public. The case, which proved fatal, caused much agitation in England, and the whole African coast was quarantined until the advent of cold weather.

1865.

In the *Statistical Report of the Health of the Navy for 1865*, (published in 1868), pp. 196-208, it is stated that "during Michaelmas" of that year, a very malignant type of yellow fever was prevailing on shore at Sierra Leone, causing a mortality of seventy-five per cent. amongst the European population.

The same authority records sixty-five cases of yellow fever occurring on the ships *Archer*, *Sparrow*, *Rattlesnake* and *Iris*, with thirty-four deaths. The first fatal case occurred September 28. The last case occurred on December 23rd, and died December 26.

All these vessels were infected at Sierra Leone. It seems, however, that there occurred quite a number of additional cases of yellow fever which were not classified thus, for Surgeon Samuel Clift, of the *Rattlesnake*, says: "I have classed fifteen cases of fever as remittent, two as ephemeral, and five as yellow fever, but they may all be looked upon as the latter disease, differing only in intensity, and as to the presence or not of black vomit." It seems, too, as though the general opinion prevailed that many more cases of fever which occurred on board the ships mentioned were also yellow fever.

1866.

The epidemic of 1886, was one of the severest experienced in the colony in many years. Between the months of April and October, one hundred Europeans died at Free-town. (Lamprey, *loc. cit.*)

In the *Report* for 1866, (published in 1868), pp. 204-256, it is stated that the squadron of the West Coast of Africa, consisted for 1866, of twenty-three vessels, with a mean force of 1,680 men. There were 519 cases of fever of a continued type or remittent type; 30 cases of yellow fever; 87 of ague. Died: Five cases of primary fever; 25 of yellow fever; one of ague. The average duration of each case of yellow fever was about seventeen days. The average duration of the fatal cases 4.3 days.

In the epidemic on the ship *Bristol*. 1865-66, the first case occurred December 28, 1865; the first death, January 3, 1866. Last case, January 11, 1866; last death, February 8, 1866.

One case reported from the ship *Espoir* occurred about May 9, 1866, died May 14th.

The epidemic on the ship *Bristol* was derived through communication with the ship *Isis*, which was thoroughly infected with the disease.

The *Report* gives two deaths from that disease on the *Isis*. One of them was taken ill on December 29, 1865, died January 1, 1866. The other took sick January 2, 1866, died January 7th. This was the last of the series of cases that occurred in the *Isis*.

Twenty-eight cases occurred on the *Bristol*, one on the *Espoir*, and one on the *Isis*. Of these, 25 proved fatal.

1868.

The year 1868, witnessed another outbreak at Freetown. (Berenger-Feraud, page 144.) The exodus of the unacclimated Europeans prevented the disease from becoming epidemic.

1872.

For four years, Sierra Leone had a reprieve from yellow fever. In 1872, the disease reappeared at Freetown. It was of a particularly malignant type, the mortality being especially high in May, June and July. Even as late as December, six deaths are recorded. The average death-

rate in Freetown during 1872, was 250 per 1,000. This excessive mortality does not include all the victims of the pestilence, as many died on shipboard in trying to escape from the colony.⁸⁵

1878.

Six years of immunity is credited to Sierra Leone, but whether deserved or not, we cannot say. In 1878, the fever reappeared and caused some mortality. The disease was present in many parts of Western Africa that year, notably in Senegal, Gambia and even in Soudan.

1884.

The epidemic of 1872, and the outbreak of 1878, had no doubt decimated the non-immune population of Sierra Leone, and the fear of falling victims to the climate had been instrumental in keeping away emigration, for we find no record of the appearance of yellow fever from 1878 to 1884. The epidemic of 1884, began in May. One of the peculiarities of the disease, is that it attacked the natives in great numbers. The average death rate among the blacks was 35 per 1,000 per month, while the death-rate among the Europeans was six per cent. for the same period. The fever was most severe in June and July, and declined with the maturity of the rains in August. It gradually decreased until December, when it totally disappeared.⁸⁶

CONCLUSIONS.

From 1884, to the present time (1908), a period of twenty-four years, there is no record of yellow fever having prevailed in Sierra Leone. This immunity is no doubt due to the fact that the British Government, profiting by the terrible experiences of the past, garrisons its posts

⁸⁵ Lamprey, loc. cit.

⁸⁶ Lamprey, loc. cit.

⁸⁷ Army Medical Department Report for the Year 1886, (London, 1888), p. 79

with black troops, whose immunity from yellow fever is proverbial. For example, in 1886, the garrison at Free-town consisted of 340 African soldiers, commanded by hardly half a dozen white officers. The mortality for the entire year among these 340 blacks, from all causes, amounted to only six.

SOUDAN.

Description.

Soudan is a country in Central Africa, south of the Desert of Sahara, and extending from the Atlantic Ocean to the Red Sea. This is the home of the true negro race, and is for the most part inhabited by degraded savages. Its area is estimated at 2,000,000 square miles, and its population from 8 to 30 millions. Arab colonists and traders form a large part of the foreign population. On the Atlantic seaboard, the French have established a colony, but, with the exception of prospectors, soldiers and laborers employed on the railroad from Kayes to Kita, no Europeans are to be found in this vast region. Timbuctoo, the capital, is far from being an ideal place. It is miserably built, in a wretched country, situated amid burning and moving sands, on the verge of a morass. There are a few brick houses, but most of the dwellings are mere circular huts of straw and earth. Population, 12,000, principally natives, with some Moors.

YELLOW FEVER YEARS.

1828; 1829; 1878; 1879; 1880; 1881; 1882; 1891; 1892; 1897; 1901; 1902; 1903; 1907.

SUMMARY OF EPIDEMICS.

1828-1829.

The history of yellow fever in Soudan, begins with the first attempt of the white man to penetrate into that in-

salubrious region. According to Boyle,⁸⁸ the epidemic of yellow fever which ravaged Sierra Leone, in 1829, first made its appearance in Sangarrah, a country in the interior, about thirty days' journey in a northeast direction from Medina. The fever broke out at Sangarrah about Christmas, 1828. It is said that more chiefs were stricken that year than ever before. Sangarrah is a low marshy country, covered with jungle. Bantoe, lying in the southwest of Sangarrah, is also said to have suffered exceedingly. Out of twelve men sent out in March, to hunt elephants, only one returned alive, the others having died in the forests. Between Sangarrah and Footah Jallon, whole villages were said to have been depopulated.

From Laheer and down through the Mandingo country, traveling in a southwest course to Fouricaria and Melicoree, the number that died was unprecedented. In the village of Yongroo, the mortality was excessive. From further and rather extensive inquiries of the natives from various parts of the main land, it was ascertained that the fever prevailed among the tribes of the following localities: Bulam, Porto Lago, Rokelle, Scarcies, Mellacoree and Foolah.

Those from whom these statements were obtained, were unanimous in the opinion that the disease proceeded from the eastward. It was greatest in the neighborhood of Porto Lago, and down to the swampy tongue of land which separates Porto Lago from the Small Scarcies, and across the country to Mellacoree and Forrecarreal.

From messengers from Timbo, in the beginning of August, it was ascertained that an epidemic prevailed there twelve months previously to that date (1829), and that it had then ceased only four months. The complaint was described by these people as being attended with pains in the head, back and loins, with hot skin and black tongue. In the advanced stage of the disease, the gums and tongue exhibited the color of blood; and it was added that some threw up a black fluid like a mixture of powder.

⁸⁸ Boyle: A Practical Medico-Historical Account of the Western Coast of Africa, etc., 1831, p. 255.

Origin of the Epidemic.

The Timbo people believed that the sickness took its origin in the attempt at clearing a swamp in the neighborhood of Timbuctoo, and that it thence spread to Jenne, from Jenne to Footah Tauro, and thence to Footah Jallon. It was also said to have prevailed at Tamassoo, Tambacca and Kissy-Kissy.

Boyle's assertion that the epidemic first made its appearance in the interior, cannot be seriously entertained, for yellow fever is not an African product, being always imported or caused by the renewed activity of infected mosquitoes who have survived the rigors of the winter-season. Timbuctoo, which is near the southern borderline of the Desert of Sahara, is totally deficient in natural products, and provisions for the sustenance of its inhabitants come chiefly from Jenne, on the Niger, about 300 miles southwest of the capital. Timbuctoo is also the entrepot for the trade between Guinea, Senegal, Sierra Leone and North Africa, and in this way, should yellow fever be prevalent in Gambia, Senegal or Sierra Leone, it could easily be imported to Bakel, Medina or Kayes by way of the Senegal River, and from Kayes, by caravans, to the interior.

In 1828, the railroad from Kayes, the head of navigation on the Senegal, to Kita, another important town of French Soudan, had not been built, and the infection was probably carried by caravans, which acting as a firebrand, successively contaminated every village it passed through, finally infecting the capital itself. The first cases, as is always the case, and especially so in a savage country, were unrecognized, and when the epidemic became widespread, Timbuctoo was naturally accused of being the original focus. It is a notorious fact, that, even in this present era, when an epidemic of yellow fever breaks out in a locality where the disease prevails only accidentally, the original mode of infection is generally disputed and rarely settled to the satisfaction of the disputants. The New Orleans epidemic of 1905, is a glaring modern exemplification of this assertion, for up to this day, over three

years after the incident, controversies are still rife as to how, when and where the "first cases" originated.

It is of no material importance to this generation or to generations to come, whether an epidemic of yellow fever which took place over a century ago in an unknown country was imported or not; but we cannot resist the temptation of taking a dig at the assertion that the disease originated in Central Africa, and try our hand at convincing our readers of the contrary.

1878.

Almost half a century elapsed before we again hear of yellow fever in Soudan. In this instance, however, the importation is clearly proved.

In 1878, yellow fever prevailed extensively along the West Coast of Africa, and was especially severe in Senegal. While the epidemic was raging along the banks of the lower Senegal River, the French government, becoming aggrieved at the conduct of certain chiefs inhabiting the western borders of Soudan, fitted out a punitive force at Saint Louis, the capital of Senegal. The history of this expedition, which is detailed in our account of the epidemic of 1878, in Senegal (q. v.), is certainly a sorrowful one. Of 317 Europeans who took part in the expedition, 180 fell victims to yellow fever. The travel of the invading fleet up the Senegal River reminds us of the case of the James D. Porter, which, that same year, successively infected every city and town it stopped at in its memorable journey up the Mississippi River from New Orleans to Gallipolis, a distance of over a thousand miles.

The spread of the disease by the invading column is minutely narrated by Lejemble.⁸⁹

The first place to be infected was Bakel, an important mart on the upper Senegal River, three hundred and fifty miles from Saint Louis. It is a walled town of about 3,000 inhabitants, and has a large stone fortress, where a French garrison is permanently maintained.

⁸⁹ Lejemble: *Epidemiologie de la Fievre Jaune au Senegal Pendant l'Anne 1878*. Paris, 1882.

A physician from Goree, who arrived at Bakel on July 28th, is accused of having brought the infection to that village. Be that as it may, the first case at Bakel was observed on August 12th, followed by death on the 16th. At that time, the garrison of Bakel consisted of only eight white soldiers. When the last case died, September 11th, there was only one left. All the others had paid tribute to the terrible scourge.

When the punitive column reached Bakel four days after leaving Saint Louis, yellow fever had already invaded its ranks. Those who were too weak to proceed, were left at the village and the transports proceeded on their way up the Senegal River. Of the sick left at Bakel, ten died with black vomit, between September 15th and October 27th. This makes a total of seventeen deaths in the village from August 12th, to the end of the epidemic.

After leaving Bakel, the expedition passed through Kayes, but there is no record of any cases at that post.

Medina, the next important post, east of Bakel, on the Senegal River, was less fortunate. A few days after the passage of the column, yellow fever broke out in the village, and from September 20th to October 11th, there were twelve deaths among the sparse white population of the place.

The soldiers, although sick and discouraged, gave battle to the tribesmen, on September 22, 1878, near Saboucire, a town on the borders of French Soudan. It was more of a slaughter than a battle, for the natives rapidly gave way to the French, and the conflict lasted hardly an hour. The return homeward was immediately begun, with results already depicted in our account of the epidemic of 1878, in Senegal.

The soldiers did not originally bring the fever to Bakel, as seven deaths had already taken place at that post when the fleet carrying the column arrived, but the other places in Soudan were undeniably infected by the soldiers. Bakel and Medina are the only places in Soudan where a record of the deaths from yellow fever in 1878 was kept, but there is no doubt that the disease prevailed at Kayes and the other places along the banks of the Upper Senegal and its branches.

1879.

In 1879, only a few cases were observed, of which no record was kept.

1880.

In 1880, cases broke out among the laborers employed in building the railroad from Kayes to Kita. The fatalities were few.

1881.

In 1881, the fever was brought into Soudan by the troops under Colonel Desbordes, and prevailed quite extensively. The colonial health authorities wanted to segregate the infected battalions, but the home government positively refused to sanction such a movement, and the malady was allowed free play. The column continued its march, spreading the infection everywhere it stopped. The malady finally subsided for want of new material. Medina, as usual, suffered considerably. No official record was kept of the cases and deaths.

1882.

In 1882, the troops again brought the fever into Soudan. The chief victims that year were Chinese and Moroccan laborers employed on the railroad. They were buried, like dogs, along the railroad embankment. Official records are silent concerning the extent of this outbreak.

It is a remarkable fact that every history of the appearance of yellow fever in Soudan, since 1878, presents about the same characteristics: That it has never gone beyond its primitive limits, but has always shown itself on the railroad between the towns above mentioned. This can no doubt be accounted for by the fact that new-comers were constantly arriving to take the place of the laborers who had been mowed down by the disease, and as they only came from time to time and were few in number, they slowly fed the fires of contagion. This view is reinforced by the fact that cases generally cropped out shortly after the arrival of imported laborers.

It is also a curious fact that the Moroccans and Chinese who are largely used in works of construction in Western and Central Africa, are even more susceptible to yellow fever than the whites. The poor fellows die like flies when an epidemic breaks out in Soudan and their bones literally strew the line of railroad from Kayès to Kita, which was built at a cost of thousand of lives.

1891.

In 1891, there was a sudden influx of Europeans into French Soudan, and yellow fever was again imported into that region.

The first news of the prevalence of the disease reached colonial headquarters on October 17th, 1891, when a telegram was received announcing that the caravan which had left Medina, on October 6th, under military escort, had reached Kita in a deplorable condition.⁹⁰ During the journey, ten soldiers had died from various causes. The doctors who accompanied the caravan, attributed this unusual death-rate to the fierce rays of the sun and fatigues, but Dr. Primet, chief health officer of the colony was far from satisfied with this diagnosis and requested that a clinical history of every man who had died be telegraphed to headquarters. In spite of the vagueness of these details and the continued reiteration of the attending physicians that the sun and fatigues were responsible for the state of affairs, Dr. Primet came to the conclusion that these deaths were the results of a common cause, and strongly suspected an outbreak of yellow fever. These suspicions were communicated to the physicians of Kita, which appeared to be the center of infection, but the hypothesis was regarded as preposterous by these gentlemen, and the reigning malady declared to be an aggravated form of typho-malaria.

Dr. Primet desired to make an issue of the matter, and determine by investigation if an epidemic of some sort

⁹⁰ Primet: Archives de Medecine Navale, Paris, 1893; Vol. 59, pp. 357, et seq.

⁹¹ Primet: Loc. cit.

was not prevalent at Kayes, the original point of departure of the caravan, but the colonial government, fearing that a panic would ensue should publicity be given to the matter, protested against the institution of such measures, unless undeniable proofs be furnished of the existence of an unusual disorder in the suspected places. Nevertheless, secret instructions were sent to the physicians of Kayes, Kita and other towns in the suspected zone, enjoining them to take extraordinary precautions and to isolate all the cases of typho-malaria or continued fever.

These half-hearted precautions did not improve the situation. Other localities successively gave evidence of abnormal health conditions. Two cases of "bilious hematic fever" appeared at Koudou, followed by one fatality. At Segou, many cases of the same malady proved fatal, and two army officers were attacked at Siguiri. One of these died. At Medina, an unusual number of cases of typho-malaria prevailed. At Bafoulabe, the situation became more serious. Cases of "pernicious fever" became daily more frequent until October 30th, when the occurrence of black vomit in some cases left no doubt as to the nature of the disease.

But the government was skeptical; it wanted a "positive" case. A few days afterwards, a workman, originally from Bafoulabe, was admitted into the hospital, at Kayes, suffering from "continued fever." He died two days later, and the autopsy revealed undeniable lesions of yellow fever.

This positive case gave Dr. Primet the entering wedge he was waiting for, and he immediately appealed to the commandant of the colony to institute rigorous measures. He pointed out that it was undeniably yellow fever which was decimating the troops, and that grave consequences would follow if the convoys which were on their way to Kita were not prohibited from going farther into the interior. In short, it was imperative to arrest the progress of the malady at Kita.

Wishing to study the situation himself, Dr. Primet left for Bafoulabe. On his arrival, he made a rigid examination, which confirmed his reiterated assertions that the

government was face to face with an epidemic of yellow fever. Orders were at last received to resort to stringent measures to prevent the newly-arrived soldiers from becoming contaminated. These instructions, although tardy, saved the new arrivals from being decimated. The government was deploying 300 men in the region, and the turning away of the soldiers who were marching to the field of operation into less frequented roads and by-ways, although, tedious and attended with more hazards, proved their salvation. The malady was confined to the troops and laborers already in the infected zone. The beneficial results of strict attention to sanitary rules and isolation from infected centers was clearly proved by the fact that, during the three months which the invading column took to reach the scene of active military operations, only three cases of sickness took place and not a single death resulted.

In the infected region, the situation was daily getting worse. It was too late to arrest the progress of the disease. The criminal negligence of the government had caused the poison to be so widely diffused, that cases erupted at nearly every place on the Kayes-Kita railroad.

A convoy which had started from Kayes, on October 25th, for Niore, consisting of thirty-five Europeans, under the command of a captain of dragoons, lost seven men by yellow fever three days after passing through Medina, and a few days after reaching Niore.

Another convoy, which had left Bafoulabe the day after the arrival of Dr. Primet, passed through Badumbe, on November 16th, where it left four sick soldiers, who all died between the 21st and 28th of September, with undeniable symptoms of yellow fever.

A lieutenant en route to the Niger, arrived at Kita, on November 5th, and died with black vomit on the 9th.

At Bakel, one death on November 4th, followed by three more shortly after.

It would be tedious to follow the progress of the disease, as it everywhere presented the same characteristics. The appended table will give an idea of its ravages among the small European population, principally soldiers and railroad laborers, from October 27th to December 31st, 1891:

Locality.	Oct.	Nov.	Dec.	Total.
Bafoulabe	6	7	2	15
Bedumbe	0	5	0	5
Bakel	0	1	3	4
Kayes	0	3	0	3
Kita	9	3	0	12
Kondou	1	0	0	1
Medina	0	5	0	5
Nioro	0	11	0	11
	—	—	—	—
	16	35	5	56

The greatest mortality took place in November, when thirty-five deaths are recorded. The isolation of the troops from the foci of infection left the disease without fresh material, and cases occurred at rare intervals until January 8th, when the last death took place.

Origin.

Dr. Primet accuses Medina of being the focus whence radiated the Soudanese epidemic of 1891-1892. This town will be remembered as the one which suffered the most during the great epidemic of 1878, only one European being left alive after the subsidence of the malady. In 1878, Medina was infected by the Logo Expedition, which left a trail of deaths and desolation from Saint Louis to Sabourcire; but, in 1891, although an expedition was sent against the natives by the French government, there was no yellow fever in Senegal, and the invading column cannot be incriminated. How, then, did Medina become infected?

A reference to our chronological tables will show that Bonny was the only locality on the African Coast where yellow fever prevailed in 1891. In the beginning of that year, Bonny was put under quarantine by the other African colonies, but the fever finally disappearing, quarantines were raised on April 10th. Bonny is an English colony, and the commercial relations between that point and Senegal are very active. It is well-known that the natives of the interior, especially the Soudanese, for some

undefined reason, prefer articles of English manufacture, such as calicoes, leather, woolen goods, etc., and that native courriers and Syrian and Moroccan peddlers do an extensive importing business, often *a la legere*. In addition to these smugglers, the river-boats bring annually a large amount of freight up the Senegal River to Kayes, the head of navigation, whence the goods are distributed to the innumerable towns and villages on the railroad from Kayes to Kita. Beyond Kita, caravans bring the products to Timbuctoo.

It will be argued that the distance between Bonny and Kayes, is too great to admit of importation, but it must be borne in mind that the coasting-vessels plying along the coast are built so as to make swift and frequent voyages, being equipped with the latest machinery, and that they lose no time in their journey up the Senegal. Mosquitoes infected at Bonny, could thus easily have been transported to Medina, where their liberation created the focus which finally infected the several localities mentioned in this history.

Primet does not take kindly to the hypothesis of importation, but believes that the outbreak was caused by the reviviscence of the germs of the epidemic of 1881, which was more severe at Medina than anywhere else in Western Africa. The bugaboo of repullulation of germs seems to be firmly imbedded in the writings of most French authors. Even as late as 1903, we find this untenable opinion promulgated by some of the most eminent French epidemiologists, although, the doctrine first launched by Finlay, in 1883, and corroborated by innumerable experiments, should leave no doubt in the mind that the mosquito theory is the only sensible one.

1892.

Only four cases of yellow fever were observed in Sudan in 1892.

On January 8th, two cases, followed by death, occurred at Bakel.

In January a fatal case erupted at Kita.

On March 30th a case was reported at Bafoulabe, in the person of a brigadier of artillery who had recently arrived. The patient recovered.

The French government tardily resorted to the wise expedient of not sending non-immunes to the localities affected by the epidemic of 1891, and the outbreak of 1892 was confined to these four cases. As they occurred solely among new arrivals, they may be considered merely as echoes of the extensive epidemic of the previous year.

1897.

From January, 1892, to September, 1897, yellow fever was kept out of Soudan. This immunity was no doubt due to the fact that the disease did not prevail in the Lower Senegal Valley, and that the movement of the French troops were not very active during that period.

The first case was observed at Talary, a military post on the Kayes-Kita railroad, between Galongo and Bafoulabe. The victim was taken sick September 20th, and died on the 24th.

On October 8th, a railroad foreman died on a train between Galongo and Talary, while on his way to the hospital, at Kayes. He had been confined to his bed since the 5th of the month.

The third case occurred at Mahina, a village on the railroad, a few days later, in the person of an army sergeant, who died on the 15th.

Three deaths within as many weeks, from undoubtedly a common cause, aroused the suspicions of Dr. Auvray, chief health officer, who fitted out a special train and went to Mahina to make a personal examination of the situation. While the lesions were decidedly suspicious, the doctor hesitated to pronounce it a case of yellow fever, as that disease had not been observed in Soudan for the past five years. He afterwards admitted, when the malady became epidemic, that this and the other cases were undeniably manifestations of yellow fever.

On his return from Mahina, Dr. Auvry stopped at Diamou, which is mid-way between Talary and Kayes, where

he took in charge a soldier who had been ill for two days previously. This patient was transported to the hospital at Kayes, where he died on the 18th. The autopsy revealed the identical lesions which had been found in the case of the army sergeant. A diagnosis of yellow fever was withheld, however, as the doctor feared the consequences which would follow the publicity of such an announcement.

On October 19th two cases were admitted into the hospital, one from Galongo and the other from Mahina. The first case died on the 22nd, the second on the 23rd.

October 16th, a Catholic missionary died, at Dinguira.

The death of the missionary was so undeniably due to yellow fever, that the diagnosis was given publicity. When the news reached Senegal, a strict quarantine was inaugurated against Soudan, and the movement of troops ordered stopped until the subsidence of the epidemic.

The government had not forgotten the terrible lesson of 1891.

October 20th, a fatal case at Kale.

October 31st, two cases admitted into the hospital at Kayes, one from Galongo and the other from Mahina. Both recovered.

November 2nd, a case erupted at Dioubeda. The patient died on the train while being transported to Kayes.

On November 2nd, a priest died at Kita.

On November 10th, a case erupted at Diamous. The patient was transported to the hospital, at Kayes, where he recovered.

On November 10th, occurred the first case at Kayes. The patient was an army sergeant who had gone to Corinville, on November 4th, where he remained until the following day. On his return, he had stopped at Diamou, where he probably contracted the disease. He died November 13th.

November 12th, second case at Kayes, followed by death on the 19th.

The epidemic seemed to end with the death on the 19th, and no new cases being observed for two weeks, Senegal raised the quarantine which had been instituted against Soudan. The medical constitution of the dependency ap-

peared to have resumed its normal condition, when a case of yellow fever suddenly erupted, at Kayes, on December 6th, in the person of the assistant commissary of the town. On the same day, two patients who had been under treatment at the hospital for simple fever, suddenly showed suspicious symptoms and were placed under close observation.

The three cases above cited terminated fatally, the first on December 8th, the second on the 9th, and the third on the 15th.

A mild case, followed by rapid recovery, was observed a few days later, at Kayes. This was the last echo of the epidemic of 1897.

Statistics of the Epidemic of 1897.

The fatalities of the epidemic of 1897 were few, because the European population was small. There were only eighteen whites employed along the railroad. These furnished fourteen cases and ten deaths. There were six cases and four deaths among the soldiers. No mention is made of the course of the disease among the Chinese and Moroccans, who generally die like flies whenever an epidemic of any sort prevails in the Soudan, be it yellow fever, malaria or typhoid. Out of a total of twenty-five cases, there were nineteen deaths, fourteen on the Kayes-Kita railroad and five outside of the infected zone. The deaths were distributed as follows:

Locality.	Sept.	Oct.	Nov.	Dec.	Total.
Diamou	0	1	0	0	1
Dingnina	0	1	0	0	1
Diobede	0	1	0	0	1
Galongo	0	1	0	0	1
Kale	0	2	0	0	2
Kayes	0	0	1	3	4
Kita	0	1	0	0	1
Mahina	0	1	0	0	1
Talary	1	1	0	0	2
	—	—	—	—	—
Total on Kayes-Kita Railroad.	1	9	1	3	14
Unclassified					5
					—
Total deaths					19

Origin.

The origin of the epidemic of 1897 is shrouded in mystery. As no cases had been observed for over five years, the genesis of spontaneity can certainly not be suspected. Auvray and Boury,⁹² from whose account the salient facts of this epidemic are taken, following in the trend of the majority of French writers, argue in favor of the telluric origin of the epidemic. The theory of evolution of the yellow fever germ promulgated by these learned gentlemen is certainly remarkable. According to their way of reasoning, yellow fever is produced by a microbe which, continuing to evolve in the cadaver, finally invades the surrounding earth, which becomes an immense culture-field, where the organism develops, until it either arrives spontaneously at the surface or is accelerated into virulent activity by being dug out from its cachette by the profane hand of man. Once at the surface, the germs circulate at will, spreading the infection far and wide. The digging of the soil along the line of the Kayes-Kita Railroad, where are inhumed thousands of yellow fever victims, is given as the active cause of the epidemic of 1897.

The theory of spontaneity being untenable, where are we to look for the source of infection? There was no yellow fever in Senegal, in 1897. As Soudan has always been contaminated by Senegal, we must look elsewhere. But where? A search through consular reports and official records fails to bring to light a single case of yellow fever on the Western Coast of Africa, in 1897; but, of course, this does not mean that yellow fever was not present and the fact officially suppressed. The ways of colonial governments, like those of the Heathen Chinese, are dark and tricky. The political history of the African colonies demonstrates that hygienic regulations are subservient to commercialism, no matter what the risk may be. The penalty for this transgression has often been severe, but mammon worship closes the eyes to past events

⁹² Auvray and Boury: *Annales d'Hygiene et de Medecine Coloniales*, 1898, vol. 1, p. 433, et seq.

and the same thing happens again and again.

How the fever was imported into Soudan in 1897, will therefore remain hidden behind the mists of conjecture.

1901.

The year 1901 witnessed another outbreak of yellow fever in Soudan. There were many cases, but the deaths were not numerous.

1902.

The first cases in 1902 were observed about October 1st, in the same localities as in 1897 and 1901. There were altogether fourteen cases and ten deaths. Five of the deaths occurred at Kayes and five along railroad.⁹³

1907.

After five years of respite, yellow fever again made its appearance in Soudan, among the same localities visited by previous epidemics, in November, 1907. The epidemic was attended with the usual heavy percentage of mortality. Between November 1st and 30th, a total of thirty-cases, with sixteen deaths, were reported.⁹⁴

We have not been able to ascertain the source of the outbreak.

1908.

We had thought that the epidemic of 1907 would close the history of yellow fever in Soudan, so far as our work is concerned, but, "as we go to press," to use the favorite expression of up-to-date journalism, we are informed by consular reports that the disease has again broken out in Upper Senegal Valley. Drastic preventive measures are being taken by the French government, and we hope that the invasion will be throttled in its inceptency.

We have no means of ascertaining, at this late date,

⁹³ Kermorgant: *Annales d'Hygiene et de Médecine Coloniales*, 1904; vol. 7, p. 405.

⁹⁴ U. S. Public Health Reports, 107; vol. 2, p. 156.

how the fever was imported into Soudan, in 1907-1908, but as every outbreak in the past has co-incided with the movements of the French troops from Senegal into the interior, we have no doubt that the same thing happened in this instance. The disease has never manifested itself outside of the zone usually traversed by these troops, and in only one instance (1828) has it been observed further east than Kita, until very recently the terminus of the railroad. The epidemic of 1828-1829 (q. v.) may be considered as an anomaly, which has never been duplicated and probably never will be, unless the white race, blind to the folly of such an act, should attempt to permanently occupy this insalubrious region.

CHRONOLOGY OF YELLOW FEVER IN AFRICA
AND THE ISLANDS OFF THE COAST
THEREOF, FROM 1494 TO 1907.

FIFTEENTH CENTURY.

First Appearance of Yellow Fever off the Coast of Africa.

1494. Canary Islands.

1495. Canary Islands.

1496. Canary Islands.

1497 to 1509. *Period of Immunity. Thirteen Years.*

SIXTEENTH CENTURY.

1510. Cape Verd Islands.

1511. Cape Verd Islands.

1512. Canary Islands, Cape Verd Islands.

1513. Cape Verd Islands.

1514. Cape Verd Islands.

1515. Cape Verd Islands.

1516 to 1519. *Immunity. Four Years.*

1520. Benin.

1521 to 1530. *Immunity. Ten Years.*

1531. Canary Islands.

1532 to 1552. *Immunity. Twenty-one Years.*

1553. Benin.

1554 to 1557. *Immunity. Four Years.*

1558. Saint Thomas Island.

1559 to 1581. *Immunity. Twenty-three Years.*

1582. Canary Islands.

1583 to 1587. *Immunity. Five Years.*

1588. Benin, Saint Thomas Island.

1589 to 1598. *Immunity. Ten Years.*

1599. Canary Islands.

SEVENTEENTH CENTURY.

1600. *Immunity. One Year.*

1601. Canary Islands.

1602 to 1605. *Immunity. Four Years.*

1606. Canary Islands.

1607 to 1638. *Immunity. Thirty-two Years.*

1639. Cape Verd Islands.

1640 to 1700. *Immunity. Sixty-one Years.*

EIGHTEENTH CENTURY.

1701. Canary Islands.

1702 to 1752. *Immunity. Fifty-one Years.*

1753. Madeira Islands.

1754 to 1758. *Immunity. Five Years.*

1759. Senegal.

1760-1761. *Immunity. Two Years.*

1762. Gambia.

1763. Sierra Leone.

1764. Gambia, Sierra Leone.

1765. *Immunity. One Year.*

1766. Gambia, Senegal, Sierra Leone.

1767. *Immunity. One Year.*

1768. Gambia.

1769. Gambia, Senegal. ..

1770. *Immunity. One Year.*

1771. Canary Islands.

1772. Canary Islands.

1773. Canary Islands.

1774 to 1777. *Immunity. Four Years.*

1778. Cape Verd Islands, Gambia, Gold Coast, Senegal, Sierra Leone.

1779. Senegal.

1780 to 1785. *Immunity. Six Years.*

1786. Gold Coast.

1787 to 1791. *Immunity. Five Years.*

1792. Bulam Island, Fernando-Po.

1793 to 1803. *Immunity. Eleven Years.*

NINETEENTH CENTURY.

1804. Morocco.

1805 to 1806. *Immunity. Two Years.*

1807. Cape Verd Islands, Sierra Leone.

1808. *Immunity. One Year.*

1809. Sierra Leone.

1810. Canary Islands.

1811. Canary Islands.

1812. Fernando-Po, Sierra Leone.

1813 to 1814. *Immunity. Two Years.*

1815. Sierra Leone.

1816. Congo Coast, Sierra Leone.

1817. *Immunity. One Year.*

1818. Ascension Island.

1819. Sierra Leone.

1820. *Immunity. One Year.*

1821. Cape Verd Islands.

1822. Cape Verd Islands, Gold Coast, Sierra Leone.

1823. Ascension Island, Gold Coast, Sierra Leone.

1824. Gold Coast.

1825. Gambia, Sierra Leone.

1826. Sierra Leone.

1827. Cape Verd Islands.

1828. Benin, Canary Islands, Gambia, Senegal, Sierra Leone, Soudan.

1829. Fernando-Po, Senegal, Sierra Leone, Soudan.

1830. Saint Helena, Senegal, Sierra Leone.

1831 to 1836. *Immunity. Six Years.*

1837. Cape Verd Islands, Gambia, Senegal, Sierra Leone.

1838. Ascension Island, Cape Verd Islands, Sierra Leone.

1839. Fernando-Po, Sierra Leone.

1840 to 1844. *Immunity. Five Years.*

1845. Sierra Leone.

1846. Canary Islands, Cape Verd Islands.

1847. Ascension Island, Banana Islands, Canary Islands, Cape Verd Islands, Sierra Leone.

1848. Sierra Leone.

1849 to 1851. *Immunity. Three Years.*

1852. Benin, Gold Coast, Ivory Coast.

1853. Benin, Gold Coast.

1854. Benin, Gold Coast.

- 1855. Benin, Gold Coast.
- 1856. Benin, Gold Coast.
- 1857. Benin, Fernando-Po, Gold Coast, Ivory Coast.
- 1858. Sierra Leone.
- 1859. Ascension Island, Gambia, Senegal, Sierra Leone.
- 1860. Angola, Congo Coast, Fernando-Po, Gambia, Sierra Leone.

1861. *Immunity. One Year.*

- 1862. Angola, Benin, Bonny, Calabar, Canary Islands, Cape Verd Islands, Congo Coast, Fernando-Po, Gold Coast, Ivory Coast, Sierra Leone.
- 1863. Angola, Ivory Coast.
- 1864. Cape Verd Islands, Fernando-Po, Lagos, Sierra Leone.
- 1865. Angola, Gambia, Sierra Leone.
- 1866. Fernando-Po, Gambia, Senegal, Sierra Leone.
- 1867. Senegal.
- 1868. Cape Verd Islands, Fernando-Po, Sierra Leone.
- 1869. Fernando-Po.

1870 to 1871. *Immunity. Two Years.*

- 1872. Senegal, Sierra Leone.
- 1873. Ascension Island, Benin, Cape Verd Islands.

1874 to 1877. *Immunity. Four Years.*

- 1878. Gambia, Senegal, Sierra Leone, Soudan.
- 1879. Senegal, Soudan.
- 1880. Senegal, Soudan.
- 1881. Bonny, Morrocco, Senegal, Soudan.
- 1882. Senegal, Soudan.

1883. *Immunity. One Year.*

- 1884. Gambia, Sierra Leone.

1885 to 1887. *Immunity. Three Years.*

1888. Canary Islands.

1889-1890. *Immunity. Two Years.*

1891. Soudan.

1892. Soudan.

1893 to 1896. *Immunity. Four Years.*

1897. Soudan.

1898. Gold Coast.

1899. Ivory Coast.

TWENTIETH CENTURY.

1900. Congo Coast, Gambia, Senegal.

1901. French Guinea, Senegal, Soudan.

1902. Ivory Coast, Soudan.

1903. Ivory Coast, Soudan.

1904. Ivory Coast (on shipboard).

1905. Canary Islands, Ivory Coast (on shipboard),
Senegal.

1906. Dahomey, Soudan.

1907. Dahomey, Soudan.

SUMMARY OF YELLOW FEVER YEARS AND
PERIODS OF IMMUNITY IN AFRICA, FOR
FOUR HUNDRED AND FOURTEEN YEARS,
1494 to 1907.

YELLOW FEVER YEARS.		PERIODS OF IMMUNITY.	
1494-1496	3	1497-1509	13
1510-1515	6	1516-1519	4
1520	1	1521-1530	10
1531	1	1532-1552	21
1553	1	1554-1557	4
1558	1	1559-1581	23
1582	1	1583-1587	5
1588	1	1589-1598	10
1599	1	1600	1
1601	1	1602-1605	4
1606	1	1607-1638	32
1639	1	1640-1700	61
1701	1	1702-1752	51
1753	1	1754-1758	5
1759	1	1760-1761	2
1762-1764	3	1765	1
1766	1	1767	1
1768-1769	2	1770	1
1771-1773	3	1774-1777	4
1778-1779	2	1780-1785	6
1786	1	1787-1791	5
1792	1	1793-1803	11
1804	1	1805-1806	2
1807	1	1808	1
1809-1812	4	1813-1814	2
1815-1816	2	1817	1
1818-1819	2	1820	1
1821-1830	10	1831-1836	6
1837-1839	3	1840-1844	5
1845-1848	4	1849-1851	3
1852-1860	9	1861	1

1862-1869	8	1870-1871	2
1872-1873	2	1874-1877	4
1878-1882	5	1883	1
1884	1	1885-1887	3
1888	1	1889-1890	2
1891-1892	2	1893-1896	4
1897-1907	11		

Total Yellow Fever
Years101

Total Years of Im-
munity313

RECAPITULATION.

Yellow Fever Years	101
Years of Immunity	313
	<hr/>
Total years under observation	414

CHRONOLOGY OF YELLOW FEVER IN AFRICA,
BY LOCALITIES.

Angola—1860, 1862, 1863, 1865.

Ascension Island—1818, 1823, 1838, 1847, 1859, 1873.

Banana Islands—1847.

Benin—1520, 1553, 1588, 1828, 1852, 1853, 1854, 1855,
1856, 1857, 1862, 1873.

Bonny—1862, 1891.

Bulam (Island of)—1792.

Calabar—1862.

Canary Islands—1494, 1495, 1496, 1512, 1531, 1582,
1599, 1601, 1606, 1701, 1771, 1772, 1773, 1810, 1811, 1828,
1846, 1847, 1862, 1888, 1905.

Cape Verd Islands—1510, 1511, 1512, 1513, 1514, 1515,
1639, 1778, 1807, 1821, 1822, 1827, 1837, 1838, 1846, 1847,
1862, 1864, 1868, 1873.

Congo Coast—1816, 1860, 1862, 1900.

Dahomey—1906, 1907.

Fernando-Po (Island of)—1792, 1812, 1829, 1839, 1857,
1860, 1862, 1864, 1866, 1868, 1869.

French Guinea—1901.

Gambia—1762, 1764, 1766, 1768, 1769, 1778, 1825, 1828,
1837, 1859, 1860, 1865, 1866, 1878, 1884, 1900.

Gold Coast—1778, 1786, 1822, 1823, 1824, 1852, 1853,
1854, 1855, 1856, 1857, 1862, 1898.

Guinea—(*See Benin, Dahomey, French Guinea, Gold
Coast, Ivory Coast, Lagos and Sierra Leone*).

Ivory Coast—1852, 1857, 1862, 1863, 1899, 1902, 1903,
1904, 1905.

Lagos—1864.

Madeira Islands—1738.

Morocco—1804, 1881.

Saint Helena (on ship-board)—1830.

Saint Thomas—1558, 1588.

Senegal—1759, 1766, 1769, 1778, 1779, 1828, 1829, 1830,
1837, 1859, 1866, 1867, 1872, 1878, 1879, 1880, 1881, 1882,
1900, 1901, 1905.

Sierra Leone—1763, 1764, 1766, 1778, 1807, 1809, 1812, 1815, 1816, 1819, 1822, 1823, 1825, 1826, 1828, 1829, 1830, 1837, 1838, 1839, 1845, 1847, 1848, 1858, 1859, 1860, 1862, 1864, 1865, 1866, 1868, 1872, 1878, 1884.

Soudan—1828, 1829, 1878, 1879, 1880, 1881, 1882, 1891, 1892, 1897, 1901, 1902, 1903, 1906, 1907.

YELLOW FEVER VISITATIONS IN AFRICA, BY LOCALITIES.

Locality.	Year of First Appearance.	Year of Last Appearance.	TOTAL NUMBER OF VISITATIONS.
Angola	1860	1865	4
Ascension Island .	1818	1873	6
Banana Islands ..	1847	1847	1
Benin	1520	1873	12
Bonny	1862	1891	2
Bulam	1792	1792	1
Calabar	1862	1862	1
Canary Islands ..	1494	1905	21
Cape Verd Islands	1510	1900	20
Congo Coast	1816	1900	4
Dahomey	1906	1907	2
Fernando-Po	1732	1869	11
French Guinea ..	1901	1901	1
Gambia	1762	1900	16
Gold Coast	1778	1898	13
Ivory Coast	1852	1903	9
Lagos	1864	1864	1
Madeira Islands .	1738	1738	1
Morocco	1804	1881	2
Saint Helena . . .	1830	1830	1
Saint Thomas . . .	1558	1588	1
Senegal	1759	1905	21
Sierra Leone . . .	1763	1884	34
Soudan	1828	1907	15

Total number of yellow fever eruptions in
Africa from 1494 to 1907..... 200

GENERAL STATISTICAL SUMMARY.

YELLOW FEVER IN AFRICA AND THE ISLANDS OFF THE COAST
THEREOF, FROM 1494 TO 1907.

Total number of years under observation.....	414
Yellow fever years	101
Years of Immunity	313
Total number of countries where the disease pre- vailed, either epidemically or sporadically.....	24
Total number of yellow fever eruptions.....	200

(The alleged eruptions of yellow fever in Egypt, Johanna Island and Madagascar, mention of which is made in our historical resume, are not included in the above tables, for the reason that we do not think they were manifestations of the disease under consideration. G. A.)

HISTORY
OF
YELLOW FEVER
IN
EUROPE.

AUSTRIA.

TRIESTE.

Trieste, the only place in Austria, ever invaded by yellow fever, is an important seaport at the head of the Adriatic Sea, seventy-three miles northeast of Venice, Italy. Population: 1870, 109,324; 1890, 158,344; 1907 (estimated) 200,962.

YELLOW FEVER YEAR.

1894.

SUMMARY OF IMPORTATION.

The history of yellow fever in Austria is focused into a single importation of that disease.

In 1894, the Italian steamship *Colombo* arrived at Genoa Italy, from Brazil. The captain reported having had yellow fever on the homeward trip. The vessel was disinfected and allowed to land her passengers and cargo. Two of the crew, who lived in Trieste, took the train for their native town as soon as they were permitted to land. They were ill at the time, but no attention was paid to this by the Genoese authorities. On their arrival at Trieste, the two sailors were taken violently sick and removed to the hospital, where they died a few days later, with all the symptoms of yellow fever.

The infection did not spread.

¹Eager: Bulletin No. 8, Yellow Fever Institute, Washington, D. C., 1902, p. 33.

AZORES.

DESCRIPTION.

The Azores, or Western Islands, are a group of nine islands in the Atlantic Ocean, 900 miles west of Portugal. Although, presumably discovered by Cabral, in 1431, the Azores were evidently known to the ancients as they are mentioned by the Arabian geographer, Edrisi, and are distinctly marked on a map of 1351. Punic coins found on the island of Covo, leads to the belief that the archipelago was visited by the Carthagenians. The islands belong to Portugal, and are a geographical part of Europe. Population, 270,000. Capital, Ponta Delgado, on the island of Sao Miguel.

YELLOW FEVER YEAR.

1858.

SUMMARY OF IMPORTATION.

Although in the path of commerce between America and Europe, the Azores are seldom visited by merchant vessels. This is probably due to the fact that the archipelago has no good harbors. To this isolation, is no doubt due the almost total immunity of the group from yellow fever, for only a solitary invasion of the disease is recorded.

According to Avelino³ and Guimaraes,⁴ yellow fever was imported to Ponta Delgado by a vessel from Brazil, in 1858, under the following conditions:

² Pedro Alvarez Cabral, a Portugese navigator, was born about 1460 and died in 1526. At the time he discovered the Azores, the islands were uninhabited and had scarcely any living things, except birds, particularly hawks. The Portugese called the whole group Azores, from "acor" or "azor," a hawk.

³ Avelino: *Gaz. Med. de Lisboa*, 1858, vol. 6, pp. 312; 327; 342.

⁴ Grimaraes: *Ibid.*, p. 358.

On August 1st, 1858, two sailors, Ramao Jose and Jose Navio, arrived at Ponta Delgado from Lisbon, on the Brazilian ship *Dois Amigos*. The men were in the first stages of yellow fever and were taken to the Hospital Misericordia. Jose died August 4th. Navio recovered and was discharged cured on August 27th. He embarked on the passenger packet *Domingo*, and was taken to the Cape Verd Islands, whence he returned to Lisbon, on the *Dois Amigos*, the same vessel which had brought him to Ponta Delgado.

Avelino mentions a third case, that of a servant at the Hopital Misericordia, who was attacked on August 4th, the day of the death of the first sailor. This case recovered, the man being well enough to resume his duties by August 12th.

Avelino doubts that this third case was yellow fever, but as the patient had been in contact with the sick, his illness was classed as such.⁵

Grimaraes' article is far from being a gold mine of information. He discusses Avelino's methods, but cites nothing which could throw additional light upon the subsequent history of this importation.

⁵ "A primeira e segunda observacao nao me deixaram, nem a nenhum dos meus collegas acima mencionados, a menor duvida de que os doentes que fazem o objecto d'ellas foram ambos affectados de febre amarella. Foram dois casos esporadicos. Nao pensamos, porem, assim acerca do doente da terceira observacao, que persumimos ter apresentado os prenomenos que descrevi, por effeito de alguma disposicao gastrica, cujos symptomas morbidos foram despertados pelas causas occasionaes que assignalei, auxiliadas mui provave'mente pelo terror."—Avellino, loc. cit.

FRANCE.

Unlike her neighbor on the southwest, France does not occupy a prominent place in the annals of yellow fever. No cases have ever been known to originate on French soil. The outbreak at Saint Nazaire, in 1861, and the sporadic eruptions in the other localities mentioned in this history were flagrant importations, and the manifestations of the disease on shore were traced in every instance to persons who had communicated with vessels arriving from infected ports or who had come direct from localities where the Antillean pestilence was prevailing. The miniature epidemic of 1861, which caused the little town of Saint Nazaire world-wide notoriety, is the only serious manifestation of the disease under discussion which has ever invaded France. In every other instance, the malady was confined to the quarantine basins and lazarettos of the seaports having direct communication with yellow fever foci. When a case occurred on shore, it was unequivocally traced to the above sources. The "cases presenting all the symptoms of yellow fever" which epidemiologists claim to have observed in Paris, details of which are given in the history of yellow fever as it concerns Paris, in this volume, were not manifestations of the disease. Of this, there can be no doubt, for reasons patent even to the most careless observer.

CHRONOLOGY OF YELLOW FEVER IN FRANCE.

1694 to 1908.

1694. Rochefort (not authentic).
1696. Aix.
1700. La Rochelle (not authentic).
1802. Brest; Marseilles.
1804. Marseilles.
1807. Marseilles.
1811. Bordeaux; Brest; Marseilles; Rochefort.
1815. Brest.
1820. Marseilles.
1821. Marseilles; Montpellier.
1822. Paris (not authentic).
1823. Marseilles.
1839. Brest.
1845. Paris (not authentic).
1856. Brest.
1857. Nantes.
1861. Havre; Montoir; Saint-Nazaire.
1862. Saint-Nazaire.
1870. Marseilles.
1881. Bordeaux; Dunkirk; Havre; Mindin; Saint-Nazaire.
1883. Paris (not authentic),
1891. Marseilles.
1899. Bordeaux; Marseilles; Nantes.
1900. Havre.
1908. Saint Nazaire.

BY LOCALITIES.

Aix. 1696.

Bordeaux. 1811; 1881; 1899.

Brest. 1802; 1811; 1815; 1839; 1856.

Dunkirk. 1881.

Havre. 1861; 1881; 1900.

La Rochelle. 1700 (not authentic).

Marseilles. 1802; 1804; 1807; 1811; 1820; 1821; 1823;
1870; 1891; 1899.

Montpellier. 1821.

Mindin. 1881.

Montoir. 1861.

Nantes. 1857; 1899.

Paris. 1822; 1845; 1883. (None of these alleged manifestations are authentic).

Rochefort. 1694 (not authentic); 1811.

Saint Nazaire. 1861; 1862; 1881; 1908.

LOCALITIES IN FRANCE WHERE YELLOW
FEVER HAS BEEN OBSERVED.

Aix. A city in the department of Bouches-de-Rhone, seventeen miles north of Marseilles.

Bordeaux. A seaport, 358 miles southwest of Paris, in the department of Garonne (Guienne), on the Garonne River, sixty miles from its entrance into the Bay of Biscay. It has a large harbor, capable of containing 1,200 ships. Population: 1875, 215,140; 1891, 242,259; 1907, (estimated), 253,000.

Brest. A city in the northwest extremity of France, department of Finistere (Bretagne), about 389 miles by rail, west of Paris. It is advantageously situated on the north shore of an arm of the Atlantic Ocean, called the Road of Brest. It is one of the foremost naval ports of Europe. Population: 1876, 66,828; 1891, 75,854; 1907 (estimated), 85,263.

Dunkirk. A fortified seaport on the northernmost coast of France, on the Strait of Dover, forty miles northwest of Lille.

La Rochelle. A fortified seaport, in Charente-Inferieure on the Atlantic, nearly mid-way between Nantes and Bordeaux. Population: 1907 (estimated), 51,553.

Havre. A city in the north of France, department of Seine-Inferieure (Normandy), on the north side of the estuary of the Seine, at its entrance into the English Channel, 143 miles northwest of Paris. It is an active manufacturing center. Being the port of Paris, Havre does an extensive passenger traffic and is connected by rail and steamships with all parts of the world. Regular lines of steamers ply between Havre and Havana, the West Indies and South America. Population: 1861, 74,336; 1891, 114,004; 1907 (estimated), 132,430.

Montpellier. A city in the south of France, celebrated for the brightness of its atmosphere and the mild salubrity of its climate. Population: 1891, 69,238.

Marscilles. The most important port of Southern France, department of Bouches-du-Rhone (Provence), at the head of a bay which opens into the Gulf of Lyons. It is 200 miles southeast of Lyons and 535 miles south of Paris. Its commerce extends to all parts of the world, and it is the principal point of debarkation of passengers for the various ports of the Mediterranean and the East. Population: 1862, 260,910; 1881, 269,340; 1891, 403,749; 1907 (estimated), 517,498.

Mindin. A suburb of Nantes.

Montoir-de-Bretagne. Commonly called Montoir. A town in Loire-Inferieure, twenty-nine miles northwest of Nantes.

Nantes. Capital of the department of Loire-Inferieure (Bretagne), at the confluence of the Erdre and Sevre-Nantaise Rivers, and 245 miles by rail west of Paris. Next to Brest, it is the most important port on the Atlantic coast of France. The city is built on several small islands in the Loire, which communicate with each other by means of numerous bridges. A canal connects Nantes with Brest. It has many manufactures and an extensive maritime commerce. Population: 1886, 127,482; 1891, 122,750; 1907 (estimated), 133,247.

Paris, Capital of France.

Rochefort. A city on the west coast of France, department of Charente-Inferieure (Saint Onge), on the Charente River, seven miles from its entrance into the Bay of Biscay. It is twenty miles southeast of La Rochelle, and eighty-nine miles southwest of Poitiers, and is an important commercial center. Population: 1851, 15,508; 1871, 18,352; 1891, 26,170.

Saint-Nazaire. A city on the west coast of France, in Loire-Inferieure (Bretagne), at the mouth of the Loire, thirty-seven miles by rail, west of Nantes. It is the terminus of passenger steamers which ply between that part of France and Mexico and the West Indies. Population: 1851, 2,400; 1881, 16,314; 1891, 26,467.

AIX.

YELLOW FEVER YEAR.

1696.

SUMMARY OF EPIDEMIC.

The pestilence which ravaged Rochefort in 1694 caused the French government to take extraordinary precautions against the importation of yellow fever, and to these measures inaugurated by Pontchartrain, Aix undoubtedly owes her escape from an invasion of the dreaded pest in 1696. In the month of August, of that year, the squadron of Admiral de Pointis, which had been cruising in the

West Indies, arrived in the harbor of Aix. There were many cases of yellow fever on board the vessels, and they were ordered to quarantine, for fear that the disease might be introduced on shore. These drastic steps were instrumental in confining the malady to the ships.⁶

BORDEAUX.

YELLOW FEVER YEARS.

1811, 1881, 1899.

SUMMARY OF EPIDEMICS.

1811.

The archives of Bordeaux are silent regarding the prevalence of yellow fever in that town, in 1811, but Robert (Guide Sanitaire, vol. 1, page 104), claims that several cases were observed in the shipping. According to this authority, no cases erupted on shore. . .

1875.

No cases of yellow fever were observed in the city proper, in 1875, but the following infected vessels were detained at the quarantine station:⁷

The *Orinoco*, from Brazil. Two deaths from yellow fever on the passage to Bordeaux.

The *Senegal*, two deaths.

The *Liguria*, one death.

The *Gironde*. One death while in the harbor of Bahia, Brazil, and four cases and two deaths on the voyage from Bahia, one of the deaths occurring six days before the arrival of the vessel at Bordeaux.

The *Corcorado*, from Brazil. This vessel arrived at about the same time as the *Gironde*, with an unclean bill

⁶ Berenger-Feraud: Traite Theorique et Pratique de la Fievre Jaune (Paris, 1890), p. 37.

⁷ Armaingnaud: Memoires et Bulletins de la Societe de Medecine et de Chirurgie de Bordeaux, 1875, p. 253.

of health, and 416 passengers. The authorities, although apprehensive of the introduction of yellow fever, found it impossible to segregate the passengers, as the lazaretto could accommodate only 210 at the utmost. As no cases had occurred during the voyage, pressure was brought upon the government to release the passengers, with the result that they were allowed to go free, but the vessel was remanded to quarantine for observation.

The dumping of over 400 persons from a vessel said to be infected with yellow fever upon an immense non-immune population, caused widespread criticism, both in France and abroad, but no diffusion of the disease eventuating the incident was soon forgotten.

1881.

A severe epidemic of yellow fever ravaged the French possession of Senegal in 1881 and the settlers fled to their native land. By this means, some of the steamers plying between the West Coast of Africa and Europe were contaminated and carried the disease to several ports of France.

THE CASE OF THE EDGARD.

Yellow fever erupted at Saint-Louis, the capital of Senegal, on July 24th, 1881. The English steamship *Edgard*, with a crew of twenty-one, arrived at the town on August 1st, and, although the port had been officially declared infected, remained at the wharf for twelve days, communicating freely with the shore. On August 13th, the vessel embarked seven refugees and left for France. The following day, yellow fever erupted on board, in the person of a fireman, who died on the 17th. On the 19th, another fireman was attacked and died on the 26th. On the 21st, an oiler was taken ill and died on the 29th; on the 31st, a cabin-boy was attacked, dying on September 2nd. On September 1st, the second engineer was stricken.

Such was the melancholy record when the *Edgard* steamed into the harbor of Bordeaux on September 3rd.

The passengers and crew were transferred to the lazaretto at Paulliac, where fifteen additional cases, with one death, occurred, exclusively among the sailors. The second engineer also succumbed a few days after his removal to the lazaretto.

The most singular phase of this outbreak on board of the *Edgard*, is that not a single passenger suffered, the attacks being confined exclusively to the crew. The escape of the passengers from infection is believed by Duval⁸ and Berenger-Feraud⁹ to have been due to the fact that they fled to the poop of the vessel as soon as the first case erupted and remained aloof from the nidus of infection during the entire voyage from Senegal to Bordeaux. The officers, with one exception, had no communication whatever with the sick, leaving them to the care of the surgeon, and escaped; but the unfortunate engineer, who communicated freely with the patients, was less fortunate, as we have seen.

Of the twenty-one composing the crew of the *Edgard*, six were attacked and five died on the voyage from Saint-Louis to Bordeaux, and fifteen were affected and two died (one an officer) in the lazaretto at Paulliac, making a total of twenty-one cases and seven deaths.⁹

THE CASE OF THE CONDE.

The French steamship *Conde*, plying between Senegal and Bordeaux, arrived at Saint-Louis, on August 7th, 1881. There was no sickness on board. There was unrestrained communication between the town and the vessel. On August 15th, sudden appearance of yellow fever

⁸ Duval: *La Fievre Jaune a Goree, Senegal* (Bordeaux, 1883), p. 84.

⁹ Berenger—Feraud: *Traite Theorique et Pratique de la Fievre Jaune* (Paris, 1890) p. 183.

on board, in the person of two sailors and the chief cook. The three patients were sent to the hospital on shore, where they died in a few days. On the 20th, the captain was taken ill and died on the 21st; another case erupted the same day. That same afternoon (21st), the vessel left for France, having taken thirty-two refugees at Saint-Louis. An attempt was made to coal at Dakar, but when the condition of the vessel was made known to the authorities, permission was denied. After an appeal to the colonial government, the vessel was allowed to coal from barges in mid-stream, extraordinary precautions being taken to prevent contamination. On August 23rd, the *Conde* resumed its voyage. The wisdom of the authorities of Dakar in prohibiting the vessel from landing at her wharves soon made itself manifest. Three days after leaving Dakar, the fever broke out again. Following is the record of deaths from the 27th to the time of the vessel's arrival at Bordeaux, September 9th:

August.	September.
27th..... 1	1st..... 1
29th..... 2	2nd..... 2
30th..... 2	5th..... 1
31st..... 1	6th..... 1
	7th..... 1

When the *Conde* arrived at Bordeaux, the passengers and crew were sent to the lazaretto at Paulliac, where one death took place on the 9th, two on the 10th, and one on the 11th.

The *Conde* furnished altogether thirty-two deaths from August 15th to September 11th, seven at Saint-Louis, twelve on the homeward voyage and four at Paulliac. The number of cases is not stated by our authority.¹⁰

¹⁰ Duval, *loc. cit.*, p. 85.

THE CASE OF THE RICHELIEU.

A third infected vessel reached Bordeaux, in 1881.

The *Richelieu*, one of the largest passenger steamers plying between Bordeaux and Senegal, arrived at Bordeaux, on September 26th, 1881, with 105 refugees on board. The vessel had come directly from Bop-Diara, Senegal, where yellow fever was prevailing. The captain gave the following history:¹¹

The *Richelieu* arrived at Goree, Senegal, on August 3rd, 1881; on the 13th, arrived at Saint-Louis and anchored near the camp of Bop-Diarra, where most of the yellow fever cases from the capital were sent. On September 7th, the disease erupted on board, three patients being sent to the hospital. On the 9th, another patient was sent to the hospital. On the 9th, 105 refugees, soldiers and civilians were embarked, and the vessel left for home. On the 10th, a young girl and a seaman were taken ill and sent ashore, the vessel being still in the river. Another case erupted on the evening of the 10th, resulting in death on the 12th. The captain, attacked on the 11th, recovered. The chief cook, also attacked on the 11th, recovered, although he had black vomit. A sergeant was taken ill on the 12th, and a soldier on the 13th; both died on the 16th. Another soldier died on the 17th. A sailor from the *Tamasi*, died on the 18th. This was the last case.

When the *Richelieu* steamed into the harbor of Marseilles, on September 26th, only eight days had elapsed since the last death, and the vessel was detained at Pauliac. No other cases erupting, she was given free pratique, and the passengers allowed to proceed on their way after being detained only a short while.

THE CASE OF THE TAMESI.

The steamship *Tamesi*, on board of which there had been many deaths while the vessel was in the Senegal

¹¹ Duval, loc. cit., p. 86.

River, near Saint-Louis, arrived at Bordeaux, on September 15th. She carried no passengers and had had no cases on board since leaving Saint-Louis. The vessel was disinfected and given immediate pratique.

RESUME.

It will thus be seen that, in less than fifteen days, four vessels infected with yellow fever entered the harbor of Bordeaux, two with cases on board, one with a dismal history of the ravages of the disease among its passengers and crew during the homeward voyage, and the other having been decimated while riding at anchor opposite a nidus of pestilence.

1899.

The French steamship *La Plata* left Rio de Janeiro, October 10th, 1899, for Bordeaux, via Senegal. Among the passengers who took passage at Dakar, Senegal, was a lady, who fell sick during the voyage. Her case was diagnosed as yellow fever. There was no sickness on board and no cases of yellow fever had been observed since she had left Rio de Janeiro, so it is evident that the infection came from Dakar. On the ship's arrival at Bordeaux, the patient was sent to the Lazaretto, where she died a day or so after.¹² No other cases occurred, either on board the *La Plata* or at Bordeaux.

¹² Havelburg: U. S. P. H. & M. H. Reports, 1899, vol. 14, p. 2318.

and commercialism. On September 29, the dispatch boat *Cygne*, which had taken part in the expedition against the natives of the Upper Senegal, returned to Saint-Louis, having on board 51 wounded, of which 17 were Europeans. The *Cygne* was permitted to land her passengers unmolested, although it was known that the vessel came from an infected territory. The soldiers returned to their homes and mingled freely with the population. In a few days, the poison began to diffuse itself through the town and the first death from yellow fever occurred on October 6. The next day, another case terminated fatally. Other cases followed rapidly, proving fatal in almost every instance. On October 8, the disease was widespread. In spite of this deplorable state of affairs, the authorities strenuously denied all knowledge of the existence of yellow fever in the town, even after eight fatalities had taken place between the 9th and 15th of October. About that date, although still refusing to admit that the epidemic was one of yellow fever, the administration began sending the sick and the "suspicious cases" to an improvised lazaretto at the Pointe-aux-Chameaux, a short distance from Saint-Louis.

The truth of the presence of the terrible disease in their midst soon became too apparent to be discountenanced and the stolid optimism of the little group of Europeans suddenly gave place to panic and despair. A rumor was circulated that all the cases transported to Pointe-aux-Chameaux died as soon as they reached the lazaretto and the families of the "suspicious cases" soon began to consider an order for the transportation of a beloved one equivalent to a burial permit.

Lejembre graphically describes the way in which the unfortunates were transferred to the lazaretto. Every morning, about nine o'clock, the patrol would make its rounds and anyone found with fever, or even "suspicious," was taken in tow. It was a gruesome sight to see these wretches dragging their ways through the streets of the town, some clad only in the blanket which had covered them on the sick-bed, some so weak that they had to be propped up and helped along by the native health-guards. But the people, dazed by the terrible havoc which was

going on in their midst, looked on with sullen indifference at the spectacle of their relatives or comrades being driven like cattle to the water's edge, where they would be packed into a small boat hardly able to contain half their numbers and rowed by blacks for two weary hours, under a blazing tropical sun, to the pest-house at the Pointe-aux-Chameaux. No wonder that they were either dead or moribund when they reached their destination. And the terror which the simple word "Lazaretto" caused the people was certainly well-founded, for out of about 150 yellow fever patients transported from Saint-Louis to the Pointe-aux-Chameaux between October 15 and November 17, there were 108 fatalities.

If the mortality at the Pointe-aux-Chameaux lazaretto was excessive, other localities, where the soldiers were sent by the authorities in a frantic endeavor to stop the ravages of the disease, suffered as much. At O'Niaga, Lampsar, N'Dialakkar, Bel-Air, Cape Manuel, Hamm, M'Bidgen, Thies, and other posts, we find the same terrible record of fatalities.

The fatalities in Saint-Louis, when the last death took place (December 17), amounted to 36 among the civil population (Europeans) and 39 soldiers.

The Disastrous Logo Expedition

While the epidemic was raging at Goree, the French government ordered that a punitive force be sent to Logo, a district northeast of Sierra Leone, to avenge some fancied wrong committed by the natives. The chief health officer of Saint-Louis, the starting point of the expedition, sent a vigorous protest against such a measure, urging as the principal reason the unsanitary condition of the country, the fact that yellow fever was raging "up the river," and the distance of the territory to be invaded; but his protestations were unheeded. On September 11, a few days before the fever broke out in Saint Louis, the troops were embarked on the dispatch boats *Arabe*, *Cygne* and *Espadon*. The expedition consisted of 535 men, 317 Europeans and 218 native soldiers. The health of the column was perfect.

tended cruise.¹⁶ After touching at Goree, Senegal, the vessel crossed the Atlantic and arrived at the Iles du Salut, French Guiana, on July 7th. On July 10th, sixty-three passengers were embarked at Cayenne, where yellow fever was raging epidemically. One of these passengers was taken ill with the fever on the 13th, but was immediately transferred to the hospital on the island. *La Fortune* sailed on July 15th, for Martinique. A second passenger, taken sick on the 22nd, was landed at Fort-de-France on the 26th. Six passengers were embarked at the latter place, and on the 29th, the cruiser reached Basse-Terre, Gaudeloupe, where yellow fever was prevailing. Thirteen passengers were taken on board at Basse-Terre. On the 30th, the vessel set sail for Brest. On August 1st, the third case of yellow fever erupted on board, followed in quick succession by other cases, the last case occurring on September 7th, three days after the vessel had arrived at Brest.

Out of a crew of 212, there resulted 118 cases, with 56 deaths. Of the fourteen inhabitants of Brest, who had business relations with the vessels, three were attacked and two died.¹⁷

DUNKIRK.

1881.

A vessel from Senegal brought yellow fever to Dunkirk, in 1881. The cases were sent to the quarantine station. There was no diffusion of the disease. (Berenger-Feraud, p. 184).

¹⁶ Cornilliac. *La Fievre Jaune Dans les Antilles*, 1886, p. 419.

¹⁷ Gerardin and Reau: *Rapport sur des cas de Fievre Jaune importees a Brest en 1856 par la Corvette de Charge La Fortune, venant des Antilles*. *Bulletin de l'Academie de Medicine de Paris*, 1856-7, vol. 22, p. 899.

HAVRE.

YELLOW FEVER YEARS.

1861; 1881; 1900.

SUMMARY OF EPIDEMICS.

1861.

The ship *Harriet* brought yellow fever to Havre, in 1861. Immediate steps were taken to isolate the vessel as soon as her condition became known to the authorities, who sent her to the Island of Tatihou, in the English Channel. No new cases erupted, the disease being confined to the original focus. (*Berenger-Feraud*, p. 138).

Melier¹⁸ gives a more elaborate account of the incident. He states that the *Harriet* was quarantined at Havre, in 1861, on account of yellow fever. On page 187, in an extract from a report by Dr. Launay, assistant health officer of Havre, it appears that while at sea the captain of the *Harriet* was attacked by yellow fever on June 15th, 1861, died June 18th, and was buried at sea June 19th. The second case occurred on July 5th, 1861, died July 8th, and was also buried at sea. Two more were observed July 6th, 1861, one on July 7th, one on July 18th, and one on July 19th. All recovered. Total: seven cases; two deaths; five recoveries.

No statement where the infection was brought aboard is made; no mention of port from which the ship had sailed for Havre. Concerning the length of time in quarantine, the report states that Launay boarded the ship and ordered a fumigation and remained on board for five days without incurring any unpleasant symptoms. None of the men who had been brought aboard to help disinfect the ship contracted the disease. In fact it seems that the cases taken down with yellow fever on July 18th and 19th,

¹⁸ Melier: *La Fievre Jaune a Saint-Nazaire* (Reprint, 1863), pp. 73 and 187.

were recovering or almost recovered when the ship reached Havre, and no further cases occurred.

In 1862, this same vessel was quarantined for three days at Marseilles, merely on suspicion.

According to Eager,¹⁹ yellow fever was brought by ships to many French ports in 1861, but a search through the files of the Surgeon General's Office, fails to throw any light on the subject.

1881.

Yellow fever was brought to the quarantine station at Havre, in 1881, by vessels. There was no diffusion of the disease.²⁰

1900.

The French steamship *Bearn*, which it will be remembered, brought five cases of yellow fever to Marseilles, in 1891, entered the harbor of Havre on August 14th, 1900. The vessel had come from Senegal, where yellow fever was prevailing. She carried fourteen passengers. An officer of the vessel had died from the disease on the homeward voyage. The passengers were disembarked at the lazaretto, but no cases erupting, they were released after a few days.²¹

On August 9th, 1900, the French steamer *Caravallos*, with about 300 soldiers from Senegal, arrived at Havre with a case of yellow fever on board. The patient was then in his ninth day and convalescent. He was sent to the lazaretto. On July 31st, two passengers had died from yellow fever on board, and the case mentioned above had erupted August 1st. The vessel was remanded to quarantine.²²

¹⁹ Eager: Bull. No. 8, Yellow Fever Institute, Washington, D. C., 1902, p. 29.

²⁰ Berenger-Feraud, loc. cit., p. 184.

²¹ U. S. P. H. & M. H. Reports, 1900, vol. 15, p. 2235.

²² Ibid, pp. 2121; 2173.

A third ship infected with yellow fever arrived at Havre from Senegal, in 1900. On August 10h, the *Santa Fe* entered the port with several cases of yellow fever on board, having had two deaths on the homeward voyage. The vessel was sent to the quarantine station. The sick recovered and no other cases erupted.²³

In none of the above instances was the disease diffused ashore.

LA ROCHELLE.

In a history of the city of La Rochelle, published by Arcere, in 1756, there is a reference to an importation of yellow fever into that town in 1700.²⁴ We have been unable to find any authentic corroboration of this report.

MARSEILLES.

YELLOW FEVER YEARS.

1802; 1804; 1807; 1811; 1820; 1821; 1823; 1870; 1891; 1899.

Summary of Epidemics.

1802.

Yellow fever prevailed on several ships at the lazaretto at Marseilles, in 1802, but the case of the *Columbia* is the only one of any epidemiological interest.

The *Columbia* took a cargo of sugar and tobacco at Havana in the beginning of 1802, and left that port for Providence, Rhode Island, where she arrived in May.

D. C.), 1902, p. 25.

²³ Ibid, p. 2173.

²⁴ Eager: Yellow Fever Institute Bulletin No. 8 (Washington,

She discharged a portion of her cargo at Providence, and took on an entirely new crew. The vessel left the American port on May 24th, and after touching at Malaga, Spain, entered the harbor of Marseilles, on August 9th. The vessel was subjected to ten days' quarantine. On the very day of its release, the captain was taken ill and died on the sixth day of the onset of the malady. The day after the captain's death, a sailor was taken ill. While a consultation of doctors was in progress, to determine what this fatal disease could be, a third member of the crew was attacked. The vessel was immediately ordered again to quarantine. Ten days having elapsed without any new case, the ship was again released. No sooner was this done, than a sailor was taken ill and died on the sixth day of the onset. For the third time, the vessel was sent to quarantine, where three other members of the crew successively died from yellow fever.

There were altogether eight attacks, followed by as many death. The first case erupted on August 28th, followed by death on September 3rd, the last case, October 10th.

The disease did not spread to the shore, according to Chervin,²⁵ Moreau de Jonnes,²⁶ Robert²⁷ and Berenger-Feraud,²⁸ from whose works this summary is taken. The source of infection in this instance was undoubtedly Havana. It is true that yellow fever was also prevailing at Malaga, where the *Columbia* touched on her voyage from Providence to Marseilles, but the fact that the fever only erupted at Marseilles after the ship had begun discharging a cargo consisting among other things of 1,000

²⁵ Chervin: Examen des Principes de l'Administration en Matiere Sanitaire (Paris), 1827, p. 38.

²⁶ Moreau de Jonnes: Notice sur les Enquetes Officieles Constatant la Contagion de la Fievre Jaune et de la Peste (1825), p. 4.

²⁷ Robert: Guide Sanitaire des Gouvernemen Europeens (Paris, 1826), vol. 2, pp. 470; 708.

²⁸ Berenger-Feraud: Traite Theorique et Clinique de la Fievre Jaune (Paris, 1890), p. 72.

barrels of sugar from Havana, is strong enough evidence to incriminate the Cuban port. Mosquitoes are proverbially fond of sugar, and a few of these infected insects were undoubtedly taken on board at Havana, where yellow fever was epidemically present at the time of loading. As the ship sailed further north, the mosquitoes secreted themselves in the remotest corners of the hold, where the cold could not penetrate, remaining hidden while the vessel was at Providence, and only reappeared at Marseilles when the unloading of the sugar was begun. It was lucky for the inhabitants of Marseilles, that the first cases erupted on board, and that the summer was almost over, for had the *Columbia* arrived a month previously, the infected mosquitoes would probably have inoculated her large non-immune population and contaminated the town.

1804.

Marseilles had another narrow escape from yellow fever invasion in 1804.

The Danish brig *Le Guillaume*, from an English port, touched at Malaga in August, 1804, where she was contaminated and lost one of her crew while at that port, August 25th. She left for Marseilles in September, and lost two more of her crew on the voyage. She arrived at the French port, on October 8th, and was ordered to proceed to quarantine. While at the lazaret, a midshipman was attacked on October 13th. Two of the health-guards contracted the disease, one on October 15th, the other on the 25th. All these cases proved fatal. Total number of cases, eight; one at Malaga, two at sea and three at the lazaret.

The following infected ships were also brought yellow fever to Marseilles, in 1804:

The Danish ship *Limpte*, from Malaga. One case at Lazaret.

An unnamed Danish ship from Malaga. One death, October 15th, at lazaret.

The Danish ship *Bonheur de la Famille*, from Malaga. Arrived at Marseilles October 22nd. Two deaths from yellow fever on voyage from Malaga. The captain was attacked on the day of the ship's arrival and died at the lazaret on the 31st.

The Swedish brigantine *Amitie* arrived at Marseilles, on November 13th, after having touched at Seville, Malaga and Alicante, all infected ports. Several deaths while at sea. Four of the crew were ill with yellow fever when the ship reached the lazaret, two dying on the 16th. The captain died on November 20th. Three other cases erupted, there resulting altogether eight deaths, four of which were from the vessel and four erupting at the lazaret.²⁹

In none of the above instances was the disease communicated to the shore.

1807.

On August 20th, 1807, the American schooner *Fame*, from Boston, with a crew of six, arrived at Marseilles. The captain claimed that he had not touched at any port on his way from Boston, but the vessel was nevertheless sent to quarantine, and only released on September 3rd. Eight days afterwards, the captain was taken sick and died on shore with all the symptoms of yellow fever. No other case erupted.³⁰

1811.

The sporadic cases of yellow fever observed at Marseilles, in 1811, were evidently imported from Spain, as the maritime annals of that port are silent concerning the prevalence of the disease on ships coming from the Antilles. The *romito negro* was epidemic in Cadiz, Carthage, Alicante and other populous cities of Spain that year, and was no doubt brought to Marseilles by refugees

²⁹ Robert: Guide Sanitaire, vol. 2, pp. 472; 719. Also: Berenger-Feraud, loc. cit., p. 79.

³⁰ Berenger-Feraud, loc. cit., p. 82.

from the Spanish Court, who sought safety in flight from the intrigues of the plotters against the throne of the unfortunate weakling, Charles IV, who during his entire shameful reign, was under the influence of his wife and her paramour, Godoy.

The weather conditions in Marseilles, in 1811,¹ were abnormal. The summer months were excessively hot, wheat and leguminous plants withering before attaining maturity, the torrid rays of the sun parching the earth and drying up springs and streams. Fulminating apoplexies, bilious disorders and even cholera-morbus were almost epidemic, and fevers generally assumed a grave or fatal type.³¹ Under such conditions, it is not surprising that yellow fever, once introduced, obtained a temporary foothold in the town, and the only reason why it did not attain epidemiological proportions, is no doubt due to the absence of the *Stegomyia Calopus* from the localities where the cases mentioned by Robert were observed. Had these carriers of infection been present, Marseilles would no doubt have experienced a pestilence which would have been appalling in its results.

We have been unable to find any complete statistics concerning this outbreak. Robert mentions that he attended many cases, eleven of which proved fatal.³² Among his patients were de Villena, the faithful field-marshal and grand chamberlain of Charles IV, who died with black vomit a week after being attacked. Another victim was Father Fernandes, also an attache of the Spanish Court. Robert, who is an authority on yellow fever, says he cannot be mistaken as to the nature of the disease. He was in attendance daily at the bedside of the two Spaniards, having been requested by their sovereign to give them the best medical care and minutely describes every phase of the malady which carried them off. The illustrious French physician also gives a clinical history of nine other cases in his practice which ter-

³¹ Robert, loc. cit., vol. 1, p. 104.

³² Robert, loc. cit., vol. 1, p. 104.

minated fatally, making in all eleven cases. There probably were other manifestations of the disease, as Robert only reports the cases which came under his personal observation, but we were unable to find any authentic evidence bearing on the subject. The first case reported by Robert, that of de Villena, erupted on Sunday, August 4th, 1811, and died on August 11th.³³ The last case was attacked on September 26th, and died on October 15th.³⁴

The fact that the malady first manifested itself in refugees from Spain, where yellow fever was almost general, strenghtens the theory that it was imported from that country. Robert, like most observers of his day, attributes the eruptions to abnormal weather conditions, a dogma which seemed rational then, but which modern medical science has relegated to oblivion.

1820.

In the month of July, 1820, two soldiers who formed part of a sanitary cordon on the sea-shore in the neighborhood of Martigues, a town in the department of Bouches-du-Rhone, France, twenty-one miles southwest of Aix, were transported to the hospital at Marseilles, where they died two days afterwards with the characteristic symptoms of yellow fever. There was no diffusion of the disease.³⁵

1821.

The yellow fever epidemic which prevailed in the quarantine slip of the Island of Pomegue, in the harbor of Marseilles, in the fall of 1821, is interesting from a point of transmission and proves the danger of mooring infected vessels in the immediate vicinity of uncontaminated ones. That the wind blew infected mosquitoes from one vessel to another, the history of the progress of the epidemic

³³ Robert, loc. cit., vol. 1, p. 113.

³⁴ Robert, loc. cit., vol. 1, p. 125.

³⁵ Robert, loc. cit., vol. 1, p. 142.

plainly shows. It was impossible for the ships in the quarantine basin to communicate with each other, as health-guards were stationed on every one of them, and the distance between each vessel was too great to admit of communication without having recourse to boats. As all boats had been ordered by the authorities to be hoisted high above the water, only craft conveying provisions and the sick or dead being allowed to communicate with the island, no other mode of infection than the mosquito-laden wind can be incriminated.

The facts of this memorable epidemic, as related by Robert,³⁶ Eager,³⁷ Berengert-Feraud³⁸ and Melier,³⁹ are as follows:

Yellow fever was committing fearful ravages in Spain, in 1821, and it was natural that the disease should make its appearance sooner or later at one of the ports of France. Anticipating this, the authorities ordered that the strictest quarantine be observed, a precaution which evidently proved the salvation of Marseilles, as subsequent events demonstrated.

On September 7th, 1821, the Danish brig *Nicolino*, Captain Mold arrived at the lazaretto of Marseilles (on the Island of Pomegue), with a history of yellow fever on board. The vessel had come direct from Malaga, an infected port, where it had remained from July 3rd to August 26th.

On September 1st, while en route to Marseilles, a sailor named Jenwersen, aged 20, was taken ill, but was convalescent when the *Nicolino* entered quarantine. On September 2nd, four days' journey from Marseilles, another sailor, Stobuy, aged 23, was taken ill. The poor fellow was abandoned by his companions and died on September 3rd. His corpse was thrown into the sea, together with all his clothes, bedding, etc.

³⁶ Robert, loc. cit., vol. 1, p. 622.

³⁷ Eager: Yellow Fever Institute Bulletin No. 8 (Washington, D. C.), 1902, p. 26.

³⁸ Berenger-Feraud, p. 93.

³⁹ Melier: Fievre Jaune a Saint-Nazaire en 1861.

On September 8th the hatches of the *Nicolino* were opened. The imprisoned mosquitoes undoubtedly began spreading the infection from that date, as subsequent events will demonstrate.

On September 11th, four days after the *Nicolino's* arrival, a third sailor was taken ill. He was sent to the lazaretto on the 13th, and died the following day.

At this time, there were forty-one vessels, practically from all parts of the world, in the quarantine slip. The position of each vessel will be better understood by referring to the plan which accompanies this account, taken from the works of Robert and Melier. As the illustrious French nosologists do not always mention the name of the vessel, but in most instances gives only that of the captain, we have inserted the latter where the former was not obtainable.

The vessels infected were as follows:

I. The *Nicolino*, the original focus of infection.

II. The *Comte-de-Gocs*, Captain Chiozotto, arrived from Saint-Jean-d'Acre and Cyprus, August 29th. Moored next to the *Nicolino*. On September 8th, while taking the breeze on the bridge of his vessel, Captain Chiozotto was incommoded by the foul odors emanating from the hold of the *Nicolino*. Knowing that the vessel was infected, he was greatly alarmed and fled to his cabin, exclaiming "*Somo morto!*"⁴⁰ He was stricken with yellow fever on the 13th, and died on the 15th. The infection spread to the balance of the crew, composed of twenty-one persons, resulting in ten cases and five deaths, including the captain.

III. The *Saint-Georges*, Captain Demorre. Arrived at Pomegue September 3rd, from Aigles, Spain. Moored to the northwest of the *Nicolino*, from which it was separated by the *Stereus*. Two sailors taken ill September 14th, died the following day. There were altogether eight cases and four deaths.

⁴⁰ "I am a dead man!"

IV. The *Catherine*, Captain Simon. Left Malaga, August 19th, and arrived at Marseilles, September 3rd. Was placed in the quarantine basin, to the northwest of the *Nicolino*. A sailor was taken ill September 14th, and died on the 21st. Four additional cases erupted, followed by recovery.

V. Captain Bexfield's ship, from Xante, arrived on September 7th, and anchored next to the *Nicolino*, on the northwest. A cabin-boy and a sailor were taken ill September 11th, and the captain on the 14th. All recovered.

VI. Floating Dock, about fifty metres to the S. S. E. of the *Nicolino*. A man who was working on this dock was taken ill September 20th. He was discharged cured from the lazaretto October 18th.

VII. Captain Matiovich's vessel, from Alexandria, Egypt. Arrived September 9th. Moored to the northwest of the *Nicolino*, from which it was separated by six vessels. A sailor was taken ill on September 22nd. He recovered.

IX. Captain Vinello's ship. Moored to the southeast of the *Nicolino*, from which it was separated by the *Comte-de-Goes*. Two cases erupted on board, followed by death.

Seven other vessels were contaminated, making sixteen in all, out of a total of forty-two which were lying at anchor in the quarantine basin, including the *Nicolino*. All the vessels where cases occurred were lying to the windward of the *Nicolino*. This encouraged the general belief of the period, that yellow fever was carried by the wind. Robert and others brought this prominently into view, giving as incontrovertible proof of the correctness of this dogma, that the "foul odors"⁴¹ from the hold of the *Nicolino* were carried by the wind to the vessels which afterward became infected. Of course, we of this enlightened age know that the wind merely accelerated the emigration of the *Stegomyia calopus*, but the illustrious medical men of the period did not have twentieth century

⁴¹ "Les odeurs infectes."

spectacles, and could only formulate myopic theories.

A few cases were also observed on shore.⁴²

On September 23rd, a case erupted in the heart of Marseilles. This was a health officer, who having been employed in cleaning the quarantine quarters, was sent to the lazaretto when yellow fever appeared in the shipping. He was released after ten days' detention, and returned to his lodgings in town. He was shortly afterward attacked with yellow fever. He was immediately sent back to the lazaretto, together with all the inmates of the house where he was stopping. The man died, but none of his companions contracted the disease.

Another case erupted in a hospital at Marseilles, in the person of a sailor who had come by land from Barcelona, Spain. He was sent to the lazaretto.

A Danish ship, commanded by Captain Föhn, left Malaga, Spain, September 20th, and arrived at Marseilles, October 1st. The captain was ill and three of the crew had died from yellow fever on the voyage from Malaga. Fearing to again kindle the fires of contagion, the authorities positively prohibited the vessel from landing and forced her to take to sea again. The doomed vessel was buffeted by the waves, and finally struck a reef near the shore, foundered and was burned to the water's edge. The captain, with the remnant of his crew, were sent to the lazaret at Pomegue. One of the sailors developed yellow fever, on October 10th. The patient recovered.⁴³

The government thought it was face to face with an invasion of yellow fever, and communicated with the celebrated Professor Palloni, who had been through the yellow fever epidemic of 1804, at Leghorn, and whose advice was no doubt largely instrumental in preventing the spread of the disease.

The first case occurred September 7th; the first death, September 14th. Last case, October 10th; last death, October 6th.

⁴² London Medical and Physical Journal, 1821, vol. 46, p. 463.

⁴³ Berenger: Feraud, loc. cit., p. 99.

Cases and deaths: At lazaretto, 25 cases; 12 deaths. At Marseilles, 2 cases; 1 death. Total, 27 cases, 13 deaths.

1823.

An American ship, Captain Thomas, left New Orleans for Marseilles, on September 21st, 1822, and arrived at her destination, November 19th. During the voyage, two deaths occurred from some "unexplained cause," according to the statement of the captain. As yellow fever was prevailing at New Orleans, when the vessel sailed, these two deaths were undoubtedly due to the disease. On arriving at Marseilles, the vessel was sent to the quarantine station, at Pomegue. On November 29th, a sailor was taken ill and sent to the lazaretto, as his case appeared suspicious. He recovered in a few days without showing any of the symptoms of yellow fever, and was sent back to his ship on December 10th. Nothing untoward happened until January 24th, 1823, when this same sailor was suddenly taken ill and died at the lazaretto in thirty-six hours. The autopsy revealed unmistakable lesions of yellow fever.⁴⁴

This case greatly puzzled the learned medical men of the period. They knew nothing of the mosquito doctrine, and wrote innumerable monographs on what they termed one of the most extraordinary and longest incubations of yellow fever on record. They dated the sailor's illness from his first indisposition, November 29th, and looked upon his fatal illness in January, as the culmination of the infection contracted on the previous date.

At the present age, the incident is easily explained. The fact is, that the first attack was not yellow fever, but simply some gastric disturbance accompanied by febrile manifestations. On his return to the ship, the man's duties undoubtedly required him to be often in the hold, where he was evidently bitten by infected mosquitoes taken on board at New Orleans.

⁴⁴ Robert: Guide Sanitaire des Gouvernemens Europeens (Paris, 1826), vol. 2 p. 745.

Robert⁴⁵ gives the clinical history of a case presenting most of the symptoms of yellow fever, which he treated at Marseilles in 1823. The patient, a woman aged 62, was taken ill July 16th, and died July 31st.

1862.

For nearly half a century (1823 to 1862) we find no mention of yellow fever having been observed either at the quarantine station at Marseilles or on vessels arriving from infected ports.

During the year 1862, fifty-nine vessels carrying sixty-nine passengers and a crew of 792, arrived at Marseilles from Havana, Matanzas, Pernambuco, Sainte-Croix-de-Teneriffe, and other infected ports. Only vessels coming from Havana were contaminated, the following giving histories of yellow fever on board during the voyage:⁴⁶

L'Etoile, 14 cases, 4 deaths.

Ville de Cannes, 10 cases, 3 deaths.

Montvernon, 13 cases, 5 deaths.

Cedars, 4 cases, no deaths.

Curra, 2 cases, no deaths.

In none of these instances did any cases erupt while the vessels were undergoing quarantine, nor was there any diffusion of the disease on shore.

1870.

In 1870, yellow fever was epidemic in several cities of Spain (q. v.), and the sea coast towns of France observed a strict quarantine against the infected localities.

On September 8th, 1870, the Spanish vessel *Carpio* arrived in the harbor of Marseilles, having come directly from Barcelona, where yellow fever was prevailing. A quarantine of seven days was imposed on the vessel. No cases developing on board, she was given free pratique.

⁴⁵ Robert: loc. cit., vol. 2, p. 140.

⁴⁶ Blache: In Melier's *Fievre Jaune a Saint-Nazaire* (Reprint), p. 204.

The wisdom of precautionary measures soon made itself manifest. On September 26th the Greek ship *Argos* entered the harbor of Marseilles with yellow fever on board. Out of a crew of eleven men, there had been four deaths from that disease—three while the vessel was at Barcelona, and one while at sea, September 23rd, three days before her arrival at Marseilles. Extraordinary precautions were taken to prevent contamination. The vessel was completely unloaded and sent to the Riou,⁴⁷ where she was thoroughly disinfected.

A Greek, one of the crew of the *Penaya*, died at the Hotel-Dieu, the municipal hospital of Marseilles, on September 29th. The autopsy revealed characteristic lesions of yellow fever. This man had come by land to Marseilles. His compatriots on board the *Argos*, denied that he had communicated with them, but the statement was disbelieved by the authorities, as there was no pestilential disease on board the *Panaya*, and the inference was drawn that the sailors of the two ships had probably mingled either at sea or at some port on the Spanish coast, where the Greek contracted the infection.⁴⁸

No other cases developed at Marseilles in 1870.

1891.

On May 17th, 1891, the French ship *Bearn*, from Rio de la Plata, South America, arrived at Marseilles with yellow fever on board. The vessel carried 665 passengers. There had been several cases and five deaths during the homeward voyage. On arrival at Marseilles, five cases were sent to the lazaretto. The passengers were isolated for ten days, after which time, no new cases developing, they were given free pratique. Of the five cases sent to the lazaretto, four recovered.⁴⁹

⁴⁷ An islet seven miles south of Marseilles.

⁴⁸ Roux: *Marseille Medical*, 1871, vol. 8, p. 193.

⁴⁹ Skinner: *Bull. No. 7, Yellow Fever Institute* (Washington, D. C.), 1902, p. 2.

1899.

The French ship *Aquitaine*, from Buenos Ayres, entered the harbor of Marseilles, on November 3rd, 1899. There had been a case of yellow fever on board, followed by death. Another case erupted shortly before the vessel reached Marseilles, and was sent to the lazaretto on her arrival. The passengers were released after three days' detention. The patient recovered.⁵⁰

MINDIN.

YELLOW FEVER YEAR.

1881.

SUMMARY OF IMPORTATION.

The steamship *Ville de Paris*, infected at Martinique, brought yellow fever to Mindin, a suburb of Nantes, in 1881. The vessel left Martinique, May 20th, with a crew of 128 and forty-five passengers. Among the latter were four convalescents from yellow fever. On June 2nd, thirteen days after leaving the island, the first case occurred on board, followed by others on the 3rd and 4th. The vessel arrived at Mindin on June 5th. The patients were transferred to the lazaretto at Mindin, where out of five cases, four proved fatal. The disease was confined to the lazaretto. (*Berenger-Feraud, loc. cit., p. 183*).

⁵⁰ Skinner: Bulletin No. 7, Yellow Fever Institute (Washington, D. C.), 1902, p. 2.

MONTOIR-DE-BRETAGNE.

YELLOW FEVER YEAR.

1861.

SUMMARY OF EPIDEMIC.

Many of the longshoremen employed in discharging the cargo of the *Anne-Marie* during the Saint-Nazaire outbreak of 1861, lived at Montoir-de-Bretagne, a village twenty-nine miles west of Nantes. Four members of this gang being taken ill, knocked off work and went home. They were attended by the village physician, Dr. Chaillon, who also was attacked by yellow fever on August 13th, and died on the 17th. The other cases recovered.⁵¹

MONTPELLIER.

YELLOW FEVER YEAR.

1821.

SUMMARY OF IMPORTATION.

A single instance of the appearance of yellow fever at Montpellier is on record. Deveze⁵² and Robert⁵³ assert that eleven soldiers were treated in the hospital of that town by Broussonet, in 1821. The patients had contracted the disease in the little town of Rose, a seaport of Catalonia, Spain. The infection did not spread. Our authorities do not say whether the cases died or recovered.

⁵¹ Berenger-Feraud, loc. cit., p. 137; Melier, Fievre Jaune a Saint-Nazaire.

⁵² Deveze: Memoire au Roi (Paris, 1821), p. 14.

⁵³ Robert: Guide Sanitaire, vol. 1, p. 104.

NANTES.

YELLOW FEVER YEARS.

1857; 1899.

SUMMARY OF IMPORTATIONS.

1857.

Yellow fever was quite prevalent on ships in the harbor of Nantes, in 1857. The number of cases is not stated, but the deaths are said to have amounted to seven.⁵⁴

1899.

In October, 1899, there were two cases of yellow fever on board the steamship Navarre, from Vera Cruz, in the harbor of Nantes. The cases proved fatal. The vessel was sent to the Saint-Nazaire lazaretto. No other cases erupted. (*U. S. Public Health Reports*, 1899, vol. 14, p. 2000.)

PARIS.

1775.

Yellow fever has never been observed in Paris, but on three occasions—1775, 1822 and 1845—a disease manifesting almost identical symptoms set the medical world agog.

The earliest mention of a disease resembling yellow fever being seen in Parish will be found in the works of Portal,⁵⁵ the celebrated French Physician, who flourished in the reign of Louis XVI. Portal mentions several cases which came under his observation, some even attended

⁵⁴ Skinner: Bulletin No. 7, Yellow Fever Institute (Washington, D. C.), 1902, p. 1.

⁵⁵ Portal: Observations sur la Nature et le Traitement de Melena, p. 174.

with black vomit, in which most of the symptoms which characterize yellow fever were present. He particularly describes a case in which a large quantity of black matter was vomited, the description of which corresponds with that of the true vomit of yellow fever. One of the individuals mentioned by Portal was no less a personage than the Comte de Vergennes, Minister of Foreign Affairs, under Louis XVI, who it will be remembered adopted the deliberate policy of humbling England by promoting the independence of the United States by the alliance of 1778.

1822.

Robert⁵⁶ and La Roche⁵⁷ relate that in the summer of 1822, after a long continuance of unusually hot weather, there occurred in the Hotel Dieu, of Paris, several cases of fever accompanied with jaundice and black vomit. Two patients were, at the same time, similarly affected at La Charite, in the wards of Dr. Lerminier, and several instances of what was denominated sporadic yellow fever were seen in Paris. In reference to the patients admitted in that hospital, Andral⁵⁸ informs us that they had delirium, a black tongue, tympanitic bowels, a jaundiced discoloration of the surface and exhibited evident signs of an ataxo-adyamic state of the system. They both threw up a quantity of a substance bearing a strong resemblance to soot—an appearance which, as we shall see, is often assumed by black vomit. La Roche doubts, however, that those cases were anything more than typhoid fever modified by the extreme heat of the season. One of the patients recovered under the use of the most powerful stimuli. The other died, and the autopsy revealed a gastro-enteritis, with red softening of the mucous membrane, and ulceration of the intestines, an anatomical character which our authority states does not belong to yellow fever.

⁵⁶ Robert: Guide Sanitaire, vol. 1, p. 104.

⁵⁷ La Roche, loc. cit., p. 272.

⁵⁸ Andral: Dictionnaire de Medecine, 1st ed., vol. 21, p. 17.

Magendie⁵⁹ mentions, that at about the same period, eleven cases of fever occurred in the hospitals of Paris, attended with brown yellow color of the skin, petechiae and black vomit.

Lassis⁶⁰ claims that there were more patients ill with what is commonly termed yellow fever in the hospitals of Paris in the month of April, 1822, than at Barcelona and Port du Passage at the time these two ports were causing the medical world such anxiety.

Chervin,⁶¹ who is anything but an admirer of Dr. Lassis, pokes fun at the Englishman for believing that these cases were manifestations of yellow fever, and criticises him for predicting that Paris may eventually become like Moscow, Barcelona, Marseilles, Arles, Aix and Toulon, the active seat of pestilential disasters, whose magnitude would be unparalleled in the annals of epidemiology.

We believe that the stand taken by the eminent La Roche the most correct for, unless imported, yellow fever cannot under the most favorable conditions of weather and temperature, originate in Paris. And, even if the disease were accidentally introduced there, it would not spread beyond the imported cases.

1845.

The *Gazette des Hopitaux* for August, 1845, contains the account of a case of typhus which occurred in the wards of Dr. Rayer, at the Hopital de Charite, Paris, which presented most of the symptoms peculiar to yellow fever. It may also be compared to the cases observed by Portal, in 1775, and by Andral and others, in 1822, mentioned in this volume.

⁵⁹ Magendie: *Lecons sur les Phenomenes Physiques de la Vie*, vol. 1, p. 117.

⁶⁰ Lassis: *Calamites Resultant du Systeme de la Contagion et Meme Celui de L'Injection* (Paris, 182—), p. 19.

⁶¹ Chervin: *Examen des Nouvelles Opinions de M. le Docteur Lassis* (Paris, 1823), p. 3.

On the 30th of June, 1845, a man named Thomas, of strong constitution entered Dr. Rayer's male ward. He had been ill for a few days only. The following were the symptoms presented: Yellow-orange tinge of the entire body; skin dry and hot; the eyes and inferior surface of the tongue, yellow; the superior surface of the tongue covered with a mucous fur; nausea; slight tympanitis of the abdomen, painful on pressure, in the right hypochondrium; liver of normal size, on percussion; stools colored by bile, not abundant; urine deeply tinged with bile; no abnormal thoracic symptom, but acute pain felt in the hepatic region on deep inspiration. Pulse full, frequent, but regular. The patient only complained of pain in the right hypochondrium, and of intense cephalagia. Venesection to twelve ounces. Blood presented a thick buff.

July 1st.—Same state. Cupped on the hepatic region; blister on the same region. Saline purgative.

July 2nd.—Vomiting set in; the matters vomited were black and sanguinolent. The stools, liquid and abundant, contained black and feces tinged with bile. Pulse very frequent; cephalagia; somnolence; tongue dry and cracked; teeth presented a brownish crust at bases; abdomen meteorized not painful on pressure.

This state persisted on the 3rd and 4th. On the 4th, slight delirium appeared. No spots or ecchymosis on the skin, universally of an orange-yellow. On the 6th, the state of the patient seemed improved. A number of small conical elevations appeared on every part of the body, similar to those of variola in its first stage. On the 7th, these elevations had formed red ecchymotic spots, like those of haemorrhagic roseola. There was, however, no symptoms of roseola. The patient appeared, indeed, better, although still in a state of semi-somnolence. On the 8th, the somnolence had increased; an eschar appeared on the sacrum; the stools were still sanguinolent. On the 11th, the eruption disappeared; somnolence and general depression increased; nausea, but no vomiting. On the

12th, he remained in a state of comatose sleep, and died suddenly on the 13th.

Autopsy, twenty-eight hours after death: The body was in a state of advanced putrefaction, the epidermis separating with the greatest ease; icteric tinge of the skin, the same as during life; no effusion of blood in the intermuscular spaces; lungs healthy, but containing a considerable quantity of mucus and blood; heart, soft, containing black blood; mucous membrane of the stomach softened, of the color of dregs of wine; duodenum presented traces of sanguineous suffusion, and contained yellow bile; the rest of the intestines contained mucous, colored with bile; Peyer's glands were not enlarged; no morbid alteration in the large intestine; the liver presented the usual volume, being soft, of an uniform icteric tinge; the vena porta, vena cava and its principal divisions were healthy, and contained black fluid blood; the biliary vesicle contained a considerable quantity of blood; the spleen was soft, of normal volume; the kidneys, soft, yellow, nearly diffuent; the brain, soft, and presenting the icteric tinge.⁶¹

1883.

According to Berenger-Feraud, a case of yellow fever was observed in Paris, in 1883, in the person of a diplomat, "who had handled dispatches coming from an infected country." Beyond giving his source of information as "les journaux politiques," our authority is mum. We have made a strenuous search through the French periodicals for the year 1883 and 1884, on file in the Library of the Surgeon-General's Office, at Washington, but find no mention of the incident.

The Parisian Mosquitoes and Yellow Fever.

It is within the range of possibility that the mosquitoes of Paris could convey the yellow fever virus. The alarm-

* Lancet (London), 1845, vol. 2, p. 231.

ing increase of mosquitoes in the capital of France was the theme for animated and interesting discussions by the medical societies of the metropolis a few years ago. At the session of the Academie de Medicine de Paris, April 9-13, 1901, Dr. Debove called the attention of his confreres to the fact that, in certain districts of Paris, mosquitoes were so numerous as to incommode the inhabitants to a great extent, and intimated that summary measures should be instituted to mitigate the nuisance.⁶³

Dr. Laveran observed that mosquitoes were certainly more numerous in Paris than formerly, and ascribed this fact to the vast number of places where stagnant water was allowed to remain. The learned scientist argued that it should be an easy task to educate the people to adopt measures to destroy the pests. If the population were instructed that the smallest amount of stagnant water is sufficient to engender enough mosquitoes to infect an entire district, they would be more careful. The Pasteur Institute had been appealed to by many industrial establishments of Paris to devise means to destroy mosquitoes, and had given advice which had already been attended by beneficial results.

Dr. Laveran further observed that the mosquitoes of Paris were of the *Culex* variety, which are positively known to transmit filaria and malaria. The former disease was very rare in Paris, but the latter was quite common, and its prevalence could no doubt be traced to the insects under discussion.⁶⁴

Dr. Farabeuf, in concluding the discussion, related his experience at Bourg-la-Reine⁶⁵ and at L'Hay, near Paris, where the mosquitoes were undoubtedly responsible for the many febrile disturbances which made life anything but agreeable at these places. Measures should be taken

⁶³ Bulletin Medical (Paris), 1901, vol. 15, p. 319.

⁶⁴ Ibid, 508.

⁶⁵ Bourg-la-Reine is a town on the Seine, five miles southwest of Paris.

at once to exterminate these insects, or the localities in question would in the near future become uninhabitable.⁶⁶

The question was also taken up by the Societe de Biologie de Paris, at its session held June 1st, 1901. The trend of the discussion was the best mode of protection against the stings of mosquitoes. It was generally admitted by the speakers that most of the methods popularly used, such as essences and oils, were practically of no value, affording only temporary immunity, as the mosquitoes finally got used to the odor and became as aggressive as ever.⁶⁷

Dr. Laveran said that the only sure mode of immunity was to protect the hands by gloves, and to wear a veil, so as to protect the face and neck. This was the plan in vogue by most of the railroad employes in the malarial districts of Italy. Perfumed oils was no protection against the stings of the insects.⁶⁸

Dr. Laveran's idea is certainly the most efficacious, but we doubt very much that the dandies of Paris would take kindly to the fashion of wearing veils.

Dr. de Gouvea, a Brazilian scientist who had taken refuge in Paris after the revolution of 1893, sounded an additional note of warning in an exhaustive article entitled *Les Moustiques et la Fievre Jaune*, in which, among other things, he cited the historic epidemic of Saint-Nazaire to prove the facility with which yellow fever can be transmitted by mosquitoes.⁶⁹

ROCHEFORT.

1694.

Was it yellow fever which devastated Rochefort in 1694?

⁶⁶ Bulletin Medical. loc. cit., p. 341.

⁶⁷ Bulletin Medical, loc. cit., p. 508.

⁶⁸ A statement which can be vouched for by the writer, who has tried the experiment in New Orleans.

⁶⁹ De Gouvea: Bulletin Medical, 1901, vol. 15, p. 861.

La Roche⁷⁰ claims that there can be no doubt on that score, and cites Chirac in support of this contention. Many authors, among whom are such eminent authorities as Pringle,⁷¹ Boisseau,⁷² Berenger-Feraud⁷³ and Keraudren⁷⁴ hold the view that the epidemic under discussion was either typhoid or the plague, an opinion we are inclined to share, after a careful perusal of the writings of the illustrious Chirac.

Yellow fever may have been brought to Rochefort in 1694 and occasioned some mortality, but what is commonly understood as the "great epidemic" of that year was undoubtedly the bubonic plague of the Orient, probably brought by ships from the eastern ports of the Mediterranean.

Chirac,⁷⁵ who was sent by Louis XIV to study and report upon the malady which was then devastating Rochefort, had exceptional facilities for observation, and published the result of his researches in two volumes. The work, which is printed in the quaint old French style of the period, goes into the minutest details, and is an admirable exposition of the peculiar views of medicine in general held by the learned medicos who flourished in the reign of the Grand Monarch.

We note from Chirac's observations that most of the diseases which prevailed at Rochefort in 1694 assumed

⁷⁰ La Roche: *Yellow Fever. Considered in its Historical, Pathological, Etiological and Therapeutical Relations* (Phila., 1855), vol. 1, p. 48.

⁷¹ Pringle: *Observations on Diseases of the Army* (London, 1800), p. 323.

⁷² Boisseau: *Physiological Pyretology; or, A Treatise on Fevers* (Phila., 1832), p. 333.

⁷³ Berenger-Feraud: *Loc. cit.*, p. 35.

⁷⁴ Keraudren: *Projet de Reglement, etc.*

a grave character. An epidemic of small-pox was followed by one of measles, and when the latter had subsided, fevers of a malignant and dealy type asserted themselves. These fevers were eventually absorbed in June by the pestilential malady under discussion, which carried away two-thirds of those who were attacked.⁷⁶ It was especially mortal in July and August and began to subside by the end of the latter month, after a series of heavy rains had filled the swamps about Rochefort and seemed to purify the air, which during the dry season, "smelled like burning gunpowder."⁷⁷

The symptomatology of the disease, which is minutely and graphically described by Chirac, leaves no doubt as to its nature. The malady was ushered either by a chill or by an intensely cold sensation, with acute headache and a sensation of extreme heaviness. The pulse became small, there was a general feeling of faintness, attended by an incessant agitation of the limbs. The facies became leaden-hued and cadaveric. In some instances, the eyes were dull; in others, sparkling and restless. Nausea and vomiting were constantly present, many never regaining their natural warmth, but being as cold as marble when death put an end to their sufferings. Cold sweats and a complete coma generally preceded death. (Page 53).

In the the majority of cases, the parotid glands were affected and buboes appeared in the axillary regions, but were rarely seen in the inguinal regions. Those in which buboes appeared on the fourth, fifth or sixth day, generally succumbed: in cases where the buboes only appeared on the seventh, eighth or ninth day, recovery generally ensued. In some cases, carbuncles broke out on the face and hands, a symptom which was generally followed

⁷⁶ "Cette maladie, qui fit perir les deaux tiers de ceaux qui estoient attaques, ne relacha and ne finit que par des grandes pluyes qui arriverent a la fin du moi d'Aout, et qui remirent de l'eau dans les mares et dans tous les marais deffeches de la prairie."—Chirac, vol. 1, p. 57.

⁷⁷ "* * * une odeur de poudre brulee."—Chirac, vol. 1, p. 31.

by death. The stools were either serous, greenish, dark, viscous or sanguinolant, and very often dysenteric. Hemorrhages from the nose were frequent. The urine was natural up to the fourth day of the onset, after which it became either red or very dark until the end of the attack. When poured in a vessel, it left a reddish residue, which resembled brick-dust. (Page 55).

Such is the description given by Chirac. We have made as literal a translation of the original text as possible. It does not require a Board of Experts to arrive at the deduction that the malady in question was not yellow fever. The symptoms, though not exactly those of the bubonic plague, are so nearly identical, as to easily lead to the conclusion that the pestilence of Rochefort was simply a milder manifestation of that terrible disease.

How such an astute observer like La Roche should have been led into error by the description of Chirac, is beyond our comprehension. La Roche's work is a classic and a monument to the author's genius and versability and this *faux-pas* merely goes to show that even the greatest minds are not infallible.

Whether it was the bubonic plague, yellow fever or typhoid which devastated Rochefort, in 1694, there is no doubt that the French government was taking extraordinary precautions that year to prevent the importation of the Antillean pestilence to its shores. A search into the musty records of that period reveals the fact that the maritime archives of Rochefort contain a letter from the Minister of Marine (the renowned Pontchartrain), dated September 15th, 1694, in which this dignitary states that he has been informed that the disease (yellow fever) was still raging in the "American Isles," and that it was important that steps should be taken to prevent its introduction into the kingdom. He also states that he had written to the admiralty official of La Rochelle to renew the measures which had formerly been taken against the crews of

vessels coming from these countries and to observe strict quarantine against infected vessels.⁷⁸

The narrow escape of Aix (q. v.) from infection, in 1696, proves that these precautionary measures were not taken a moment too soon.

SAINT-NAZAIRE.

YELLOW FEVER YEARS.

1861; 1862; 1881; 1899; 1908.

SUMMARY OF EPIDEMICS.

1861.

The outbreak of yellow fever which took place at Saint-Nazaire, near Nantes, in 1861, occupies a notable place in the annals of epidemiology, being the only serious manifestations of the disease in France. Accidental eruptions have occurred from time to time in the heart of Havre, Brest, Marseilles, Rochefort and Nantes, but these were directly traceable to persons who had communicated with infected ships and were limited to one or two cases. In the Saint-Nazaire incident, however, the disease assumed a vicious and aggressive type, and was even carried to Montoir-en-Bretagne, a village near Saint-Nazaire.

⁷⁸ The original letters reads as follows:

"15 Septembre, 1694.—J'apprends par les lettres que je recois par le vaisseau le Leger, que la maladie continue toujours aux isles de l'Amerique; cela est bien facheux. Cependant, comme il est important d'empecher qu'elle ne s'introduise dans le royaume, j'ecris aux officiers de l'Amiraute de la Rochelle de renouveler les defenses qui ont ete faites aux equipages des vaisseaux, qui reviennent de ces pays, de ne mettre pied a terre qu'apres que la visite en aura ete faite, pour les obliger de faire quarantaine, s'ils sont attaqués de ce mal et c'est a quoi il est necessaire que vous teniez la main.

(Signed) "PONTCHARTRAIN."

Much has been written about this epidemic. We cull the following resume from the comprehensive work of Melier,⁷⁹ and from the interesting accounts given by Eager⁸⁰ and Berenger-Feraud:⁸¹

The *Anne-Marie*, a ship of the port of Nantes, with a crew of sixteen, sailed from Havana June 13, 1861. The vessel carried barrels of sugar, between the tiers of which layers of sugar cane were placed, in order to properly dress the cargo. After five days' navigation, five days of broiling calms and storms followed by rains, the captain, in order to rest the crew, decided to drift in the Strait of Florida without using sails. Passing out of the strait, the winds became steady, and the men went to work with a will to make sail, showing no trace of fatigue or malady.

July 1, eighteen days after the departure from Havana, two seamen fell sick and died within a few hours of each other on the fifth day of their illness.

July 2, another sailor was taken ill, but it is recorded that "with strong doses of the sulphate of quinine and with violent purgatives, he was cured after ten days." On successive days, six other persons were stricken, including the captain. All were dosed with quinine and cathartics, and recovered more or less promptly. Altogether, among the sixteen persons aboard, there were nine cases of sickness and two deaths.

In this condition the ship entered the port of Saint-Nazaire, twenty days after the last death and ten days after the inception of the final case of suspicious illness. Since no case of sickness had occurred during the last ten days, and all were well on board at the time of arrival, the vessel was punctually given pratique, in conformity with the French sanitary regulations.

⁷⁹ Melier: *Memoires de l'Academie de Medecine de Paris*, 1863, vol. 26, pages 1 to 228; also, reprint of this article.

⁸⁰ Eager: *Bull. No. 8, Yellow Fever Institute* (Washington, D. C.). 1902, p. 26.

⁸¹ Berenger-Feraud: *Gazette Medicale de Nantes*, 1883-4, vol. 2, p. 4.

As soon as the *Anne-Marie* was released from quarantine, her crew were paid off, and according to the custom in vogue at nearly all European ports, they were discharged and an entirely new set of men engaged to discharge the cargo. The men went to their homes. The subsequent movements of the crew of the *Anne-Marie*, is one of the most interesting phases of the vagaries of this epidemic, as will be seen by the following tableau:

Roster of the Crew of the "Anne-Marie;" the Localities They Went to After Leaving the Ship, and What Happened to Them.

NAME	RANK	Place they went to	REMARKS
Voisin.....	Captain	Painbouef	Developed Yellow Fever, Recovered.
Eloy	Second executive officer.....	Saint-Nazaire ...	Developed Yellow Fever; Died.
Barand	Sailor	Painbouef	Not attacked.
Jabin.....	Carpenter	Nantes	Not attacked.
Glot.....	Cook	Unknown	Unknown
Riquidel.....	Sailor	Nantes	Had Yellow Fever during homeward voyage; recov'd
Le Pendernat...	Sailor	Concarreau	Not attacked.
Compu	Apprentice	Crosic	Not attacked.
Le Baquelin.....	Sailor	Nantes	Had Yellow Fever during homeward voyage; recov'd
Rabier	Sailor	Saint-Nazaire ...	Not attacked.
Pineau	Sailor	Unknown	Unknown...
Guillio	Apprentice	Saint-Nazaire...	Not attacked.
Monizet	Ship's Boy.....	Saint-Nazaire...	Not attacked.

It will thus be seen that of the two officers and eleven men composing the crew of the *Anne-Marie*, two had yellow fever during the voyage and recovered; two developed the disease after arriving at Saint-Nazaire, one succumbing; two could not be traced, and the remaining seven continued well and hearty during the whole progress of the epidemic.

The Epidemic.

We shall now take up the events at Saint-Nazaire.

In the same basin where the *Anne-Marie* was at anchor, were the following vessels:

The *Chastang*, a small tug boat in the service of the government, having two barges in tow.

The *Cormoran*, a transport.

The *Lorient No. 6*, a steamboat plying between Lorient and St. Nazaire.

The *Dardenelles*, a three-masted merchantman.

L'Arequipa, a three-masted merchantman.

The *Chastang* sailed on July 29, two days after the opening of the hatches on board of the *Anne-Marie*, and arrived the same day at Indret. The tug had a crew of five, who had all been on board the *Anne-Marie*, attracted by curiosity. On August 1, one of these men was taken ill and died on the 3rd. His case presented all the symptoms of yellow fever. On the 3rd or 4th of August, three more of the crew were attacked and died in a few days. The fifth member of this unfortunate crew was stricken on the 5th, and died on the 10th of August.

The two barges which were in tow of the *Chastang*, had each a crew of two men; one of the barges had in addition, a woman on board. Only one out of these five people is known to have visited the *Anne-Marie*, but two of them helped to carry the dead from the *Chastang*, while the tug was moored at Indret. Another of this crew had spent two nights nursing one of the sailors on board the *Chastang*. The woman nursed and helped to prepare for burial two of the dead sailors. These five people (who composed the personnel of the barges) were all taken ill, showing all the symptoms of mild yellow fever. No fatalities occurred among them.

The news of what had occurred at Indret had not yet reached Saint-Nazaire when, August 2, the first officer of the *Anne-Marie*, a robust man, aged 28 years, died after being ill of yellow fever for sixty hours. The next day, a cooper, who had spent several days in the hold of the

Anne-Marie engaged in repairing sugar barrels, fell sick of the same disease and died in five days. August 4, a master stonemason, who worked on the harbor front, 260 meters from where the infected vessel was stationed, acquired the disease, and after six days, died. He had had no communication with the ship, no contact with the men or merchandise of the vessel. August 5, five stevedores from the infected ship were attacked. Three died in about four days, the other in eight days. August 7, there were three more cases, and two others the following day. A woman who sold old clothes, sails and cord was taken sick with yellow fever, August 6. She had received in her house two seamen of the *Anne-Marie*, and had bought from them some discarded garments and odds and ends of canvas and cordage. The next day, a woman, aged 55, who had intimate relations with the stevedores of the pest ship, was prostrated with the same malady. A laborer, engaged in handling the cargo of the *Anne-Marie*, lived with a cobbler, who sat at his bench from morning till night and never moved from the place of his work, was stricken with yellow fever and died in a few hours. His guest, the laborer, and the laborer's wife, both took the disease, but got well.

The *Cormoran*, the government transport mentioned above, had a crew of ten men. She arrived at St. Nazaire, on July 31, and remained fifteen days alongside of the *Anne-Marie*. This vessel sailed from St. Nazaire, on the 3rd of August, and arrived at Lorient on the 10th. On August 14th, two of the crew were attacked, and died on the 26th. No other attacks or mortalities are recorded as having taken place on board this vessel.

The *Lorient No. 6* remained from the 28th to the 30th of July, moored alongside of the *Anne-Marie*, and left on the morning of August 4th for Lorient, where she arrived the same night. One of the officers and a cabin-boy were taken ill that same night, presenting all the symptoms of mild yellow fever. They made an uneventful recovery. No other cases on board.

The *Dardanelles*, a merchantman from the Gulf of Guinea, weighed anchor in the same basin where the *Anne-Marie* was discharging her cargo. Being on the off-shore side of the *Anne-Marie*, the crew of the *Dardanelles* were compelled to use the above named vessel as a passage-way to and from the shore. Only one case developed on board of the merchantman, that of a cabin-boy, who had a mild attack and quickly recovered.

The *Arequipa*, a merchantman from Sierra Leone, arrived at Saint-Nazaire, on June 23. From July 26th to August 1st, she moored alongside the *Anne-Marie*, while the latter's cargo was being discharged. On August 1st, the *Arequipa* sailed for Cayenne, South America. On the 5th of August, the second officer was taken ill with fever and died on the 10th, while the vessel was still in the Gulf of Gascony, where the vessel had been detained for some cause which is not given by the chroniclers of this memorable epidemic. On August 22nd, a second case, in the person of a cabin-boy, occurred, followed by death on the 30th. On August 26th an apprentice was attacked; recovery. On August 29th, the fourth case occurred; recovery. On September 11th, the captain of the vessel was taken ill; recovery. On September 11th and 20th, sixth and seventh cases; recovery. On September 20th, eighth and last case, followed by death.

The last echo of this epidemic was furnished by one of the men employed in cleaning and fumigating the *Anne-Marie*, who was taken ill, August 29th, and died September 5th.

Dr. Eager brings out the fact that the records of the epidemic at Saint-Nazaire show that all the infected ships were stationed down the wind from the *Anne-Marie*. The fact is established by the data of the meteorological and maritime observer at Lorient. It is interesting to note that a ship of the imperial navy, the *Chandernagor*, and a passenger transport, the *Lorientais No. 8*, posted near the *Anne-Marie*, but up the wind, were perfectly immune from yellow fever. The distance of anchorage and the length of time passed near the infected vessel seemed to

have had decided influence in determining outbreaks of the disease. The prevailing temperature did not appear to have any influence. The daily temperature during the epidemic oscillated between the maxima of 21° and 25.5° C., and the minima of 11.8° and 17° C.

Infected Vessels which Entered the Harbor of Saint-Nazaire, in 1861.

It is interesting to note that the *Anne-Marie* was not the only vessel infected with yellow fever which entered the harbor of Saint-Nazaire, in 1861. A reference to the maritime annals of the port, reveals the fact that from July 15 (the date of the arrival of the *Anne-Marie*) to September 17, the following vessels arrived from ports where yellow fever was prevailing:

July 15. *Anne-Marie*. Left Havana, June 13. Had nine cases and two deaths on homeward voyage. Focus of infection whence originated the epidemic of Saint-Nazaire.

August 7. *Etoile de la Mer*. Left Havana, July 6. Healthy.

August 8. *Jules*. Left Havana, July 3. Healthy.

August 13. *Nicholas-Cezard*. Left Havana, July 16. Two cases on arrival; one died. A third case, August 29; died September 5.

August 15. *Paul Auguste*. Left Havana, July 12. One death (July 30) at sea.

August 15. *Amelia*. Left Havana, July 12. One death at sea.

August 15. *Pere Chaigneau*. Left Havana, July 10. Healthy.

August 16. *Washington*. Left Havana, July 16. Healthy.

August 18. *Jacques Langlois*. Left Matanzas, July 15. Healthy.

August 19. *Amelie-Henriette*. Left Havana, July 12. One death at Havana.

August 25. *Olivier*. Left Havana, July 19. Healthy.

September 4. *Etienné*. Left Matanzas, July 25. Healthy.

September 4. *Enfants Nantais*. Left Havana, July 21. Six cases at Havana; no deaths.

September 15. *Gironde*. Left Havana, August 9. Three deaths at Havana, two at sea. Every person on board sick, with the exception of one man, who had had yellow fever two years before.

September 17. *Brothers*. Left Cardenas, August 3. Healthy.

Of these fifteen vessels, twelve were from Havana, two from Matanzas, and one from Cardenas. Of the twelve arrivals from Havana, five gave histories of yellow fever on board, and two, the *Anne-Marie* and the *Nicholas-Cezard*, sent cases to the lazaretto at Saint-Nazaire. The vessels from Matanzas and Cardenas were healthy and gave no history of yellow fever on board, either in Cuban waters or at sea.

General Summary.

It will thus be seen that two vessels, the *Anne-Marie* and the *Nicholas-Cezard*, infected the port of Saint-Nazaire in 1861. The total number of cases and deaths were as follows:

Infected by the <i>Nicholas-Cezard</i>	13 cases,	resulting in 2 deaths
Infected by the <i>Anne-Marie</i>	40 cases,	resulting in 23 deaths
	—	—
Total cases and deaths	43	25

Aside from a fatal case at Montoir-de-Bretagne (q. v.), the Saint-Nazaire fever was not carried to any other part of France.

1862.

It is not generally known that yellow fever was brought to Saint-Nazaire, in 1862, but according to Gestin,⁸² five

⁸²Gestin: In Melier's "Relation de la Fievre Jaune Survenue at Saint-Nazaire en 1861," Paris, 1863, p. 199.

vessels infected with the disease reached that port between June 17 and December 1.

The first suspicious vessel to enter the harbor was the French cruiser *Montezuma*, from Vera Cruz, June 17. There was no infectious disease on board, but the commander reported the death of one of the crew from yellow fever while the warship was at Vera Cruz. This man had surreptitiously visited the shore, where he contracted the disease. The fever was not communicated to any other person on board, and when the *Montezuma* arrived at her destination, more than a month had elapsed since the death of the sailor and the officers and crew were healthy.

The *Albert*, which reached Saint-Nazaire, August 10, actually brought yellow fever to the port. There had been eleven cases out of a crew of eighteen, while the vessel was at Havana, followed by one death at sea (July 18). On the ship's arrival, four cases were transferred to the floating hospital *Jeanne-D'Arc*, where they eventually recovered. There was no diffusion of the disease ashore.

The *Wologa*, which arrived from Havana, September 6, reported having had four deaths while in the Cuban port. No cases at sea or at Saint-Nazaire.

The *Alfred and Mary*, which arrived from Havana, November 16, gave a history of two cases at the port of departure. No other manifestations.

The fifth and last vessel with a history of yellow fever, entered the harbor on December 1. There had been twelve cases on board at Havana, and one at sea, during the homeward voyage. The crew were healthy on arrival, and no cases erupted while the vessel was at Saint-Nazaire.

1881.

The memorable epidemic of 1861, does not seem to have imbued the authorities of Saint-Nazaire with any extraordinary ideas of prudence, for we see yellow fever again at the doors of the quaint old French city, in 1881. That the disease did not invade the town on this occasion, is certainly not due to the sagacity of its health guardians.

The facts of the second importation of yellow fever to Saint-Nazaire, are as follows:⁸³

The transatlantic passenger steamer *Ville-de-Paris*, left Porto-Bello, Brazil, on April 30th, 1881, and arrived at Fort-de-France, Martinique, on May 5th, where she remained fifteen days. Yellow fever was prevailing in the town. While in the harbor, the *Ville-de-Paris* communicated freely with the dispatch-boat *Magicien*, which was also infected. The steamer left Fort-de-France, on May 20th, with a crew of 128 and 45 passengers, among the latter being four convalescents from yellow fever.

On June 2nd, thirteen days after her departure from Fort-de-France, yellow fever broke out on the *Ville-de-Paris*. This case was an engineer attached to the vessel, who had had many dealings with persons connected with the *Magicien*. The next day, three cases erupted. The vessel arrived at Saint-Nazaire on the 4th. That same day, a child of seven was taken ill.

On May 5th the vessel was sent to the quarantine station and the patients, five in number, were sent to the lazaretto at Mindin, where only one recovered.

The passengers were given free pratique on May 13th, only eight days after the eruption of the last case, and the vessel released from quarantine on the 20th.

The imprudence of allowing persons from a notoriously infected ship to circulate freely after only a week's detention, caused much adverse comment and French nosologists called attention to the terrible consequence which might have ensued had even one of these persons carried the germ in his system for a longer period than a week.

The question was again agitated at the meeting of the *Quatrieme Congres International d'Hygiene et de Demographie*, held at Geneva, Switzerland, September 4-9, 1882. In a general discussion, in which Drs. Formento (of New Orleans), Bourru (of Rochefort), da Silva Amado (of Lisbon), Rochard (of Paris), Cabello (of Madrid) and

⁸³ Griffon du Bellay: Recueil des Travaux du Comite Consultatif d'Hygiene Publique de France, Paris, 1883, vol. 11, p. 213.

Layet (of Bordeaux) participated, the danger of the introduction of the *typhus amaril* into France was forcibly pointed out and the authorities censured for being too lax in the enforcement of preventive measures. Dr. Rochard, in an inspired address, pointed out this grave danger. Following is a translation of his most pungent remarks:

“France, on account of its higher altitude, has less to fear than countries where the disease easily propagates itself and, to this day, when yellow fever has been imported to our shores, it has never spread beyond the original focus of infection. But will it always be thus? It would be undue boldness to answer the question affirmatively. There are certain days in July and August when the heat is intense in the heart of France, and notably at Paris. Let us suppose that a vessel infected with yellow fever should arrive at Saint-Nazaire, and that strict sanitary measures were overlooked, what would prevent the disease from being carried to Paris by the next train? And then, admitting that the disease did reach the capital, what terrible havoc it would cause among the two million souls massed within its walls.”⁸⁴

But these warnings have been little heeded by the French Government, for, on reading the quarantine laws now in vogue, we notice (Article 61) that passengers from infected ships, even when yellow fever is actually on board on its arrival in port, are only subjected to a detention of seven days.

The established incubative period of yellow fever is from two to seven days; sometimes longer, but this is rare. And how do we know that a certain kind of mosquito of the genus other than the *Stegomyia Calopus*, capable of transmitting yellow fever, does not exist in Paris? If such things be, France may one day awake and see Professor Rochard's prophecy fulfilled and her proud capital in the merciless grasp of the Yellow Demon.

⁸⁴ Rochard: Trans. Quatrieme Congres International d'Hygiene et de Demographie (Geneva, 1883), vol. 1, p. 480.

1899.

In October, 1899, the French ship *Navarre*, from Vera Cruz, arrived at Saint-Nazaire with yellow fever on board.⁸⁵ The vessel was remanded to the quarantine station. No other cases erupted.

1908.

The year 1908 furnishes the last link in the chain of yellow fever importations to the port of Saint-Nazaire. The facts are as follows, (*U. S. Public Health Reports*, 1908, vol. 23, pp. 1507; 1543; 1621):

The disease was brought to St. Nazaire by the French steamship *La France*, which arrived at that port September 16 1908, after having touched at Fort-de-France, Martinique (Sept. 10), where yellow fever was prevailing.

The steamship, upon arrival at St. Nazaire, received pratique, and the crew and all the passengers landed, the passengers scattering in different directions.

A few days after the arrival of the *La France*, several members of the crew were admitted to the local hospital as suffering from paludic fever. After the death of three of these, a necropsy was held over one of the bodies, which revealed the fact that he had died of yellow fever.

In the meantime all the crew of the Steamship *La France* had been transferred to the Steamship *Versailles*, which sailed October 9, for Guadeloupe, Martinique, Venezuela, Colombia and Colon, Panama.

Up to October 10, nine cases of yellow fever had developed and entered the hospital at St. Nazaire. Five died.

On October 20, two more cases and an additional death had been added to the list, making altogether eleven cases, out of which five proved fatal.

The outbreak was confined to the above cases and deaths.

⁸⁵ Hill: U. S. P. H. & M. H. Reports, vol. 14, 1899, p. 2000.

TOULON.

1862.

The *Amazon*, a transport in the service of the French Government, entered the port of Toulon in October, 1862. The vessel having served as a yellow fever hospital ship while at Vera Cruz, she was looked upon with great suspicion by the health authorities and remanded for observation.⁸⁶ The commander gave a history of eighty deaths from yellow fever while in Mexican waters and two additional deaths during the homeward voyage. The transport was detained in quarantine until October 29, and given free pratique. No cases erupted on board while at Toulon, but the entrance of a yellow fever hospital ship in a French port, especially when the events which had transpired at Saint-Nazaire the year before were still fresh in the minds of the people, caused general consternation throughout the country.

⁸⁶ Gallas: In Melier's "Relation de la Fievre Jaune Survenue a Saint-Nazaire en 1861," p. 215.

YELLOW FEVER

IN

GREAT BRITAIN.

YELLOW FEVER

IN

GREAT BRITAIN.

With the exception of the epidemic at Swansea in 1865, imported from Havana by the *Hecla*, and which is detailed at length in this volume, yellow fever has never obtained a foothold in Great Britain. Vessels have from time to time brought the disease to the seacoast towns of the Empire, and in a solitary instance (1878) a death occurred in the very heart of London; but the inhabitants of the British Isles have to this day proved immune to the scourge on their own soil, the eruptions being in every instance confined to the imported cases. Swansea furnishes the only example to the contrary.

The exemption of Great Britain from an invasion of the Saffron Scourge may not be as secure as one would think. It is true that the *Stegomyia Calopus* does not flourish on English soil, but the *Culex Calopus* does and there remains the possibility that either this species, or a different species at this day established in the "tight little island," may some day be impregnated with the virus of the disease and spread the contagion far and wide. The doctrine of the mosquito transmission of yellow fever is yet in the adolescent stage and future experiments may prove that other species than the *Stegomyia Calopus* are also active agents in the dissemination of the disease under discussion.

CHRONOLOGY OF YELLOW FEVER IN GREAT BRITAIN.

- 1713. London. |
- 1817. Falmouth.
- 1843. Swansea.
- 1845. Isle of Wight.
- 1846. Woolwich.
- 1848. Woolwich.
- 1851. Swansea.
- 1852. Southampton.
- 1853. Southampton.
- 1854. Cork. *1854*
- 1857. Southampton; Dublin, (not authentic).
- 1860. Southampton.
- 1864. Falmouth; Southampton; Swansea.
- 1865. Llanely; Swansea. *1865*
- 1866. Southampton.
- 1867. Southampton.
- 1877. Salcombe.
- 1878. London.

BY LOCALITIES.

- Cork. 1854.
- Dublin. 1857, (not authentic).
- Falmouth. 1817; 1864.
- Isle of Wight. 1845.
- Llanely. 1865.
- London. 1713; 1878.
- Motherbank. (See Isle of Wight).
- Portsmouth. 1763.
- Salcombe. 1877.
- Southampton. 1852; 1853; 1857; 1860; 1864; 1866;
1867.
- Swansea. 1843; 1851; 1864; 1865.
- Woolwich. 1846; 1848.

LOCALITIES IN GREAT BRITAIN WHERE YELLOW FEVER HAS BEEN OBSERVED.

ENGLAND.

Dover. A seaport and parliamentary borough, on the northwest side of Dover Strait, County Kent, sixty-six miles southeast of London and twenty-one miles from Calais, France. It is an important railway terminus, and as a port for mail and railway service with the Continent, has a large passenger traffic. Population: 1881, 28,486; 1891, 33,418.

Falmouth. A seaport, in Cornwall, on Falmouth Bay, on the southern side of the estuary of the Fall River, sixty-six miles by rail southwest of Plymouth, and 250 miles from London. From 1688 to 1850, Falmouth was an important packet station, but it is now chiefly a port of call. It has a fine roadstead, affording excellent refuge for shipping. Population: 1891, 4,273.

Isle of Wight. An island in the English Channel, off the south coast of Hampshire, separated from the mainland by The Solent and Spithead.

London. Capital of the British Empire and the largest city in the world. It is situated in the southeast of England, on both sides of the River Thames. It is difficult to assign any exact limits to London, on account of its straggling form and numerous suburban extensions; but it may be said to stretch from east to west about fourteen miles and from north to south about ten. Population: 1881, 3,816,483; 1900, 4,546,752; 1907, (estimated), 7,217,941.

Motherbank. A shoal off the south coast of England, between the mainland and the Isle of Wight.

Newcastle-on-Tyne. A city in the northeast of England, Northumberland County, on the left bank of the Tyne River, about eight miles from the North Sea. It is an extensive manufacturing center. Within the city and vicinity are numerous blast furnaces and malleable and

other iron foundries. Population: 1891, 186,345; 1907, (estimated), 264,511.

Salcombe. A town in Devon.

Southampton. An important seaport near the English Channel, in Hampshire, on a peninsula at the mouth of the Itchen River, near the head of Southampton Water. It is seventy-one miles southwest of London. The town is a rendezvous for many steam packet lines and is much visited by ocean steamers. It has extensive docks and is an emigrant station. The Royal Mail Steamers ply regularly between Southampton and the West Indies. Population; 1891, 65,325; 1907 (estimated), 119,745.

Woolwich. This was formerly a naval port of England, County of Kent on the Thames, seven miles southeast of Saint Paul's Cathedral, London. It is now a part of the metropolis. The chief importance of the place lies in the fact that it is the seat of the Royal Arsenal, founded in 1585, which employs about 12,000 men, whose wages exceed \$350,000 a month.

IRELAND.

Cork. A river-port of Ireland, capital of the County of Cork, 137 miles southwest of Dublin. Population: 1881, 80,124; 1891, 75,070.

Dublin. Capital of Ireland, on the Liffey River, by which it is separated into two nearly equal parts. Population: 1891, 254,709; 1907, (estimated), 378,994.

WALES.

Llanelly. A seaport town of Wales, on a creek emptying in Carmarthen Bay, fifteen miles of Carmarthen. Population: 14,973.

Swansea. A seaport of Wales, County of Glamorgan, on the west side of the Tawe, at its mouth in Swansea Bay, Bristol Channel. It is an important commercial center and is connected with London by rail. Population: 1871, 51,702; 1881, 59,597; 1891, 90,349.

ENGLAND.

DOVER.

1878.

In 1878, yellow fever was almost brought to the town of Dover. A Norwegian ship, on which there had been three deaths from the disease on the passage from Rio de Janeiro, entered the port without being subjected to quarantine measures. Fortunately, no cases erupted on board while the vessel was in the harbor.¹

FALMOUTH.

1817.

The brig *Britannia*, from the West Indies, after having touched at Liverpool, arrived at Falmouth. She remained in that port six weeks before beginning to discharge her cargo, which consisted principally of cotton. No sooner had the unloading begun than yellow fever developed on board. The disease was limited to the crew of the vessel.²

1864.

A ship from Sierra Leone brought a case of yellow fever to Falmouth in 1864. The patient died.³

ISLE OF WIGHT.

1845.

In 1845, the ship *Eclair*, which later in the year infected the Cape Verd Island (q. v.), brought yellow fever to the Isle of Wight. A pilot and a doctor who had come from shore to the vessel were attacked, but recovered. The outbreak was limited to these two cases.⁴

¹ Berenger-Feraud: *Traite Theorique et Pratique de la Fievre Jaune* (Paris, 1890), p. 158.

² Eager: *Bulletin No. 8, Yellow Fever Institute* (Washington, D. C.), 1902, p. 32.

³ Berenger-Feraud, *loc. cit.*, p. 141.

⁴ Berenger-Feraud, p. 117.

LONDON.

1713.

Currie⁵ (page-64) asserts that yellow fever was brought to London by "a vessel" in 1713, but that the disease did not spread beyond the imported cases. The information is very indefinite, not even giving the name of the vessel, the number of sick or the original source of infection. A careful survey of this and the other books of Currie indicates that this is the only place in which mention is made of yellow fever in London.

1878.

The only authentic case of yellow fever ever observed in London, is commented upon at length by Leggatt and Greenfield⁶ in the *Transactions of the Clinical Society of London, for 1878*.

The patient, D., a retired army officer, was in the habit of spending the winter months in a warm climate and for two years previous to his illness had done so in South America. Leaving England January 9, 1878, he landed at Rio de Janeiro on the 30th of the same month and then went to Buenos Ayres. He returned to Rio on February 21. Yellow fever was then epidemic in the town and shipping. He left Rio on February 24, arrived at Lisbon on March 14, and at Southampton on the 17th. He

⁵ Currie: A Sketch of the Rise and Progress of the Yellow Fever, and of the Proceedings of the Board of Health, in Philadelphia, in the Year 1799; to which is added a Collection of Facts and Observations Respecting the Origin of the Yellow Fever in this Country; and a Review of the Different Modes of Treating it.

Philadelphia: Printed by Budd and Bartram, No. 58 North Second Street, 1800.

⁶ Leggatt and Greenfield: "A Fatal Case of Yellow Fever Occurring in London."—*Transactions of the Clinical Society of London, 1878, p. 187.*

reached London, March 18, was taken ill on the 21st, and died on the 27th.

The autopsy disclosed a typical case of yellow fever.

What puzzled the English doctors who attended this case, was the seemingly long incubation of the germ of yellow fever, about twenty-five days, according to their computation. They calculated the probable date of infection to have been February 24, the day of D.'s departure from Rio. The fallacy of this conclusion is proved by a reference to an extract from the diary of the officer, published in the article from which this account is taken. It seems that on February 12, while the ship on which he had taken passage was at Buenos Ayres, the assistant purser died of yellow fever. The vessel left Buenos Ayres, February 15 and arrived at Rio on the 21st and sailed for England on the 24th. Two days later, two of the crew, who had never left the vessel since her departure from England, were stricken with yellow fever. One recovered; the other died on March 5. No other cases erupted on board.

From the above, it is certain that D. did not contract the disease at Rio, but was infected on board the vessel on which he was a passenger a few days after the death of the third case (March 5). This would give an incubation of nine or ten days.

NEWCASTLE-ON-TYNE.

1895.

Much apprehension was caused in England in 1865 by the announcement that the Norwegian ship *Mindet*, from Mobile, Alabama, which arrived at Newcastle-on-Tyne in November of that year, had yellow fever on board. An investigation by the health officers of the town revealed the fact that eleven men were suffering from malarial fever and that two had died of this disease on the passage from Mobile. The eleven men were removed to the

Tyne Port floating hospital, as a precautionary measure. All recovered.⁷

There was no yellow fever in Mobile in 1865, and as the *Mindet* did not touch at any port on the trip to Newcastle-on-Tyne, the diagnosis of malaria was undoubtedly correct.

PORTSMOUTH.

1763.

Legallois⁸ says that the war vessels returning from America in the fall of 1763, landed at the Haslar Hospital, near Portsmouth, several seamen sick with yellow fever, The hospital being overcrowded, it was found impossible to segregate these patients, but in spite of this lack of precaution, the disease was confined to the imported cases. The number of cases and deaths is not given.

1827.

La Roche⁹ quoting Niel,¹⁰ relates a case of fever which occurred at Portsmouth in July, 1827, during a very hot spell of weather. In this case, which was of very severe character, there was jaundice and other symptoms, which gave it somewhat the character of yellow fever. The patient was attacked on the night of the 8th; on the 15th, he vomited thrice in the night, the matter being black like coffee grounds. The stools assumed the same appearance. After twenty days of sickness, the patient recovered.

⁷ Campbell: U. S. Public Health Reports (Washington, D. C.), 1895, vol. 10, p. 1150.

⁸ Legallois: *Rocherches sur la contagion de la Fievre Jaune* (reprint), Paris, 1850, p. 20 (foot note).

⁹ La Roche: *Yellow Fever* (Philadelphia, 1855), vol. 1, p. 274.

¹⁰ Neil: *London Med. & Phys. Journal*, N. S., vol. 5, p. 105.

Had this case occurred in New Orleans or any other locality where the disease has been observed from time to time, it would have been unhesitatingly pronounced yellow fever. It is one of the many examples which goes to prove how difficult it is to arrive at a correct diagnosis of the saffron pest.

SALCOMBE.

1877.

In the beginning of 1877, a German sailor was landed at Salcombe, Devon, from the schooner *St. Lucia*, from the West Indies, suffering from fever. He was taken to the workhouse infirmary at Kingsbridge. Unmistakable symptoms of yellow fever having manifested themselves, all the other inmates were removed from the hospital, and the Board of Trade was communicated with. The patient recovered and no other case resulted.

SOUTHAMPTON.

YELLOW FEVER YEARS.

1852; 1853; 1857; 1860; 1864; 1866; 1867.

SUMMARY OF IMPORTATIONS.

1852.

It is surprising that Southampton, which has extensive commercial relations with the West Indies, South America and the West Coast of Africa, all notorious foci of yellow fever infection, should not have been invaded by the disease prior to 1852. The passenger traffic between the town and the countries above mentioned is very active and as hardly any precautions are taken when a ship from these localities arrives at the port, unless yellow fever is present or has been raging on board during the voyage, there is no doubt in our mind that outbreaks of yellow fever have

occurred at dates anterior to 1852 and were put down by the authorities as "typhus" or "malignant fever," either through ignorance of the symptomatology of the tropical plague or through a wanton desire to conceal the real state of things. The slogan of the British nosologists is "No Quarantine," as they hold that the ship alone and not the place whence it comes should be held under suspicion and though yellow fever may be committing fearful ravages in a certain place, no barrier is put upon vessels arriving therefrom, unless the vessel itself is known to be infected. Owing to the swiftness with which trans-Atlantic vessels make the voyage from America these days, a ship may be a slumbering nidus of infection and a detention of two days, which is the usual custom in England, is hardly sufficient to place a ban on the importation of the disease. The only thing which saves Southampton, London and other ports of the Empire from a devastating invasion of yellow fever, is the fact that the *Stegomyia calopus* is either totally absent or is present in such small quantities in these localities, that even when importation does take place, there is no agent present to disseminate the virus and the invasion ends with the original cases.

The solitary case which erupted in the very heart of Southampton in 1852, substantiates the above assumption. Had this incident happened in New Orleans, which is now as free from the disease as Boston, New York or Philadelphia, but which was then a hot-bed of pestilence, it would have created a focus whence the poison would have been carried to every section of the city. To the *Stegomyia calopus*, New Orleans owes the terrible carnage caused by yellow fever in the past and to the strict quarantine regulations and the almost total annihilation of the winged carriers of contagion, does she owe her present freedom from a disease which at one time was said to be endemic.

The history of the infection of Southampton in 1852 is as follows:¹²

On the morning of the 18th of November, 1852, the Royal Mail Steampacket Company's ship *La Plata* arrived at Southampton from the West Indies, with the loss, from yellow fever, on the homeward voyage, of her commander, together with six of the crew. She had left Southampton on the 18th of October (exactly one month previously), and gone directly to the Island of Saint Thomas, which she reached in thirteen days; and remaining there four or five days, sailed again on the 4th of November for Southampton.

This was the second voyage of the *La Plata* from England to the West Indies. The vessel was new and the crew, when she left Southampton in October, were in perfect health. Yellow fever was then prevailing both in the town of Saint Thomas and among the shipping in the harbor. During the time the *La Plata* lay in the West Indian port, her officers and crew communicated freely with the people on shore and with the crew of some of the adjacent ships. Moreover, just before leaving England, she received on board a considerable number of invalids from the *Great Western*, the *Thames* and the *Essex*—ships belonging to the Royal Mail Company—as likewise from the war-steamer *Highflyer*. All these invalids were recovering from fever and one was actually ill at the time of the transfer (November 5th), had black vomit the next day and died on the day following.

Within twelve hours after the *La Plata* steamed from Saint Thomas, on the 5th of November, the second engineer fell ill with yellow fever. The captain was attacked on the 8th. The same day, the purser and two coal trimmers were seized, and each of the five days following furnished fresh cases of the disease. In all, fifteen cases occurred during the passage from the 4th to the 13th of November, of which seven proved fatal.

¹² Harvey: *Lancet* (London), 1853, vol. 1, p. 148; Phillips: *Ibid.*, p. 2931; Milroy: *Ibid.*, 460.

When the *La Plata* arrived at Southampton, the above particulars were communicated to the quarantine officer of the port, and the vessel was placed in quarantine till the morning of the 20th, when she was released.

The distressing intelligence thus conveyed by the *La Plata*, and the fact that yellow fever was through her brought almost to the doors of the town, created intense excitement, as well in the kingdom at large as at Southampton. And this feeling had scarce began to subside when it was heightened by the occurrence, in the town of Southampton itself, eight days after the release of the vessel from quarantine, of an unequivocal case of yellow fever affecting and proving fatal to Mr. Napier, fourth engineer of the *La Plata*.

It was impossible to be without misgivings as to the condition in which the steamers next in succession from the West Indies might arrive and accordingly their advent was looked forward to with greatest anxiety. Unfortunately, the worst fears were realized. The *Medway*, the *Orinoco*, the *Magdalena*, and the *Parana*, which successively came in, all gave histories of having suffered more or less from the fever. Not to go into details respecting them, it may be observed that including the *La Plata*, the several steamers furnished an aggregate of about 124 cases, of which about 50 ended fatally.

The particulars of the sickness and death of Mr. Napier are as follows:

The *La Plata* arrived at Southampton on the 18th of November, 1852. Amongst her officers was Mr. Napier, who was engaged in the engineer's department. He took lodgings in town, where he slept at night. During the day he was occupied on some work in the engine room, in the lowest part of the vessel, where he no doubt was bitten by the infected mosquitoes who had retreated to the warmest part of the ship to escape the cold, the winter season being then at its height. He was taken ill at his lodgings on the 28th of November. On the evening of the 3rd of December, he vomited black matter and died on the morning of the 5th.

When the news of this death reached the public, Southampton was in an uproar almost bordering on panic and all sorts of wild rumors were circulated. Every case of fever was looked upon with suspicion and it only needed the eruption of a second case to cause an exodus of the population. A report was spread that the woman who had nursed the unfortunate engineer had been seized with yellow fever, but when the rumor was sifted, it was found that a woman had been engaged to attend to the patient, but left the house and the landlady had taken her place. She was not in good health when she began her ministrations and having to attend the patient day and night, the fatigue incidental to her arduous task rendered her ill. This indisposition was magnified by the excited populace into a case of black vomit and it was only when the health authorities publicly announced that the rumor was false, that the excitement subsided. One good trait of the English people, is their unshakable faith in the word of their health guardians, and even if the woman really had yellow fever, the mere fact that a representative of Her Majesty said that she did not, was sufficient. There was no "going behind the returns," as we do in America.

The case of Mr. Napier was the first and last manifestation of yellow fever in Southampton in 1852.

1853.

During 1853, yellow fever continued to rage in the West Indies, particularly at Kingston, Jamaica, where the vessels of the Royal Mail Company continued to be infected, as in 1852. According to the reports published in the *Lancet*, *British Medical Journal* and *London Medical Gazette*, for 1853, we glean the fact that the following vessels had yellow fever on board on their homeward voyage from America:

January ——. The *Parana*. Infected at Saint Thomas. Thirty cases; four deaths. On arrival at Southampton, thirteen invalids were transferred from the vessel to the

Marine Hospital. All recovered and no other cases occurred.

May 17th. The *Severn*. Infected at Rio Janeiro or at Saint Thomas. Six cases; no deaths. Last case, May 2nd. Fifteen days having elapsed since the last case, the vessel was admitted to pratique, after a rigid examination. No other cases erupted.

May 18th. The *Orinoco*. Infected at Saint Thomas. Fourteen cases; two deaths. One of the invalids being "as yellow as a guinea," when the *Orinoco* reached Southampton, the vessel was detained at quarantine for four hours, pending an investigation. A release was then given, but the "saffron man" was sent to the quarantine station and the yellow flag hoisted. A guard was stationed to prevent any possibility of escape, but the patient improving rapidly, was released after a detention of two days. No other cases erupted while the *Orinoco* was at Southampton, but the vessel was reinfected a few weeks afterwards, as we shall see later.

May 30. The *La Plata*. Infected at Saint Thomas. This is the steamer which imported the celebrated case of Mr. Napier to Southampton in 1852. On arrival at the quarantine station, it was learned that there had been fourteen cases and three deaths on board since May 7th, the date of the first case. The last case had occurred on the 24th, and the last death on the 30th, the day of her arrival at Southampton. Immediately after the conclusion of the investigation, the mails were landed, but the ship was detained at quarantine and the facts communicated to the Privy Council Office. Orders were received from London to release the healthy passengers at once, but to detain the ship until the afternoon, in order to complete the stipulated six days from the outbreak of the last case. The invalids were eventually transferred to the Marine Hospital. No new cases ensued.

July 17th. The *Orinoco*. This is the same vessel which had had fourteen cases and two deaths on a previous

voyage, noted above. On arriving at quarantine, the fact was elicited that the first case had appeared on the day after the ship arrived at Saint Thomas, in the person of a seaman. This evidently does away with the assumption that the vessel was infected at Saint Thomas in this instance, as yellow fever certainly takes more than twenty-four hours after infection to manifest itself. Be that as it may, during the remainder of her stay at Saint Thomas, no less than thirty cases occurred, confined principally to the seamen and stokers. After leaving Saint Thomas, fifteen fresh cases erupted, among which was a passenger. The forepeak of the steamer was fitted up and used as a hospital during the time the ship was in the harbor of Saint Thomas; but on her leaving, the heat being excessive from the closing of the ports, the sick were removed to the deck, where awnings were spread. This was attended by a diminution of the sickness, which finally disappeared altogether.

The Southampton authorities took extraordinary precautions to prevent the disease from spreading to the shore. All persons on board, in good health, who made a sworn declaration that they had had, in their lives, anything like yellow fever, were permitted to land at once. Those who could not do so, were put under surveillance and allowed to proceed on their way only after a rigid examination.

The disease was not communicated to the shore.

1857.

The steamship *Tamar*, which brought yellow fever to Lisbon, Portugal, in 1857 (q. v.), entered Southampton shortly afterwards.¹³ She had deaths on the passage from Spain and gave rise to several cases of yellow fever in the harbor of Southampton.

¹³ Eager: Yellow Fever Institute Bulletin No. 8, Washington, D. C., 1902, p. 33.

1860.

On April 3rd, 1860, the Royal Mail Steamer *Tyne* arrived at Southampton with yellow fever on board. Eight cases, with three deaths, had occurred during the homeward voyage. One of the passengers was seized only eight days before the arrival of the ship at Southampton. Three of the patients, in an extremely debilitated condition, were sent to the Marine Hospital, where they eventually recovered.¹⁴ No new cases manifested themselves while the *Tyne* was at Southampton.

IRELAND.

CORK.

1854.

A solitary instance of yellow fever having been brought to Ireland is recorded.

In 1854, according to the *Lancet* (London), vol. 1, page 90, 1854, a vessel entered the harbor of Cork, with yellow fever on board. Two patients, who were transferred from the ship to the Marine Hospital, died. This incident created much alarm among the inhabitants of the town and prompt and extraordinary precautions were adopted to prevent a spread of the disease. No other cases erupted.

DUBLIN.

1857.

Cummins¹⁵ relates a case which came under his observation at Dublin in 1857, which presented all the charac-

¹⁴ *Lancet* (London), 1860, vol. 1, p. 386.

¹⁵ Cummins: Case of Fever, with Unusual Symptoms. Dublin Quar. Jl. of Med. Sciences, 1858, vol. 26, p. 212.

teristics of yellow fever. The patient, a boy five years old, had exhibited symptoms of ill health for some months previous, consisting of debility, loss of appetite and shooting pains in various parts of the body. These symptoms were given proper attention by Dr. Cummins, but without much decided or permanent improvement. On December 2, 1857, the little patient developed a fever which seemed to be of a grave nature. "From day to day, as I watched the progress of the symptoms," observes Dr. Cummins, "I became more and more reminded of that disease which numbers its victims by thousands within the tropics, but rarely carries its devastations to more temperate regions, and as yet has only been observed in isolated cases in this country."

The Doctor did not at the time suspect that he was dealing with a case of yellow fever, and did not treat it as such, but remarks that if the case had occurred in any of the habitats of yellow fever, there would not have been a second opinion about pronouncing it to be that disease.

The patient died on December 9th, seven days after the graver symptoms of his illness had manifested themselves. Shortly before death, he had black vomit.

At the time of the above occurrence, yellow fever, having transgressed its ordinary bounds, had visited Southern Europe and was making fearful ravages in Lisbon. Our authority does not give the probable source of infection in the case under observation, leaving one under the impression that it originated in Dublin. Such could not possibly happen, however, under the most vivid stretch of the imagination. If the case was one of yellow fever, there is but one way in which it could have been engendered. We regret our inability to either verify or disprove the question at issue, as the literature of the period fails to enlighten us in that direction.

WALES.

LLANELY.

1865.

While the yellow fever was causing widespread consternation at Swansea (q. v.), the sloop *Eleonore*, which lay close to the *Hecla*, from September 16th to the 18th, was infected and carried the disease to Llanely.¹⁶ Charles Hayes, John Slocum and Daniel Stapleton, sailors on board the sloop, were attacked. The *Eleonore* sailed for Llanely, where two of the patients died.¹⁷

SWANSEA.

YELLOW FEVER YEARS.

1843; 1851; 1864; 1865.

1843.

On July 26th, 1843, the brig *Piric*, from Cuba, arrived at Swansea, with a cargo of copper ore. Some of the crew had died from yellow fever on the homeward voyage. Benjamin Davies, a Swansea pilot, boarded the vessel on her arrival, remained on board that day at the Mumbles Road, entered the harbor the following day, the 27th. He repaired to his home as soon as the ship was moored. He felt indisposed, complaining of violent pain in the head and died on the 28th, exhibiting all the symptoms of yellow fever.¹⁸

¹⁶ Donnet: Arch. de Med. Navale, 1870, vol. 14, p. 118.

¹⁷ Buchanan: Eighth Report of the Medical Officer of the Privy Council for 1865 (London, 1866), p. 443.

¹⁸ Buchanan, loc. cit., p. 443.

1851.

The bark *Henrietta*, from Cuba, arrived at Swansea in the month of August, 1851, with a cargo of copper ore. William Gammon, a sailor, was employed to go on board as ship-keeper. While attending to his duties, he was taken ill, went home on August 25th, and died the next day, an unmistakable victim of yellow fever.

A second case developed on the *Henrietta*. When Gammon was first taken ill, his brother, also a sailor, not suspecting the nature of his relative's illness, went on board the vessel to take his place. He was also taken ill, but having obtained the prompt service of three doctors, as well as that of the ship's old captain, recovered. His illness is said to have been yellow fever.¹⁹

No other cases erupted on board the *Henrietta* nor was the disease diffused on shore.

1862.

During the year 1862, the following vessels arrived at Swansea with histories of yellow fever on board:²⁰

The *San Jose* lost two of her crew from yellow fever at Cuba.

The *Florence*, one.

The *Cornwall*, ten, five in Cuban ports and five at sea on the homeward voyage.

The *Ellen*, eight, seven at Havana and one on the passage home.

The *Hampshire*, one.

The *Mamgosteen*, one.

The *Countess of Bective*, five.

The *Dorsetshire*, four.

The *Cobrero*, four.

¹⁹ Buchanan, loc. cit., p. 443.

²⁰ Buchanan, loc. cit., p. 444.

1863.

The year 1863, although not as prolific as 1862, furnished the following:²¹

The *Florence* lost one man at Cuba from yellow fever.
The *Stains Castle*, one.

The *Cornwall*, three, two at Cuba and one on the way home.

The *San Jose*, one, at Cuba.

1864.

In July, 1864, the bark *Mangosteen*, from Cuba, arrived at Swansea, with a history of yellow fever on board during the homeward voyage. Samuel Dawkin, a ship-keeper, was placed in charge of the vessel. He was soon taken ill and died on the third day.²²

The following vessels also furnished histories of yellow fever infection in 1864:²³

The *Dorsetshire*, two at Cuba.

The *Mangosteen*, one, at sea.

The *Pedro Ferrer*, one, at Cuba.

1865.

THE FAMOUS CASE OF THE "HECLA."

The year 1865 furnished the only epidemic of yellow fever which has ever flourished on English soil. We shall, therefore, make free use of Dr. Buchanan's masterly report of the incident.²⁴ The facts as condensed from the voluminous document in question, are as follows:

²¹ Buchanan, loc. cit., p. 444.

²² Buchanan, loc. cit., p. 443.

²³ Buchanan, loc. cit., p. 444.

²⁴ Buchanan: Report on the Swansea Fever, published in Eighth Report of the Medical Officer of the Privy Council for 1865 (London, 1866), p. 442, et. seq.

The bark *Hecla*, a wooden sailing vessel, returning from Cuba to Swansea with a cargo of copper ore, arrived at the British port September 8, 1865. The vessel was boarded at 5 P. M., by George Morgan, a Swansea pilot, fifteen miles to N. E. of Lundy Island (about twenty-five miles off Swansea) Morgan found the ship in charge of a Bristol Channel pilot, who gave up his post and returned to his own boat. The master informed Morgan that he had a man sick with dropsy on board, that he had lost three of his crew on the voyage home, was in consequence short-handed, and desired the pilot to send his boat ashore for four or five men to assist him in coming in. This was accordingly done and the five men boarded the *Hecla*. The vessel anchored in the Mumbles roadstead, about 9 P. M., and showed a light through the night. At daylight on Saturday, September 9, the ensign was hoisted, and the ship's number shown. The steam tug came up about 6 A. M., and towed the *Hecla* in, in the ordinary course. Not a word was said to the pilot about yellow fever, and he had no idea that the men died of that disease. The last vessel that had arrived from Cuba, less than a fortnight before, had had no sickness on board, and the pilot had no reason, particularly as the *Hecla* had a clean bill of health, to believe that the sickness on board was of an infectious character.

The *Hecla* entered Swansea harbor at 9 A. M., on September 9, showing no quarantine flag, and giving no indication that sickness was on board. She was placed in the North Dock, alongside the Cobre Wharf, in the usual discharging berth. A good many people went on board as she entered the dock. Within an hour of the ship's arrival, two passengers were landed with their baggage, and the crew had left the ship, and had distributed themselves over the town. Three men were landed sick; two of whom were recovering from "fever;" one the captain reported ill of dropsy. Within three hours of the vessel's arrival in port the hatches were removed, a stage rigged and gangs of men commenced discharging the cargo. About noon the sanitary inspector came to the mayor,

told him of the arrival of the *Hecla*, and stated to him that deaths were reported to have occurred on the vessel in her homeward passage, and that one seaman had been landed from the ship seriously ill. The mayor went at once to the collector of customs and to the master of the *Hecla*, and learned that the rumor about sickness on board was true, that some of the deaths had been from yellow fever, and that the sick seaman was suspected to be suffering from the same disease. Thereupon the mayor requested Dr. Paddon to accompany him, and they went together to Welcome Court, where the man, James Saunders, who had been removed from the *Hecla*, lay sick. He had before been visited by two medical men (Messrs. Harrington and Thomas). This was the man who was stated by the captain to be ill of dropsy. Dr. Paddon found him in bed, in a wretched room of a small filthy house, dying of exhaustion from fever, without any sign of dropsy; his body tinged yellow. He was so near death that no detailed examination could be made. The mayor and Dr. Paddon had scarcely left the house when the people ran after them, to say that Saunders was dead. Dr. Paddon thereupon certified that he died of "fever, probably yellow fever."

At this time, soon after noon on September 9, a good deal of public anxiety existed about the *Hecla*, and about the possibility of the disease spreading from the house in Welcome Court or from the crew. Under Dr. Paddon's advice, the mayor caused the following precautions to be taken: The body of Saunders was put into a tarred sheet, and buried within four hours of his death; the house where he died was immediately emptied, and disinfected with limewash and chloride of lime and, for further safety all the houses in the court were similarly treated. The bedding and clothing of the dead man were destroyed, and the house was again cleansed and disinfected before it was allowed to be tenanted, a week after. The mayor also set the police to find out the passengers and crew of the *Hecla*, instructed the sanitary inspector to have their clothes and rooms and persons fumigated with chlorine.

But the mayor and Dr. Paddon were further desirous of dealing with the *Hecla* herself, on the supposition that she might be a source of infection. The mayor therefore convened a meeting of magistrates, to consider whether there was any power to remove the vessel from the dock, and if so, whether the sailors who had left the ship could be compelled, under their articles, to take her out. The customs authorities and the board of health were also applied to. All agreed that the vessel ought never to have come into port, but having entered and partly discharged her cargo, the authorities found themselves powerless to insist on her removal. The agents for the owners of the ship and cargo were communicated with, but they at first refused to allow either ship or cargo to be meddled with, arguing that other ships had come into Swansea having had yellow fever on board on their homeward passage, that they had never been interfered with, and that no ill results from them had occurred to inhabitants of the town. After consultation with other authorities of the town, the mayor on the afternoon of the same day, September 9, set the police to turn people off the vessel, and keep everybody from going on board her. The unloading was stopped, and the hatches shut down, but not before some thirty tons of ore had been taken out and placed in the Cobre yard. Measures of purifying the ship were now had recourse to; these continued until September 12, and consisted in washing the decks and forecastle with solution of chloride of lime, and in the copious sprinklings of chloride in the forecastle, steerage, hold, and places of storage.

A man named Norman, whose case is recorded by Dr. Buchanan, noticed when he was on the ship on the 9th, before any chemicals were used, that a very bad odor came from the forecastle, where the sick people had been; and on Monday (the 11th), Dr. Paddon observed even the scupper holes filled with what appeared to be excrement, and had them cleaned out. The fumigation of the ship was finished on the 12th; the police were then removed, and communication with the vessel permitted.

On the morning of the 13th, she began to discharge her cargo, and finished unloading on the 20th or 21st of September, lying all the time alongside the Cobre company's yard into which her ore was taken. The agent for the Cobre company had this ore sprinkled with disinfecting fluid.

MEDICAL HISTORY OF THE "HECLA" PREVIOUS TO HER ARRIVAL AT SWANSEA.

On the afternoon of the day when the *Hecla* arrived, as soon as action had been taken, inquiry into the history of the vessel and into the circumstances of her arrival was more accurately made. At about 3 P. M., the collector of customs instructed the examining officer to put to the master the usual quarantine questions. It must be premised that the master had been guilty of an infraction of the quarantine laws, and that his answers were defensive in character, and were not always consistent with themselves. From them it appears that the *Hecla* left Swansea on May 1, and touched at no place until she arrived at Cuba; that she left Cuba on the 26th of July with a clean bill of health, again touching at no place in the homeward voyage. The master's answers further state that he was not aware of any infectious disease prevailing in any degree at the place from which he sailed, but that he heard reports of sickness at Cuba. He states that two seamen died at Cuba. (In a subsequent examination by Mr. Cullum, of the customs, the master stated that before sailing from Cuba several cases of sickness occurred, and on July 21, George Wilson died in the hospital on shore, and Hansel Pederson was left in the hospital sick). The master further stated that he had four officers, ten seamen, and two passengers on board (they had, however, dispersed at the time the examination was taken), and that in the course of his homeward voyage he lost three of those on board, viz., on August 11, one man, sixteen days sick; on August 24, a second, three days sick; and on Sep-

tember 1, a third, forty-two days sick. The bedding and pillows of these men were thrown overboard.

Saunders, who died on the day of the *Hecla's* arrival at Swansea, had been fourteen days sick. Of the six deaths, two had been from yellow fever, two from intermittent. (In his statement to Mr. Cullum the master says he considered Saunders was suffering from dropsy. In the book of "receipts of wages and effects of deceased seamen," the cause of death of each of the six men is entered as "yellow fever.") Among other answers to the quarantine questions, the master stated that all except the cases now mentioned had been well during both voyages and at Cuba. (In his subsequent statement to Mr. Cullum, however, he says that several cases of sickness occurred before sailing from Cuba, and that during the passage home several of the crew, besides those who died, were sick).

A PECULIAR "QUARANTINE."

Those answers having been obtained from the master, the collector of customs forwarded them on September 9, to the Commissioners of Customs in London, and stated that "he had put the vessel in quarantine." On being questioned by Dr. Buchanan, on October 3, as to what this statement signified, inasmuch as the crew were already dispersed, and the vessel partly unloaded, the collector said that he meant that he had the quarantine questions put, and that the mayor had prevented communication with the ship, and had had her hatches shut; but that the customs authorities had adopted no preventive measures.

IGNORANCE OF THE LAW IS SOMETIMES AN EXCUSE.

Dr. Paddon was desirous, on September 9, that the Board of Trade should be at once acquainted with the circumstances by telegraph, and their instructions asked. Finding this was not done, he wrote on September 11 to

the president of the Board of Trade, detailing the chief points already abstracted here.

On September 15 the Board of Customs instructed Mr. Cullum, their collector at Newport, to proceed without delay to Swansea, and to institute a full inquiry into the circumstances connected with the *Hecla*. The chief points elicited in this inquiry have already been stated.

The observations of the Board of Customs upon Mr. Cullum's report are, "that there has been great irregularity and neglect of the usual precautions on the part of all persons on board, and that the master, the Swansea pilot, as well as the Bristol pilot, and the crew who landed from the vessel have in strictness rendered themselves liable to prosecution under the quarantine laws. They would, however, appear to have acted in ignorance and not from any willful intention of violating the law." This opinion having been communicated to the Privy Council, the customs authorities were informed that the parties implicated must be warned of their liability to prosecution, but that under the circumstances no prosecution would take place.

This is one of the few instances on record where ignorance of the law has proved a convenient loophole for the guilty to escape. And yet, we have always been led to believe from infancy that the majesty of the law is supreme in Britain, a delusion which Dr. Buchanan's report punctures beyond re-inflation.

THE EPIDEMIC.

After Saunder's interment, and after the precautions before described had been taken, no further alarm appears to have been felt about yellow fever. The *Hecla* some days after unloading, was transferred from her place by the Cobre Wharf into the Beaufort Dock, a branch of the North Dock, surrounded by high warehouses. But on September 23, the registrar of births and deaths in Swansea, got a medical certificate that a death had occurred from yellow fever, and heard it reported that other cases were about the town. That letter, transmitted by the

Registrar General of births and deaths to the Privy Council Office, was the immediate cause of the inquiry headed by Dr. Buchanan being set on foot. This eminent scientist discovered that since the arrival of the *Hecla*, cases of true yellow fever had occurred among residents of Swansea. The character and sequence of the attacks were only made out by degrees; each is related separately with as much accuracy as possible in the supplement to the exhaustive report from which this account is taken. The history of these cases, while exceedingly interesting, presents the same clinical and pathological features which are seen in the average case of yellow fever, and not to make this chapter too lengthy, are omitted here.

Dr. Buchanan calls attention to the fact that during the summer of 1865, and at the time of this outbreak, there had been extremely little fever of any sort in Swansea. What did exist was ordinary typhoid, and there were no cases of this on the island. There was not, and there had not been for many years, any instance of relapsing fever.

Between September 15, when the first case occurred, to October 13, when the last case became convalescent, there were twenty-two cases in which the diagnosis of yellow fever could pretty certainly be made, and seven other cases in which the circumstances of exposure or the character of the attack led to a more or less strong suspicion that the illness was of the same nature.

Of the cases diagnosed yellow fever, fifteen died—besides the man brought by the *Hecla*—and seven recovered. Of the doubtful cases, one died, and six recovered.

INTERESTING POINTS OF THE EPIDEMIC.

Other ships having arrived at Swansea from infected localities in 1865, it appeared right, before connecting the *Hecla* with the deaths which occurred after her arrival, to make quite sure that no other vessels which had entered the harbor of the English port, coming from an American or West Indian port, had had any cases of yellow fever—

even not fatal—on board. In answer to an inquiry on this score, the Registrar General of Seamen furnished Dr. Buchanan extracts from the logs of all vessels so arriving within two months preceding the *Hecla* incident. These extracts showed that of the twenty-four ships coming from Cuban waters which discharged their crews at Swansea during the year in question, only three gave histories of deaths from yellow fever, viz.: *The Augusta Schneider*, one; the *Victoria*, two at sea; and the *Hecla*, whose history is given in these pages.

This information, coming from such high authority, led Dr. Buchanan to the conclusion that no other vessel than the *Hecla* could be connected with the outbreak—an opinion which is no doubt shared by all those who have followed the history of this remarkable epidemic.

The rise and progress of this epidemic shows that all those attacked either went on board the *Hecla* or visited the homes of the stricken ones. This proves beyond question that a small colony of yellow fever mosquitoes was imported to Swansea either by the ship in question or by other ships coming from the natural habitat of the insects. To the fact that the winged pests were not present in large numbers, is due the escape of the balance of the population of the thriving seaport from a disastrous visitation of the West Indian pestilence.

Many interesting incidents are brought to light in Dr. Buchanan's report. For example, the sloop, *Eleonore*, which remained about three days alongside the *Hecla*, discharging her cargo, left Swansea for a neighboring port (Llanely, q. v.), where she lost two of a crew of four, one of them certainly from yellow fever.

Another remarkable fact is that the Bristol and Swansea pilots, the five seamen who helped to bring the ship into the harbor, the custom-house officers and men, and almost all the men employed in discharging the *Hecla's* cargo, escaped an attack of the fever (the after-history of most of them being known), although they had much more direct dealing with the ship than the persons who were attacked. For this circumstance, Dr. Buchanan states

that no explanation can be offered. In this age of advanced scientific knowledge, however, it is easy to account for this apparently extraordinary immunity. It can be explained in a few plain words: They were not bitten by the active agent of infection, the nefarious *Stegomyia calopus*. But *why* they were not bitten while others, less exposed, were, requires a modern Edipus to elucidate. We are modern, but we have no Edipian faculties.

WOOLWICH.

1846.

The *Eclair* is accused of having infected Woolwich in 1846. After the incident of 1845, the vessel was brought to that port, where it was thoroughly renovated and, to make the metamorphosis more complete, the name *Eclair* was stricken from the marine register and the rehabilitated vessel christened *Rosamond*. But the infection was still dormant in the hold and broke out while the ship was being put in trim for a voyage to the South Atlantic stations. Four men were attacked with what the *Second Report on Quarantine*⁸⁵ is pleased to be called "typhus," but which was no doubt yellow fever. Two of the patients died in the Woolwich hospital. What gives additional color to the assumption that the disease was yellow fever, is the fact that in February, 1847, three days after leaving Woolwich, another "suspicious" case was observed, followed in rapid succession by others as the vessel neared the tropics. When in the neighborhood of the Cape Verd Islands, before any communication was had with the shore, a sailor died on board, having vomited black for two days, after having shown other marked characteristics of yellow fever infection. We can therefore safely assert that the outbreak at Woolwich, while the ship was being renovated, was a typical manifestation of yellow fever.

⁸⁵ Second Report on Quarantine, 1852, p. 98.

1848.

The war-steamer *Growler* infected Woolwich in a round-about way in 1848. The vessel, which was employed in conveying liberated Africans to the West Indies, left Sierra Leone on November 12, 1847, and arrived at Trinidad on December 5. During the voyage, forty-six deaths occurred among the emigrants from dysentery and two from "fever." The total number of cases of "fever" under treatment was seventy-five, of which seventy-two recovered. After visiting other West Indian Islands and being accused of infecting Barbadoes, the *Growler* returned to Africa, whence she sailed for Woolwich. When the hatches were opened at that port, two men who slept directly over the hatchway, were afterwards seized with fever, possessing all the characteristics of yellow fever and, in the course of a few days, both had black vomit and died in the Marine Infirmary.²⁶ The fact that they slept near the open hatchway made them an easy prey to the infected mosquitoes which were lurking in the ship's hold. The disease did not spread to the town.

²⁶ Bryson: *Climate and Diseases of the African Stations*, p. 224; also Milroy: *Lancet*, London, 1853, vol. 1, p. 461.

HISTORY
OF
YELLOW FEVER
IN
ITALY.

ITALY.

Italy is the easternmost country in Europe where yellow fever has been observed. Only on two occasions, however, has the disease made any progress on its shores—Leghorn, in 1804, and Torre Annunziata, in 1883. The only epidemic of any consequence was that of Leghorn.

CHRONOLOGY OF YELLOW FEVER IN ITALY.

- 1804. Leghorn; Pisa.
- 1821. Leghorn.
- 1828. Leghorn.
- 1850. Genoa.
- 1868. Naples.
- 1870. Varignana.
- 1883. Torre Annunziata.

BY LOCALITIES.

- Genoa. 1850.
- Leghorn. 1804; 1821; 1828.
- Naples. 1868.
- Pisa. 1804.
- Torre Annunziata. 1883.
- Varignana. 1870.

GENOA.

Description.

Genoa is a seaport of Northern Italy, on the coast of the Mediterranean, at the head of the Gulf of Genoa, seventy-five miles southeast of Turin. It is one of the oldest cities of Europe, its origin being said to be more remote than that of Rome. Its population in 1883 was about 140,000; in 1903, 222,000.

YELLOW FEVER YEARS.

1850; 1903.

SUMMARY OF IMPORTATIONS.

1850.

A vessel from Pernambuco, Brazil, is accused of bringing yellow fever to Genoa in 1850. No details are given by our authority.¹

1903.

The health authorities of Genoa were put on the *qui vive* in April, 1903, by the report that the steamer *Antonina*, from Buenos Ayres, which arrived at the Italian port on April 23, was infected with yellow fever.² An investigation revealed the fact that a "suspicious death" had occurred during the voyage. As the *Antonina* carried 743 passengers destined for Genoa and contiguous ports, precautionary measures were immediately taken to prevent a spread of the disease. No cases erupted while the vessel was at Genoa.

LEGHORN.

Description.

Leghorn is an important seaport of Western Italy, on the Mediterranean, twelve miles southwest of Pisa and sixty-two miles west of Florence. Leghorn was a mere fishing village in 1421, when it fell into the hands of the Florentines, and it continued to be a place of small importance till the 16th Century, when the decline of Pisa as a commercial mart gradually gave it prominence until it now ranks third among the chief ports of Italy, being excelled only by Naples and Genoa.

¹Berenger-Feraud: *Traite Theorique et Pratique de la Fievre Jaune* (Paris, 1890), p. 120.

²U. S. Public Health Reports, 1903, vol. 15, p. 852.

YELLOW FEVER YEARS.

1804; 1821; 1828.

SUMMARY OF EPIDEMICS.

1801.

Keating³ claims that yellow fever was present at Leghorn in 1801, and that "150 died daily for several months." A search through the works of Palloni,⁴ Tomassini,⁵ Dessessartz and Halle,⁶ Guillaume and Gouet,⁷ Ozanam,⁸ Berenger-Feraud,⁹ Mocchi, Pasquetti and Brynole,¹⁰ Guignon,¹¹ and others who have written at length upon the prevalence of the disease at Leghorn, fails to verify Keating's statement. The learned gentlemen evidently got his dates mixed or inadvertently substituted Leghorn for some other locality.

1804.

The epidemic of yellow fever which almost devastated Leghorn in 1804 was for a long time the subject of much

³ Keating: History of Yellow Fever, 1879, p. 81.

⁴ Palloni: *Observatione Medice Sulla Malattia Febrile Dominante in Livorno*. Livorno, 1804.

⁵ Tomassini: *Recherches Pathologiques sur la Fievre Jaune*, Paris, 1812.

⁶ Dessessartz et Halle: *Jl. Gen. de Med., Chir, et Pharm.*, Paris, 1805, vol. 23, pp. 3; 19.

⁷ Guillaume et Gouet: *Jl. de Med., Chir. et Pharm.*, Paris, 1805, vol. 23, pp. 274; 331.

⁸ Ozanam: *Histoire Generale, Medicale et Particuliere des Maladies Epidemiques*, 1835, vol. 3.

⁹ Berenger-Feraud: *Loc. cit.*

¹⁰ Mocchi, Pasquetti and Brynole: *Relazione Medica della Malattia cho Domina Presentimente in Livorno*. Livorno, 1812.

¹¹ Guignon: *Dissertation sur la Fievre Jaune qui a Regne a Livourne en 1804*. Paris, 1810.

heated discussion as to diagnosis and source of infection. Bally¹² incriminates a Jew from Gibraltar, who surreptitiously entered the city; other authors contend that the disease was of home origin, while some place the onus on America. The most plausible and generally accepted opinion, however, is the one expounded by Ozanam,¹³ who implicates the *Anna Maria* in the importation. The facts are as follows:

A Spanish ship, the *Anna Maria*, entered the port of Leghorn, August 18, 1804. On a voyage from Havana to Cadiz this vessel had lost the entire crew from yellow fever. At Cadiz the ship was refused permission to enter port, but was allowed to recruit the crew in quarantine. Through some irregularity the *Anna Maria* was given clean papers at Cadiz and, July 10, passed Gibraltar and proceeded to Alicante, where she received free pratique. The vessel sailed from Alicante August 9, and reached Leghorn August 18. Owing to the prevalence of yellow fever in Spain, special sanitary restrictions had, since July 17, been placed on all vessels arriving at Leghorn from Spanish ports. There had been sickness on board the *Anna Maria* on the passage from Alicante to Leghorn. The declaration of the captain, supported by oath, and the liberal donations of money made by the owner of the cargo, appear to have been effective in quieting all apprehensions at Leghorn.¹⁴ The ship was given free pratique. Two sick men taken from aboard were carried ashore and lodged at an inn in the Strada Pescheria Vecchia. These men died three days after, and a few days later twelve persons at the inn were taken sick. All the cases ended fatally. A Neapolitan who had left the inn at the first

¹² Bally: Typhus d'Amerique (Paris, 1814), p. 91.

¹³ Ozanam: Historie Medicale, Generale et Particuliere des Maladies Epidemiques (Paris, 1835), vol. 3, p. 227.

¹⁴ This incident goes to prove that "graft" is not a strictly modern American institution, but has done much to shape the destiny of the world since the day Mephistopheles handed Adam that delicious apple in the Garden of Eden.—G. A.

appearance of the disease was attacked ten days after and died in another neighborhood. A French butcher who took breakfast at the inn in the Strada Pescheria Vecchia died of the disease in ten days. Soon after his wife, the woman who owned the house in which he lived, and a friend, an officer of the French army, died of the same affection. At the time these events were occurring at the inn, another focus was formed at a bakery in the Via San Antonio. A baker had brought from the infected ship a quantity of sacks which were to be filled with biscuits. The bread was baked in the night and, in the intervals between ovenfuls, the bakers rested themselves by lying down on the empty bags. In a few days these men were stricken with a strange malady. Suspicion was directed against the *Anna Maria* as the source of the disease, and sanitary guards were stationed aboard. In their turn, the guards acquired the disease.

and wood used in the art of dyeing, and was stored in warehouses in different part of the city. In the neigh-

The cargo of the *Anna Maria* consisted of sugar, hides borhood of these magazines the disease gained quick headway. The porters who handled the goods and the custodians of the warehouses were taken with the disease. Two porters and one custodian died. Thus, spreading by degrees, the malady extended throughout the city of Leghorn. At that period Leghorn had a population of 60,666, not including the men of the French garrison. About 7000 fled. The French soldiers were transferred elsewhere. None of those who left the city carried the disease to the places they fled to, with the exception of two refugees who died at Pisa (q. v.)

Authorities widely differ as to the total mortality. Lacoste says that 1,900 died during siege of the fever, Lacoste¹⁵ says that 1,900 died during siege of the fever,

¹⁵ Lacoste: *Dissertation Historique sur la Fievre Regnante a Livourne, etc.* Livourne, 1804.

¹⁶ Coppi: *Cenni Storici di Alcune Pestilenze.* Roma, 1832.

¹⁷ Bally: *Typhus d'Amerique*, p. 81.

¹⁸ Palloni: *Loc. cit.*

last named figures are those generally accepted. According to Palloni's computation, the deaths were as follows:

August	7
September	51
October	204
November	390
December	3
	655
Total	655

The fever was at its height in the beginning of November, gradually declined after the 15th of the month, and had totally disappeared by December 9th.

1821.

Cornilliac¹⁹ claims that yellow fever was present in the shipping at Leghorn in 1821.

1828.

According to Cornilliac,²⁰ a vessel brought yellow fever to Leghorn in 1828. There was no spread of the disease.

NAPLES.

Description.

Naples is the most populous city of Italy. It is situated on the shores of the Adriatic, on the Bay of Naples, at the foot of Mount Vesuvius, 118 miles southeast of Rome.

¹⁹ Cornilliac: *Recherches Chronologiques, etc.*, (Fort-de-France, Martinique, 1886), p. 228.

²⁰ Cornilliac: *Loc. cit.*, p. 228.

1868.

Profilo²¹ relates an interesting case, said to be yellow fever, which was observed in Naples in 1868. The patient, a gunsmith, aged 40 years, came to Naples from Torre Annunziata. The onset of the attack occurred on February 10, and he was admitted to the Hospital in the clinical ward of Prof. Cardarelli on the eighth day of the disease, February 18. At that time, his skin and visible membranes were of a decided yellow color. Albumin was present in the urine. Under careful treatment, his condition improved and about two weeks later he left the hospital to return to his home in the Province of Parma.

A careful search through Profilo's article fails to disclose the source of infection in this case. In his synopsis of the symptomatology, the learned gentleman says that the diagnosis was *tifo icterodes biliosa*. We doubt very much, from a careful digest of the clinical history given by Dr. Profilo, that this was a case of yellow fever and for this reason do not include it in our chronology. We have given it a place in this volume for the reason that it is the only instance where a case of yellow fever is said to have been observed in Naples.

PISA.

Description.

Pisa is a city of Northern Italy, capital of the province of the same name, six miles from the Mediterranean and forty-four miles west of Florence. It is located on both banks of the Arno, here crossed by three stone bridges for general traffic and one for the railway. In the north-west part of the city are the famous "Leaning Tower" and the Campo Santo, the most remarkable cemetery in the world.

²¹ Profilo: Un Caso de Tifo Icterode. Morgani (Napoli), 1868, vol. 10, p. 897.

YELLOW FEVER YEAR.

1804.

SUMMARY OF IMPORTATION.

During the prevalence of the great epidemic of yellow fever at Leghorn in 1804, 7,000 of its terror-stricken inhabitants fled to the surrounding country. Of this vast number, only two carried the infection with them.²² These two were stricken sick after their arrival at Pisa and died with black vomit a few days after the onset of the attack. The population of Pisa was thrown into consternation and the refugees made preparations to flee anew. The authorities, to stem the threatened panic, publicly burned the belongings of the dead, proclaiming that such a course would prevent the "contagion" from spreading. No other cases erupting, confidence was restored and to this day the good people of Pisa, no doubt, attribute their escape from a visitation of the terrible pestilence to the incineration of the clothes and bedding of the two victims of the scourge.

TORRE ANNUNZIATA.

Description.

Torre Annunziata is a seaport in the Province of Naples, Italy, at the foot of Vesuvius, on the Bay of Naples.

YELLOW FEVER YEAR.

1883.

SUMMARY OF EPIDEMIC.

The second epidemic of yellow fever on Italian soil took place at Torre Annunziata in 1883, nearly eighty years after the "Great Epidemic" of 1804. The terror which this visitation of the Saffron Scourge would have

²² Dictionnaire des Sciences Medicales (Paris), vol. 15, p. 356.

otherwise caused, was totally overshadowed by the greater epidemic of cholera which threatened to overrun Italy that year and which created such havoc in Naples the following year.

According to researches made by Eager²³, the first case occurred June 19, 1883, in the person of a tavern keeper, aged 60, from Ischia. This man went directly from Ischia to Torre Annunziata, May 29, to transact business as a wine merchant. His case was diagnosed as one of grave icterus and he died July 8, in Via Cisterna. A few days later another man, 80 years old, living in the Via del Popolo, two or three blocks away, died with the same symptoms. The attending physicians made a diagnosis of acute yellow atrophy of the liver. The third case was that of a woman aged 70 years, who died August 25, after an illness of eight days. She lived in Via Garibaldi, within two blocks of the first cases. The same diagnosis of acute yellow atrophy was made.

Early in September, several persons living in Via Cisterna were taken sick about the same time and with the same symptoms. An alarm arose and strict sanitary measures were employed. September 6, a custom-house clerk in Via Cisterna was taken ill. He had a chill, pains in the back, high fever, slow pulse, severe headache and black vomit. He died in seven days. Cases continued to appear in the same neighborhood until October 13. There were in all thirteen cases and seven deaths. In September, a commission of medical men from the University of Naples investigated the disease. Among them was Professor Somma, who died in the cholera epidemic at Naples the next year. After much discussion the members of the commission admitted the specific nature of the malady, but did not give it a name. However, Professor Somma, in a concise letter written September 24, 1883, to Dr. Gennaro Cozzolino, made the statement that the disease prevailing at Torre Annunziata was yellow fever. During the height of the epidemic the most

²³ Eager: Bull. No. 8, Yellow Fever Institute, 1902, p. 31

careful investigations were made; necropsies were conducted by the most skillful pathologists of Naples; a special lazaretto was established, and the most stringent measures of isolation and disinfection insisted upon. The disputes between medical men were numerous and more or less violent. As a result, the consensus of opinion excluded yellow fever. Icteroid typhus and infective fever characterized by jaundice were the diagnosis settled upon by the different physicians who went so far as to give it a name.

VERIGNANA.

Description.

We have been unable to locate the exact position of Verignana on the map of Italy, but infer from Allau's article that it is a small place between Leghorn and Genoa.

YELLOW FEVER YEAR.

1870.

SUMMARY OF IMPORTATION.

According to Allau,²⁴ two cases of yellow fever were observed in the lazaretto at Verignana in 1870. The facts, as translated from Allau's article, are as follows:

The merchant vessels *Guiseppe* and *Pirro*, both from Leghorn, went on a cruise to Barcelona, Spain, where several of the crew were infected with yellow fever.

The *Guiseppe* left five sailors in the hospital at Barcelona and three more contracted the disease on the homeward voyage. Of the latter, two died and were buried at sea.

The *Pirro* left five sailors in the hospital at Barcelona; an additional case followed by death, developed on the voyage from Barcelona to Leghorn.

The authorities of Leghorn, recalling the epidemic of

²⁴ Allu: Relazione Finale sui Casi di Febre Gialla Verificatisi nel Lazaretto de Varignano durante l'Autunno 1870. Venizio, 1871.

1804, which was brought to the town in just such a manner, refused to allow the vessels to enter the harbor. The infected ships then went to Verignana, where an attempt was made to conceal the fact that yellow fever had occurred on board. The authorities were suspicious, however, and the *Guiseppe* and *Pirro* were detained at quarantine and put under surveillance. Two health officers of the village, detailed on board the vessels, were stricken with yellow fever, one on October 6, dying on October 8, and the other October 7, dying on the 12th.

No other cases erupting, quarantine was raised November 10.

CONCLUSIONS.

The epidemic at Torre Annunziata is the last observed on Italian soil. Since 1883, vessels have come to the seaports of the kingdom with histories of deaths from yellow fever during the voyage, but no case has erupted on shore since 1883. And, with our present knowledge of the mode of transmission of the disease under discussion, we fervently hope none ever will.

YELLOW FEVER

IN

PORTUGAL.

PORTUGAL.

With the exception of Lisbon, which has suffered much from occasional visitations of yellow fever, the history of the disease in Portugal is of minor epidemiological interest, being confined to seven localities, from 1718 to 1880. The only epidemic of consequence was that of 1857, which threatened to invade the entire kingdom and caused a mortality of 5,652, in Lisbon.

CHRONOLOGY OF YELLOW FEVER IN PORTUGAL.

- 1718. Peniche.
- 1721. Ericeira.
- 1723. Lisbon (Great Epidemic).
- 1724. Lisbon.
- 1850. Oporto.
- 1851. Oporto.
- 1856. Belem; Lisbon; Oporto.
- 1857. Belem; Bom Successo; Lisbon (Great Epidemic); Olivaes.
- 1858. Lisbon; Oporto.
- 1860. Lisbon (in harbor).
- 1879. Lanceda; Lisbon.
- 1880. Lisbon (in harbor).

By Localities.

- Belem. 1856; 1857.
- Bom Successo. 1857.
- Ericeira. 1721.
- Lisbon. 1723; 1724; 1856; 1857; 1858; 1860; 1879; 1880.
- Olivaes. 1857.
- Oporto. 1850; 1851; 1856; 1858.
- Peniche. 1718.

BELEM.

Description.

Belem is a town of Portugal, three miles south of Lisbon, on the right bank and near the mouth of the Tagus. It has been a part of Lisbon since 1885.

YELLOW FEVER YEARS.

1856; 1857.

SUMMARY OF EPIDEMICS.

1856.

Guyon,¹ Eager² and Berenger-Feraud³ give interesting accounts of the epidemic of 1856, the first on record at Belem. This port was the seat of the yellow fever hospital during the epidemic at Oporto. The first case at Belem was observed in August, in the person of the wife of a druggist of the town. This case was followed by two others in the same family, and then by scattered cases at considerable interval and, finally, an epidemic established itself. The fever was mistaken for typhus by the local physicians, but the members of the Royal Commission that investigated the pestilence found that at least some of the cases presented the undoubted characteristics of yellow fever. There were 100 cases and 30 deaths.

Lisbon is suspected of having infected Belem.

1857.

In 1857, occurred the great epidemic of yellow fever at Lisbon (q. v.) The disease was transmitted from Lisbon to Belem by a carpenter who made daily trips between the two cities. He was taken ill October 12. His wife was stricken on October 14 and died on the 20th. The carpenter was transported to his mother's house. The father contracted the disease and died on the 28th.⁴ This was the last death of the outbreak.

¹ Guyon: *Gazette Medicale de Paris*, 1858, vol. 39, p. 451.

² Eager: *Bull. No. 4, Yellow Fever Inst., Washington*, 1902, p. 10.

³ Berenger-Feraud: *Fievre Jaune, etc.*, (Paris, 1890), p. 127.

⁴ Berenger-Feraud, p. 131.

BOM SUCCESSO.

1857.

In 1857, during the progress of the epidemic which was ravaging the coast cities of Portugal, the infection was brought from Lisbon to Bom Successo, a village near the capital, by a child who had slept in a house where cases had occurred. On November 11, the day after its arrival, the child was attacked by the fever and died on the 19th. The boy's father, who had been constantly at the little patient's bedside, fell a victim to the pest.⁵ We find no record of other cases at Bom Successo.

ERICEIRA.

Description.

Ericeira is a town of Portugal, near the Atlantic, twenty-two miles northwest of Lisbon. Population, 2,091, mostly fishermen.

1721.

Ericeira occupies the doubtful honor of being the second place in Portugal where yellow fever has been observed. According to Guyon,⁶ who gives Rodrigues de Avreu as his authority, the disease was imported to the town in 1721. No details are given.

* Berenger-Feraud, p. 131.

* Guyon: Loc. cit.

LISBON.

Description.

Lisbon, capital of the Kingdom of Portugal, is on the right bank of the Tagus, near its mouth in the Atlantic Ocean. The climate is healthy, but variable, the city being exposed to heavy rains and cold winds in winter. Population, 1864, 208,376; 1878, 253,496. In 1885, Belem and Olivae were made part of the city.

Historical Resume.

Lisbon is a place of remote antiquity. It was anciently called Olisipo or Ulyssippo, on account of its foundation being ascribed to Ulysses. It was originally a Roman province, but was conquered by the Goths, from whom it was captured by the Moors in 716. The new conquerors called the city El-Oshbuna and retained possession of it until 1147, when it was seized by Alphonse I, of Portugal, with the aid of the English, French and Flemish crusaders. In 1713, it was attacked and partly burned by the Castilians, but the inhabitants succeeded in repulsing the invaders. The Castilians again made an unsuccessful effort to capture the city in 1724. It was made the capital of the Kingdom by Juan I in 1422, and was seized in 1580 by Alva for Philip II of Spain. It was from this port that the famous "invincible" *Armada* sailed in 1588. In 1640, the Duke of Braganza aroused his countrymen to shake off the Spanish yoke and once more Lisbon became the capital of Portugal.

The French were in possession of the city for ten months during 1807-08. A series of military revolts in the middle of the last century culminated in almost open rebellion in 1831, which was with difficulty put down by the government.

Lisbon suffered from a severe earthquake in 1344, was devastated by the plague in 1348 and was almost destroyed by the "Great Earthquake" of 1755, which, in ten

minutes, killed between 40,000 and 60,000 people and damaged property to the extent of \$100,000,000.

The tale of Lisbon's misfortunes, covering a period of over twelve centuries, was culminated on February 1, 1908, by the assassination of King Carlos I and the Crown Prince by anarchists in the streets of the ancient metropolis of Lusitania.

In addition to the turmoils of internal dissensions and inroads by the Moors, Lisbon has been repeatedly visited by epidemics from an early period. The following table gives a tolerably correct summary of the many eruptions of pestilential disease in the Portuguese capital.

CHRONOLOGY OF EPIDEMICS AT LISBON SINCE 1191.

Year.	NATURE OF DISEASE.	MONTH	DURATION	MORTALITY
1191	Epidemic Meningitis	January	3 Months	No Record
1348	Black Death	September 29	3 Months	20,000, (Pop. 60,000)
1384	Contagious Typhus	August 1	1 Month and 3 Days	No Record
1415	Plague	June	No Record	"
1437	Plague	No Record	Two Years	"
1458	"Pestilential Epidemic"	March	Four Months	"
1464	Plague	October	No Record	"
1469	Plague	No Record	"	"
1479	Plague	"	Two Years	"
1484	Plague	August	1 Year and 2 Months	"
1487	Military Sweat	October	No Record	"
1493	Plague	February	2 Years and 7 Months	"
1503	Plague	No Record	2 Years and 7 Months	"
1505	Epidemic Petechial Fever	October	2 Years	"
1510	Plague	July	2 Months	"
1514	Military Sweat	No Record	No Record	"
1517	Plague	"	"	"
1520	Plague	April	3 Months	"
1522	Plague	No Record	9 Months	"
1526	Plague	August	No Record	"
1531	Plague	No Record	"	"
1557	Whooping Cough	"	"	"
1569	Plague	June	5 Months	80,000
1575	Typhus	April	3 Months	No Record
1579	Plague	November 10	1 Year and 4 Months	40,000
1598	Plague	October 26	10 Months	2,727
1600	Plague	No Record	August, 1602	No Record
1631	Contagious Typhus	May	No Record	"
1641	"Typhus of Prisons"	December	"	"
1658	"Typhus of Camps"	No Record	"	"
1679	Plague	December	"	"
1723	Yellow Fever	Sept. 15	3 Months	6,000 (Pop. 150,000)
1724	Yellow Fever	August	2 Months	No Record
1755	Typhoid Fever	November	4 Months	"
1810	"Typhus of Camps"	October	10 Months	"
1832	Cholera	No Record	No Record	"
1856	Cholera	"	"	3,600
1856	Yellow Fever	August	September	40
1857	Yellow Fever	September	December	5,652
1858	Yellow Fever	January	February	Small
1860	Yellow Fever	May	May	"
1879	Yellow Fever	May	Two Cases	Two
1880	Yellow Fever	June 10	One Case	None

YELLOW FEVER YEARS.

1723; 1724; 1856; 1857; 1858; 1860; 1879; 1880.

SUMMARY OF EPIDEMICS.

1723.

The third invasion of Portugal by yellow fever took place at Lisbon in 1723, during the reign of Juan V.⁸

The documents relating to this outbreak are very rare and only meagre details could be obtained. According to Da Cunha,⁹ the first case was observed on September 15. The epidemic lasted three months, causing a mortality of 6,000, out of a population of 250,000. Among the illustrious dead was the great admiral, Antonio Estevao de Costa Sousa. The last death took place in November.

Da Cunha designates the disease under the name of *Vomito Preto*. It was evidently imported from the West Indies. Eager¹⁰ claims that the disease was imported from Brazil, but as there is no record whatever of the prevalence of yellow fever in that country in the eighteenth century, we think it is more logical to incriminate that natural hotbed of dissemination—the Antilles.

1724.

Yellow fever was again present in Lisbon in 1724. There were only a few cases and the mortality was not high. It is to be regretted that the authors who have written on this recrudescence of the disease in the capital

⁸ First recorded invasion took place at Erliceiva (q. v.) in 1721.

⁹ Acunha: *Discouro e Onservacoes Apollineas Sobre as Doencas que Houve na Cidade Lisboa Occidental ne Oriental no Otouno de 1723. Lisboa, 1726.*

¹⁰ Eager: *Loc. cit.*, p. 9.

of Portugal (Guyon,¹¹ Avreu,¹² Leitau,¹³ Sachetti,¹⁴ Salndaha¹⁵ and Berenger-Feraud¹⁶) do not go into more minute details.

1856.

For a period of one hundred and thirty-one years—1724 to 1856—no record can be found of the prevalence of yellow fever in Lisbon.

In 1856, the disease was epidemic at Oporto, which is 170 miles north of Lisbon, and it is not surprising that it should have manifested itself in the capital that year. The first cases were observed at Belem, a suburb of Lisbon, towards the last days of August. Shortly after, cases cropped out here and there in Lisbon, but the malady was not extensive, resulting in 211 cases and 40 deaths.¹⁷

The original source of infection of this epidemic was Brazil, as will be seen by reference to our account of the fever which prevailed at Oporto in 1856.

1857.

The epidemic of 1857 was the most disastrous which had visited Lisbon since 1723 and gave rise to numerous elaborate and learned monographs and treatises on yellow fever, prominent among which are the works of

¹¹ Guyon: *Gaz. Med. de Paris*, 1858, p. 451.

¹² Avreu: *Loc. cit.*

¹³ Leitao: *Medicina Comme Arte* (1738).

¹⁴ Joa Mendes Sachetti: *Consideracoes Medicas*.

¹⁵ Salndaha: *Ilustracao Medica*, vol. 2, p. 483.

¹⁶ Berenger-Feraud: *Loc. cit.*, p. 43.

¹⁷ Lyons: *Report of the Epidemic of Yellow Fever at Lisbon in 1857*, p. 113. (The figures given by Lyons are 311 cases and 11 deaths, but as 100 cases, followed by 30 deaths, were observed at Belem, then a separate city from Lisbon, we have deducted these last figures from Dr. Lyons' total.—G. A.).

Pinto,¹⁸ Alvarega¹⁹ and Lyons,²⁰ and the Report of the Extraordinary Council of Public Health of Lisbon.²¹ These monographs contain many odd and untenable doctrines, it is true, but are, nevertheless, historically accurate and can be fruituously consulted by the student.

Origin, Rise and Progress of the Epidemic.

Three vessels are accused of having brought yellow fever to Lisbon in 1857—the *Tamar*, the *Gerona* and the *Cuidad de Belem*. These three pest ships came from Brazil.

In March, 1857, yellow fever developed on board the steamship *Tamar*, from Rio de Janeiro, and when the vessel reached Lisbon, the captain reported having lost two men from the disease during the voyage. The vessel only touched at Portuguese ports, leaving immediately for England. As will be seen by reference to our account of yellow fever at Southampton in 1857, that port was infected by the *Tamar* shortly after her arrival, thus prov-

¹⁸ De Sequeira Pinto (A. C.): Relatorio Dirigido ao Governo de Sua Magestade acerca da Organizacao e Servico dos Hospitales Provisorios de Febre Amarella Estabelecidos, em 1857, n'esta Capital e do Respectivo Movimento Clinico Desenvolvido por Quadros Estatisticos. Lisboa, 1858.

Also: Union Med., Paris, 1863, 2. s., xvii, 570; 585.

By the same author: Parecer de Alguns Medicos Estrangeiros e Nacionaes Acerca da Anatomia Pathologica e Symptomatologia da Febre Amarella em Lisboa no Anno de 1857. Lisboa, 1862.

²⁰ Lyons (R. D.): Report on the Pathology, Therapeuties, and General Aitiology of the Epidemic of Yellow Fever which Prevalled at Lisbon. during the Latter Half of the Year 1857. London, 1855.

²¹ Relatorio da Epidemia de Febre Amarella em Lisboa no anno de 1857. Feito pelo Conselho Extraordinario de Saude Publica do Reino.—Lisbao, 1859.

ing that the vessel was a hotbed of pestilence. Nothing unusual occurred to disturb the health conditions of Lisbon after the departure of the *Tamar*, and the incident was soon forgotten by the authorities. The *Tamar* again touched at Lisbon in September, but no history of the disease having prevailed on board at that time could be found.

According to the available documents and the accounts of the epidemic by the authors above named, notwithstanding the prevalence of laryngeal affections, bronchitis, diseases of the lungs and rheumatism during the first three months of 1857, which were followed in the spring and early summer by erysipelas, typhoid, intermittent and remittent fevers, and also gastric maladies, the public health of Lisbon proved satisfactory until the end of July, as shown by this conclusive fact, that the rate of mortality throughout the metropolis of Portugal actually ranged less than it had done during the analogous six months of the two previous years.

Such was the sanitary condition of the Portuguese capital when the steamship *Genora*, from Rio de Janeiro, arrived at Lisbon early in July, 1857, bringing immigrants from Brazil. Many of these persons were so ill that all of them were sent at once to Belem to pass the period of quarantine in the lazaretto. Cases began to erupt at Belem soon after the arrival of the *Genora*. The infection eventually reached Lisbon, where the first unequivocal case of yellow fever developed in a man dwelling in Padaria Street. The patient died on the fifth day of the attack. A second case, affecting a woman, occurred on July 29, which likewise terminated fatally on the fifth day. The epidemic slowly spread to other districts, becoming more prevalent during August and September, being especially severe during October, about the middle of which month the malady manifested its greatest intensity.

It is a peculiar fact that while the fever was ravaging the city proper, the health of the harbor remained good. No cases are recorded as having occurred in the shipping

during the progress of the epidemic and the health-guards stationed along the water front proved immune to the pestilence. This anomalous state of things puzzled the Royal Commission to a considerable degree, and caused them to propagate the dogma that the infection had not been introduced by vessels and their crews, but by "filthy fomites deposited in the customs magazines of the town"—an opinion which seemed plausible then, but which reads like a passage from the Arabian Nights at the present day.

The spreading of the disease from one locality to another deserves special mention. The Report of the Portuguese Board of Health informs us that it travelled by slow and successive steps from place to place, generally from one street to another, and even from house to house, according to their proximity, and extending from lower to higher parts of the city; where, however, the epidemic manifested minor intensity than throughout less elevated districts. This progress seemed so regular, that observers could almost tell beforehand the course which the disease would pursue. Generally speaking, the epidemic spread from east to west; the central part of the capital, from being most populous, suffering in greater proportion than localities not so crowded, while the suburbs furnished much fewer cases, especially towards the western portion, in which only several isolated examples appeared. Towards the sea-shore, and in buildings abutting on the quays, the complaint proved more virulent than elsewhere.

Having become gradually more extended throughout August and September, the malady exhibited its maximum intensity towards the third week of October, on the 20th of which month 298 new cases were recorded, being the greatest number ever occurring in one day. From that date the cases became daily less frequent, and on the 31st only 185 fresh attacks came under notice among the entire population of Lisbon. On the 4th of November, however, 259 new cases were recorded, thus showing a temporary augmentation. But afterwards the number

of cases diminished consecutively till the end of December, when yellow fever ceased entirely:

Statistics of the Epidemic.

During the period mentioned—that is, while the epidemic lasted, the cases registered amounted to 13,757 altogether. Of these, 7842 were treated at the patient's own domicile, 5161 in special hospitals, and the remaining 754 in other establishments. Considering many instances may have been overlooked when yellow fever first made its appearance in the Portugese metropolis, the Report states that most likely the total persons attacked reached 18,000; which, hence gives a ratio of one person affected by the epidemic in every eleven inhabitants. Respecting the mortality, it is added that 5652 cases proved fatal, of which 3466 died at the patient's own dwelling, 1932 in special hospitals, and the remaining 254 in other public institutions. Consequently, the proportion of deaths ranged about one in thirty-five of the total population; and if the number of attacks be assumed at 18,000, as the Council of Health believed, that would average one fatal case to every 318 individuals affected.

Married Men Suffered Much.

Some interesting statistical deductions may be derived from the tables contained in the Report. For example, among the 3466 fatal cases which took place in private domiciles, 2061 were male and 1405 female patients, or 146 of the former to 100 of the latter, the period of life which seemed most fatal being from thirty to forty years of age; while married men seem to have died in a much larger proportion than married females. Whereas widows oftener fell victims to yellow fever than widowers, the proportion being about double in both categories; 12 married men having died to every 5 married women, and 10 widows to every 53 widowers.

Mortality among Trades and Occupations.

It is also curious, in reference to occupations, to know that more persons died who worked on wood than in metals; while those employed on leather also suffered considerably, as for instance, curriers and shoemakers. On the other hand, persons engaged in weaving silk and cotton, although they constituted a numerous body in Lisbon, only 24 deaths were reported against 108 among the leather workers..

Among professional men the mortality was greatly out of proportion to other classes. Thus 30 clergymen, 13 physicians and 16 apothecaries died; besides 16 other medical practitioners who fell victims in the hospitals to yellow fever, or had retired to the country previous to their deaths. If comparisons be made betwixt persons belonging to the liberal or educated professions, and industrial laborers, the mortality proved much larger among the former than the latter, in reference to their relative numbers; 436 of the former category having died, or one-eighth of the entire amount recorded, which, much exceeds the ratio of those engaged in handicrafts.

Mortality in Hospitals.

The Report gives a detailed account of the movement of patients attacked with yellow fever, who were received into the several hospitals when that malady existed in Lisbon. The total number treated in these institutions amounted to 5161; of whom 4043 were males and 1118 females—7 of the former to 2 of the latter sex; the recoveries being 3229, comprising 2499 males and 730 females; while 1932 died, or 1544 of the former sex to 388 of the latter. According to such data, it therefore appears the average mortality ranged as one death in every 267 admissions; or in five cases treated, about two died. The proportion of male patients received was at least three men to one woman; the fatal cases being, however, comparatively, nearly analogous. In both sexes a very large

proportion of the deaths recorded took place in persons varying from puberty to thirty years of age; 3003 fatal cases of the entire number previously stated having occurred among patients at that period of life; while only 31 instances were reported in children at or under their tenth year. The largest number of deaths occurred in bachelors; next the married, and lastly widowers; while among female patients, fewer single women became victims than in any other class of that sex.

The movement of patients in the military hospitals who were attacked by the prevailing epidemic, next occupies the Board of Health's attention. According to their report, 626 men and officers were received into these establishments during October, November and December, of whom 503 were cured and 123 died; thus showing a much smaller mortality than among the civil population. It is, however, worthy of remark that the disease proved more fatal to officers than to common soldiers. Thus, out of 8 officers admitted, 6 died, whereas, among 501 rank and file, the deaths were 91, or two in every eleven admissions, which therefore makes a remarkable difference. It is also further interesting to mention that, among the 626 fatal cases recorded in military hospitals, only 34 were married men and 4 widowers—hence, coinciding with the remark made in reference to civilians attacked by yellow fever—viz., that bachelors oftener died than married men—while 422 were persons from twenty to thirty years of age.

The Military and Municipal Guards.

Again, as the garrison of Lisbon and Belem then amounted to 5230 men, and the total deaths being 626, about one-eighth of the entire number thus fell victims to the epidemic, whereby the proportionate mortality exceeded that noticed among the general population. The municipal guard also suffered considerably, since out of a force comprising 1161 men, 126 were attacked, of whom 39 died. The horse-patrols of this body were, however,

less severely affected than the infantry; while patients treated at their own dwellings exhibited a smaller comparative mortality to those sent to the hospital.

Mortality in the Shipping.

On board the ships of war at anchor in the Tagus, exactly 57 individuals were attacked, of whom only five died, which formed, therefore, a small mortality. In mercantile ships, the disease also made very little havoc—this immunity of the marine population being especially manifested among those guards who did duty on board of ships, and still more marked in a detachment comprising 120 men stationed at Belem, of whom not one became indisposed. The very reverse was specially noticed respecting persons employed in the arsenal, 291 cases of yellow fever having been registered in that establishment, of whom 106 proved fatal, the most of these having been constantly employed on shore, although a few occasionally worked on board of ships.

1858.

In January, 1858, at a time when the inhabitants of Lisbon had scarcely recovered from the terrible experiences which had overshadowed their native land, a few scattered cases of yellow fever were observed in localities where the disease had been especially malignant the year before. Prompt sanitary measures were taken and by the middle of February, the incipient epidemic had been stamped out.²² The number of cases is not stated, but eleven deaths are recorded during the period mentioned. Grave fears were entertained by the government, it being predicted that the disease would again manifest itself during the summer months, but apart from the fact that the steamship *Deux Amis*, from Rio de Janeiro, after being subjected to a month's quarantine at Lisbon, car-

²² Berenger-Feraud, p. 133.

ried yellow fever to Ponta-Delgado, in the Azores (q. v.)²³ nothing untoward happened to disturb the health conditions of the capital.

1860.

In the beginning of May, 1860, the Royal Mail steamer *Tyne* touched at Lisbon on her way to Southampton. Yellow fever was prevailing on board and seventy-six passengers, destined for Lisbon, were prohibited from landing by the health authorities. They were all huddled in the lazaretto, but no cases developing were allowed to proceed on their way after a few days' detention.

1879.

Rio de Janeiro again contaminated Lisbon in 1879.

The English ship *Imogene* left Rio de Janeiro in the beginning of May, 1879, and arrived at Lisbon on the 7th of the month, with forty-two passengers and a crew of eighteen. The captain reported that nine passengers and three sailors had died of yellow fever during the voyage. The vessel was sent to the quarantine station and thoroughly disinfected. Two of the workmen employed in the disinfection of the vessel were attacked by the disease. These two cases were immediately isolated by the authorities and their lodgings fumigated and quarantined. The infection did not spread.²⁴

1880.

The history of yellow fever in Lisbon closes with a "suspicious case" in the beginning of June, 1880. The patient was attacked on June 10th, went through a severe spell of the disease, and was discharged cured on the

²³ See page 357 of this volume.

²⁴ *Lancet* (London), 1860, vol. 1, p. 386; Berenger-Feraud, p. 136.

²⁵ Berenger-Feraud, p. 168.

30th of the same month. The source of infection is not given by our authority.²⁶

OLIVAES.

1857.

The great epidemic which devastated Lisbon in 1857, spread to Olivaes, then a separate city of 23,000 inhabitants, but since 1883, a part of Lisbon. There is a record of 120 cases, 60 being fugitives from Lisbon. Our authority (Eager, *loc. cit.*, p. 10) does not give the number of deaths.

OPORTO.

Description.

Oporto is the second largest city in Portugal, on the right bank and about two miles from the mouth of the Douro, 170 miles north of Lisbon. The appearance of the city on a first approach is very prepossessing, but in reality most of the streets are narrow, crooked and filthy, and the houses irregularly constructed. The principal trade is in wine, white and red, but chiefly the latter (*Port Wine*, so named from this town). Oporto was at one time the capital of Portugal. It was at this place that Wellington routed the French in 1810, after the remarkable passage of the *Douro*. It was originally the *Portus Cale* of the Romans and was the stronghold of the Christians against the ferocious Moors in the early days of the Church of Rome. Population: 1878, 105,838; 1890, 139,856.

YELLOW FEVER YEARS.

1850; 1851; 1856; 1857; 1858; 1859.

SUMMARY OF EPIDEMICS.

1850.

There is no record of yellow fever having prevailed at Oporto previous to 1850, when two vessels from Brazil brought the disease to the ancient capital of Portugal.

²⁶ Firmo Ferrara des Santos: Jl. Soc. Science Med. de Lisboa, 1881, vol. 45, p. 136.

In July of the year above mentioned, the ship *Duarte IV* entered the harbor of Oporto. No history of yellow fever on board was given by the captain, but five customhouse employes of the town who had been on board were taken ill a few days afterward and three died. The disease was diagnosed as yellow fever, but the facts were withheld from the public, for fear of creating a panic. The incident would undoubtedly have been unnoticed by the population had not a second infection taken place. The new focus was created by the *Tentadora*, also from Rio de Janeiro, which arrived at Oporto during September, having lost five men from yellow fever during the voyage. Customhouse inspectors who had been sent by the health authorities to investigate the health conditions on the vessel caught the disease and contaminated their fellowmen. Scattered cases cropped out throughout the town, but fortunately the cool season stopped the progress of the fever on October 19, after fifty deaths had resulted from the epidemic. The number of cases is not stated by our authority.²⁷

1851.

The *Tentadora* and *Duarte IV*, both from Rio de Janeiro, again infected Oporto in 1851. A third ship, the *Santa Cruz*, from Brazil, also imported the disease into the town that year.

The *Tentadora*, which entered the port in August, had had five deaths from yellow fever during the voyage. Several customhouse employes who went on board the ship were taken sick and died of the dreaded disease. As in the year 1850, the infection did not spread from these initial cases, and the town would probably have escaped an invasion of the pest if proper precautions had been taken by the health authorities when the next ship arrived from Brazil. Rigorous sanitary measures were neglected, however, and a repetition of the disasters which

²⁷ Berenger-Feraud, p. 120.

overran Portugal in the past was only prevented by the advent of the cool season, which put a quietus to the activities of the *Calopae*.

In an account given by Eager,²⁸ it seems that the *Duarte IV* arrived at Oporto on September 10, having had deaths aboard from yellow fever during the voyage. The vessel spent twelve days in quarantine. After being given pratique, two custom-house men posted aboard to guard the ship were attacked with the disease and died. A few days later, three laborers employed in removing the cargo from the hold, and several other persons who had been on the vessel, were taken ill with the same malady. The disease afterwards spread in the quarters known as Miragaia ad Massarellos and altogether seventeen persons died in consequence.

While this incipient epidemic was gradually spreading, there arrived from Brazil another vessel, the *Santa Cruz*. The same malady attacked the custom-house employees, the stevedores and other persons who in one way or another had had direct relation with the infected ship. The popular alarm occasioned by these frequent appearances of fatal cases resulted in the appointment of a sanitary commission for the study of the matter and the recommendation of measures of betterment. Notwithstanding the vigorous means adopted to this end, cases continued to occur. The infection spread to two British vessels anchored down the wind from the pest ship *Santa Cruz*. The British vessels were supposed to be quite isolated from the *Santa Cruz*. Soon other cases appeared on two Portuguese vessels anchored to leeward of the British vessels. Several of the men of the Portuguese vessels died.

The epidemic which was of short duration, came to an end on October 19, resulting in 100 cases and 40 deaths.

1856.

The third invasion of Oporto by yellow fever took place

²⁸ Eager: Bull. No. 4, Yellow Fever Inst., Wash., 1902, p. 9.

in 1856, under identical conditions as in 1850 and 1851. Verily, the Lusitanians do not profit by experience.

The kingdom, which had been ravaged by cholera since 1853, and which lost 3,275 of her inhabitants from that disease between October, 1855, and November, 1856, was hardly prepared for the invasion of a second foreign pestilence and the appearance of yellow fever at Oporto in 1856 caused widespread terror.

According to Eager and Lyons,²⁹ early in July, some vessels arrived from Brazil, where yellow fever prevailed. July 12, the first cases appeared, and, as before the first persons affected were custom-house employees, stevedores and those in contact with the suspicious vessels. Again a focus of infection was established in the Miragaia and Massarelos quarters. There were also cases of yellow fever among the soldiers of the municipal garrison, but a marked difference was noted, both in the intensity of the symptoms and in the issue of the disease between the cases falling ill on board ship and those resulting from communication with infected foci on land. The first cases were congregated in a special hospital, and of these, sixteen out of twenty-one died. On the other hand, only ten deaths took place among the twenty-seven soldiers attacked. Energetic measures were taken by the authorities of the port. Certain of the vessels, being evidently deemed infected beyond hope of cleansing, were sunk at sea.

The first case was observed July 12 and the last October 2. A total of 120 cases and 63 deaths resulted from the outbreak.

1857.

The *Tentadora*, which, it will be remembered was one of the causes of the epidemics of 1851 and 1852 at Oporto, again brought yellow fever to that port in 1857.

²⁹ Eager: Loc. cit., p. 10.

Almost simultaneously with the sitting of the Quarantine Congress at Paris in 1857, and while the terrible ravages of the epidemic which was then decimating Lisbon, were being discussed and ways and means devised to stop its awesome progress, Europe was startled to learn that Oporto, after successfully warding off the invasion from the capital of the Kingdom, had been infected by importation from a foreign country. Fortunately, the importation took place at the beginning of the cool season and did not spread. The facts are as follows:

The *Tentadora* arrived at Oporto, from Brazil, about the beginning of September, 1857. Several of her crew had died from yellow fever during the passage. It is said that one of the crew was missed while the vessel was on her way to Oporto and that, on the cargo being discharged, his body was found in a state of decomposition in the ballast in the hold. Three persons from Oporto who boarded the vessel soon after her arrival, were attacked with the fever and died. The fourth case to erupt on shore was that of a store-keeper. This man had not been on board the *Tantadora*, but had received in his store casks from the infected vessel.³⁰

The outbreak was confined to the cases above noted, while unfortunate Lisbon, only 170 miles to the south, and which had been infected in a similar manner, lost 5,652 souls.³¹

1858.

A few cases in the harbor in 1858 proved to be the last echo of the history of yellow fever in Oporto.³² The sick were promptly isolated and the infection did not spread. As fifty years have elapsed since, we trust that the health authorities of the former capital of Lusitania, grown wise by past experiences, will continue to keep the foreign pestilence away from the shores of the little Kingdom.

³⁰ Editorial: Medical Times and Gazette (London), 1857, vol.

³¹ See page 467 of this volume for a description of the Lisbon epidemic of 1857.

³² Berenger-Feraud, loc. cit., p. 135; Eager, loc. cit., p. 12.

PENICHE.

Description.

Peniche is a fortified town of Portugal, on the Atlantic and south side of the peninsular of Peniche. Population, 2,963.

YELLOW FEVER YEAR.

1718.

SUMMARY OF OUTBREAK.

According to Rodrigues de Avreu, quoted by Berenger-Feraud (*loc. cit.*, page 42), the first appearance of yellow fever in Portugal took place at Peniche in 1718, seven years before the great epidemic of Lisbon. As no details are given, we infer that the outbreak was limited to a few cases, probably in the shipping.

HISTORY OF
YELLOW FEVER

IN

SPAIN.

SPAIN.

Spain has been a nidus of pestilential disease from time immemorial. As far back as the year 1100 B. C., an epidemic devastated that country. It is recorded that this was followed by twenty-five years of drought without interruption; springs were dried up, rivers became fordable, their waters becoming almost stagnant; there was neither pasture for beast nor fruit for man. So great was the barrenness, that there was scarcely any green things to be found, except some olive trees on the banks of the Ebro and the Guadalquivir. Such, says the historians of the period, was the melancholy state of ancient Spain—"full of dreadful mortalities, plagues and miseries of every description, which with immigration to other lands, nearly depopulated our country."

In the year 476 B. C., and the succeeding years, there prevailed in Spain, from time to time, a series of pestilences and other minor diseases by which a multitude of people perished. The Carthagenians, to appease the anger of the gods, to whom they attributed these fatal visitations, offered human sacrifices, and made incisions in their arms, legs and on other parts of their bodies; they also immolated cattle of all kinds, according to the severity of the pestilence.

Ancient records speak of pestilential diseases in Spain in the years 427, 383, 237, B. C.

During the Christian Era, fearful epidemics have ravaged Spain; but as our aim is simply to give a narration of the progress of yellow fever in that country, we will not dwell upon them, referring the reader for fuller details to that part of this work which treats of the ravages of pestilential disease in Europe. Suffice it to say that, at the present day, Spain is one of the healthiest countries in Europe and the favorite objective point of the tourist in quest of the romantic and beautiful.

Spain has suffered more from visitations of yellow fever than all the other countries of Europe combined. At one time (1800 to 1830) the disease seemed to have taken up its permanent abode within the confines of the Kingdom. The last general epidemic took place in 1821, although in 1870 cases were observed in several localities and fears were entertained that the great epidemics of the beginning of the century would be duplicated. Prompt sanitary measures were resorted to and the progress of the pestilence checked.

A reference to the year 1800 in our chronological table will show the appalling list of mortalities from yellow fever in Spain that year. Forty-six localities were invaded by the saffron scourge, causing a mortality of over 62,000. In 1804, when thirty-eight localities were visited with a combined population of about 428,000, the death roll reached nearly 53,000, or one death for each eight inhabitants.

LOCALITIES IN SPAIN WHERE YELLOW FEVER HAS BEEN OBSERVED.

In Andalusia.

Aguilar de la Frontera. A town twenty-two miles southeast of Cordova. Population, 12,300.

Alcala de los Gazules. On the slope of the Ronda Mountains, thirty-seven miles east by south of Cadiz. Population, 5,516.

Alcala de Guadaira. A town seven miles east of Seville; situated on a hill. Population, 7,341.

Algeziras. On the northwest coast of the Bay of Gibraltar, and opposite the latter town; little elevated above the level of the sea; behind it are high ranges of mountains. Population, 14,229.

Alhaurin el Grande. On an eminence, twenty miles west from Malaga. Population, 6,781.

Almeria. On the Mediterranean, 104 miles east of Malaga. Population (1908), 46,806.

Antequera. In a plain between Granada and Seville, twenty-eight miles west of Malaga; it is built partly on a rising ground; streets straight and wide. Population, 27,201.

Arahal. Twenty-two miles southeast of Seville. Population, 9,287.

Arcos de la Frontera. Situated on a very high rock, thirty miles north of Cadiz. Population, 15,378.

Ayamonte. At the mouth of the Guadiana, near the frontiers of Portugal, in a sterile country, eighty miles from Seville. Population, 5,972.

Benaocaz. Sixty miles northeast of Cadiz. Population, 1,960.

Bornos. Twenty miles from Cadiz. Population, 4,530.

Cadiz. On the Isla de Leon, at the extremity of a narrow neck of land, extending about six and one-half miles into the sea, sixty miles northwest of Gibraltar and sixty-four miles south of Seville. Population (1908), 69,382.

Carmona. Eighteen miles northeast of Seville, on a hill. Population, 20,074.

Catalan Bay. A small fishing village near Gibraltar.

Chiclana. Twelve miles southeast of Cadiz.

Carlota. Seventeen miles southwest of Cordova. Population, 1,350.

Chipiona. On a rock on the coast, near the mouth of the Guadalquivir, four miles from San Lucar and nine miles from Cadiz. Population, 500.

Coria. Six miles south of Seville, on the Guadalquivir, Population, 3,756.

Cordova. In a plain near the Sierra Morena, on the river Guadalquivir; distant from the sea, seventy miles in a direct line, and eighty-six miles northeast of Seville. Population, 55,614.

Cortes de la Frontera. Forty-eight miles southwest of Malaga. Population, 4,330.

Dos Hermanas. Six miles southeast of Seville. Population, 3,498.

Ecija. In a plain on the western bank of the Xenil, eighteen miles before its junction with the Guadalquivir,

in a fertile country, and eighty-two miles from Seville. Population, 27,216.

El Borge. A small town near Malaga. Population, 1,200.

El Palo. A village about three miles east of Malaga.

Espejo. Twenty-five miles southeast of Cordova, in a plain on the river Guadajoz. Population, 5,420.

Espera. Thirty-four miles northeast of Cadiz. Population, 1,822.

Estepa. Fifty-four miles from Seville. Population, 8,133.

Gibraltar. A fortified town and rock at the south extremity of Andalusia, belonging to Great Britain. Population, (exclusive of garrison), 19,859.

Granada. Beautifully situated on two spurs of the Sierra Nevada mountains, at an elevation of 927 feet above the sea level, forty-eight miles from Malaga and about thirty-one miles in a direct line from the sea. Population, 76,605.

Huelva. On an inlet of the Atlantic, forty-nine miles southwest of Seville. Population (1908), 24,000.

Isla de Leon. On the east side of the island of the same name, seven miles southeast of Cadiz. Population, 18,202.

La Rambla. A town in the Province of and fourteen miles south of Cordova. Population, 5,926.

Lebrija. Twenty-nine miles southwest of Seville, in a plain six miles from the river Guadalquivir. Population, 16,328.

Los Barrios. A small village, situated in the mountains, about fourteen miles west of Gibraltar, on the road to Cadiz.

Los Palacios. Twelve miles south of Seville. Population, 1,835.

Mairera del Alcor. Thirteen miles east of Seville. Population, 4,406.

Malaga. At the base of a range of hills, sixty-five miles east of Gibraltar. Population (1908), 135,000.

Medina Sidonia. Twenty-two miles southeast of Cadiz, and twelve miles from the sea. An old town, built on a high hill. Population, 9,703.

Montilla. Eighteen miles southeast of Cordova; situated partly on a hill. Population, 15,000.

Moron-de-la-Frontera. Thirty-two miles northeast of Seville, at the foot of the chain of mountains, called Sierra de Ronda. Population, 12,846.

Paterna de la Ribera. Twenty-three miles east of Cadiz, at the foot of the Xerez Mountains. Population, 1,500.

Puerto Real. In Cadiz Bay, six miles from that city. Population, 6,544.

Ronda. Situated in the midst of a range of mountains of that name, at a very great elevation above the sea; distant from Gibraltar, forty-two miles north. Population, 19,334.

Rota. On the coast, three miles from Puerto Santa Maria, and six miles from Cadiz. Population, 6,972.

San Fernando. On the Isla de Leon, near Cadiz. Population, 18,202. (*Also known as Isla de Leon.*)

San Lucar de Barameda. At the mouth of the river Guadalquivir, eighteen miles north of Cadiz. Population, 18,130.

San Roque. Fifty-six miles southeast of Cadiz, and seven miles northwest of Gibraltar. Population, 60,458.

Seville. On the river Guadalquivir; situated in an extensive plain, seven-two miles north northeast of Cadiz. Population (1908), 148,315.

Ubrique. Forty-six miles northeast of Cadiz. Population, 4,876.

Utrera. Sixteen miles southeast of Seville; situated between two hills. Population, 12,441.

Vejer de la Frontera. Twenty-seven southeast of Cadiz, on a very high but cultivated hill, at a short distance from the sea, opposite Cape Trafalgar. Population, 7,662.

Velez Malaga. Situated at about fourteen miles to the east of Malaga, on the slope of a hill, two miles from the sea, on the river Velez. Population, 12,523.

Vera. Thirty-nine miles from Almeria, about three miles from the Mediterranean, in a plain. Population, 6,017.

Villa Franca de la Marisma. Fifteen miles south of Seville. Population, 4,268.

Villa Martin. Forty-three miles southeast of Seville, on the river Guadaleta. Population, 1,000.

Xerez de la Frontera. Sixteen miles north northeast of Cadiz, on a hill in a fertile country. Population, 64,523.

Ximena de la Frontera. Forty-six miles north of Cadiz, about twenty miles from Gibraltar, on a hill. Population, 6,577.

In Aragon.

Fraga. Fifty-five miles southeast of Huesca. Population, 6,695.

Mequinenza. Sixty miles southeast of Huesca, on the Ebro and Segra; distant from the sea in a direct line forty miles. Population, 2,890.

Nonaspe. A village near Mequinenza, on the small river Nonaspe. Population, 1,000.

Balearic Islands.

Palma. Capital of the Island of Majorca, 130 miles south of Barcelona. Population, 58,224.

Port Mahon. Capital of the Island of Minorca, situated on its south side. Its port is one of the best and most commodious on the Mediterranean. (Population, 18,588.

In Catalonia.

Asco. A small town on the right bank of the Ebro, partly on a hill, thirty-nine miles from Tortosa. Population, 1,300.

Barcelona. In a plain on an extensive bay, having on its western side a high mountain. It is 312 miles east northeast of Madrid. Population (1908), 600,000.

Barcelonetta. A suburb of Barcelona, and on the same bay, distant from the latter city, a quarter of a mile.

Canet-de-Mar. Twenty-six miles northeast of Barcelona. Population, 3,301.

Jesus. A village opposite Tortosa.

Malgrat. Thirty-seven miles northeast of Barcelona. Population, 3,287.

Olot. Twenty-one miles northeast of Gerona. Population, 9,984.

Regens. A village five miles from Tortosa.

Roquito. On the Ebro, opposite Tortosa.

Salou. Eight miles southwest of Tarragona.

Sitges. Eighteen miles southwest of Barcelona.

Tarragona. At the mouth of the Francoli, on a lofty rock, fifty-two miles from Barcelona. Population, 18,923.

Tortosa. On the left bank of the Ebro, twenty-two miles from the sea and forty-three miles southwest of Tarragona. Population, 24,702.

In Guipuzcoa.

Passajes. On the Bay of Biscay, three miles east of San Sebastian. Population, 921.

In Murcia.

Archena. Fourteen miles northwest of Murcia, in a plain at the foot of a range of mountains, near river Segura. Population, 1,766.

Cartagena. On a bay of the Mediterranean, twenty-seven miles southeast of Murcia. Population, 75,908.

Cieza. Twenty-six miles northwest of Murcia. Population, 8,000.

Jumilla. In Province of Cartagena, thirty-seven miles northwest of Murcia, at the foot of a hill, forty miles from the sea and sixty-five miles northwest of Cartagena. Population, 9,613.

Lorca. Forty-two miles southwest of Murcia. Population, 48,138.

Masarron. Twenty miles west of Cartagena. Population, 3,745.

Molina. Six miles from Murcia, and thirty-five miles from Malaga, in a plain, on the river Segura. Population, 2,469.

Murcia. On the river Segura, north of Cartagena. Population, 91,805.

Ojos. Fifteen miles north of Murcia, in a narrow valley on the river Segura. Population, 300.

Palmar. Three miles south of Murcia.

Ricot. Twenty-seven miles north of Murcia, in a plain at the foot of a range of mountains, and one and a half miles from river Segura. Population, 1,098.

Sarria. Near Barcelona. Population, 3,752.

Totana. Ten miles northwest of Lorca. Population, 3,315.

Villa Nueva del Ariscal. Seven miles from Seville. Population, 1,651.

In New Castile.

Madrid. Capital of Spain, in New Castile, in the center of the Peninsula, on the Menzanares River. Population (1887), 470,283; (1908), 556,663.

Villaseca de la Sagra. Twelve miles northeast of Toledo. Population, 1,369.

In Old Castile.

San Andero.

In Pontevedra.

Vigo. Thirteen miles south southwest of Pontevedra. A lazaretto is maintained at this port. Population, 8,214.

In Valencia.

Alcantarilla. Five miles from Murcia. Population, 4,089.

Alicante. In a fertile country, on the sea-coast, at the foot of a hill, 800 feet high. Population, 42,500.

Guardamar. Twenty-one miles southwest of Alicante, at the mouth of the river Segura. Population, 2,696.

Orihuela. In a plain, near a range of mountains, on river Segura, thirty-two miles from Alicante, and distant from the sea, fourteen miles. Population, 25,208.

Palmar. Three miles south of Murcia.

Penacerrada. A small village, three miles from Alicante, consisting, at the time of epidemic, of forty-two families or 158 inhabitants.

San Juan. A small village in the neighborhood of Alicante.

Sans. A short distance north of Barcelona.

Tabarra. A small island in the Mediterranean, five miles south of Alicante. Population, 500.

Valencia. In a fine plain on the Guadalaviar, about two miles from the sea and 190 miles east southeast of Madrid. Population, 143,861.

CHRONOLOGY OF YELLOW FEVER IN SPAIN, FROM 1649 TO 1890.

1649. Gibraltar, Seville. (*First appearance of yellow fever in Spain*).

1696. Castille; Navarre.

Immunity. Forty-Six Years.

1700. Cadiz.

Immunity. Three Years.

1701. Cadiz.

1702. Cadiz.

1703. Cadiz.

Immunity. One Year.

1705. Cadiz.

Immunity. Twenty-One Years.

1727. Gibraltar.

- Immunity. Two Years.*
1730. Cadiz.
 1731. Cadiz.
 Immunity. Two Years.
 1734. Cadiz.
 Immunity. One Year.
 1736. Cadiz.
 Immunity. Three Years.
 1740. Cadiz.
 1741. Cadiz; Malaga.
 Immunity. Two Years.
 1744. Cadiz; Palma.
 1745. Cadiz.
 1746. Cadiz.
 1747. Port Mahon.
 1748. Port Mahon.
 1749. Palma.
 Immunity. Three Years.
 1753. Cadiz.
 Immunity. Seven Years.
 1761. Cadiz.
 Immunity. One Year.
 1763. Cadiz.
 1764. Cadiz.
 1765. Cadiz.
 Immunity. Fourteen Years.
 1780. Cadiz.
 Immunity. Three Years.
 1784. Cadiz.
 Immunity. Five Years.
 1790. Cadiz.
 1791. Malaga.
 1792. Cadiz.
 Immunity. Six Years.
 1798. Gibraltar.
 Immunity. One Year.
 1800. Alcala de los Gazules; Arahal; Arcos; Avriata;
 Ayamonte; Benaocoz; Bornos; Cadiz; Caneta la Real;
 Carmona; Chiclana; Cordova; Conil; Cortes de la Fron-

tera; Coria; Dos Hermanas; Ecija; El Arahál; Esprezalena; Estepa; Gibraltar; Huelva; Isla de Leon; La Cabezas; Lebrija; Los Palacios; Maireno; Medina Sidonia; Montejuge; Moron de la Frontera; Olivera; Paterna de la Riviera; Puerto de Santa Maria; Puerto Real; Rota; Ronda; San Lucar de Barameda; Santa Caridad; Sarria; Seville; Tribujena; Ubrique; Uterera; Vejer; Villamartin; Villaluneja; Xeres de la Frontera.

Total localities infected in 1800, forty-seven.

1801. Cadiz; Medina Sidonia; Seville.

1802. Cadiz; Carmona; Churianna; Cordova; Malaga; Medina Sidonia.

1803. Algeziras; Alicante; Antequera; Barcelona; Barcelonette; Cadiz; Corunna; Espera; Gibraltar; la Rambla; Malaga; Montilla; Palma; Ronda.

1804. Alcada de los Panderas; Algeziras; Alhaurin-el-Grande; Alicante; Antequera; Arcos de la Frontera; Ayamonte; Balearic Islands (Majorca); Cadiz; Cartagena; Churriana; Coin; Cordova; Ecija; El Borge; El Palo; Espejo; Espera; Gibraltar; Granada; Guardamar; La Rambla; Los Barrios; Malaga; Mijas; Montilla; Moron de la Frontera; Murcia; Palma; Paterna de la Ribera; Pena-Serrada; Puerto de Santa Maria; Rouda; San Juan; San Roque; Torre-Molino; Velez-Malaga; Vera; Villamartin; Xeres de la Frontera; Ximines de la Frontera.

Total localities infected in 1804, forty-one.

Immunity. Two Years.

1807. Cadiz.

1808. Cadiz. Xeres de la Frontera.

Immunity. One Year.

1810. Alberca; Barcelona; Cartagena; Cadiz; Gibraltar; Seville.

1811. Alicante; Alcantarilla; Cadiz; Cartagena; Gibraltar; Isla de Leon; Jumila; Lebrija; Lebrillo; Lorsa; Medina-Sidonia; Murcia; Tobarra; Totana; Ziesar.

Total localities infected in 1811, fifteen.

1812. Cadiz; Cartagena; Cieza; Jumilla; Murcia.

1813. Cadiz; Catalan Bay; Gibraltar; Malaga; Medina-Sidonia; San Andero.

1814. Cadiz; Catalan Bay; Gibraltar.

Immunity. Two Years.

1817. Cadiz.

1818. Gibraltar.

1819. Barcelona; Cadiz; Chiclana; Isla de Leon; Port Mahon; Puerto de Santa Maria; Puerto Real; San Lucar de Barameda; Seville; Xeres de la Frontera.

Total localities infected in 1819, eleven.

1820. Cadiz; Alcala de los Gazules; ~~La Carlotta~~; Malaga; Puerto de Santa Maria; Mequinenza; Xeres de la Frontera.

1821. Aguilas; Asco; Badalona; Barcelona; Barcelonette; Canet de Mar; Fraga; Jesus; Las Arguilas; Lebrija; Nonaspe; Malaga; Malgrat; Mequinenza; Monte Alegre; Olot; Palma; Pedrara; Port Mahon; Puerto de Santa Maria; Roquetas; Rota; Salou; San Gervaiso; San Lucar de Barameda; Sans; Sarria; Seville; Sitges; Tortosa; Villa Secca; Xeres de la Frontera.

Total localities infected in 1821, thirty-two.

1822. Corunna; Gibraltar.

1823. Loyola; Passajes.

1824. Gibraltar.

1825. Gibraltar.

1826. Gibraltar.

Immunity. One Year.

1828. Catalan Bay Gibraltar.

1829. Gibraltar.

Immunity. Twenty-eight Years.

1858. Ferrol; Vigo.

Immunity. Eight Years.

1867. Madrid.

Immunity. Two Years.

1870. Alicante; Barcelona; Madrid; Palma; Port Mahon; Tortosa; Valencia.

Immunity. Seven Years.

1878. Madrid.

1879. Pedroches.

Immunity. Three Years.

1883. Barcelona.

Immunity. Five Years.

1889. Vigo.

1890. Malaga. (Last appearance of yellow fever in Spain).

CHRONOLOGY OF YELLOW FEVER IN SPAIN, BY LOCALITIES.

1649 TO 1890.

A star (*) placed after a name means that authorities consulted do not state the year of the prevalence of the disease.

Aguilar de la Frontera.*

Aguilas. 1821.

Alaurinego. 1804.

Alabama,*

Alberca. 1810.

Alcala de Guadayra.*

Alcala de los Gazules. 1800; 1820.

Alcala de los Panaderos. 1804.

Alcantarilla. 1811.

Alcaria.*

Algeziras. 1803; 1804.

Alhaurin-el-Grande. 1804.

Alicante. 1803; 1804; 1811; 1870.

Almeria.*

Antequera. 1803; 1804.

- Arahal. 1800.
 Archena.*
 Arcos de la Frontera. 1800; 1804.
 Asco. 1821.
 Avriata. 1800.
 Ayamonte, 1800; 1804.
 Badalona. 1821.
 Barcelona. 1803; 1810; 1819; 1821; 1870; 1883.
 Barcelonette. 1803; 1821.
 Barrio de Perchel. 1803; 1804.
 Benaocaz. 1800.
 Bornos. 1800.
 Cadiz. 1700; 1701; 1702; 1703; 1705; 1730; 1731;
 1733; 1734; 1736; 1740; 1741; 1744; 1745; 1746; 1753;
 1761; 1763; 1764; 1765; 1780; 1784; 1790; 1792; 1800;
 1801; 1802; 1803; 1804; 1807; 1808; 1810; 1811; 1812;
 1813; 1814; 1817; 1819; 1820; 1821.
 Canet-de-Mar. 1821.
 Caneta-la-Real. 1800.
 Carmona. 1800; 1802.
 Carraca. 1800.
 Carrana.*
 Cartagena. 1753; 1804; 1810; 1811; 1812.
 Castille. 1696.
 Catalan Bay. 1813; 1814; 1828.
 Chiclana. 1800; 1819.
 Chipiona.*
 Churriana. 1802; 1804.
 Cieza. 1811; 1812.
 Coin. 1804.
 Conil. 1800.
 Cordova. 1800; 1802; 1804.
 Coria. 1800.
 Cortes de la Frontera. 1800.
 Corunna. 1803; 1822.
 Dos Hermanos. 1800.
 Ecija. 1800; 1804.
 El Arahal. 1800.
 El Borge. 1804.
 Elche.*

- El Palo. 1804.
 Eprezalena. 1800.
 Escala.*
 Espejo. 1803; 1804.
 Espera. 1800; 1804.
 Estepa. 1800.
 Ferrol. 1858.
 Fraga. 1821.
 Gibraltar. 1649; 1727; 1798; 1800; 1803; 1804; 1810;
 1811; 1814; 1818; 1822; 1824; 1825; 1826; 1828; 1829.
 Granada. 1804.
 Guardamar. 1804.
 Huelva. 1800.
 Isla de Leon. 1800; 1811; 1819.
 Jesus. 1821.
 Jumilla. 1811; 1812.
 La Cabezas de San Juan. 1800.
 La Carlotta. 1800; 1820.
 La Rambla. 1803; 1804.
 Las-Aguilas. 1821.
 Lebrixa. 1800; 1811; 1821.
 Los Palacios. 1800.
 Lorsa. 1811.
 Los Barrios. 1804.
 Loyola. 1823.
 Madrid. 1867; 1870; 1878.
 Mairena del Alcor. 1800.
 Malgrat. 1821.
 Malaga. 1741; 1791; 1802; 1803; 1804; 1813; 1820;
 1821; 1890.
 Mazarron.*
 Medina-Sidonia. 1800; 1801; 1802; 1811; 1813.
 Mequinenza. 1821.
 Mijas. 1804.
 Molina.*
 Monte Alegre. 1821.
 Montejugue. 1800.
 Montilla. 1803; 1804.
 Moron de la Frontera. 1800; 1804.
 Murcia. 1804; 1811; 1812.

- Navarre. 1696.
Nonaspe. 1821.
Ojos.*
Olivera. 1800.
Olot. 1821.
Orihuela.*
Palma. 1744; 1749; 1803; 1804; 1819; 1821; 1870.
Palmar.*
Pasajes. 1823.
Paterna de la Ribera. 1800; 1804.
Penacerrada. 1804.
Pedrara. 1821.
Pedroches. 1879.
Port Mahon. 1747; 1748; 1819; 1821; 1870.
Puerto de Santa Maria. 1800; 1804; 1819; 1820; 1821.
Puerto Real. 1800; 1819.
Ricote.*
Ronda. 1800; 1803; 1804.
Roquetas. 1821.
Rota. 1800; 1804; 1821.
Saint Eloy.*
Salou. 1821.
San Andero. 1813.
San Gervaiso. 1821.
San Juan. 1804.
San Lucar de Barameda. 1800; 1819; 1821.
San Roque. 1804.
Sans. 1821.
Santa Caridad. 1800.
Sarria. 1800; 1821.
Seville. 1649; 1800; 1801; 1810; 1819; 1821.
Sitges. 1821.
Tabarca. 1804.
Tarragona.*
Tobarra. 1811.
Tortosa. 1821; 1870.
Totana. 1811; 1812.
Torrenela.*
Torre-Molino. 1804.
Ubrique. 1800.

- Utrera. 1800.
 Valencia. 1870.
 Vejer de la Frontera. 1800.
 Velez Malaga. 1804.
 Vera. 1804.
 Vigo. 1858; 1889.
 Villafranca.*
 Villamartin. 1800; 1804.
 Villalunueva del Ariscal. 1800.
 Villa Seca. 1821.
 Xeres de la Frontera. 1800; 1804; 1808; 1819; 1820;
 1821.
 Ximines de la Frontera. 1804.
 Yelar.*
 Ziera.*

Total number of cities in Spain in which yellow fever has been observed from 1649 to 1890, a period of *two hundred and forty-one years*, 144.

SUMMARY OF EPIDEMICS.

AGUILAS.

1821.

The little port of Aguilas, in Murcia, on the Mediterranean, was infected by the brig *Saint-Joseph*, from Malaga, in 1821. It had then a population of 700. Vessels from Cadiz also brought yellow fever cases to the town. There were 75 cases and 25 deaths.¹

*Chervin: Examen de l'Administration en Matiere Sanaire. Paris, 1827, p. 91.

¹ Fellowes: Reports of the Pe tilential Disorder of Andalusia, etc., (London, 1815), pp. 181, 185.

ALBERCA.

1810.

Refugees from Murcia, four miles distant, infected Alberca in 1810. There was no diffusion of the disease.*

ALCALA DE LOS GAZULES.

1800.

Alcala de los Gazules, situated on the slope of the Ronda Mountains, thirty-seven miles southeast of Cadiz, was contaminated by refugees from the the last named locality in 1800, and lost 817 of its inhabitants.²

1820.

The second and last appearance of yellow fever at Alcala de los Gazules took place in 1820. A native of the town went on a visit to Xeres de la Frontera, contracted the malady and died on his return to Alcala. The infection did not spread.³

ALCALA DE LOS PANDEROS.

1804.

The inhabitants of the village of Alcala de los Panderos, located about four miles from Seville, proved remarkably immune from yellow fever during the great epidemic of

*Bonneau and Sulpicy: Recherches sur la Contagion de la Fievre Jaune, Paris, 1823, p. 364.

² La Roche: Yellow Fever, etc. (Phila., 1855), p. 534.

Alfonso da Maria: Memoria Sobre la Epidemia de Andalusia, p. 122.

³ Jackson: Remarks on the Epidemic Yellow Fever which has appeared at intervals on the South Coasts of Spain (London, 1821), p. 41 (foot note).

1804. The place, which takes its name from the occupation of its inhabitants, who are mostly bakers, and furnished nearly all the bread consumed in Seville at the time, was in daily communication with the latter place, where, out of a remaining population of 80,000, over 76,000 are said to have been attacked by yellow fever; yet, in spite of this, only twenty-four persons had the disease in the village, eighteen of which died.⁴ In every instance, those attacked had communicated with Seville. Aside from these, not a single case erupted in the village. Jackson, Fellowes, Berthe and others who have written at length on the epidemics of Spain, ascribe this remarkable immunity to the fact that aromatic herbs were burned in the ovens of the innumerable bakeries in the village, claiming that this purified the atmosphere and rendered the "miasmata" innocuous. The logical explanation in these days of enlightenment, is that the fumes of the "aromatic herbs" were distasteful to the nostrils of the yellow fever mosquitoes and kept them away from the locality.

ALCANTARILLA.

1811.

Alcantarilla ("the little bridge") was contaminated by refugees from Murcia, in 1811. The outbreak was not extensive and the mortality was small.⁶

ALGERZIRAS.

1803.

In 1803, smugglers brought yellow fever from Gibraltar to Algerziras. Only a few cases resulted.⁶

⁴ Bancroft: An Essay on the Disease Called Yellow Fever (London, 1811), p. 460.

⁵ Berenger-Feraud: Traite Theorique et Pratique de la Fievre Jaune, Paris, 1890, p. 84.

⁶ Berenger-Feraud, p. 74.

1804.

In 1804, Algerziras had a population of about 14,000. Yellow fever, which was widespread in Spain that year, soon made its appearance in the town, but was confined to one or two streets. The mortality was small.⁷

ALHAURIN-EL-GRANDE.

1804.

A few cases of yellow fever, all imported, were observed at Alhaurin in 1804, principally in persons communicating with Malaga. The disease did not obtain a foothold in the village.⁸

ALICANTE.

1803.

Government officials patrolling the coast are accused of having brought yellow fever to Alicante in 1803. Other authorities attribute the outbreak of the disease to a bale of cotton goods from Gibraltar, which had been surreptitiously taken into Alicante and hidden in the residence of the port commissioner. The latter was the first victim of the outbreak, which was not extensive and resulted in only a few cases and deaths.⁹

1804.

The ill-starred inhabitants of Alicante were less fortunate in 1804. The first case of yellow fever was observed August 9. The town, which had a population of 13,957, had taken great precautions to prevent an importation of the disease, and when the news spread that the pestilence was in their midst, the inhabitants became terror-stricken

⁷ Fellowes, p. 101 (foot note).

⁸ Fellowes, pp. 181; 182.

⁹ Berenger-Feraud, p. 74.

and all who could do so sought fancied security in flight. It is of record that 2,110 fled to the neighboring country, leaving 11,847 within the focus of the disease. Out of this number, there resulted 6,971 attacks, of which 2,472 proved fatal. It is a notable fact that the disease was more fatal to men than women, 1,552 of the former succumbing, while the fatalities among the latter amounted to 920. The disease manifested its greatest intensity on October 9, gradually subsiding after that date and becoming extinct on December 13.¹⁰

1811.

Alicante was infected by Gibraltar in 1811. Only a few cases were observed.¹¹

1870.

During the outbreak of yellow fever which devastated Barcelona in 1870, some cases were imported into Alicante.

The virulence of the epidemic and the rapidity with which it spread, brought back to the minds of the terror-stricken inhabitants, the horrors of the pestilences which had laid waste the flourishing cities of Andalusia, in the beginning of the century. Alicante had a population of 25,000 in 1870. When news of the eruption of the first case (September 13) became public, and the first death was recorded (September 14), the alarm was general, and in less than a week, 12,500 or half the population fled.

¹⁰ Summarized from the works of:

Moreau de Jonnes: *Monographie Historique et Medicale de la Fievre Jaune des Antilles*, Paris, 1820, p. 341.

Bally: *Typhus d Amerique ou Fievre Jaune*, Paris, 1814, p. 90.

La Roche, *loc. cit.*, p. 536.

Fellowes, *loc. cit.*, p. 478.

Chervin: *Second Report on Quarantine*, London, 1852, p. 203.

¹¹ Berenger-Feraud, p. 84.

The epidemic raged most fiercely between October 20 and November 15. After the last named date, it gradually subsided and became extinct on December 13, when the last death took place.

Following is the summary of cases and deaths, taken from the interesting report of Bergez y Dufoo,¹² after divesting it of the sonorous verbiage and onerous details which ever characterize the writings of the Castellians:

CASES.		DEATHS.	
Men	3,857	Men	1,082
Women	1,012	Women	228
Children	484	Children	70
	5,353		1,380

Of the 70 mortal cases among children, 44 were boys and 26 girls.

ANTEQUERA.

The first appearance of yellow fever at Antequera took place in 1803. The infection came from Malaga. The outbreak was unimportant.¹³

1804.

In 1804, yellow fever appeared at Antequera on August 2. It was brought to that place by Joseph Delgado, a journeyman tailor, who, in dread of the malady which had begun its ravages at Malaga, fled to his father's house at Antequera. He left Malaga on the 23rd of July, was taken ill on the 27th, and died on the 2nd of August. His mother was attacked on the 15th of the same month, and died on the 24th. One of his brothers sickened on the

¹² Bergez y Dufoo: *Siglo Medica* (Madrid), 1871, vol. 18, pp. 280, 311, 327, 437.

¹³ Berenger-Feraud, p. 74.

17th, and died on the 21st. Two sisters were taken ill on the 18th, one died on the 22nd; the other recovered. Another brother, a youth about 14 years, was attacked on the 19th; he recovered. The father of this unfortunate family, aged 75, was taken ill on the 28th of August, and died on the 2nd of September; and, finally, the remaining brother, aged 26, was attacked on the 30th of August, and died on the 4th of September.

Another refugee from Malaga created a new focus of infection at Antequera almost simultaneously with the importation of Delgado. A lady by the name of Munoz fled from Malaga and sought refuge among friends at Antequera. She arrived about the end of July, was taken ill on the 1st of August, and died on the 7th. The servant who attended her and six of the family where she lodged fell victims to the disease.

A third focus was created by a woman named Rosario, who arrived at Antequera from Malaga on the 7th of August, already indisposed. She died on the 12th. The master of the house where she lodged was taken ill on the 19th of August, and died on the 25th. His wife was attacked on the 23rd, and died on the 27th.¹⁴

From these three foci, the infection spread with incredible swiftness and the entire city was soon under its influence.

In the beginning of October, the death-rate was between thirty and forty daily. The populace, who looked upon the pestilence with superstitious terror, sought to arrest its progress by religious demonstrations. On the evening of October 12th, they formed into a solemn procession and marched through the streets until three o'clock in the morning, singing hymns and bearing aloft a picture of Our Lady of the Rosary.¹⁵ The folly of a multitude parading the streets of an infected city soon made itself evident,

¹⁴ Jackson, loc. cit., p. 19.

* During the terrible epidemic which ravaged Cadiz in 1800 a similar demonstration was made by the fanatical populace. See page 530 of this volume.

¹⁵ Bally, p. 436.

for on the fourth day following the demonstration, the deaths increased from forty to eighty each day.

The last death took place November 6. Out of a population of 14,577, there were 2,490 deaths, divided as follows: Males, 1,850; females, 1,090.¹⁶

Since 1804, yellow fever has never been observed at Antequera.

ARAHAL.

During the widespread epidemic of 1800, a few hundred cases were imported to Arahall, twenty-two miles from Seville, resulting in 180 deaths.

ARCOS DE LA FRONTERA.

1800.

Arcos de la Frontera was infected by Cadiz in 1800, and lost 631 of her inhabitants.¹⁸

1804.

In 1804, Arcos de la Frontera had a population of 9,894. The first case of yellow fever was observed on August 13, and between that date and December 3, when the last death took place, 184 victims paid tribute to the pestilence. Of this number, 113 were males and 71 females.¹⁹

ASCO.

1821.

Asco, a small town on the Ebro, thirty-nine miles from Tortosa, was infected in a peculiar manner in 1821. It

¹⁶ Fellowes, p. 478.

¹⁸ La Roche, vol. 1, p. 534.

¹⁸ La Roche, vol. 1, p. 478.

¹⁹ Fellowes, p. 478.

appears that a man from Tortosa was visiting friends in Asco, when he was informed that his wife had been taken suddenly ill. Impatient to return home, he borrowed a horse from his host, promising to send back the animal the following day. On arriving at his destination, the unfortunate Tortosan was stricken with the malady which was then prevailing in his native town (yellow fever), and died in a few days. The party at Asco to whom the horse belonged, not hearing any tidings of his property, sent his servant for the animal. The latter, on reaching Tortosa, was told of the death of his master's friend and given permission to take back the animal. On his return to Asco, he was stricken with yellow fever, communicated the disease to his master, who in turn infected the balance of the family, and from this focus, radiated an epidemic which threatened to encompass the town. The inhabitants fled to the neighboring country. This checked for a time the progress of the malady, and Asco was congratulating itself upon having escaped with only a few cases and deaths, while Tortosa and Barcelona were being depopulated, when the infection broke out anew. An investigation by the health authorities to discover the source of the secondary infection, as Asco had established a strict quarantine against places where the malady was then prevailing, revealed that four thieves had broken into a house where yellow fever had been most murderous, and had ransacked it from top to bottom of everything valuable. These four law-breakers paid dearly for their depredation, for they were shortly after stricken with yellow fever and died. From this source radiated the second outbreak. Another general exodus of the population took place. The commissary of Asco caused every dog in the town to be killed (for reasons not explained by the chroniclers of the period), opened wide the doors and windows of every habitation for six consecutive days, and forbade the inhabitants to return until the epidemic was completely stamped out. These energetic measures saved Asco from depopulation.²⁰

²⁰ Bally, Francois and Pariset, p. 59.

AVRIATA.

1800.

A few cases of yellow fever were observed at Avriata in 1800. There is no record of any other invasion previous to or after that date.²¹

AYAMONTE.

1800.

Ayamonte is one of the few places in Spain where yellow fever has been observed only infrequently. Fellowes claims that it suffered to some extent in 1800, but does not give any details.²²

1804.

Chervin²³ pokes fun at Pariset because the latter solemnly asserts in his work published in 1820,²⁴ that yellow fever was introduced into Ayamonte in 1804 by means of cheese and crackers²⁵ smuggled into the town from Gibraltar by a fisherman. As yellow fever was quite severe at Gibraltar in 1804; and it was proved that the lone fisherman had communicated in the open sea with a vessel coming from the infected port, there is no doubt in the world that he contaminated Ayamonte, for he died of the disease on his return home; but we side with Chervin in exonerating the cheese and crackers. Cheese sometimes (especially in summer) contains animalculæ, but it has never been known to harbor the larvæ of the winged disseminators of yellow fever.

²¹ Rougeau: Theses de Paris, 1827, No. 119.

²² Fellowes, p. 444.

²³ Chervin: Examen Critique, etc., p. 18.

²⁴ Pariset: Observations sur la Fievre Jaune, p. 88.

²⁵ * * * "Au moyen du fromage et du biscuit."

The unfortunate fisherman communicated the disease to his family, who all fell victims to the pestilence. The fever invaded the three streets contiguous to the fisherman's home, but did not spread to other quarters of the town. The number of cases and deaths is not given by our authorities.²⁶

BADALONA.

1821.

A workman living at Badalona, six miles from Barcelona, contracted yellow fever at the latter place, and was transported to his home, where he expired the following day. The authorities of Badalona had the body transported outside the town limits, and threatened to shoot any one who should harbor refugees from infected places. These stringent measures saved the village from contamination.*

BALEARIC ISLANDS.

YELLOW FEVER YEARS.

1744; 1747; 1748; 1749; 1803; 1804; 1819; 1821; 1870.

SUMMARY OF EPIDEMICS.

1744.

Palma.

Berenger-Feraud²⁷ and Pariset²⁸ give vague accounts of an outbreak of yellow fever on the Island of Majorca in 1744. Whence the fever was imported or what ravages it caused, is left to conjecture.

²⁶ Fellowes; Chervin; Bally, Francois and Pariset.

* Bonneau and Sulpicy: *Recherches sur la Contagion de la Fievre Jaune.* Paris, 1823, p. 306.

²⁷ Berenger-Feraud, p. 48.

²⁸ Pariset, p. 123.

1747.

Port Mahon.

According to Cleghorn,²⁹ the second appearance of yellow fever in the Balearic Islands took place on the Island of Minorca in 1747.

No particulars of any historical value are given concerning this importation.

1748.

Port Mahon.

It is recorded that the disease was present at Minorca in 1748.³⁰

No authentic data concerning this invasion are obtainable.

1749.

Palma.

The fourth invasion of the Balearic Islands took place at Majorca in 1749, according to Cleghorn.³¹

The literature on the subject is as unsatisfactory as in the preceding outbreaks.

1803.

Palma.

A vessel from Alicante brought yellow fever to Palma in 1803.³²

The outbreak was unimportant.

²⁹ Cleghorn: Observations on the Epidemic Diseases of Minorca, from the Year 1744 to 1749 (London, 1779). Also: Berenger-Feraud.

³⁰ Moreau de Jonnes, p. 336.

³¹ Eager, p. 16.

³² Berenger-Feraud, p. 74.

1804.

Palma.

The state of the public health at Palma was excellent in 1804, when a vessel arrived from Alicante, having on board a Majorcan who was convalescing from an attack of yellow fever, and a family destined for the Island of Minorca. The latter took lodgings at Palma, intending to leave for their native town in a day or so. On the same day of their arrival, the mother of the family was taken ill with yellow fever. The following day, the husband and child were attacked. The unfortunates were immediately sent to the pest-house, but some soldiers who frequented the tavern where the stricken family had taken lodgings, contracted the disease and brought the infection to the town barracks, where several cases were observed. The disease did not spread through the town.³³

1819.

Port Mahon.

In 1819, yellow fever ravaged the cities on the south coasts of Spain. The infection was originally brought by the ship *Asia*, from Vera Cruz and Havana, to the Isla de Leon, and infected Cadiz. The *Asia* was sent to the quarantine station at Port Mahon, where three inhabitants of the town contracted the disease and died. The outbreak was limited to these three cases.³⁴

1821.

Palma.

In 1821, another great epidemic wave of yellow fever desolated the sea coast cities of Southern Spain.

³³ Berenger-Feraud, p. 79.

³⁴ Begin: Journal de Medecine Militaire, 1820, p. 346. Also: Berenger-Feraud, p. 89.

On August 6, 1821, a vessel left Barcelona, where "a suspicious fever" was beginning to cause much public unrest, and arrived at Palma two days later. Among the passengers was a merchant of Palma, who lived in the La Paz Quarter. On his arrival home, the merchant was taken ill with yellow fever. He was nursed by his wife and his little daughter and recovered. The girl was soon attacked and died with black vomit on the fifth day. The women who prepared the girl for burial were mostly all attacked and died. The merchant's wife was next attacked. She was transported to a house in San Pedro Street, where she recovered. The two adjoining houses were contaminated.

The merchant was visited during his illness by two friends, Poulet and Roig and by two female relatives, Munera and Femina. These four persons were soon after taken ill with yellow fever and died. Poulet's wife and all her children next fell victims to the disease. A man named Renz, who lived in a small room in the house of the Munera woman, soon succumbed to the fever. The man Roig, who died of the fever, contaminated his clerk, Mulet and five or six persons who roomed in his house. When Mulet's wife felt the first febrile symptoms, she fled with her children and a servant to a remote quarter of the town, which was free from sickness at the time. She soon died of the disease and was followed by her children and the servant who had accompanied her.

Such was the pre-epidemic situation in Palma, when the authorities finally awoke from their lethargy.

Up to September 10, the malady had been confined to the two districts—La Paz or Puyg de San Pedro and the Boleria, but cases began to crop out so rapidly, that the authorities decided to take urgent measures to check the inroads of the fever. News of the contemplated move on the part of the authorities reached the inhabitants of the infected districts, and fearing that they would be surrounded by an impenetrable sanitary cordon, entire families fled in the middle of the night to relatives or friends all over the city. This wholesale migration acted like a firebrand in spreading the fever, and the epidemic was soon beyond control.

Panic seized the inhabitants.

It was now a question of everyone for himself. Fathers deserted their families, mothers their babes, and indescribable terror prevailed in the town. On September 15, the superior authorities, civil and military, fled to the village of Valdemosa, about twelve miles from Palma. The citizens, following their example, made a precipitate retreat to the country beyond the walls of the pest-ridden city. The migration was so considerable that of 36,000, only 12,000 remained, 24,000 fleeing from the terrible pestilence. The government found it necessary to raise funds, secure means of maintenance and build huts in the open country, and two encampments were formed at the foot of Mount Biver, about two miles from Palma. It is a remarkable fact, out of this multitude fleeing from a nest of pestilence, not a single case erupted, save in those who already had the disease when they joined in the frenzied exodus.³⁵

There were altogether 7,400 cases in Palma, of which 5,341 died.

Port Mahon.

During the epidemic which ravaged the seacoast towns of Spain in 1821, forty-three vessels were quarantined at Port Mahon, beginning with the *Jaque Constitucion*, from Barcelona, August 13, 1821, and ending with the *Luad Santo Cristo del Grau*, October 24, 1821.

Among the total of 196 cases of yellow fever, 122 died. Owing to the vigilance of the health authorities, the disease did not spread to the inhabitants of Port Mahon.

Among the 49 attendants at the Lazaret Nacional at Port Mahon, 10 were attacked with yellow fever, five of whom died. These cases and deaths are included in the above total.

³⁵ Bally, Francois and Pariset, p. 63.

³⁶ Junta Superior de Sanidad de dicha Isla de Minorca, etc., Mahon, 1821.

1870.

Palma.

For nearly fifty years after the sinister epidemic of 1821, yellow fever was kept out of Palma. In 1870 a few cases were imported to that town from the south coast of Spain, where the disease had been originally brought to Barcelona in August by the ship *La Maria*, from Havana. Prompt sanitary measures were resorted to, and the outbreak at Palma was confined to a few cases.³⁷

We have searched diligently through files of Spanish journals for a history of the prevalence of the disease at Palma, in 1870, but the results have been negative. On page 630 of *El Siglo Medico* for 1871, is a reference to an article entitled "*Historia de la Fiebre Amarilla que se Padeceia en Palma de Mallorca en 1870*," but, with the characteristic haziness which generally pervades the literature of the Castellians when it comes to facts and figures, the article conveyed nothing tangible.

Port Mahon.

We were more fortunate in gathering information concerning the prevalence of yellow fever at Port Mahon in 1870. The infection did not spread to the shore, but was confined solely to ships in the quarantine basin.

According to *El Siglo Medico* for 1871, vol. 18, pages 233, 260, 310 and 406, the following infected ships were quarantined at the lazaretto during the epidemic of 1870:

1. Steamship *Menorca*, from Barcelona, September 15. Carried three women ill with yellow fever, who were removed to lazaretto. Two died.

2. Bark *Dunamarguesa*. Arrived from Barcelona, September 17. Three of the crew were afflicted on the way from Barcelona. On arrival, a third case died. On September 21, a patient was carried to the lazaretto from

³⁷ Berenger-Feraud, p. 145.

this vessel, and died on the 28th. On September 28, one of the health-guards was attacked and died.

3. Steamship *Union* arrived from Barcelona, September 23. Two passengers were found to be indisposed, and were sent to the lazaretto. Both died, one the same day and the other six days later. Another fatal attack on the 24th. Another case on the 26th, followed by recovery.

4. Steamship *Mallorca*, from Barcelona, September 24. Among six passengers, one had yellow fever and died on the fourth day.

5. Brigantine *Nuevo Copernico*, from Barcelona, September 28. Two cases sent to lazaretto. One died.

6. Polacre *Grienza Evangelista*, from Barcelona, September 25. Three attacks during voyage. One died at sea. Other two sent to lazaretto; both died.

7. Warship *Lepanto*, from Barcelona, September 23. On October 4, gunner's mate attacked; on the 5th, 6th and 7th, two sailors and a *cabo de canon* were attacked. All recovered.

8. Ship *San Juan*, October 2. First case October 4; carried to lazaretto where he died several hours later. On October 5, a second case; recovery.

9. Gunboat *Ligera*, from Barcelona, October 16. On the 22nd, disembarked a case of yellow fever; recovery.

10. Brigantine *Juanita*, from Barcelona, October 8. On the 11th, one case sent to lazaretto; recovery.

General summary:

First case, September 15; last, October 22.

First death, September 17; last, October 4.

Total cases, 22; total deaths, 12.

With the exception of the health-guard who was infected on the *Dunamarguesa*, not a single inhabitant of Port Mahon contracted the disease.

Since 1870, the Balearic Islands have been free from yellow fever.

BARCELONA.

YELLOW FEVER YEARS.

1803; 1810; 1819; 1821 (Great Epidemic); 1870; 1883.

SUMMARY OF EPIDEMICS.

1803.

The first authentic importation of yellow fever to Barcelona took place in 1803. While the fever was raging at Malaga, cases began to erupt in the harbor of Barcelona. Five soldiers, who had been placed on duty on board vessels, were attacked and died. Their colonel next fell a victim to the malady. The cases, which were confined to the shipping, amounted to 73, of which 30 proved fatal.³⁸

1810.

Yellow fever is said to have been present at Barcelona in 1810. We have been unable to obtain any details concerning this alleged outbreak. The *Medico-Chirurgical Journal and Review* (1821, vol. 2, p. 19,) claims that yellow fever "raged" at Barcelona during the year under observation, but efforts to corroborate this statement have been fruitless. Cadiz, Gibraltar, Seville and Carthagena suffered from the saffron scourge that year, and a few cases were probably brought to Barcelona or erupted on vessels in the harbor; but there certainly was no epidemic in the ancient capital of Catalonia in 1810. If there had been, Berenger-Feraud, Audouard, Bally, Pariset, Eager and others who have written interestingly of the epidemics which ravaged Spain in the beginning of the last century, would certainly have made note of the occurrence.

³⁸ Bally, p. 84. Bally, Francois and Pariset, p. 461.

1819.

A solitary case of yellow fever was observed in Barcelona in 1819, according to Robert.³⁹ Our authority does not go into details, but states that the case erupted in July, and proved fatal in a few days. There was no diffusion.

1821.

The epidemic of 1821 was appalling and has gone into history as one of the most murderous on record.

The population of Barcelona in 1821 was 150,000. When the true nature of the "mysterious disorder" which was causing widespread anxiety to the inhabitants of the ancient city became known, 80,000 fled precipitately to all points of the compass. Of the 70,000 who remained, nearly every one was attacked and between 16,000 and 20,000 died, according to the estimates of various authorities.*

The Pest-Ships from Havana.

The dismal history of this epidemic, as condensed from the works of O'Halloran,⁴⁰ Audouard,⁴¹ Bally, Francois and Pariset,⁴² Eager⁴³ and Berenger-Feraud,⁴⁴ is as follows:

The following vessels are accused of having brought yellow fever to Barcelona in 1821:

³⁹ Robert: Guide Sanitaire, vol. 1, p. 88.

* La Roche (Vol. 1., p. 536) says that these figures are exaggerated and places the cases at 14,000 and the deaths at 9,730.

⁴⁰ O'Halloran: Remarks on the Yellow Fever on the South and East Coasts of Spain (London, 1823), pp. 22 et seq.

⁴¹ Audouard: Relation Historique et Medicale de la Fievre Jaune qui a Regne a Barcelone en 1821. Paris, 1821.

⁴² Bally, Francois and Pariset: Histoire Medicale de la Fievre Jaune (Paris, 1823), pp. 4 et seq.

⁴³ Eager: Bull. No. 5, Yellow Fever Inst., 1902, p. 22.

* Bally, Francois and Pariset: p. 613.

⁴⁴ Academia de Medicina y Cirurgia de Barcelona: Memoria sobre la Epidemia de Febre Amarilla Sufrida a Barcelona en 1870. Barcelona, 1872, page 148.

Also: Berenger-Feraud, p. 91; Roux, Marscilles Medicale, 1871, vol. 8, p. 194.

1. The brig *Talla Piedra*
2. The brig *Nuestra Senora del Carmen*.
3. The brig *Gran Turco*.
4. The Spanish frigate *La Libertad*.

The above named vessels sailed from Havana on April 28, 1821, and were part of a fleet consisting of fifty-two sails, destined for the following ports: thirteen for Cadiz, twenty for Barcelona, six for Coruna, three for Santander, four for Malaga, one for Vigo, one for Ferrol, one for Bilbao, one for Palma, one for Lisbon and one for Bahia.

A cursory glance into the history of these four pest-ships proves interesting.

The *Talla Piedra* touched at Cartagena on June 12, arriving at Barcelona on the 19th of the same month. She was given pratique after having performed eight days' quarantine.

The *Nuestra Senora del Carmen* arrived at Cartagena on June 16, obtained pratique and disembarked her second pilot. She arrived at Alicante June 19, where she unloaded part of her cargo and embarked a passenger. The *Carmen* finally cast anchor in the harbor of Barcelona on July 11. This vessel had three cases of yellow fever during the voyage from Havana to Alicante, one of which proved fatal. The passenger who had boarded the ship at Alicante, was ill when the ship arrived at Barcelona, but eluded the vigilance of the authorities by sitting on deck "all dressed up" when the vessel entered the port. He died a few days after landing, of a malady which presented "strange and suspicious symptoms." This was no doubt the first case of yellow fever at Barcelona in 1821, but the man who had been taken on board through charity and had no parents or influence, was buried by the city without any inquiries being made about his previous personal history.

The *Gran Turco* reached Cadiz on June 5, where she obtained pratique, disembarked twenty-four passengers and took on board four others and three sailors. She then set sail for Barcelona, where she arrived June 29. The *Gran Turco* had formerly been a slave-ship. During

the voyage from Havana, there had been some deaths from yellow fever on board.

The frigate *La Libertad* arrived at Malaga on June 8, obtained pratique and disembarked part of her cargo; she then sailed for Cartagena, where she also landed some freight, a passenger and a sailor, after which she left for Barcelona, where she arrived June 28.

Which of these four vessels contaminated Barcelona, or whether they each played a role in bringing the disease from Havana, has never been satisfactorily elucidated to this day; but that the onus fell on the quartette, there is not the slightest doubt.

The First Seeds of the Epidemic.

The state of the public health was excellent at Barcelona. Great preparations were being made by the civil and military authorities, as well as the general public, for a great festival to be held July 12, to celebrate the anniversary of the promulgation of constitutional law in Spain. Owing to bad weather on the selected date, which would have marred the eclat of the celebration in the harbor, where elaborate manœuvres were to be held, the feast was postponed until the following Sunday, July 15. On that day, the sky was cloudless and the weather splendid, and the populace congregated on the quays to witness the nautical sports. There were then about twenty ships from Havana and Vera Cruz in the harbor, and they took part in the celebration. Captain Sagredas, commanding the *Gran Turco*, gave a reception on board his ship. His wife, their children, his brother-in-law, sister-in-law and many other persons, altogether forty, attended. After spending a couple of days aboard the *Gran Turco*, the captain's family went to Barcelonetta, near Barcelona, where they lived. In a few days, every member of this family sickened "of a strange malady," and all died. Of the forty persons who had visited the *Gran Turco*, thirty-five died, with pronounced symptoms of yellow fever.

Many persons visited the *Talla Piedra* during the progress of the festival. In a few days, they were all taken

ill with the same "strange malady," and the majority died.

The French brig *Josephine* was riding at anchor close to the above named vessels. The crew was taken ill with yellow fever, and only a few survived. The *Saint-Joseph*, from Naples, also moored near the infected vessels, was contaminated and lost most of her crew.

The captain of the *Josephine*, when he saw the havoc wrought on board his ship, took lodgings in Barcelona. Eight days afterwards, this lodging house was infected, and the landlady, her husband, their children and the servants were attacked in rapid succession.

Shortly after the death of captain Sagredas' family and the fatal cases in the lodging house above mentioned, cases of the same "strange and suspicious malady" began to crop out here and there in Barcelona and neighboring villages on the sea-shore, mainly among those who had communicated with the infected ships or who had visited the houses where cases had erupted. While the disease was slowly gaining ground, the "eminent physicians" of Barcelona were in daily conclave, wrangling over the situation and refusing point-blank to admit that they were face to face with an invasion of yellow fever. It was only after the malady had invaded nearly every quarter of the town that the authorities saw that they had been blundering and began the institution of sanitary measures to stop the progress of the "mysterious malady." But it was too late—the demon of pestilence was unchained and Barcelona was destined to pay a terrible penalty for the criminal negligence of those sworn to safe-guard her interests.

On August 5, the health authorities began sending the sick to isolation hospitals, but this had little effect in arresting the progress of the malady, for the people, deluded by the manifestos of the Spanish physicians deny that the "mysterious malady" was yellow fever, openly defied the law and violently opposed interference with their business and pleasure.

Panic and Flight.

On August 12, the situation became so grave, that the number of isolation hospitals were increased, and peremptory instructions given that the places of amusement be closed and public assemblages prohibited. The populace violently opposed these measures, and riots were of daily occurrence. The local medical society sustained public opinion, denying that the disease was yellow fever. Under this state of things, the pestilence, unchecked by concerted preventive measures, was soon beyond control, and the deaths became daily more frequent and the malady more aggressive and widespread.

On August 16, the public finally awoke to the real situation and a panic ensued. In the space of a few days, half the population of the town had fled.

An example of the fearful mortality may be deduced from the fact that out of 853 male and 886 female patients treated at the Seminary Hospital between September 13 and November 25, 640 of the former and 622 of the latter died.

Between August 16 and the first days of October, the ravages of the epidemic were terrible. In the beginning of October, 400 deaths were daily recorded. At the end of the month, the situation improved and by the middle of November, health conditions were nearly normal. On November 25, the last case erupted, but it was not until December 18 that the authorities relaxed their vigilance and withdrew the sanitary cordon which had completely shut out communication between Barcelona and the outside world.

Thus came to an end one of the most awesome epidemics of yellow fever on record, which has been unsurpassed for its fierceness and appalling mortality (21,483* out of a remaining population of 70,000), and which could have been controlled in its incipiency, but for the ignorance of the people and the shameful wrangles and pig-headedness of the physicians who controlled the destinies of the unfortunate city.

1870.

For forty-nine years, Barcelona enjoyed a total immunity from yellow fever.

Early in August, 1870, the ship *Maria* arrived at Barcelona from Havana. There had been two deaths on board during the voyage. In spite of this, the vessel was given free pratique, without being required to undergo the necessary sanitary formalities. The physicians of the port and the secretary of the sanitary office, who visited the vessel and gave her a clean bill of health without making strict inquiries, were taken ill with yellow fever a few days after their return home and died. Members of their families were next stricken, and the disease by this means spread through the city. During the months of August and September, the malady became epidemic and a general exodus of the population took place. Toward the end of October, the daily mortality varied from twenty-five to forty.

The epidemic came to an end in the early days of November, resulting in 2,510 cases. Of these, 1,250 died, or 49.8 per cent.

The disease extended to Valencia, Alicante, Palma and Madrid. The total mortality in Spain that year amounted to 2,658.⁴⁴

1883.

The last appearance of yellow fever in Barcelona took place in 1883. In October of that year, the *San Jose*, from Havana, arrived at the port. Two men employed in discharging guano from the vessel were taken ill with yellow fever and died.⁴⁵ The cool season undoubtedly saved Barcelona from an invasion of the Antillean pestilence.

BARCELONETTE.

1803.

A few cases of yellow fever were observed in Barcelo-

⁴⁵ Berenger-Feraud, p. 189.

nette in 1803, imported from vessels in the harbor. There was no spread of the disease. (*Pariset*, p. 38).

1821.

The seeds of the great epidemic which desolated Barcelona in 1821, were sown at Barcelonette, a suburb of the first named city. The little burg was infected on July 16, by parties who had been on board the ship *Gran Turco*, and the first death took place July 26. The history of this epidemic is so closely associated with that of Barcelona, that a reference to the preceding pages will suffice to place the reader in touch with the distressing events which shrouded Spain in gloom during the year under consideration.⁴⁶

BARRIOS.

1804.

Barrios, near Algerziras, was infected in 1804 by soldiers forming part of an escort which had left Cadiz with a consignment of money.⁴⁷ On the night of September 11, the cavalymen stopped at the village inn, where one of their members was taken ill and died on the morning of the 13th. The yellowness of the cadavre excited the suspicions of the authorities, and steps were at once taken to prevent a spread of the disease. The *stegomyiae* were already infected, however, and within two weeks six cases, followed by death, erupted in the immediate neighborhood of the lodging-house. No other cases were observed.

BENAOCAZ.

1800.

During the general epidemic of 1800, a few cases were observed at Benaocaz. The outbreak was unimportant.⁴⁸

⁴⁶ Audouard, loc. cit., gives a comprehensive and interesting account of this epidemic.

⁴⁷ Bally, p. 444.

⁴⁸ Rougeau: Theses de Paris, 1827, No. 19.

BORNOS.

1800.

The epidemic of 1800 spread to Bornos. The number of cases is not stated, but the mortality amounted to 17.⁴⁹

CADIZ.

Historical Resume.

Cadiz is one of the most ancient cities of Spain. It was founded by the Phenicians, and early became of great commercial importance. It is situated at the extremity of a tongue of land which juts out from the Isla de Leon, is well built, well paved, and for a Spanish city, very clean. Cadiz, in common with other cities of Spain, has often been the scene of exciting political disturbances and, in the past, has been besieged, taken and sacked by the Romans, the English and the French. Its present population is estimated at 69,322.

The Epidemics of Cadiz.

According to Fellowes,⁵⁰ the first great sickness of Cadiz of which there is any account, appeared in the year 1466. In 1507, an equally fatal malady prevailed there. The disorder, on both occasions, was supposed to be the plague, although the word *peste*, used by Spanish authors, is applied to infectious disorders in general.

Of the sickness which broke out in Cadiz in 1582, little can be ascertained. It is said to have ceased through the intercession of St. Roque, to whom the city dedicated a chapel.

In 1649, the plague was introduced into Cadiz, and lasted three years, causing a mortality of over 14,000.

In 1661, the plague again appeared.

⁴⁹ La Roche, vol. 1, p. 534.

⁵⁰ Fellowes, p. 22.

From 1661 to 1700, when *el vomito negro* (black vomit) first made its appearance in Cadiz, there is no record of any extraordinary change in the state of the public health in that historic city.

Cadiz, being the westernmost port of Spain and directly in the path of an extensive trans-Atlantic commerce, is more exposed to infection from the West Indies and South America than any other city on the Iberian Peninsula. Since 1700, when the first authentic importation of yellow fever took place, the city has suffered from thirty-nine visitations of the disease. Five of these outbreaks (1730, 1731, 1800, 1804 and 1819) were attended with fearful mortality.

YELLOW FEVER YEARS.

1700; 1701; 1702; 1703; 1705; 1730 (Great Epidemic); 1731 (Great Epidemic); 1734; 1736; 1740; 1741; 1744; 1745; 1746; 1753; 1761; 1763; 1764; 1765; 1780; 1784; 1790; 1792; 1800 (Great Epidemic); 1801; 1802; 1803; 1804 (Great Epidemic); 1807; 1808; 1810; 1811; 1812; 1814; 1817; 1819 (Great Epidemic); 1820; 1821.

SUMMARY OF EPIDEMICS.

1700.

Vessels from the West Indies are said to have brought yellow fever to Cadiz in 1700.⁵¹ Beyond this mere statement, no other information is of record concerning this importation.

1701.

A few cases of yellow fever were imported to Cadiz in 1701. There was no diffusion of the malady.⁵²

⁵¹ Berenger-Feraud, p. 38.

⁵² Arejula: Archives de Medecine Navale, vol. 7, p. 251.

1702.

Unofficial reports allege that yellow fever was present in Cadiz in 1702.⁵³ These probably refer to cases in the harbor, as we could find no record of the prevalence of the malady in the town that year.

1703.

"Ships from America" are said to have infected the harbor of Cadiz in 1703. We could find no authentic documents to substantiate this allegation.

1705.

According to Father Labat,⁵⁴ the vessel on which he was a passenger was quarantined at Cadiz in 1705, owing to the fact that a ship previously arrived from the West Indies had brought yellow fever to the town. The reverend chronicler does not state whether the disease was still prevalent when he arrived.

1730.

The epidemic of 1730 is the first of which any authentic record exists. All previous outbreaks of yellow fever which are said to have prevailed in Cadiz lack substantiation.

The squadron of Admiral Pintado, contaminated at the West Indies, brought the fever into Cadiz in 1730. The mortality was high, but no details are given by our authority.⁵⁵

1731.

Fellowes (page 23) states that yellow fever "prevailed with equal fury" in the year 1731. Two symptoms were particularly noted as being most fatal in this disorder,

⁵³Berenger-Feraud, p. 39.

⁵⁴Labat: *Nouveau Voyage aux Iles d'Amerique*, Paris, 1742.

⁵⁵Berenger-Feraud, p. 44; Fellowes, p. 23.

viz., spots of a livid yellow or dark color, and were the certain forerunners of the black vomit. The Spanish physicians were of the opinion that the malady was of a pestilential nature, and they advised the magistrates to take the necessary precautions. The Court was then at Seville, and Don Josef Cervi, physician to Carlos III (at that time Duke of Parma and Placentia), was directed to send a practitioner from Seville to examine into the origin and character of the disorder which was raging in Cadiz. For some unexplained reason, the result of this investigation was never published and the full extent of the epidemic which devastated Cadiz in 1731 is left to conjecture.

1733.

Spanish tradition⁵⁶ asserts that yellow fever was present in Cadiz during the year 1733. No authentic documents have been found giving any detailed description of this outbreak, but the prevalence does not appear to have been extensive.

1734.

A mild epidemic of yellow fever prevailed in Cadiz in 1734. Authors are divided as to whether this outbreak was due to new importation from the West Indies or the sea coast towns of America or a repullulation of the germs of the previous year.⁵⁷

1736.

A few cases were observed in 1736.⁵⁸

1740.

Another mild manifestation in 1740.⁵⁹

⁵⁶ Bally, p. 42; Eager, p. 15.

⁵⁷ Berenger-Feraud, p. 45.

⁵⁸ Berenger-Feraud, p. 45.

⁵⁹ Bally, p. 44; Berenger-Feraud, p. 47.

1741.

Yellow fever prevailed at Cadiz in 1741.⁶⁰ That same year, nearly 10,000 persons died from the disease in Malaga.

1744.

Cadiz was again afflicted in 1744, the infection being brought by vessels from the West Indies. The outbreak was of moderate intensity.⁶¹

1745.

In 1745, another mild manifestation.⁶²

1746.

A vessel from Cuba infected Cadiz in 1746.⁶³

1753.

The squadron of Admiral Don Pedro de la Cerda brought fever from the West Indies to Cadiz in 1753. The outbreak was not extensive.⁶⁴

1761.

A few cases were observed in 1761, according to Pariset.⁶⁵

1763.

The outbreak of 1763 was quite severe, and was imported by "a vessel from America." There had been several deaths from yellow fever on board during the voyage, but the captain concealed this fact from the

⁶⁰ Berenger-Feraud, p. 47.

⁶¹ Eager, p. 16.

⁶² Berenger-Feraud, p. 49.

⁶³ Eager, p. 16; Berenger-Feraud, p. 49.

⁶⁴ Eager, p. 16.

⁶⁵ Pariset: Histoire Medicale de la Fievre Jaune Observee en

authorities and the vessel was admitted to pratique immediately upon her arrival. Shortly after, cases broke out in a tavern where sailors from this vessel had lodged, and thence spread to the adjoining houses, occupied by the poorer classes. The progress of the malady was slow, but it finally spread to other quarters of the town and caused much mortality. Ships near the shore suffered, but those anchored a mile or more from the wharves were not infected.⁶⁶

1764.

In the month of September 1764, the traditional "ship from America" brought yellow fever to Cadiz. Chroniclers disagree as to the extent of the epidemic, but Lind,⁶⁷ a recognized authority, states that it was very fatal, a hundred deaths being recorded in a single day.

1765.

In the month of April, 1765, two persons visited a room where cases had occurred the year before and ransacked some old clothes which had been left undisturbed in a closet since the death of the occupants of the house. The couple were shortly after taken ill and died with the characteristic symptoms of yellow fever. The malady did not spread.⁶⁸

1780.

A few cases were observed in 1780.⁶⁹

⁶⁶ Berenger-Feraud, p. 53.

⁶⁷ Lind: *Diseases Incidental to Europeans in Hot Climates* (First American Edition, 1811), p. 91.

⁶⁸ Berenger-Feraud, p. 54.

⁶⁹ Hirsch: *Deutsche Vierteljahrsschrift für Offentl. Gesdhts.-Pflg.*, vol. 4, part 3, pp. 353-377. Also: Berenger-Feraud, p. 57.

1784.

Sporadic cases were observed in 1784.⁷⁰

1790.

Scattered cases erupted in 1790.⁷¹

1792.

A few cases are recorded for 1792.⁷²

1800.

We now come to a recital of the greatest epidemic of yellow fever which has ever invaded Cadiz, and which, radiating into neighboring localities, plunged Spain in mourning. In Cadiz alone, one-sixth of the population perished in the space of little more than three months.

Havana, the Eternal Source of Infection.

According to the various authors who have written

⁷⁰ Robert, Guide Sanitaire, vol. 1, p. 88.
Berenger-Feraud, p. 58.
Pariset, p. 104.

⁷¹ Robert, vol. 1, p. 88; Pariset, p. 104.

⁷² Robert, vol. 1, p. 88.
Berenger-Feraud, p. 60.
Pariset, p. 104.

on the subject,⁷³ the importation of the disease is attributed to the brig *Dolphin*, which sailed from Havana at the end of May, 1800, arrived at Charleston, S. C., on the 30th of the same month, whence she sailed on June 11, after embarking three sailors, finally arriving at Cadiz on July 6.

When the vessel arrived at Cadiz, the captain reported that three of the crew had died from yellow fever during the voyage across the Atlantic. He was refused pratique and the vessel remanded for observation. On July 15, after ten days of apparently rigid isolation, and twenty days after the last death, the health of all on board being reported perfect, the vessel was permitted to disembark her passengers and discharge her cargo.

Two other vessels are also suspected of having infected Cadiz:

⁷³ See the following works:

Bally, Typhus d'Amerique, p. 70.

Bancroft, Essay on Yellow Fever, p. 439.

Berenger-Feraud, p. 68.

Berthe: Précis Historique de la Maladie qui a Regne en Andaloucie en 1800. Paris, 1801.

Eager: Bull. No. 5, Yellow Fever Inst., p. 16.

Fellowes, p. 37.

Ameller: Descripcion de la Enfermedad Epidemica que tuva Principio en la Ciudad de Cadiz, etc., Cadiz, 1800.

Arejula: Breve Descripcion de la Fiebre Amarilla, etc. Madrid, 1806.

Assalini: Remarks on the Yellow Fever of Cadiz, etc. New York, 1806.

Edinburgh Medical Journal, 1815, vol. 11, pp. 389, 390.

Halle: Jl. de Med., Chir., Phar., etc., Paris, 1801, vol. 1, p. 291.

Dictionaire des Sciences Medicales, Vol. 15, p. 347.

Jackson, p. 16.

O'Halloran, p. 17.

La Roche, vol. 1, pp. 534; 536.

Pascalis: Medical Repository, New York, 1808, vol. 11, p. 131.

Schousboe; Jl. d. Pract. Arzük. und Wundarzuk. (Jena und Berlin) 1801, vol. 11, p. 84.

Supplement to Madrid Gazette, Tuesday, October 28, 1800.

Perez: Theses de Paris, 1825, No. 127, p. 13.

Various official Spanish documents.

The *Aguila*, which sailed from Havana May 28, 1800, stopped at San Lucar de Barameda (Spain), during the last days of June, where the crew dispersed and other men were shipped, and reached Cadiz June 30, six days after the arrival of the *Dolphin*.

The ship *Jupiter*, which cleared from Vera Cruz, February 4, 1800, and arrived at Cadiz March 28. A few days after her departure from Vera Cruz, one of the officers fell ill and died in a few days. Then, one after another, all hands on board were taken sick. The condition of the ship was at one time so desperate that the captain was at one time undecided whether to proceed on the voyage or return to Havana. The crew, however, made an uneventful recovery and the vessel continued on her way.

Eager (*loc. cit.*, p. 16), states that in addition to the three vessels which fell under direct suspicion, a large number of vessels were continually entering the port from trans-Atlantic ports, and that by order of the King, dated February 1, 1800, it was absolutely prohibited to submit to quarantine any vessel coming from America. Thus all safeguards were for a time removed.

The Wages of Official Corruption.

The reason why the *Dolphin* is principally incriminated in the infection of Cadiz, is due to the following facts, narrated by Fellowes (p. 38): The Board of Health of Cadiz was at the period under discussion, merely a nominal establishment; health officers were, however, appointed, who took the duty by turns weekly. At the time the *Dolphin* arrived in the harbor, a man named Vallialta was the *Diputado de Sanidad*, or member of Health Board, was on duty. When the *Dolphin* was put under observation, it was currently reported in Cadiz that money had been paid to this person, which bribe induced him not only to give the ship pratique sooner than the time required, but to connive at the communication which took place with persons from shore, and particularly with

smugglers and others living in Sopranis and Boqueta streets.

The Pre-Epidemic Cases.

The first cases were observed early in August, in the persons of two health guards who had been on board the *Dolphin*, and who were taken ill on returning to their lodgings in the Barrio de Santa Maria. One died; the other recovered.

Whether imported by the *Jupiter*, *Aguila* or the *Dolphin*, or by the nondescript craft which entered the harbor of Cadiz in 1800, there is no disputing the fact that the fever was brought from abroad, as yellow fever has never originated on Spanish soil. It is also of record that the state of the public health of Cadiz was excellent up to the beginning of August, when a certain species of fever made its appearance in the Barrio de Santa Maria, which from the violence and singularity of its symptoms and the uncommon rapidity with which its course was terminated, attracted the attention of the practitioners of the ancient metropolis of Spain.

While Doctors Wrangled, Cases Multiplied.

The malady, although at first confined to two streets—Boqueta and Sopranis—in the Barrio de Santa Maria, inhabited by sailors and customhouse employes, continued daily to gain ground and, in whatever house it appeared, every person in the family was attacked. The frequent deaths alarmed the magistrates, who, anxious to check the evil, assembled all the practitioners of the town, to deliberate on the measures of precautions to be taken; but upon this, as upon other similar occasions noted in this history, useless discussion arose, each individual thinking it incumbent upon himself to do all the talking and advance all the theories, with the result that general confusion arose and the deliberations led to nothing. The prevailing disorder was attributed to all the causes which have ever been assigned for the production of fever and

many names were given to it, such as synochal, putrid, bilious, ephemeral, etc.; in fact, every designation except the correct one—yellow fever.

While the physicians and health authorities of Cadiz were wrangling as to its diagnosis, the "mysterious fever" was daily gaining ground; by the middle of August, the number of deaths amounted to twenty or thirty a day.

The Follies of Superstition and Ignorance.

On August 20, the news were spread through the Barrio de Santa Maria, that Villialta, the man accused of having permitted unlawful communications between the *Dolphin* and the inhabitants of Cadiz, had caught the disease and, filled with remorse at the effects which he foresaw were likely to result from his misconduct, refused all medical assistance and expired in great agony. This circumstance aroused the suspicion in the public mind that the reigning malady was not the common endemic of Cadiz, which is observed nearly every year, and occasioned so much alarm amongst the inhabitants of that quarter of the town, that on August 23 a mob assembled before the house of the *Syndico Personero* (or head of the municipality) and supplicated him to permit them to form a procession through the streets, bearing aloft the image of Our Savior (*Nuestro Padre Jesus*), as a means of arresting the progress of the malady. The lower classes of Spain are naturally ignorant and superstitious, and such was the terror of this fanatic people, that they considered themselves the objects of offended Heaven and imagined that by following the Cross with humility, they would effectually appease the anger of the Deity. The magistrate, dreading this assemblage of persons in a part of the town where the disorder was spreading, in vain endeavored to quiet their apprehensions, but all reasoning was ineffectual, and the procession took place, passing

⁷⁴A similar procession was held at Antequera during the epidemic of 1804, and was also followed by dire consequences. See page 505 of this volume.

through Sopranis and Boqueta streets, and thence to other quarters of the city, where the malady had not yet spread.⁷⁴

The worst fears of the magistrate were soon realized. In a few days, cases of the fever erupted in Barrios of San Antonio, and on August 27, the pestilence was widespread. On that day 157 deaths were reported.

The panic was now at its height and it is recorded that 13,992 persons fled from the pest-cursed city.

Desolation.

Cadiz was now a vast charnel house. It was ordered that the dead should be conveyed away in carts and buried outside the town; the ringing of bells was prohibited and every measure adopted to tranquilize the minds of the people, but the dread of this awful calamity was so strongly impressed on every individual, that it seemed only to increase the aptitude to take the disease, and many instances are recorded of deaths accelerated solely by the terror thus induced.

By the middle of September, the deaths amounted to 200 daily. All those who could do so, had fled from the city. The streets were deserted, the shops, drug-store and public places closed, and the air became so vitiated, that its noxious state affected even animals and birds. Dogs, cats, cattle, etc., were attacked by some disease or other, and died by the thousands; canary birds died with blood issuing from their bills and even the pugnacious sparrow migrated to purer atmospheres.

The unfortunate inhabitants of Cadiz might have mournfully applied to themselves the following lines taken from Boucher's immortal poem describing the ravages of the plague of Marseilles:

*“Chaque instant voyait hors des murailles,
S'avancer tout rempli le char des funeraillles;
Sans parens, sans amis, sans pretre, sans flambeau,
Nulle voix ne suivant se mobile tombeau.”*

Amid this scene of desolation, the most perfect order prevailed among those who had remained in the city. Although several leading members of the municipal government had been early carried off by the fever, the populace behaved admirably, and none of the disgraceful scenes took place which had occurred in other towns of the Kingdom during the periods of public calamity.

A Rift in the Clouds.

At the time under observation, England and France were engaged in one of their periodical disagreements. Spain had allied itself with Francè against the common enemy and Johnny Bull sent a fleet to blockade the ports of the doughty Castillians. Early in October the British fleet under Lord Keith appeared before Cadiz; and this novel and startling sight produced an extraordinary effect upon the minds of the populace. The fear of an attack roused this courageous people to individual exertions for their defense, and they swarmed from their closed infected houses to repel the invading force. The transition from a melancholy contemplation of the spectre of pestilence to a state of belligerency against a hated enemy, combined with the inception of the cool season, seemed to have a magical effect upon the health conditions of the city. From that date, the disease gradually decreased, and by October 30, only 357 cases were under treatment and the mortality was unimportant.

On November 12, the pestilence came at an end and the city was officially declared in a state of health by the celebration of the *Te Deum*.

Total Cases and Deaths.

Authorities differ as to the exact proportions of cases and deaths. The mortality from yellow fever has been prodigious in nearly epidemic that has invaded Spain; but the precise number of deaths has never been absolutely correct, owing to the natural demoralized con-

dition of affairs and the difficulty of obtaining authentic data. Jackson (*loc. cit.*, p. 137), states that it may be said with safety that the mortality was not in reality less than one-half of those who were attacked. The generally accepted figures, so far as the epidemic of 1800 is concerned, are as follows, (*La Roche*, vol. 1, p. 534) :

Cases, 48,520; deaths, 10,946.

Arejula (*loc. cit.*, p. 256), says that it is a sorrowful fact that all the localities in Spain where the disease obtained a foothold, owed their misfortunes to the inhabitants of Cadiz, who fled to them, not with any intention of introducing the disorder, but to save their lives by taking refuge in places where no disease whatever prevailed at the time. Thus it happened that the seeds of this pestilence were scattered in the neighboring towns, such as Puerto de Santa Maria, Isla de Leon, Puerto Real, San Lucar and others, causing a total mortality of 61,363 in the Kingdom.⁷⁵

1801.

Another outbreak, but not as mortal as that of the previous year, prevailed in Cadiz in 1801. The disease was observed principally in a newly-arrived regiment, and its spread was not very extensive.⁷⁶

1802.

In the year 1802, five hundred cases were observed in Cadiz. These cases all came from ships in the harbor, and were transported to the hospital of San Juan de Dios by order of Admiral Gravina. The malady did not spread to the inhabitants.⁷⁷

⁷⁵ The detailed mortality in the principal cities and towns in Spain during the epidemic of 1800, will be found in our chronological tables for that year.

⁷⁶ *Periodico de la Sociedad Medico-Quirurgica de Cadiz*, 1822, p. 23; Berenger-Feraud, p. 70; O'Halloran, p. 177.

⁷⁷ Dariste: *Recherches Pratiques sur la Fievre Jaune* (Paris, 1825), p. 61.

1803.

In 1803, according to Eager, yellow fever spread widely in Cadiz and resulted in great loss of life.⁷⁸ The number of fatalities is not stated.

1804.

Cadiz was infected by refugees from Malaga in 1804, and suffered cruelly. The first case was observed August 28, and from that date until November 5, when the epidemic came to an end, 5,000 cases were recorded, of which 2,892 proved fatal (2,692 males and 200 females).⁷⁹

1807.

After three years of respite, Cadiz again found herself threatened with an invasion of yellow fever. The outbreak was confined to the French squadron in the Bay of Cadiz, and did not spread to the shore.⁸⁰

1808.

A few cases were imported to Cadiz in 1808, but the developments were unimportant.⁸¹

1810.

In August, 1810, yellow fever was introduced into Cadiz by smugglers, and soon attained the proportions of an epidemic. Our authorities (*Berenger-Feraud*, p. 83 and *Eager*, p. 21) do not give any details.

⁷⁸ Eager, p. 18.

⁷⁹ La Roche, vol. 1, p. 536; Fellowes, p. 479.

⁸⁰ Second Report on Quarantine (London, 1852), p. 232.

⁸¹ Eager, p. 20.

1811.

Santa Cruz de Teneriffe, which had been contaminated by Cadiz in 1810, infected that city in 1811. The outbreak was not general.⁸²

1812.

Keating⁸³ claims that yellow fever was epidemic in Cadiz in 1812, but we have not been able to substantiate the statement. Only a few imported cases were observed.

1813.

In 1813 Cadiz was in a flourishing condition once more and had a population of 130,000. During the last days of July, the warship *Saint-Pierre*, from Vera Cruz, having the vice-roy of Mexico on board, entered the harbor. There was no history of yellow fever on board, and the illustrious passenger was received with open arms by the inhabitants, and the crew allowed the freedom of the town. Shortly afterwards, cases of yellow fever began to appear in the richest and most fashionable part of the city, the first to be attacked being the nephew of the vice-roy, who died a few days after the onset. From this focus, the disease radiated to other quarters of the town, finally becoming violently epidemic. We have been unable to discover the number of cases, but the mortality is said to have been 4,000.⁸⁴

1814.

Many cases were observed in Cadiz in 1814. Keating claims that the disease was epidemic, but no authentic records can be found to substantiate the report.⁸⁵

⁸² Berenger-Feraud, p. 84.

⁸³ Keating: History of Yellow Fever, p. 83.

⁸⁴ Berenger-Feraud, p. 85; Keating, p. 83.

⁸⁵ Berenger-Feraud, p. 85; Keating, p. 83.

1817.

The famous Spanish physician, Arejula, is quoted by Pariset and Robert⁸⁶ as saying that his little daughter died of yellow fever in the month of August, 1817. This would tend to indicate that the disease was prevalent that year in Cadiz, but no mention is made in any of the works we have consulted, nor in public documents, of any other case. Apart from the statement accredited to him by Pariset, Arejula himself is silent on the subject. Berenger-Feraud leans to the belief that the case spoken of by Arejula was probably one of malignant icterus and not yellow fever.

The frequent application of the word *vomito preto* at that period to any dark fluid ejected from the stomach, tended no doubt to create obscurity as to the character of diseases; and in Spain, medical men, for want of a better name, sometimes employed the word *fiebre dudosa* (fever of a doubtful nature) when speaking of an epidemic characterized by febrile manifestations and black vomit.

1819.

The great epidemic of yellow fever which devastated Cadiz in 1819 has only been equaled in intensity and mortality by that of 1800. As on previous occasions, unending acrimonious discussions arose as to its origin, and scores of contradictory theories were formulated. Public opinion even went so far as to accuse the warship *San Juliano*, from Calcutta, of having imported the pestilence; but as the vessel had been on duty at the Philippines previous to arriving at Calcutta, this contention was easily punctured. What placed the *San-Juliano* under suspicion, was the fact that the vessel had scarcely begun to load a cargo of cannon powder at Isla de Leon, when suspected cases of yellow fever appeared among the persons employed on board. The disease also broke out in the quarter of the city called *Barrio del Christo*, where

⁸⁶ Pariset, p. 104; Robert, vol. 1, p. 88.

the baggage of the crew of the *San-Juliano* had been deposited.

The ship *Asia*, which arrived in the port from Vera Cruz and Havana at about the same time, was also accused of having infected Cadiz. This accusation seems to us to have been well-founded, for several deaths from yellow fever had taken place on board while the *Asia* was in mid-ocean, and the health conditions of the vessel appeared so unsatisfactory that she was refused pratique, and the captain ordered to proceed to the quarantine station at Port Mahon for further observation. The fears of the health authorities of Cadiz seem to have been well grounded, for three individuals employed in discharging the cargo at Port Mahon contracted the malady and died.

It is therefore evident that the *Asia* could easily have contaminated the *San-Juliano* before being sent to Port Mahon. It is also of record that passengers from the *Asia* "escaped" during the night while the vessel was in the harbor of Cadiz, and went to their homes in the *Barrio del Christo*, the locality where the first cases were observed. Merchandise was also smuggled on shore while the guards were "looking the other way."

When news spread that cases of yellow fever had broken out in the *Barrio del Christo*, the inhabitants were greatly alarmed, and at the instigation of a public demonstration, the commandant of the city sent his chief sanitary officer, Dr. Flores, to Isla de Leon where the original cases had been observed, to study the disease and report on its nature. Dr. Flores, convinced from his investigations that the disease was yellow fever, declared that rigorous measures alone could avert a disaster. But his counsels were not listened to. On the contrary, he was accused of high treason and held for trial before a tribunal of war. The commanding general assured the alarmed population that yellow fever did not exist on the Isla de Leon, and boastfully added the rather unintelligible information, that should it enter the city of Cadiz, he was prepared to meet it with the point of his sword.

Notwithstanding all assurances to the contrary, the unheeded warning of the unfortunate Flores came true. The scourge struck with frightful force, and among the first to run away from the city was the bombastic general.

The population of Cadiz in 1819 was only 72,000, war with France and the unceasing drain upon the Spanish cities to maintain peace in the colonial possessions of the Kingdom having reduced the male population about one-half. The virulence of the fever may be deduced from the fact that out of this small population, there resulted 48,000 cases, of which 5,000 proved mortal.⁸⁷

1820.

The following year (1820) a few sporadic cases were observed. We can find no record of fresh importation, and the first cases no doubt owed their origin to the re-awakening of infected mosquitoes which had remained inactive during the cool season.

The first case was a Frenchman, who returned from Madrid in February, and who took lodgings in a small room where, during the preceding epidemic, two persons had died of yellow fever and one had been very ill. At the end of May, the new-comer was attacked with the diagnostic symptoms of yellow fever.

The second case was the *ordinario* of the Bishop of Cadiz, who slept in a dark, ill-ventilated room, where in the foregoing year, his predecessor had died of yellow fever.

Our source of information⁸⁸ does state whether these cases proved fatal or not.

We infer from Dr. O'Halloran's report that the outbreak was not extensive. Whether the escape of Cadiz from an invasion of yellow fever can be attributed to the

⁸⁷ Berenger-Feraud, p. 89; Eager, p. 21; La Roche, vol. 1, p. 536.

⁸⁸ O'Halloran, p. 177 (foot note); *Periodico de la Sociedad Medico-Quirirgical de Madrid*, 1822, p. 23.

* See histories of the epidemic which ravaged these localities, under the proper chapters in this volume.

inactivity of the *Calopac* or to the probability that the widespread epidemic of the previous year had left no non-immune material, we cannot say. It is one of these inscrutable problems which often confronts the searcher after knowledge, and which no amount of reflection can elucidate.

1821.

The frightful epidemic of 1821 is one of the darkest pages in the history of Spain, and nearly depopulated Barcelona, Tortosa, Malaga, Asco, Palma and other thriving cities of the Kingdom. Cadiz, however, escaped the full force of the pestilential wave. There were cases and deaths here and there, but the attacks were so limited that they scarcely deserve the denomination of an epidemic.⁸⁹

The origin of the cases observed in Cadiz in 1821 is shrouded in mystery. All that is known, is that the first persons who suffered, lived in that part of the town inhabited by smugglers and the poorer classes, and that the first cases erupted in the dwellings of smugglers who had "recently arrived from the Bay." From this last observation, it may be logically surmised that the infection was contracted on ship-board.

Conclusion—1821 to 1909.

There is no record of yellow fever having been imported to Cadiz since 1821. The awesome fierceness of the epidemic of 1821 in Spain, and the havoc produced in the wealth and life of the richest industrial section of the peninsula by frequently repeated and devastating pestilences, attracted the attention of other nations. There were accusations of negligence in the enforcement of sanitary regulations. This led the Spanish government to adopt extraordinary precautions for the prevention of future disasters of this character. The leading academies

⁸⁹ O'Halloran, pp. 70; 164.

and societies of medicine in the Kingdom were interpellated as to whether yellow fever could be considered of American origin and of an infectious and contagious nature. The physicians of Spain, like those of every other nation on the globe, when a question is brought up for final decision, could not agree when it came to a vote, but the majority were convinced of the exotic nature of the disease, and that it was "infectious and contagious." As a consequence, stringent provisions of maritime sanitation were devised and put into effect, and save the epidemic of El Passajes in 1823 and that of Gibraltar in 1828, yellow fever ceased to obtain a foothold in Spain after the disaster of 1821.

CANETA DE MAR.

1821.

Although only twenty-six miles north of Barcelona, on the Mediterranean, Caneta de Mar experienced but a single invasion of yellow fever. The facts are as follows:⁹⁰

During the last days of August, 1821, a young carpenter of Caneta de Mar, while seeking employment in Barcelona, was hired to do some work on board the ship *Talla-Piedra*. (This vessel, it will be remembered, infected Barcelona that year and caused a terrible epidemic). He was shortly afterward taken ill and returned home, where he arrived on September 5. On the 10th, he was a corpse. His mother was attacked on the 12th and died on the 15th. The house was hermetically closed by the authorities, and no one allowed to enter it until the advent of the cold weather, when it was thoroughly aerated before any one was permitted to inhabit it.

No other case erupted in the village.

⁹⁰ Bally, Francois and Pariset, pp. 51; 57.

CANETA-LA-REAL.

1800.

Refugees from infected localities contaminated Caneta-la-Real in 1800. Only a few cases were observed.⁹¹

1800

CARMONA.

The population of Carmona suffered cruelly during the epidemic of 1800, according to Chervin.⁹²

The number of cases and deaths is not stated.

1802.

A few yellow fever patients escaped from the public hospitals of Cadiz in 1802,, and sought refuge among friends in Carmona. Most of the refugees died, but did not contaminate the inhabitants of Carmona. (*Pariset*, p. 79).

CARRACA.

1800.

The disastrous epidemic of 1800 invaded Carraca and claimed 515 victims.⁹³ The number of cases is not given.

CARRANA.

Several writers mention the fact that yellow fever prevailed at Carrana during the epidemic period in Spain (1800-1822), but do not state the year.

⁹¹ Rougeau: Theses de Paris, 1827, No. 119.

⁹² Chervin: Examen Critique, etc., p. 56.

⁹³ La Roche, vol. 1, p. 534.

CARTAGENA.

YELLOW FEVER YEARS.

1753; 1804; 1810; 1811; 1812.

SUMMARY OF EPIDEMICS.

1753.

"Ships of war from America" are said to have brought yellow fever to Cartagena in 1753. There was no extensive spread of the disease.⁹⁴

1804.

For over fifty years, we hear of no importation of yellow fever to Cartagena. In 1804, smugglers communicating with a vessel on which deaths had occurred from the disease and which was still in quarantine, brought the infection on shore. The first victim was the daughter of the Swedish consul, in whose house the smugglers had secreted goods surreptitiously taken from the vessel above mentioned. A nun who had visited the young girl in question and who had been given handkerchiefs to hem (these goods having also been smuggled from the same vessel), was taken ill with yellow fever and died. Seven other nuns living in the same convent rapidly succumbed to the disease and the balance fled, the majority carrying the germs of the fever with them, and dying in the places where they sought refuge. The disease soon made its appearance along the principal street of the town, running its course from house to house, until it finally invaded every quarter of the town.

The population of Cartagena in 1804 was 33,222. From September 5, when the first case was observed, to January 23, 1805, the date of the extinction of the epidemic,

⁹⁴ Eager, p. 16.

11,445 persons fell victims to the pestilence, of which 7,630 were males and 3,815 females.⁹⁵

1810.

Yellow fever appeared for the third time in the history of Cartagena in 1810. Its ravages were considerable, but no authentic statistics are obtainable.⁹⁶

1811.

Yellow fever reappeared in 1811. The war with France militated against the enforcement of preventive measures and the disease soon became epidemic and spread to adjoining cities and towns.⁹⁷

1812.

The outbreak of 1812 was not extensive, but proved very fatal. It prevailed principally among the British troops stationed in the city. The first unequivocal case was that of Major-General Ross, who died with black vomit on September 26, at Galleras, a fort situated at the summit of a hill on the west side of the town. The infection rapidly spread to the balance of the troops, and by October, over 100 cases were under treatment. On October 5, about seventy of the worst cases were transported on board an improvised hospital ship. Three died the evening they arrived on board, two the day following, and, in the course of a few days, twenty more fatalities were recorded. From October 5 to December 21, when

⁹⁵ Bally, p. 447

Fellowes, p. 478.

La Roche, vol. 1, p. 356.

Mimaut: *Mémoire sur la Nature des Maladies Endémiques de Cartagene* (Paris, 1819), p. 47.

⁹⁶ Eager, p. 21; Berenger-Feraud, p. 83; Mimaut, loc. cit.

⁹⁷ Berenger-Feraud, p. 84; Eager, p. 21; Mimaut, loc. cit.

the epidemic became extinct, all the "bad cases" were transported to this vessel. The mortality was heavy.⁹⁸

Of the prevalence of the fever among the inhabitants of Cartagena during this epidemic, the records are very unsatisfactory and no authentic data could be found as to the total number of cases and deaths. It is, therefore, to be presumed that the malady was confined chiefly to the invading army.

CATALAN BAY.

1813.

The little village of Catalan Bay (known also by the name of La Caleta, and inhabited principally by fishermen and washerwomen) is located a few miles east of Gibraltar. A single case of yellow fever was observed there in 1813, in the person of Antonio Perez, aged 28, who had gone to Gibraltar on business. On his return home, he was taken ill, but the fact was concealed from the inspector. He recovered without contaminating any other inhabitant of the village.⁹⁹

1814.

In 1814, during the prevalence of yellow fever at Gibraltar, twelve of the inhabitants of Catalan Bay, who had visited the former place, were taken ill on their return home. Most of those attacked concealed their illness from the inspector, from fear of being sent to the Lazaretto, and the majority died while pursuing their avocations—some in the streets and some in their fishing-smacks. Only those who had communicated with Gibraltar contracted the disease.¹⁰⁰

⁹⁸ Proudfoot: Dublin Hospital Reports, 1818, vol. 2, p. 254. Also Berenger-Feraud, p. 85; Eager, p. 21; Mimaut, loc. cit.

⁹⁹ *Documens Recueillis par MM. Chervin, Louis et Trousseau.* Paris, 1830, vol. 2, pp. 62; 116.

¹⁰⁰ *Ibid.*, p. 120.

1828.

The virulent epidemic of yellow fever which made 1,677 victims in Gibraltar in 1828, was introduced into Catalan Bay by a water-carrier, whose occupation compelled him to make daily pilgrimages to the city. This man, taken sick about September 18. died on the 23rd. His family consisted of his wife and four children. Two of the children were next attacked, then the mother and then the remaining children. All but one boy followed the unfortunate water-carrier to the grave.

From this focus, the disease radiated in every direction, and hardly an inhabitant of the hamlet escaped an attack.¹⁰¹

CHICLANA.

1800.

Like the balance of the towns in Southern Spain, Chiclana was invaded by the "yellow pestilence" in 1800. Out of a population of 10,000, 1,328 died. (*La Roche*, vol. 1, p. 534).

1819.

The widespread epidemic of 1819 spread to Chiclana and caused much mortality. (*Berenger-Feraud*, p. 90).

CHIPIONA.

At some time or other, during the epidemics which desolated Spain from 1800 to 1828, Chipiona suffered from yellow fever, but the authors we have consulted do not state the exact date. (See the vague and unsatisfactory accounts given by Chervin, Pariset, Bally and other ancients who have discussed at length the great epidemics of yellow fever in Spain).

¹⁰¹ *Ibid.*, p. 2; *Berenger-Feraud*, p. 106.

CHURRIANA.

1800.

Churriana, suburb of Malaga was, in 1800, a separate community, inhabited principally by bakers, who supplied the metropolis with bread. Only one case was observed in the village that year, in the person of the wife of a baker, who recovered.¹⁰²

1804.

In 1804, yellow fever committed fearful ravages in Malaga.¹⁰³ Thirty-two inhabitants of Churriana, who had brought bread and other provisions to Malaga, returned home with the disease in their system and died. The disease did not spread, only those who had communicated with the seat of infection falling victims to the pestilence.¹⁰⁴

CIEZA.

(See *Zieza*).

COIN.

1804.

Refugees from Malaga infected Coin in 1804. The disease did not spread to the inhabitants of the village, being confined to the imported cases.¹⁰⁵

¹⁰² Chervin, Examen Critique, p. 52.

¹⁰³ See Malaga, year 1804.

¹⁰⁴ Dariste, p. 62; Fellowes, pp. 181; 185.

¹⁰⁵ Fellowes, p. 181.

CONIL.

1800-1821.

Chervin¹⁰⁶ states that between the years 1800 and 1821, inclusive, 172 persons affected with yellow fever came to Conil from Cadiz and other infected localities, but in no instance was the infection transmitted to the residents of the village. Most of the cases proved fatal.

CORDOVA.

1800.

[A few fugitives from Cadiz were treated in an isolated section of the Cordova general hospital in 1800. There was no spread of the malady.¹⁰⁷

1802.

In 1802, five hundred cases of yellow fever were sent from vessels in the harbor to the public hospital of Cadiz. A few patients escaped to Cordova and other localities. There was no diffusion of the malady.¹⁰⁸

1804.

The only epidemic of yellow fever in Cordova, of which there is any record, took place in 1804. The population was then 40,000. The first case came from Malaga and erupted September 28. From that period until November 14, the date of the last case, there were 400 deaths, of which 180 were males and 220 females.¹⁰⁹ It is worthy of note that this is one of the few epidemics of

¹⁰⁶ Chervin: Examen Critique, p. 54; Rougeau, Theses de Paris, 1827, No. 119.

¹⁰⁷ Bally, p. 74.

¹⁰⁸ Pariset, p. 79.

¹⁰⁹ Fellowes, p. 478; Chervin, Examen Critique, p. 3.

yellow fever in Spain in which the mortality was greater among women than men.

CORIA.

1800.

Coria, six miles south of Seville, was contaminated by the latter in 1800. Mortality, 450.¹¹⁰

CORTES DE LA FRONTERA.

1800.

During the general epidemic of 1800, refugees from infected points brought yellow fever to Cortes de la Frontera. The infection did not spread to the inhabitants of the village.¹¹¹

CORUNNA.

1803; 1822.

Corrunna, the northwesternmost port of Spain, was threatened with invasions of yellow fever in 1803 and 1822. Energetic sanitary measures were immediately taken in both instances and the disease confined to imported cases. (Pariset, p. 96).

DOS HERMANAS.

1800.

Seville contaminated Dos Hermanas in 1800. The mortality amounted to 70, all refugees.¹¹²

¹¹⁰ La Roche, vol. 1, p. 534.

¹¹¹ Rougeau, Theses de Paris, 1827, No. 119.

¹¹² La Roche, vol. 1, p. 534.

ECIJA.

1800.

Ecija, fifty-two miles northeast of Seville, on the Genil River, is a point of much interest to the tourist, on account of its ancient Roman ruins and fine sheltered promenades, but it is so hot as to be called "the frying pan of Andalusia."

Ecija has been invaded by yellow fever on three occasions only, two epidemics (1800 and 1804) and one importation (1802). The present population of the town (about 30,000) does not show that much progress has been made in this direction, as there were 40,000 souls within its walls in 1800.

Ecija was contaminated by Seville in 1800. Profiting by the terrible experiences of that unfortunate city of Cadiz, stringent sanitary measures were instituted, and the disease limited to 400 cases, of which 100 died.¹¹³

1802.

According to Pariset (page 79), a few cases of yellow fever were observed in Ecija in 1802. The disease was confined to the importations.

1804.

In 1804, the population of Ecija was about the same as in 1800. On October 8, the first unequivocal case of yellow fever was reported, and by the 31st of the month, the epidemic was widespread. The fever raged until December 20, resulting in 5,000 cases, of which 3,802 proved fatal. This is another of the few examples where the mortality was higher among women than men, the figures being 2,122 for the former, against 1,380 for the latter.¹¹⁴

¹¹³ Bally, p. 75; La Roche, vol. 1, p. 536.

¹¹⁴ La Roche, vol. 1, p. 536; Fellowes, p. 478; Chervin, Examien, etc., p. 8.

EL ARAHAL.

(*See Arahal*).

EL BORGE.

1804.

The village of El Borge was contaminated in 1804 by persons fleeing from Malaga, and lost the greater part of its population.¹¹⁵ The number of cases and deaths is not stated.

EL PALO.

1804.

El Palo, infected by Malaga in 1804, suffered cruelly from yellow fever. "All of the inhabitants were attacked with the epidemic, and it occasioned great destruction among them."¹¹⁶

EL PASSAJES.

(*See Passajes*).

EPREZALENA.

1800.

In common with other towns within the radius of infection, Esprazalena was invaded by the Saffron Scourge in 1800. The mortality was inconsequential.¹¹⁷

¹¹⁵ Fellowes, p. 186.

¹¹⁶ Fellowes, p. 186.

¹¹⁷ Rougeau, loc. cit.

ESPEJO.

1803.

Refugees from Malaga brought yellow fever to Espejo in 1803. The outbreak was not extensive.¹¹⁸

1804.

The terrible yellow fever epidemic of the year 1804, which prevailed at various sea coast towns of Spain, is said to have made its way into Espejo in the following manner:¹¹⁹

John Cordoba, a muleteer, arrived from Malaga about five in the evening of the 27th of August, much indisposed. He sent for one of the physicians of the place, who finding the case to be alarming, reported the circumstances to the health authorities. Cordoba was himself impressed with the idea that he was infected with the plague or epidemic. He had brushed, in passing through the streets, one of the carts employed to carry the dead to the grave. His imagination was struck; and, conceiving that touch was sufficient to communicate the malady, he believed the incident alluded to, to be the actual cause of the indisposition which he then felt. Various persons from the adjoining houses visited Cordoba in his illness, some in friendship, others to purchase things which he had brought from Malaga for sale.

When news of Cordoba's illness reached the authorities, the patient was at once carried to the open country,

¹¹⁸ Berenger-Feraud, p. 75.

¹¹⁹ Jackson: Yellow Fever on the South Coasts of Spain, p. 23; Fellowes, p. 478; Bailly, p. 90; Eager, p. 20.

* Fellowes gives the following figures: Males, 100; females, 268. This would give a total of 368. Both Fellowes and Bailly state that the total deaths were 329. It is a noteworthy fact that the mortality among men has in nearly every instance been greater than among women during the epidemics of Andalusia and we have taken the liberty of adding the missing figures to the male column.

and the remaining goods he had brought from Malaga destroyed. But it was too late. The seeds of infection were already sown. All those who had visited the muleteer during his illness, were taken ill with yellow fever and a majority died. The disease manifested itself at first to the portion of the city frequented by the friends of Cordoba. A rigorous cordon was instituted and thus the other sections of the city were spared.

Espejo had a population of 4,961 in 1804. From August 27 to November 25, the date of the last death, there were 329 fatalities from the fever. Of this number, 161 were males and 168 females.

ESPERA.

1800.

In 1800, yellow fever invaded Espera and caused a mortality of 442. The infection undoubtedly came from Cadiz.¹²⁰

1804.

The population of Espera in 1804 was 2,084. The first case of yellow fever was observed September 25; the last, December 3. During the course of the epidemic, there were 439 deaths, of which 280 were males and 159 females.¹²¹

ESTEPA.

1800.

A single instance of yellow fever having invaded Estepa is recorded. During the general epidemic of 1800, refugees fled to this village. In spite of the fact that the scourge was committing fearful ravages in nearly every city and town in Andalusia, only two persons died of the disease in Estepa. (*La Roche, vol. 1, p. 534*).

¹²⁰ La Roche, vol. 1, p. 534.

¹²¹ Fellowes, p. 478.

FERROL.

1858.

Ferrol, twelve miles northeast of Corunna, was confronted with a small epidemic of yellow fever in 1858. On July 30 of that year, the warship *Isabel II* entered the port. She had originally sailed from Havana in the last days of May, and had stopped at Gijon, a port in the Bay of Biscay, before coming to Ferrol. On July 31, the day after her arrival, a sailor named Pablo Borrell, who had been ailing for several days, was transferred from the vessel to the military hospital, where he died of yellow fever on August 1. On August 8, three more sailors from the *Isabel II* died from the same disease at the hospital. Nine cases in all were admitted to the hospital. Our source of information does not state whether or not there were any further fatalities. The disease did not spread to the inhabitants of Ferrol.¹²²

FRAGA.

1821.

Refugees with the poison of yellow fever in their system fled to Fraga in 1804, and a majority died. The inhabitants of the village were not contaminated.¹²³

GIBRALTAR.

YELLOW FEVER YEARS.

1649; 1727; 1798; 1800; 1803; 1804; 1810; 1811; 1813; 1814; 1818; 1822; 1824; 1825; 1826; 1828; 1829.

¹²² Capriles: *Siglo Medico*, Madrid, 1858, vol. 5, p. 284; Vizalde; *Ibid*, pp. 263, 282.

¹²³ Bally, Francois and Pariset, p. 62.

HISTORICAL RESUME.

Gibraltar, known to the Greeks as Calpe, was first fortified as a strategic point by the Saracen leader, Tarik Ibu Zeiad, in 711-712, from whom it was thenceforward called Gebel-al-Tarik, the rock of Tarik. It was ultimately taken by the Spaniards from the Moors in 1462, fortified in the European style, and so much strengthened that the engineers of the seventeenth century considered it impregnable. It was taken, however, after a vigorous bombardment in 1704 by a combined English and Dutch force under Sir George Rooke and Prince George of Darmstadt, and was secured to Britain by the Peace of Utrecht in 1713. Since then it has remained in British hands, notwithstanding many desperate efforts on the part of Spain and France to retake it.

Vast sums of money and an immense amount of labor have been spent by England in fortifying this celebrated stronghold, which, in case of war, would form one of the most important points of support for naval operations. Numerous caverns and galleries, extending two to three miles in length, and of sufficient width for carriages, have been cut in the solid rock, with port-holes at intervals of every twelve yards, bearing upon the neutral ground which separates the fortress from the mainland and the Bay of Gibraltar, and mounted with more than 1,000 guns, some of them of the largest size. The regular garrison in time of peace is 5,000.

SUMMARY OF EPIDEMICS.

1649.

Historians assert that yellow fever had never been observed at Gibraltar prior to 1803, but ancient documents and Spanish tradition give vague, but undoubtedly authentic accounts of the prevalence of the disease among the Spanish garrison, as far back as the middle of the seventeenth century.

According to the *Second Report on Quarantine*, published by the General Board of Health of Great Britain in 1852 (*page 153*), a Dr. Morillo, who had been employed at Marabella and other towns in Andalusia during a pestilential outbreak (the nature of which is not stated), went also to Gibraltar, to investigate an epidemic, which, according to an old history of Gibraltar by Ayola, proved so fatal, that the people, losing all confidence in human means, instituted processions to the neighboring hermitage of San Roque, which were kept up annually in the month of August, till the surrender of the garrison to the British in 1704.

Although we have been unable to find any record of Dr. Morillo's report (if any was ever made), we have no doubt that this epidemic was one of yellow fever.

1727.

There is a record that the garrison at Gibraltar lost 500 men by fever in 1727, twenty-three years after the fortress had been taken by the British. The character of the disease is not described, but the excessive mortality leaves no doubt that it was yellow fever.¹²⁴

1798.

Another outbreak of yellow fever on this celebrated rock, not mentioned in the various works on epidemiology we have consulted, is said to have taken place in 1798. This information is contained in a letter written Staff-Surgeon Hill, of the British Army, dated June 13, 1832, and published in the *Second Report on Quarantine*.

It appears from said letter that the 48th Regiment having returned from the West Indies a complete skeleton, were completed by recruits from the different supplementary corps to the number of 1,100 strong, with which it immediately embarked on board the *Calcutta* Indiaman, September 1, 1798, at Lymington, England, and arrived at Gibraltar the following month (October);

¹²⁴ *Second Report on Quarantine*, p. 153.

previously to the regiment embarking there had been a detachment on board, and two or three cases of small-pox occurred; the ship had been fumigated and whitewashed, but, nevertheless, a few cases of small-pox were debarked at Gibraltar on the arrival of the regiment at that fortress; in all other respects the men were healthy, although much crowded on board ship, and such was the state of equipment that the men appeared in their different county militia uniforms, not having had time to fit on the proper uniform clothing prior to leaving England.

Soon after the arrival of the corps at Gibraltar, several cases of yellow or bilious remittent fever made their appearance, which increased rapidly and proved highly fatal. Dr. Harness, physician to Lord St. Vincent's fleet declared the fever was precisely the same he had seen in the West Indies, and requiring the same treatment.

The young recruits were the only sufferers, not an officer being attacked. Most of the latter had lately returned from the West Indies, but among the subalterns there were several that had never before been out of England.

The total mortality amounted to 100. The number of cases is not stated.¹²⁵

The fact that the 48th Regiment came from the West Indies, a notorious hot-bed of yellow fever, and the high rate of mortality, leaves no hesitation in our mind that the disease under discussion was yellow fever.

1800.

In Trotter's *Medicina Nautica*, it is stated that 257 deaths from "fever" took place at Gibraltar in 1800, among the military.¹²⁶

Although the word "yellow fever" is not mentioned by this authority, the fact that this disease was general in Spain in 1800, and that the average yearly mortality during non-epidemic periods among the military had been only thirty-eight, is conclusive proof that the Antillean Pestilence prevailed at Gibraltar that year.

¹²⁵ Second Report, etc., pp. 153; 206.

¹²⁶ Second Report, etc., p. 153.

1803.

We now come to the first authentic invasion of Gibraltar by yellow fever. During the summer months (presumably August), smugglers brought the disease to the town. Only a few sporadic cases resulted.¹²⁷

1804.

A reference to our chronology will show that yellow fever was widespread in Andalusian in 1804. A rigorous cordon was placed in the environs of Gibraltar, but smugglers from Cadiz and Malaga succeeded in eluding the vigilance of the coast-guards, and stole into the place. That they carried something more harmful to public interests than contraband goods is obvious from the sequel. Some of them developed yellow fever in the midst of the healthy population of Gibraltar and died, diffusing the infection among the inhabitants.¹²⁸

The population of Gibraltar in 1804 (both civil and military) was 15,000. When the epidemic came to an end, 5,733 fatalities had occurred, 4,864 among the civilians and 869 among the military.¹²⁹

1810.

Sporadic cases appeared in 1810, causing a mortality of seventeen among the civilians and six among the soldiers.¹³⁰

1811.

Gibraltar was infected by Cadiz in 1811. Beyond the mere mention of this fact, our authority¹³¹ gives no information of any value.

¹²⁷ Berenger-Feraud, p. 74.

¹²⁸ Eager, p. 19.

¹²⁹ Second Report on Quarantine, p. 158.

¹³⁰ Second Report on Quarantine, p. 158.

¹³¹ Berenger-Feraud, p. 84.

1813.

The warship *St. Pierre* brought yellow fever to Cadiz in 1813. On August 11 of that year a vessel called the *Fortune* arrived at Gibraltar from Cadiz. One of the crew being ill, was sent to the Catholic Hospital, and died on the 19th of the same month, with every symptom of yellow fever. Nothing untoward happened until the end of the month, when a Frenchman, a native of Paris, residing in Government Street, near City Hall Lane, was taken ill with the same symptoms as the first case, and died on September 3. It afterwards developed that this man had been a passenger on board the *Fortune*, and had landed the same day as the sailor who died on August 19th.

Between the 3rd and 11th days of September, nine persons died of yellow fever in the same neighborhood. The disease spread to other streets and the entire town was soon infected.

The total number of cases and deaths was as follows:

	Cases.	Deaths.
At Lazaaretto	635	281
In town	684	218
At Military Hospital	1,470	384
	2,789	883

Among the deaths at the Military Hospital, were twenty-four officers, fifty-eight soldiers' wives and six children.¹³²

1814.

The epidemic of 1814 lasted from August to November, and claimed the following victims.¹³³

Civilians	132
Soldiers	114
	246

¹³² Gillipin: Medico-Chirurgical Transactions, London, 1814, vol. 5, pp. 328, 338.

¹³³ Second Report on Quarantine, p. 159.

1818.

In the month of August, 1818, a solitary case of yellow fever, followed by recovery, was observed at Gibraltar.¹³⁴

1822.

Two cases of yellow fever are recorded for the year 1822. They were observed in September.¹³⁵

1824.

Gillkrest, surgeon of the 43rd Light Infantry, reports having attended two cases of yellow fever at Gibraltar in 1824.* One of the cases was that of a private, whom the doctor attended, until, in the course of his ministrations, he was himself taken ill, furnishing the second case.¹³⁶

¹³⁴ Amiel: Second Report on Quarantine, p. 266.

¹³⁵ Amiel, loc. cit.

* As the main object of the researches made by the compilers of the Second Report on Quarantine was to uphold the theory that yellow fever was not always imported to Gibraltar, but could originate on Spanish soil when certain climatic and atmospheric conditions were present, the eminent physicians who conducted the examinations embodied in the Report evidently took advantage of every honest opportunity to amass evidence to fortify their pretensions. We therefore think that the evidence they gathered regarding the prevalence of sporadic cases in certain years genuine, notwithstanding adverse criticism by numerous authors. Of course, the opinion that the disease originated on Spanish soil is absurd, our present day knowledge leading to the belief that the sporadic cases noted in this history owed their origin simply to the renewed activity of infected Calopae. Why the disease did not propagate in those special instances, is one of these mysteries which Nature veils from human ken and which no amount of reasoning, however deep or methodical, can satisfactorily explain.

¹³⁶ Gillkrest: Second Report on Quarantine, p. 266.

Dr. Gillkrest was attended by Dr. Arejula, physician to the King of Spain, who has written learnedly on the epidemics of Andalusia.

1825.

In November, 1825, two sporadic cases of yellow fever are said to have erupted in Gibraltar. This is the first time on record where fellow fever showed itself so late in the year in this locality. Our informant does not furnish any details.

1826.

Three cases, a soldier and two civilians, were observed in 1826. One of the civilians died.¹³⁵

1828.

A severe visitation of yellow fever ravaged Gibraltar in 1828. The history of this epidemic is related at length by Messrs. Chervin, Louis and Troussseau, in a work remarkable for the vast amount of documentary evidence which these gentlemen amassed, but which is unfortunately so unwisely classified, that it takes a vast amount of dessication to separate the wheat from the chaff, and therefore greatly detracts from the importance of the work as one of ready reference. After laboriously going over the 542 documents, covering two volumes of 412 pages each, one is finally able to condense the following information:

The Swedish ship *Dygdén* left Havana May 12, 1828, with a crew of 16. The vessel reached Gibraltar June 28. Two sailors had died from yellow fever during the voyage, one on May 27 and the other June 1. The *Dygdén*

¹³⁷ Amiel, loc. cit.

¹³⁸ Browne and Gillice: Second Report on Quarantine, p. 266.

¹³⁹ *Documens Recueillis par MM. Chervin, Louis et Troussseau, Membres de la Commission Francaise Envoyee a G'braltar pour Observer l'Epidemie de 1828; et par M. le Dr. Barry, Medecin des Armees Anglaises. 2 vols., Paris 1830.*

was deemed so unsanitary that pratique was refused the captain, and the vessel ordered to quarantine, where she remained forty days. Although presumably under strict surveillance, it was only on July 27, or 29 days after her arrival, that health-guards were sent on board. The ship was released from quarantine August 8.

The first cases of yellow fever on shore erupted August 29, in the house of a man named Testa, one of the guards sent on board the *Dygden* on July 27. Much stress is laid on this fact by the historians of this epidemic, and Testa is accused of having infected his sister, who was the first person to die of the disease, but as Testa himself did not have the malady at the time and the germs are not spread by contact, infected mosquitoes were no doubt introduced into the premises, probably in smuggled goods, and thus a focus was created. Of course, our astute friends of over a century ago had no idea of the mosquito transmission of yellow fever, and the fact that Testa had been on board the *Dygden* and his sister was the first person stricken, was strong enough evidence to place the burden of contagion on the shoulders of the unfortunate health-guard.

Another vessel, the *Meta*, is also accused of having contaminated the town in 1828. This ship left Havana at about the same date as the *Dygden*, and arrived at Gibraltar at the end of June, having lost two men from yellow fever during the voyage. She was submitted to a quarantine of twenty-one days. Contraband goods found their way on shore, and the vessel was also visited by washerwomen from Gibraltar and the neighboring village of Catalan Bay, who took the soiled linen of the sailors to their homes. Most of the washerwomen contracted yellow fever and died. The chroniclers of the period attributed their death to the fact that among the clothes taken by them from the *Meta*, were some which had belonged to the sailors who had died during the voyage, and which were still soiled with black vomit.

Whether contaminated by the *Dygden* or the *Meta*, or by both, it is plain, from a summary of the evidence, that Havana was the original source of infection. Such has

generally been the case in nearly every epidemic of yellow fever in Spain.

The last death occurred December 25. With the exception of the disastrous epidemic of 1804, that of 1828 proved to be the worst that Gibraltar ever experienced. There were 5,543 cases, of which 1,677 proved fatal. The mortality among the civil population amounted to 1,170, while the military, out of a population of 3,781, lost 507.

1829.

A few cases and deaths are recorded for the month of January, 1829, being the "tail end" of the epidemic of the year previous. The last death occurred on the 14th of the month.

Since 1829, yellow fever has not been observed at Gibraltar.

GRANADA.

1804.

The beautiful and historic city of Granada was visited by yellow fever once in its history. On August 25, 1804, the first case was observed, and the disease slowly propagated itself, resulting in a total of 306 deaths, out of a population of 54,962. The mortality among the males was 185; females, 121. The epidemic exerted its greatest intensity on October 10, and became extinct on the 28th of the same month.¹⁴¹

GUARDAMAR.

1804.

Yellow fever was brought to Guardamar by refugees from Alicante and other infected places in 1804, but did not spread to the inhabitants. Out of a population of

¹⁴⁰ Second Report on Quarantine, p. 159.

¹⁴¹ Fellowes, p. 478.

2,464, not a single case occurred among the inhabitants. Only fourteen deaths are recorded, the first, September 21, and the last, November 16. The mortality among the men was eight; women, 6.¹⁴² The absence or inactivity of the *Calopae* no doubt saved Guardamar from a disastrous epidemic.

HUELVA.

1800.

A few cases of yellow fever were brought by refugees to Huelva in 1800, according to Rougeau.¹⁴³ The developments must have been unimportant, as we find no detailed history of the incident in any works on epidemiology.

ISLA DE LEON.

Isla de Leon (also know as San Fernando) is only seven miles from Cadiz, and it is surprising that yellow fever has not been observed there more frequently than on the three occasions mentioned in this history.

1800.

In 1800, Isla de Leon was infected by refugees from Cadiz. The town had then a population of 32,000. In less than three months, 5,033 of its inhabitants fell victims to the terrible pestilence.¹⁴⁴

1811.

In 1811 yellow fever was imported to Isla de Leon by a vessel from Santa Cruz de Teneriffe, and claimed many victims.¹⁴⁵ From this focus, the disease spread to Cadiz, Gibraltar and Alicante.

¹⁴² Fellowes, p. 478.

¹⁴³ Rougeau: Theses de Paris, 1827, No. 119.

¹⁴⁴ La Roche, vol. 1, p. 534.

¹⁴⁵ Berenger-Feraud, p. 84.

1819.

The steamship *Asia*, from Vera Cruz and Havana, infected Isla de Leon in 1819.¹⁴⁶ From this focus, the neighboring city of Cadiz was contaminated and experienced one of the most dismal epidemics in its history.

JESUS.

1821.

Fugitives from Tortosa brought yellow fever to the village of Jesus, on the Ebro, opposite that city, in 1821. A man named Cordoba and his daughter, who had communicated with Tortosa, contracted the disease and died, without contaminating other inhabitants of Jesus. During the progress of the epidemic at Tortosa, several persons who had fled to the village died, but in no instance did the malady spread.¹⁴⁷

JUMILLA.

1811.

A few cases of yellow fever were observed at Jumilla, thirty-seven miles northwest of Murcia, in 1811. There was no spread of the disease.¹⁴⁸

1812.

The battle of Salamanca (July 22, 1812), which stopped the progress of the victorious French army through Spain, compelled General Marmon to abandon his plans of further conquest and retrace his steps. During the month

¹⁴⁶ Begin: *Journal de Medecine Militaire*, 1820, vol. 7, p. 346.

Also: Berenger-Feraud, p. 89.

¹⁴⁷ O'Halloran, p. 121.

¹⁴⁸ Bally, Francois and Pariset, p. 560.

of September, 1812, a portion of this once splendid corps traversed the Kingdom of Murcia. A division arrived on October 1, at Zieza, a small town on the Segura, where yellow fever was epidemic, having been imported by two individuals from Cartagena during the early days of September. Nearly all the inhabitants of Zieza had fled from the threatened pestilence, and the troops finding only deserted houses and rotting corpses, pressed northward. Two days later, the soldiers arrived at Jumilla, which had already been contaminated by Zieza, but where conditions were better, and decided to rest from their fatigues. A few days later (October 8), a soldier was taken ill with the prevailing fever and died in forty-eight hours. From that date to the 28th of the month, the disease spread through the camp and claimed about 100 victims. The segregation of the soldiers finally put an end to the epidemic.¹⁴⁹

LA CARLOTA.

1800.

The beautiful little town of La Carlota, seventeen miles southwest of Cordova, had a population of 733 in 1800. Refugees from Cadiz brought yellow fever to the place that year. When the first cases erupted, all those who could do so fled, the remaining population being 473. Out of this small number, there resulted 195 cases, 122 of which proved fatal.¹⁵⁰

This is the only authentic record of the appearance of yellow fever at La Carlotta.

LA RAMBLA.

1803.

La Rambla, which had been spared during the widespread epidemic of 1800, was contaminated by refugees

¹⁴⁹ Pessou: *Journal de Medecine Militaire*, 181, vol. 5, p. 304.

¹⁵⁰ Bally, p. 74.

from Malaga in 1803, and suffered severely.¹⁵¹ Our authority fails to give any details.

1804.

In 1804 yellow fever was introduced into La Rambla from Malaga in the following manner:¹⁵²

A man by the name of Nieto, who had been at Malaga on business, was prompted by morbid curiosity to follow and touch a burying-cart containing the corpse of a person that had died of yellow fever. Of course, the mere fact that he did this was certainly not sufficient to infect him, but the incident is mentioned to illustrate the peculiar views of contagion held by the physicians of the period.

Even Jackson, who lived in an atmosphere of rabid contagionists and infectionists, ridicules the idea. "It is known by experience," observes the doctor, "that neither burying-carts nor dead bodies possess the material of contagion in a condition to communicate the infection to others; the whole has the air of a story, the blanks of which are filled up by fiction—the facility of doing which seems to be characteristic of the Spanish nation."¹⁵³

In whatever manner Nieto contracted the disease, it is certain that he brought it to La Rambla. He went to bed immediately on his arrival home, on the day in question. He was not seriously ill and recovered. A youth named de Castro who lived near Nieto, and who visited him during his illness, was taken ill on the 9th of September and died on the 16th. A young woman, Maria Marina Doblás, a cousin of Nieto, who lived in a house contiguous to his, came to see him during his illness and was attacked by the disease. Christobal Doblás, who occupied the same house with Maria, was taken ill about the same time as the woman, and died on the 19th of September. Garcia Luque, bridegroom of Maria, was taken ill about the same time as his wife, and also died

¹⁵¹Berenger-Feraud, p. 74.

¹⁵²Arejula: Breve Descripcion de la Fiebre Amarilla Padecida en Cadiz, etc., p. 286.

¹⁵³Jackson, p. 21.

on the 19th. Garcia Luque lived in a distant part of the town where there was as yet no sickness, and no doubt contracted the malady when he came to live with his father-in-law. Luque's mother was attacked about a month after the death of her son.

La Rambla had a population of 6,000 in 1800. The disease made slow progress, and finally came to an end in the early days of October. Only seventy cases, of which thirty-seven proved fatal, are recorded.

LAS AGUILAS.

(*See Aguilas*).

LAS CAVEZAS DE SAN JUAN.

1800.

Yellow fever invaded Las Cavezas de San Juan in 1800 and, according to La Roche,¹⁵⁴ caused a mortality of 994.

LAS PALACIOS.

1800.

Las Palacios experienced a solitary invasion of yellow fever. According to La Roche, 192 fatalities resulted in 1800. No other details are given.¹⁵⁵

LEBRIXA.

1800.

In the year 1800 the people of Lebrixa suffered from yellow fever, in consequence of being infected by a cavalry regiment from Alcantara, which, proceeding from places where the malady was prevailing, passed a night in the

¹⁵⁴ La Roche, vol. 1, p. 534.

¹⁵⁵ La Roche, vol. 1, p. 534.

town and left some sick. The fever spread after the departure of the regiment and attacked progressively the inhabitants, causing such havoc that "numbers of them could not obtain professional aid or attendance for this malignant and fatal disease." (*O'Haaloran, p. 153*). According to La Roche, 2,100 persons were carried off by the epidemic.¹⁵⁶

-1811.

A few cases were observed in 1811. The local Board of Health inaugurated strict sanitary measures and increased its vigilance, cutting off every communication with infected localities, and the disease was confined to the imported cases.¹⁵⁷

1821.

The first case of yellow fever in Lebrixa in 1821, appeared in the person of Simon Riega, who resided in the Posada Nueva de la Constitucion. He fell ill on the 15th of September, and died on the 18th. Rieto's family, consisting of eight persons, were not attacked, although they communicated freely with the sick man.

Two men who had come from Xeres de la Frontera, where the fever was epidemic, and who stopped at a house in the Posada Nueva, are suspected of having imported the malady.*

The second case occurred at a distance of five hundred yards from the former, in the person of Maria Catalina, a girl sixteen years of age, who resided in the Calle Nueva. She became indisposed on September 15, and died on the 21st. The girl had no communication with Riega or his family. Ten persons living in the same house with Maria proved immune to the infection.

¹⁵⁶ La Roche, vol. 1, p. 534.

¹⁵⁷ Robert, Guide Sanitaire, vol. 1, p. 284; Berenger-Feraud, p. 84; Bally, Francis and Periset, p. 559.

A man named La Paz, residing in Calle la Pena, furnished the third case. He was taken ill September 16, and died on the 23rd. He resided 250 yards from Riega's place. No one in the La Paz household was affected, with the exception of a child, who contracted the disease two months afterwards, at a time when the malady was almost extinct.

A youth named de Salas, aged eighteen, furnished the fourth case. He resided in the Barrio Nuevo Secundo, about 250 yards distant from the nearest house in which the cases previously noted occurred. He was taken ill September 20, and died on the 28th.

Two weeks after the death of de Sales, the fifth case was recorded, in the person of a boy, who lived in the same neighborhood, and who died thirty-six hours after the onset.

The above first five cases, taken from O'Halloran's¹⁵⁸ work, are given to show that the original focus was within a comparatively restricted area, and undoubtedly owed its infection to the two voyagers from Xeres de la Frontera.*

From this focus, the disease slowly spread through the town. Contrary to the usual dilatory tactics of the Castilian, the Lebrixa Board of Health acted quickly and energetically, and caused all the healthy inhabitants who could do so to emigrate to the country, by this means preventing a repetition of the disaster of 1800. From the most authentic sources, there were only 500 cases, of which 150 died.

LORCA.

1811.

Lorca, forty-two miles southwest of Murcia, was infected in 1811. The disease did not spread.¹⁵⁹

¹⁵⁸ O'Halloran: Remarks on the Yellow Fever, etc., p. 151.

* The Spanish authorities claim that these men came from Puerto de Santa Maria, but authentic researches made by Dr. O'Halloran elicited the information that they were from Xeres de la Frontera. (O'Halloran, p. 155, foot note.)

¹⁵⁹ Bally, Francois and Pariset, p. 560.

LOS HUMEROS.

(A suburb of Seville, which see)

LOYOLA.

1823.

Loyola, the birth-place of the founder of the Order of Jesuits, was threatened with an invasion of yellow fever in 1823. In August of that year, the ship *Doniasteria*, from Havana, arrived at Pasajes and was visited by many inhabitants of the Basque town. Among the visitors were two persons, husband and wife, who had stopped at Pasajes on their way to a pilgrimage to Loyola. After visiting the ship, they continued to their destination, where they were taken ill shortly after their arrival, and died of yellow fever a few days afterwards. Although much apprehension was felt by the inhabitants of the quaint old Spanish town, the infection did not spread beyond these two cases.

A reference to Pasajes, in this volume, will show that the *Doniastera* infected that locality in 1823, resulting in 101 cases and 40 deaths.

MADRID.

Description.

Madrid, the capital of Spain, is in the center of the Peninsula, on the Manzanares. Situated on a high plateau, 2,400 feet above sea-level, wind-swept from the snowy Guadarrama, with unhealthy extremes of temperature, the city has no advantages except the fanciful geographical merit of being the center of Spain. Railways connect it with the principal cities of the Kingdom. Population: 1887, 470,283; 1908 (estimated), 556,663.

YELLOW FEVER YEARS.

1867; 1870; 1878.

SUMMARY OF IMPORTATIONS.

1867.

Yellow fever has never obtained a foothold in Madrid. Even during the calamitous disorders of the beginning of the last century, when Andalusia was nearly depopulated and cases were imported to nearly every city of the Kingdom, although Madrid received its quota of fugitives, not a solitary case manifested itself in the capital.

The first case of yellow fever in the history of Madrid was observed in 1867. In December of that year, a man who had been to the Canaries, arrived at Cadiz on the steamship *Clara*. Deaths from yellow fever had occurred on board the vessel. The man went from Cadiz to Madrid and was taken ill in his lodgings on December 3, and died on the 7th. The autopsy revealed typical lesions of yellow fever.¹⁶⁰

1870.

The captain of the merchant vessel *Torcuato* came from Barcelona to Madrid on September 29, 1870, and was taken ill with yellow fever immediately on his arrival. He recovered. Our authority¹⁶¹ does not state whether other cases occurred in Madrid or not, and as a search through the Spanish medical press of 1870 and subsequent years fails to throw any light on the subject, it is to be presumed that there were none. Eager (*loc. cit.*, p. 24), says that "a few cases" were observed, but we have been unable to verify the statement.

¹⁶⁰ De Pedro: Un Caso de Fiebre Amarilla an Madrid. Siglo Medico, Madrid, 1868, vol. 15, p. 20.

¹⁶¹ De Pedro: Un Emigrante de Barcelona en Madrid; Fiebre Amarilla. Siglo Medico, Madrid, 1870, vol. 17, p. 676.

1878.

In September and October, 1878, many Spanish soldiers returned from Cuba. They disembarked at Santander, a seaport on the Bay of Biscay, 207 miles north of Madrid, and the majority went by rail to the capital. Among the soldiers were a great number whose term of service had expired and who, having no families, took up bachelor quarters in Calle Tetuan, in a mean, filthy dwelling, where they slept fifteen or twenty in the same room. Among these *licenciadas* were many who had yellow fever in Cuba, and also some who had never contracted the disease.

On September 15, a youth of fifteen, who lived in Calle Tetuan, was taken ill with peculiar symptoms which baffled the attending physician. Four members of the youth's family were soon attacked with the same mysterious disease, and when two other persons in the same house were taken ill, considerable alarm was created and an investigation by the health authorities revealed the fact that these cases were genuine manifestations of yellow fever. Prompt measures were immediately taken, but the malady spread to the adjoining houses in Calle Tetuan, making slow, but steady progress, only subsiding with the advent of cold weather. The last case was observed October 15. There were in all fifty cases, of which thirty-five proved fatal.¹⁶²

MAIRENA DEL ALCOR.

1800.

A few cases of yellow fever were imported to Merina del Alcor in 1800, principally from Seville, thirteen miles distant. Only nine fatalities are recorded.¹⁶²

¹⁶² Guichet: *Memoires de Medecine Militaire*, 1878. Also: Berenger-Feraud, p. 158; Eager, p. 24.

* La Roche, vol. 1, p. 534.

MALAGA.

Description.

The ancient and historic city of Malaga, said to have been founded by the Carthagenians, is situated on a bay of the Mediterranean, sixty-five miles east of Gibraltar. It is of much commercial importance. Population (1908), 135,000.

THE EPIDEMICS OF MALAGA.

We shall premise the history of yellow fever in Malaga by a summary of the several pestilential diseases which have ravaged the famous Spanish city since 1487, the year of the expulsion of the Moors from the Kingdom. Previous to 1487, no records were kept.

In an old Spanish work published by Cecilio Garcia de la Lena,¹⁶³ a learned priest of Malaga, the history of every epidemic which invaded his native town from 1493 to 1750 is given. The ecclesiastic designates these pestilential visitations by the common name of plague, no matter what the etiology of the disease could have been.

1493. First epidemic of which there is any record. Great mortality. No details given.

1522. Plague caused excessive ravages. The details are too vague to recognize anything but the great mortality.

1580. This epidemic is designated by the name *el catarro* by the good Padre. About eighty persons died daily. A torrential rain, on October 10, stopped its ravages.

¹⁶³ Cecilio Garcia de la Lena: *Conversaciones Historicas Malaguenas*, 1789-1793.

1582-1583. This epidemic was caused by the introduction of old clothes brought by strangers coming from "countries across the sea." What countries, the learned historian does not say. The malady was attended by bubos.

1597. The "Fifth Plague" to harass Malaga broke out in 1597, and lasted three years. As in 1582-3, it was introduced "by sea." Nearly the entire population of the town perished.

1620. Plague again introduced into Malaga "by persons coming from the sea." The mortality was such, that the government was compelled to send families from other towns to re-people the stricken city.

1637. Padre de la Lena goes into more details concerning the "Seventh Plague," which was brought to Malaga by a vessel "on its way to Leghorn." He does not state whence the ship originally sailed. While in the harbor, an inhabitant of Malaga went on board the vessel, where he remained all night. When he returned home next morning, he was taken sick and died shortly afterwards. His whole family shared the same fate. The doctor who had treated these unfortunates, warned the people that they had died of plague, but his admonitions were disregarded, and the neighbors invaded the house and took possession of the clothes and furniture. By this means, the disease was communicated to neighboring streets and spread rapidly through the town, and even to neighboring villages. From the beginning of April to the end of May, the entire city was infected. Entire streets were improvised into hospitals, and the public parks were transformed into huge furnaces, where the clothing of the dead was burned night and day. The epidemic only stopped for want of material, about September 1. The mortality is variously estimated by different authors at twelve thousand, seventeen thousand and twenty-five thousand.

1648-1649. Famine and the influx of strangers into Malaga are given as predisposing causes of the plague

of 1648-9. The mortality was not great in 1648, but it is said that 40,000 people died in 1649.*

1674. A pestilential disease, called *el catarro*, caused much mortality in 1674. No details are given.

1678-1679. The plague of 1678-9 was brought from Oran and Carthage (Africa) by strangers bringing in old clothes and chattel. Although the epidemic lasted two years, our author states that "we are happy in the thought that only 8,000 persons perished, notwithstanding the fact that the city was very populous."

1719. The epidemic of 1719 had its origin in Africa. The malady broke out among the troops which had been sent to defend Ceuta, Morocco, from the Moors. Many of the sick soldiers were transferred to Malaga, and communicated the contagion to the inhabitants. The epidemic, whose principal characteristics were malignant fevers (*tabardillos*), lasted several months and caused much mortality.

1738. This epidemic is also designated *tabardillos*, and is said to have been engendered by the great famine of 1734, the most cruel of the epoch. More than forty persons died daily. The total mortality is not stated.

1741. Although designated by the name "plague" by Padre de la Lena, the epidemic of 1741 was nothing else but yellow fever, the details of which will be found in our relation of the eruptions of that disease in Malaga.

1750-1751. This epidemic, also characterized by the name *tabardillos*, caused 6,000 deaths. Its origin is not given.

According to de la Lena, no pestilential diseases were observed in Malaga from 1751 to 1793, the year of the publication of his monograph.

Diego Blanco Salgado, a distinguished Spanish physician, sent by the King to study this epidemic, also wrote on the subject.

* Rodrigo Enriquez and Jaun Serrano de Vargas Ykrena have also written histories of this plague.

YELLOW FEVER YEARS.

1741; 1791; 1802; 1803; 1804; 1813; 1820; 1821; 1890.

SUMMARY OF EPIDEMICS.

1741.

A French squadron coming from Martinique touched at Malaga in 1741. Yellow fever was prevailing on board the vessels, but the commander concealed this fact from the port authorities, and the officers and crews had uninterrupted communication with the town. The disease soon broke out in Santo-Domingo street, in a locality which had been much frequented by the French marines. Thence it spread rapidly through the town and even invaded its suburbs. The epidemic lasted three months and, according to Barea,¹⁶⁴ more than 10,000 persons died. Rubio, however, claims that only 3,000 died,* but the majority of chroniclers assert that the figures given by Barea are approximately correct.

1791.

Robert (*Guide Sanitaire*, vol. 1, p. 271), claims that Malaga suffered from yellow fever in 1791, and that 10,000 persons perished.* We have looked through the writing of Bally, Ozanam, Eager, Berenger-Feraud and old Spanish documents and works on epidemiology, but can not substantiate this statement. Even Gendrin, in his elaborate monograph on the epidemics of Spain, published

¹⁶⁴ Barea: *Conversaciones Malagenas*, p. 51.

Rexano: *Chrosis Epidemica*, 1742, Section 20.

Cecilio Garcia de la Lena, loc. cit.

Gendrin: *Journal General de Medecine*, 1824, vol. 88, p. 293.

Chervin: *Examen Critique*, etc., 1828, p. 26.

* This historian's exact language is as follows:

"Pericieron, segun el mas riguroso escrutino, tres mil personas, pocos mas o menos."—Rubio, *Analysis Medica*, etc., p. 20.

* * * * Malaga, qui, en 1791, vit introduire dans ses murs une affreuse contagion, et compta dix mille victimes."

originally in the *Journal General de Medicine* for 1824 (vols. 88 and 89, pp. 289 and 10, respectively), is silent on the subject. A few sporadic cases, which escaped the attention of other observers, probably occurred; but the excessive mortality mentioned by Robert as having taken place in 1791, is undoubtedly a chronological hiatus.

1802.

In 1802, yellow fever was imported to Cadiz, and thence spread to other cities on the south coast of Spain. A few sporadic cases were observed in Malaga.¹⁶⁵

1803.

The mild visitation of 1802 was but a premonition of the terrible epidemic which was destined to afflict Malaga the following year.

Likely, nearly all the disastrous visitations of yellow fever which desolated the southern cities of Spain during the first quarter of the last century, the origin of the Malaga disorder of 1803 is shrouded in obscurity. The details which follow are culled from the most reliable authorities on the subject.¹⁶⁶

¹⁶⁵ Eager, p. 17; Berenger-Feraud, p. 72.

¹⁶⁶ Summarized from:

Guendrin: *Journal General de Medecine, Paris*, 1824, vol. 88, pp. 289 et seq.

Alfonso da Maria: *Memoria Sobre la Epidemia de Andalusia de 1880 al 1819*. Cadiz, 1820, p. 122.

Fellowes: *Reports of the Pestilential Disorders of Andalusia*, p. 157.

Mendoza: *Historia de las Epidemias Padecidas en Malaga en los años de 1803 y 1804*. Malaga, 1813.

Arejula: *Breve Descripcion de la Fiebre Amarilla Padecida en Cadiz y Pueblos Comercanos en 1800, en Medina Sidonia en 1801, en Malaga en 1803, etc.* Madrid, 1806.

Eager: *Bulletin No. 5, Yellow Fever Institute*, p. 17.

Berenger-Feraud, p. 73.

La Roche, vol. 1, p. 536.

Bancroft: *Essay on Yellow Fever*, pp. 468; 471.

Bancroft: *Sequal to an Essay on Yellow Fever*, p. 309.

Keating: *History of Yellow Fever*, p. 81.

Lally: *Typhus d' Amerique*, p. 81.

The Suspected Carriers of Infection.

The historians of this epidemic accuse the following vessels of having infected Malaga in 1803:

1. The *Joven Nicolas*, a Dutch store-ship, sailed from Smyrna on the 14th of March, 1803, and arrived at Malaga on the 22nd of May, after a passage of seventy days, and having during that period touched at different ports.

2. The French brig *Desaix*, chartered by the French Government to convey troops to St. Domingo, sailed from Marseilles on the 26th of April, 1803, with 171 men, chiefly deserters, prisoners and convicts. Almost the whole of them had been forced on board, and were taken from forts St. John and St. Nicolas (at Marseilles), in which the jail fever at that time prevailed. Fourteen of these unfortunates were convalescents and had lately been discharged from the hospital. This vessel entered Malaga on the 17th of May, having lost during the voyage thirteen men; thirty-six on board whilst under strict quarantine in the bay, and three in the fort of Gibralfaro, which overlooks the town of Malaga.

3. The French brig *l'Union*, also chartered by the French Government, sailed from Marsaille on the 5th of May of the same year, with 150 men of a similar description, besides twelve sailors; they had been embarked from Fort St. Nicholas, at Marseilles, where the jail fever prevailed; and this vessel entered the harbor of Malaga on the 3rd of June, 1803. During the passage, seven men died, and eight on board in the bay. Total deaths, sixty-seven. This was the French account, but they lost many more, who, as reported, had drowned themselves or deserted. On the 18th of August, 1803, the remainder of the people were permitted to disembark, and they were conveyed at night to the Moorish Castle of Gibralfaro.

On the 7th of September, 1803, the two brigs were admitted to pratique.

4. The Spanish ship *Providencia*, belonging to Manescau and Co., Malaga, from Monte Video, and laden with cocoa, hides and tallow; she entered the bay of Malaga

on the 9th of June, 1803, and was admitted to pratique a few days after her arrival.

The Celebrated Case of Felix Munoz.

It was generally asserted and believed by Arejula, that the first man who died of the epidemic in Malaga was Felix Munoz, a noted smuggler. On or about the 14th of July, he was known to have gone on board the *Joven Nicolas*, whence he brought away samples of cotton and tobacco, and he himself confessed to the physician who attended him, that from the moment he left the ship, he felt ill.

In fact this man on his return home, took to his bed and died on the fifth or sixth day of his illness.

This circumstance produced at the time great consternation in Malaga; immediately after his death, his wife and all his family fled into the country and did not return until late the following year. Hence, Arejula concludes that as no one entered the house, the disorder of which Munoz died, did not spread, and the alarm subsiding, no further notice was taken.

From this period there was an interval of thirty-five or thirty-six days until the sickness broke out in the Verduras family, which is regarded as the source of the epidemic.

As the *Joven Nicolas* came from Smyrna, where yellow fever has never prevailed—as least, within recorded times—we fail to see how Munoz could have contracted the disease by simply visiting the ship in the interest of his nefarious business. If he died of yellow fever—in our humble opinion a remote possibility—he contracted it elsewhere.

The Real Origin of the Epidemic.

Out of the mass of discussions, denunciations, recriminations and dissensions, which even the courts failed to untangle, the following facts are called:

The disorder which broke out in Malaga in 1803, commenced in the house of Christopher Verduras, living in the district of Perchel, on the west side of the Guadalmedina.

Verduras was a caulker by trade, but a noted smuggler, and a person who was likely from his character to do anything for gain. It was generally reported in Malaga that this man about the latter end of August, had brought a person from one of the vessels in the bay—some say it was an American vessel, others a Dutch ship—and secretly conveyed him to his house. This person was then suffering from a disease of which he soon after died. It was afterwards discovered that the body was buried privately in the neighboring church of St. Peter, in the middle of the night.

Arejula states that the interment took place with the connivance of the curate of St. Peters. The priest was himself taken ill and died of the disease, together with the physician who attended him. These two were suspected of having been interested in the smuggling transactions that were going on in the Verduras household. If such were the case, retribution came unmercifully, for every person connected with the curate's house, was taken ill and died; even the sacristan and his wife, as well as the *monaguillo*, or altar-boy.

"The facts were well known at the time," says Arejula, "and it was affirmed by all the inhabitants of the district De Perchel that those who had entered the Church of St. Peters to hear mass on St. Michael's day, were taken ill, and a great part of the congregation died."

Fellowes says that, on this account, the people conceived so great a horror of this edifice, that it became necessary to shut it up, and it continued closed until December 18, 1805, when Dr. Arejula, accompanied by several physicians of Malaga, fumigated it with oxygenated muriatic acid and other germicides.

On the 26th of August, Michael Verduras, the son of Christopher, was taken ill in the same house, and from the report of the physicians who attended him, there is no

doubt of his having died of yellow fever. In two or three days after Michael had fallen sick, two other men, friends of his, and caulkers by trade, who worked with him, were also attacked with the fever. One of them died; the other, Lucas Perez, recovered.

Shortly after the death of Michael Verduras, which took place on September 3, his mother and two sisters sickened with the same symptoms. Christopher Verduras died on the 15th of September. His daughter and another son, Antonio were also attacked and died on the 19th.

Whilst the fever was running through the Verduras family, Dr. Del Pino, who had treated all the members of the family, was called to visit a young man, a sailor, 19 or 20 years of age, who lived in a house immediately opposite to that of Verduras, and was the friend and companion of Michael. His symptoms were similar. About the same time Pascual, a baker, who lived in a house adjoining to Verduras, was attacked with the disorder, and the similarity of symptoms was so remarkable, that Dr. Del Pino called a consultation, in which it was determined that a report should immediately be made to the Governor of Malaga, of a very alarming disease having made its appearance, and the two physicians accordingly declared that they had seen several sick persons laboring under some alarming symptoms, such as were unusual in the place. The Governor received this report, and transmitted it to the Board of Health, but no notice was taken of the matter.

The disorder, however, continued to spread gradually, not only in the narrow lanes and streets of the district de Perchel, where Verduras had lived, but it afterwards extended to other suburbs, and to the adjoining districts of the Trinidad, Capuchins and Alto, which are at some distance from the Perchel. The spread of the infection to these localities was said to have been caused by the fact that many persons living there, principally laborers and workmen, joined early in the morning to hear mass in the church of the Corventico with those of Perchel, because the services were held earlier in that district.

"It must be observed," says Fellowes, "that in Catholic countries, especially in Spain, the lower orders chiefly are very attentive to their religious duties, by going early to church to hear mass, previous to their entering upon the duties of the day."

From this source, and in this manner, the disorder was undoubtedly propagated from the suburb of Perchel to other parts of the town.

Fellowes, who made personal investigations concerning the rise and progress of this epidemic, visited Malaga in March, 1806. From the result of his inquiries among all the survivors of the different families, it appeared that the disorder spread on the following order:

1. Verduras.
2. Pedro de Torre.
3. Gabriel Vasquez.
4. Blaize Martin.
5. Francisco Ferrari.

Martin's house, directly opposite Verduras, was the third attacked, and had eleven cases, of which five died.

Ferrari lost his wife, two sons, a daughter and a nephew—all living in the same house.

From these *foci*, the pestilence gradually advanced, until the entire city was invaded. Consternation was now general; terror multiplied the dangers. Of the 48,015 inhabitants that Malaga numbered at the beginning of the epidemic, thousands fled, sowing the seeds of pestilence throughout southern Spain.*

The following statistics, compiled by Guedrin from documents furnished by the Spanish Government at the time of his investigations, is taken from the *Journal General de Medicine* for 1824, (vol. 88, p. 308), and may be considered authentic:

* Algerziras, Alicante, Antequera, Barcelona, Cadiz, Espera, Gibraltar, La Rambla, Montilla and Palma owe their infection in 1803 to Malaga.

* In his "Sequel to an Essay on Yellow Fever," p. 319, Bancroft refers to Fellowes' criticism of his error, but makes no explanation.

TABLEAU OF THE MALAGA EPIDEMIC OF 1803.

	Population of Malaga.		No. who Fled		No. Remain'g		CASES		DEATHS	
	Males	Females	Males	Females	Males	Females	Males	Females	Males	Females
Citizens	20,142	24,093	1,624	1,972	18,518	22,121	5,257	5,600	2,722	2,289
Hospitals	75	23	0	0	75	23	4,864	563	1,379	312
Suburbs	744	472	132	2	612	470	140	93	60	28
On Ships	Unknown		Unknown		Unknown		Unknown		94	0
Military ...	6,068	128	0	0	6,068	128	Troops were segregated		No Cases or Deaths	
Totals by sex	27,029	24,716	1,756	1,794	25,273	22,742	261	6,256	4,255	2,629
Grand Totals	51,745		3,730		48,015		16,517		6,884	

From this table, it will be seen that out of a population of 51,745 souls, 3,730 fled and 6,196 were segregated, leaving 41,819 exposed to the fury of the pestilence. Of this remainder, 16,517 (or 2 out of 55) contracted the disease, and 6,884 (or 41 for every 100) died.

The epidemic was officially declared extinct on December 20, having lasted two months and twenty days.

1804.

The epidemic of 1804 was still more disastrous than that of the previous year. Its origin is obscure, but as no fresh importation could be proven, the recurrence of the malady was no doubt due to the renewed activity of the *Stegomyia Calopae*, which had remained quiescent during the winter and spring.

Stegomyia Calopae have a habit of hiding in old clothes hanging in closets, or hibernating in draperies, curtains, etc., and are capable of retaining the virus in their system for months. Manson (*Tropical Diseases*, 1907, p. 213), says that the usual period is fifty-seven days, but instances are of record where mosquitoes which had fed on blood of yellow fever patients, survived for five months or more. In this connection, the recrudescence of the epi-

demie of Malaga can easily be explained. The first epidemic ended December 20, 1803. From that date until June 29, when the initial case of the second and greater epidemic erupted, is a trifle more than six months. Sporadic cases of mild yellow fever probably occurred previous to June 29, but their mildness prevented the true nature of the disease from being recognized, and it was only when the virulent manifestations in Pozos Dulces street threw the populace into consternation, that the real situation was thoroughly understood.

The historians of this great epidemic are many. We have summarized the following account from the most reliable.¹⁶⁷

The first case of unequivocal yellow fever in Malaga in 1804 erupted on June 29, at No. 12 Pozos Dulcas street, where two natives, Rinz and Ximenes died. As soon as the news became public, a wild panic ensued and the inhabitants, recalling the horrors of the preceding year, fled in swarms. On July 1, all but those who were too poor to get away had sought fancied security in flight, and in their mad rush spread the pestilence broadcast throughout Andalusia.

Bancroft, in his *Essay on Yellow Fever* (p. 468), falls into a serious error when speaking of the epidemic of 1804. He claims that it first appeared in the Barrio de Perchel, as in 1803. *Fellowes* (page 177) and *Gendrin* (*Journal de Medicinc*, 1824, vol. 84, p. 314), conclusively prove that the disease broke out in Pozos Dulces street in 1804, in an opposite part of the town. This is confirmed by Mendoza's work on the subject and other historians, who declare that the *Barrio de Perchel*, the focus of the disaster of 1803, was not affected in 1804 until the begin-

¹⁶⁷ Gendrin, loc. cit., vol. 88, p. 312.

Arejula, loc. cit.

La Roche, vol. 1, p. 536.

Fellowes, p. 478.

Bally, p. 85.

Bancroft, Sequel, p. 320.

Medical Repository (N. Y.), 1805, vol. 8, p. 430.

Berenger-Feraud, p. 76.

ning of September, more than two months after the first deaths at No. 12 Pozos Dulces street.*

But we have no concern with the polemic quarrels of the pros and cons of contagions who spent the best years of their lives in trying to prove each other falsifiers and charlatans. Let us return to our mutton. Between the 29th of June and the 23rd of July, fifteen fatal cases occurred in Pozos Dulces street, in eight different houses, but little distant from each other. During that interval, only one fatal case had been observed in the city proper, and this was in Los Marmoles street, directly across the river from Pozos Dulce street. By the end of July, the total mortality had reached 129. In the beginning of August the fever appeared almost simultaneously in many parts of the city, followed by a heavy mortality, the deaths being as many as fifty a day. The epidemic then seemed to subside, and by August 11, the deaths had considerably diminished. On the 14th, the conditions had so improved that the physicians of the place subscribed the following opinion before a magistrate, which was promulgated throughout the city:

“We, the undersigned physicians, certify that no epidemical disease prevails at Malaga at present. It is a sort of *ague* or *malignant fever*, similar to that which rages in many other parts of Spain; and it has of late so much subsided, that out of twenty people taken ill, only five died; whilst, on its first appearance, fifteen died out of twenty. We hope that by the use of gentle medicines and by taking the necessary precautions of fumigating the houses where the disease has existed, it will soon disappear.”

The subsidence of the disease was but the lull before the storm. The proclamation had hardly been posted, than new foci erupted everywhere, and the death-rate became appalling, 1,640 fatalities being recorded for the month of August alone.

The epidemic reached its greatest intensity September 7, when 300 deaths occurred. The mortality continued to be excessive during September. In October, the disease slowly subsided, finally becoming extinct on the 28th of

November, having raged five months and one day.

Even as late as December, the afflicted town was like a vast necropolis. The following account is extracted from a letter dated December 3, 1804, written by an inhabitant of Malaga, and published in the *New York Medical Repository*, vol. 8, 1805, p. 431:

"It is impossible to form a just idea of the aspect exhibited by our unfortunate city. It resembles a desert. The mortality here has in some measure ceased, it is true, for want of victims. Seven thousand persons only have escaped its attack; twenty-six thousand have fallen a sacrifice to it.

"The effects of this great disaster are remarked in everything that surrounds us. The grapes have rotted on the vines for want of hands to gather them. On all sides we hear the cry of Bread! Bread! The plague is everywhere succeeded by famine.

"In most parts where the epidemic has prevailed, the following observations have been made: It was less fatal to females than to males, and it appears that it had no influence on old women, for they continually assisted the sick without being attacked by it. Persons of a delicate constitution were also less subject to its fatal effects than those of robust constitution. In regard to the negroes it scarcely produced any effect on them."

With the exception of the statement that 26,000 persons died, an exaggeration which is pardonable, owing to the desolation which surrounded the writer, the above letter may be taken as a faithful pen picture of the situation.

The Awesome Mortality.

The total population of Malaga in 1804 was 44,020, of which 23,190 were males and 20,830 of the gentler sex. At the beginning of the epidemic, 4,548 fled, leaving 39,472 exposed to the influence of the pestilence.

There were altogether 18,787 cases, of which 8,989 were men, and 9,798 women. Of this number, 7,476 men and 4,010 women perished, a total mortality of 11,486.

Twenty doctors and nine pharmacists died. At one time, there was only one physician in the entire city able to minister to the sick, the others being either dead or sick with the fever. The practitioner who escaped an attack had had yellow fever in 1803.

If the reader has attentively followed the dismal history of the epidemics which devastated Malaga, he will no doubt be struck by the difference in population between the years of 1803 and 1804. This is readily accounted for by the fact, that on December 20, 1803, the population had been diminished by 6,884, and that deaths from various causes must have caused a still greater decrease up to July 1, 1804. It is obvious that six months and ten days is too short a period to permit any material increase under the fundamental laws of Nature.

Comparative Mortality between 1803 and 1804.

The difference in the mortality according to age and sex during the sinister epidemics of 1803 and 1804, is thus given by Gendrin (*loc. cit.*, vol. 88, p. 321) :

	1803.			1804.		
	Males	Females	Total	Males	Females	Total
Under 10 years.....	355	26	641	586	461	1,047
Bet. 11 and 20 years....	422	348	770	709	711	1,420
“ 21 “ 30 “	509	431	940	958	757	1,715
“ 31 “ 40 “	483	407	890	708	657	1,365
“ 41 “ 50 “	411	36	227	518	404	921
“ 51 “ 60 “	257	198	455	314	256	570
“ 61 “ 70 “	123	114	240	187	152	339
“ 71 “ 80 “	53	44	107	104	90	194
“ 81 “ 90 “	16	32	38	48	26	74
“ 91 “ 100 “	8	7	15	17	13	30
	4,255	2,629	6,884	7,476	4,010	11,486

It will be seen from the above resume that the mortality was abnormally great among young persons, 2,351 under 30 years of age being carried away in 1803, and 4,202 in 1804.

1813.

In 1813, a ship from Gibraltar, where yellow fever was prevailing, brought malady to the port of Malaga, infecting all those who had any communication with it. Being on the alert, the disease was at once recognized by the Superior Board of Health, and energetic measures instituted. All the sick were transported to the lazaretto, and the houses they occupied were closed and guarded. A mortality of twenty-seven is recorded.¹⁶⁸

1820.

In 1820 a family affected with yellow fever, left Xeres de la Frontera and came to Malaga. The nature of their illness was at once discovered by the authorities, and they were removed to the lazaretto, together with all those who had communicated with them. There was no extension of the disease.¹⁶⁹

1821.

The appalling epidemics of 1803 and 1804 seem to have exhausted the non-immune material in Malaga, for though we read of yellow fever having been observed at Cadiz in 1807 and 1808, and nearly every year from 1811 to 1821, as well as in seventeen cities and towns of Andalusia in 1811, Melaga kept the yellow pestilence away from its doors for sixteen years. In 1821, however, much apprehension was felt for the safety of the city, the disease having been introduced under the following conditions:¹⁷⁰

Between June 7 and 22, 1821, twelve ships forming part of a convoy which had sailed from Havana April 28, entered the port of Malaga. There was much sickness on board these vessels during the voyage across the Atlantic, especially on board the *San Antonio* and the *Liberal*, the

¹⁶⁸ Gendrin, loc. cit., vol. 88, p. 328.

¹⁶⁹ Gendrin, loc. cit., vol. 88, p. 328.

¹⁷⁰ Gendrin, loc. cit., vol. 89, p. 10; Bally, Francois and Pariset, p. 112.

latter having lost her captain at sea. The frigate *Libertad*, which formed part of the convoy, was accused of having sent some sick sailors and a few cases of merchandise on shore. All these vessels carried suspicious clearance papers, but they were, nevertheless, admitted to pratique after only a short quarantine. Some were admitted even without going through this formality.

The Danish schooner *Initium*, from Barcelona, which arrived at Malaga on August 1, is the only vessel directly accused of having infected the port. During the six days the vessel took to make the voyage from Barcelona, out of a crew of six and one passenger, four cases of yellow fever, of which one proved fatal, had occurred on board. On arrival, the three cases were transported to the lazaretto of Los Angeles, on the outskirts of the city, where two died. In spite of its flagrant unsanitary condition, the *Initium* was given free pratique on August 11. Two Swedish sailors, who went on board that day, were stricken shortly afterward and sent to the lazaretto, where they died. This last incident was not made known to the board of health.

Rumors began to circulate that a strange malady was causing much mortality among the vessels in port. On August 21 and 22, a delegation from the Superior Board of Health began an investigation and discovered that five vessels, moored on both sides of the *Initium*, had had suspicious cases of fever. While the committee was urging immediate measures and the board of health was demurring, the Danish consul appeared on the scene and reported that two undoubted cases of yellow fever were at that moment on board another ship of his nation, and requesting that "something be done" in the premises. This spurred the nonchalant members of the board of health into action, and they went to extremes. All vessels, whether infected or not, were ordered to quarantine, the port was closed and communication between the Malaganeses and "any vessel in port" positively prohibited. The authorities even went so far as to send to the lazaretto an entire family, at whose house one of the sailors of the *Initium* had taken lodgings. Although not a single

case had developed in this house, it was hermetically closed.

This sudden frenzy of precautionary measures threw the population of Malaga into consternation. They imagined the pestilence already in their midst, and an indescribable terror took possession of them. Thousands fled, abandoning relatives and business, and seeking refuge wherever they could. The exodus is said to have been more considerable than during the the epidemics of 1803 and 1804. After a few days, the public health continuing good, calm was restored and the majority of those who had fled returned.

In the beginning of September, it being the season when the produce of the surrounding country finds its way into the markets of the town, nothing untoward having taken place in the status of the public health, the port was re-opened to facilitate the handling of the increasing commerce, and the segregated vessels again permitted to anchor at the wharves. Quarantine regulations were relaxed and uninterrupted communication had with the nondescript craft in the harbor.

It was this lack of precaution which paved the way for the entrance of the pestilence into the city.

How the fever finally invaded the town, is difficult to surmise from the publications of the period. It may be that the infection was diffused by persons communicating with the *Initium*, for the first cases were observed in the districts of Alcazaba and Alcazabilla, inhabited principally by sailors and the poorer classes. The brig *Souverain Congres*, which arrived from Havana in August, with an unclean bill of health, and which had suffered from yellow fever during the voyage, is also incriminated. It is said that the captain of this vessel and his crew came ashore as soon as the vessel was released from quarantine, and that the captain's family, residing in Alcazabilla, were first to contract the malady.

By whatever means the disease was introduced, the first case presenting unmistakable symptoms of yellow fever manifested itself on September 6, in the son of Jose Rodriguez, a caulker, residing in the Alcazaba district,

whose parent had been employed on one of the vessels in port. The boy, aged 11, died on the 9th, but the father, taken ill almost simultaneously, recovered. The historians of this epidemic accuse the elder Rodriguez of having brought the infection ashore, but as he was taken ill after his son, such a contention certainly seems absurd in this age of known mosquito transmission of the disease. Personal contact and fomites were then held responsible for the spread of yellow fever; but now, things are different. How the little fellow contracted the malady, is a problem which cannot be satisfactorily solved at this late day, unless we take it for granted that, like all children of his age, he played about the streets in his neighborhood, already infected by persons from the ships in the harbor, and was bitten by *Calopae*, with the sad result above narrated.

On September 12, three days after the death of young Rodriguez, a doctor reported that he had seen in Cober-tizo del Corte street a suspicious case of illness, followed by death on the fourth day. This patient had come from the Alcazaba district. The health authorities started an immediate investigation and declared that the man had died of a "suspicious contagious disease," and quarantined the house where he had passed away. They went further and quarantined the residence of the governor of Alcazaba, whence the suspicious case originally came, and caused the official's family to be forthwith transported to the lazaretto. The governor, who was ill, died on the 26th. The authorities ordered that his house be hermetically closed and guarded, although it was plain to everybody that the poor man had not died of yellow fever, but of an ailment totally foreign to that disease.

The public, already on the *qui vive*, were thrown into indescribable consternation by these rigorous measures. The terror became so great, that the inhabitants fled in multitudes, some even running through the streets and seeking refuge in the country, as if an invading army were pursuing them.

On September 27, in the middle of the night, the physicians of Malaga were called together by order of the

Superior Board of Health, to arrive at some decision, as to the real character of the malady which was creating so much alarm. After considerable wrangling, a manifesto was issued to the public, of which the following is the gist:

"The undersigned physicians and surgeons declare that the general state of the public health is good; but, in particular instances, cases of a malignant malady presenting the symptoms of yellow fever, have been observed. There actually exists three such cases, against which common prudence and a regard for the public health demand that measures of non-communication be adopted."*

This was signed by thirty of the most prominent physicians of Malaga.

On September 27, Dr. Mendoza (whose elaborate work on this and other epidemics of Malaga, are regarded as authorities), suggested that the district of Alcazaba, where the disease was concentrated, be isolated, arguing that this would be an easy matter, as the infected quarter was connected with the city proper by two gates only. Dissensions among the members of the Superior Board of Health as to the propriety of such a measure prevented same from being adopted, and many inhabitants of Alcazaba, fearing to be cooped up at any moment within the ancient Moorish citadel, fled to various parts of the city and thus spread the infection.

Whether the *Calopac* were unusually inactive in Malaga in 1821, or causes which cannot be explained intervened, the disease did not spread rapidly nor does it appear to have been very deadly. Cases continued to crop out here and there during October and November, and by the end of the latter month, cold weather put an end to the activities of the few straggling *Calopac*, and the epidemic was at an end. On December 2, Malaga was officially declared free from fever, and all quarantines raised.

The number of cases is not given, but the mortality was as follows:

Month.	Sex.		Total.
	Males.	Females.	
August	5	0	5
September	17	3	20
October	56	33	89
November	67	39	106
December	15	7	22
Totals	160	82	242

In the above table are comprised deaths in the city proper, in the shipping and at the lazaretto.

1890.

The Case of the Herman Cortes.

Malaga narrowly escaped an invasion of yellow fever in 1890. The circumstances were as follows:¹⁷¹

The steamship *Herman Cortes* sailed from Havana April 28, 1890, and anchored at Malaga May 20. In accordance with an old custom, the boys of the musical band from the Asylum San Bartolome, boarded the ship, entertained the passengers and spent several hours "feasting and making merry." On May 23, the ship departed for Barcelona.

On May 25, one of the boys was taken sick with yellow fever and died four days later. On June 1, a second became ill and died on the 3rd. A third was attacked on the 11th and died twenty hours later. On the 15th and 16th, two more cases appeared; both recovered.

According to the authorities cited, these are all the cases that occurred at Malaga. The *Herman Cortes* came from New Orleans via Havana, laden with cotton, etc. Most of the cargo was unloaded at Malaga and stored in

¹⁷¹ Caro: Boletín de Medicina Naval, Madrid, 1890, vol. 13, p. 190.

Ibid: Independencia Medico, Barcelona, 1889-90, vol. 21, p. 461.

U. S. Public Health Reports, 1891, vol. 5, pp. 286; 299.

factories and other establishments in the town, but no ill effects resulted. There was no yellow fever in New Orleans in 1890. There had been yellow fever in Havana up to three days prior to the arrival of the ship, but no cases occurred on board of the vessel either before arriving at Malaga or after leaving that port.

Infected mosquitoes were undoubtedly taken on board with the cargo at Havana, and the weather being still too cool for them to venture in the open, they remained in the hold until Malaga was reached, when the opening of the hatches gave them an opportunity to sally forth and feed on the unfortunate orphans who had come on board to welcome their friends. It is a noteworthy fact that all the boys affected had been among the number who visited the ship. It is also worthy of note that all the boys were not affected, and that the passengers and crew of the *Herman Cortes* escaped contamination. This is one of the extraordinary freaks of Nature which no human ingenuity can solve, and which conjecture only renders more mysterious and inexplicable.

Summary.

First case, May 25; first death, May 29; last case, June 16; last death, June 12. Total cases, 5, of which 3 proved fatal.

MALGRAT.

1821.

Malgrat, thirty-seven miles northeast of Barcelona, was infected by persons fleeing from the latter city in 1821.¹⁷² There was no diffusion of the disease.

¹⁷² Cornilliac: Recherches Chronologiques, sur l'Origin et la Propagation de la Fievre Jaune, etc., Fort-de-France, 1836, p. 408.

MAZARRON.

1804.

Mazarron, twenty miles west of Cartagena, was infected by fugitives from that city in 1804. The disease was confined to the imported cases.

MEDINA-SIDONIA.

YELLOW FEVER YEARS.

1800; 1801; 1802; 1811; 1813.

SUMMARY OF EPIDEMICS.

1800.

Previous to 1800, yellow fever had never been observed in Medina-Sidonia. Fugitives from Cadiz infected the town that year, but the disease was not extensive, being confined solely to the imported cases. This was fortunate for the inhabitants of Medina-Sidonia, for out of 51 cases reported by the health authorities, 46 ended fatally.¹⁷³

1801.

As no importation can be traced regarding the epidemic of 1801, it is natural to lay the blame to a revival of pernicious activity on the part of the *Stegomyia Calopae*, infected the year previous.

The historians of this epidemic claim that the infection was due to the opening of a house where fugitives from Cadiz had died in 1800, and which had remained closed until the middle of 1801. Viewed in the light of 1909, this statement serves to strengthen the mosquito theory.

¹⁷³ Periodico de la Sociedad Medico-Quirirgica de Cadiz, vol. 3 (Appendix), p. 49.

(La Roche, p. 534, quoting Alfonso da Maria, p. 123, says that the deaths were 136.)

The first case erupted on August 3, followed by death on the 6th. The father of this case, taken ill on the 5th, died on the 9th. Another person in the same house was attacked on the 29th, and died September 2. The malady then spread rapidly and was especially severe in San Francisco, Loba, Santa Catalina, Cigarra and Sucia Streets. The epidemic came to an end on November 6, resulting in 821 fatalities.¹⁷⁴

1802.

A few cases of yellow fever were observed at Medina-Sidonia in 1802. No reliable details are obtainable.¹⁷⁵

1811.

Cadiz infected Medina-Sidonia in 1811. Only a few cases were observed.¹⁷⁶

1813.

Sporadic cases appeared in 1813. The invasion does not seem to have been extensive.¹⁷⁷

MEQUINENZA.

1821.

Mequinenza, a small town on the Ebro, was only invaded once by yellow fever, under the following conditions:¹⁷⁸

¹⁷⁴ Bally, p. 76.

Robert, vol. 1, p. 272.

Pariset, pp. 95; 96.

Chervin: Examen Critique, p. 80.

Bancroft: Essay on Yellow Fever, p. 462 (note.)

Bancroft: Sequel, p. 309.

¹⁷⁵ Moreau de Jonnes: Monographie Historique, etc., p. 341.

¹⁷⁶ Berenger-Feraud, p. 84.

¹⁷⁷ Berenger-Feraud, pp. 85; 86.

¹⁷⁸ Bally, Francois and Pariset, p. 61.

Robert, Guide Sanitaire, vol. 1, p. 272.

O'Halloran, p. 45.

In August, 1821, a boat left Tortosa, where yellow fever was epidemic, and reached Mequinenza on the 28th of the same month. One of the passengers, on reaching Mequinenza, was taken ill and was transported to his home in the town, where he died of yellow fever on the 30th. Of nine persons who composed his family, seven contracted the disease and died. The malady spread to the inhabitants and caused much mortality.

MIJAS.

1804.

Mijas, fifteen miles southwest of Malaga, was infected by fugitives from that city in 1804. The disease did not spread to the inhabitants.¹⁷⁹

MONTE ALEGRE.

1821.

A family consisting of father, mother and two children, fleeing from Barcelona, arrived at Monte Alegre, October 30, 1821. The father, taken ill on his arrival, died on November 3; the mother followed on the 21st. One of the children was also affected; the other escaped an attack. The disease did not spread beyond these cases.*

MONTEJUGUE.

1800.

Refugees from infected localities contaminated Montejugue in 1800. The disease did not spread to the inhabitants.¹⁸⁰

¹⁷⁹ Salamanca: Observaciones Medica sobre la Fiebre Amarilla, etc., Malaga, 1804, p. 5.

* Bally Francois and Pariset, p. 99.

¹⁸⁰ Rougeau, loc. cit.

MONTILLA.

1803.

A few cases of yellow fever, refugees from Malaga and other infected points, were observed in Montilla in 1803. The inhabitants escaped the infection.¹⁸¹

1804.

In 1804, Montilla had a population of 4,000.* It was contaminated in the following manner:¹⁸²

A monk who had recently arrived from Malaga, was taken sick at Montilla, August 11, and died in five days. Other cases followed that of the padre. The houses where the deaths had occurred were closed and all persons having contact with the cases were isolated. September 4, another monk, a fugitive from Malaga, was attacked with yellow fever and died in a few days. A muleteer returning from Malaga fell victim to the same fate. From these foci, the disease extended to a large portion of the community, but owing, it appears, to the energy of the sanitary authorities, did not work such havoc as elsewhere. December 15, the city was declared free from yellow fever.

The mortality was as follows: Males, 616; females, 451; a total of 1,067.

¹⁸¹ Berenger-Feraud, p. 74.

* Chervin (*Examen Critique*, p. 5) says that the population of Montilla in 1804 was 14,000, and not 4,000; but as the majority of chroniclers place the number at 4,000 and taking into consideration the fact that the present population of Montilla is only 15,000, we incline to the belief that Chervin was misinformed.

¹⁸² Eager, p. 20.

Fellowes, p. 478.

Bally, p. 90

Chervin, *Examen Critique*, p. 5.

Pariset, p. 86.

Jackson, p. 22.

MORA.

1821.

In 1821, an inhabitant of Mora, a town on the Ebro, 30 miles west of Tarragona, communicated with Tortosa, where yellow fever was prevailing. He was taken ill with the disease on his return home and died in a few days. The infection did not spread, being confined to this solitary case.*

MORON DE LA FRONTERA.

Moron de la Frontera, 32 miles from Seville, was visited twice by yellow fever and, in each instance, the mortality was heavy.

1800.

The great epidemic wave of yellow fever which passed over Spain in 1800, also reached Moron de la Frontera. A mortality of 1,854 is recorded.¹⁸³

1804.

In 1804, the first case in Moron de la Frontera was observed September 15. The epidemic lasted until December 12. Out of a population of 11,000, there were 2,000 deaths. Of these, 1,300 were men and 700 women.¹⁸⁴

MURCIA.

1804.

The ancient Moorish city of Murcia, 30 miles northwest of Cartagena, was infected by fugitives from the latter place in 1804. There was no diffusion of the disease.¹⁸⁵

* Rapport lu a l' Academie Royale de Medecine de Paris (Paris, 1828), p. 86.

¹⁸³ Alfonso da Maria, p. 122; La Roche, vol. 1, p. 534.

¹⁸⁴ Fellowes, p. 478; Bally, p. 90.

¹⁸⁵ Bally, p. 90.

1810.

Sporadic cases were observed in 1810. The inhabitants did not suffer.*

1811.

Cases were also imported into Murcia in 1811. There was no spread of the malady.¹⁸⁶

1812.

A few sporadic cases, fugitives from infected localities.

NONASPE.

1821.

Fugitives brought yellow fever to Nonaspe in 1821. There was no spread of the disease.¹⁸⁷

OJOS.

1821.

During the series of epidemics of yellow fever in Spain from 1800 to 1821, sporadic cases, all refugees, were observed at Ojos. The chroniclers of the period do not specify the year.

OLIVERA.

1800.

A few cases of yellow fever found their way into Olivera in 1800, but the infection did not spread to the inhabitants.¹⁸⁸

* Bonneau and Sulpicy, p. 363.

¹⁸⁶ Berenger-Feraud, p. 84; Bally, Francois and Pariset, p. 559.

¹⁸⁷ Bally, Francois and Pariset, p. 62.

¹⁸⁸ Rougeau, loc. cit.

OLOT.

1821.

A mattress-maker residing at Olot,* who made daily trips to Barcelona in the interest of his business, was taken ill on his return home, on October 26, 1821, and expired shortly afterwards. His son, who ministered to him during his illness, was not affected. The man's house was rigidly quarantined and no other case resulted.¹⁸⁹

PALMA.

(See Balearic Islands).

PALMAR.

Refugees died at Palmar during the series of yellow fever epidemics in Spain in the beginning of the last century, but the exact date is not given by our authority.¹⁹⁰

PASAJES.

1823.

In 1823, yellow fever was introduced into Pasajes (also known as El Pasajes and Port du Passage) under the following conditions:¹⁹¹

* Chervin, Pariset, Berenger-Feraud and other chroniclers call this place "Xlot," instead of "Olot." On a map of the environs of Barcelona, the locality is designated as "Olot."

¹⁸⁹ Pariset: *Histoire Medicale de la Fievre Jaune*, etc., p. 86.

Chervin: *Examen des Principes de l'Administration en Matiere Sanitaire*, p. 51.

¹⁹⁰ Second Report on Quarantine, p. 209.

¹⁹¹ Audouard: *Revue Medicale Francaise et Etrangere* (Paris), 1824, vol. 3, p. 224.

Jourdain: *Journal General de Medecine*, 1824, vol. 86, p. 176.

Montes: *Decadas de Med. y Cirug. Pract.* (Madrid), 1827, vol. 14, p. 321.

Bolsseau: *Physiological Pyretology*. Philadelphia, 1832, p. 335.
Berenger-Feraud, p. 101.

The ship *Donastiera*, sailed from Havana, where yellow fever was prevailing, at the end of June, 1823, with a crew of fifteen and five passengers. The vessel had previously been engaged in the slave trade between Africa and Havana.

Ten days after leaving Havana, one of the crew died, the symptoms being "of a suspicious nature." The vessel reached Corunna, Spain, thirty-five days after her departure from Havana, and was subjected to ten days' quarantine, after which it left for Santander, where it remained six days, finally reaching Pasajes on August 2. No quarantine was interposed. The crew was discharged and the cargo disembarked between the 6th and 16th, and stored in warehouses in the burgs of Saint-Jean and Saint-Pierre, which together form the town of Pasejes. The population was then, 3,200 of which 2,000 were at Saint-Jean and 1,200 at Saint-Pierre.

On August 15, nine days after the opening of the hatches, a customhouse employe who had been stationed on board the *Donastiera* was taken ill and died on the 17th, with symptoms of yellow fever.

On August 20, a carpenter who had been employed in making repairs to the vessel, was attacked and died on the 22nd. From the last date until September 1, six workmen engaged in removing rotten timbers from the hold of the vessel, and a huckster and two boatmen who had gone on board, were successively taken ill and died, making a total of eleven deaths in two weeks. The characteristic symptoms of yellow fever and the appearance of black vomit in nearly all the cases, left no doubt as to the true character of the disease.

Pasejas is situated on the Bay of Biscay, near the French frontier, and yellow fever had never been observed there before. When the real state of affairs became public, the population recalling the horrors of the Barcelona epidemic of 1812, were thrown into consternation bordering on terror, and by September 5th, 1,620 had fled pell-mell wherever they could.

On September 12, a strict military sanitary cordon was established around the infected localities, but in spite of

these precautions, the disease continued to spread. On September 16, yielding to popular clamor, the *Donastiera* was burned to the water's edge and her cargo, which had been stored in warehouses in the town, guarded by the military.

The last case erupted September 25, but the sanitary cordon was not removed until October 23, when the inhabitants were permitted to return to their homes. But the goods from the *Donasteria*, which had been sequestered shortly after the outbreak of the epidemic, were not allowed to be placed on sale until January, 1824.

There were 101 cases, of which 40 (25 men and 15 women) proved fatal.

This epidemic was the subject of much acrimonious discussions between the chroniclers of the period.

PATERNA DE LA RIBIERA.

1800.

Yellow fever invaded Paterna de la Ribiera in 1800, resulting in 86 deaths.¹⁹²

1804.

In 1804, Paterna de la Ribiera had a population of 1,140. Yellow fever appeared in the town on August 30, and lasted until December 8, causing a mortality of 117, of which 72 were men and 45 women.¹⁹³

PEDRARA.

1821.

Refugees from Seville died at Pedrara during the epidemic of 1821. The infection did not spread to the inhabitants.¹⁹⁴

¹⁹² La Roche, vol. 1, p. 534.

¹⁹³ Fellowes, p. 478; Bally, p. 90.

¹⁹⁴ Bally, Francois and Pariset, p. 99.

PEDROCHES.

1879.

The bark *Imogen*, from Rio de Janeiro, arrived at Pedroches June 7, 1879, with a crew of fifteen and forty-one passengers. Twelve cases of yellow fever, all fatal, had occurred on board during the voyage across the Atlantic. While the ship was in the quarantine basin at Pedroches, a case erupted on June 18, followed by two others. Our authority does not state whether these cases were fatal or not. There was no diffusion of the infection.¹⁹⁵

PENACERRADA.

1804.

Penacerrada, a village of 100 inhabitants, was invaded by yellow fever on September 28, 1904. From that date until November 16, there were 14 deaths, of which 9 were men and 5 women.*

PORT MAHON.

(See Balearic Islands).

PUERTO DE SANTA MARIA.

1800.

Puerto de Santa Maria was infected by Cadiz in 1804. It had then a population of 20,000, out of which 3,493 died from the pestilence.¹⁹⁶

¹⁹⁵ Branco: Correjo Med. de Lisboa, 1879, vol. 8, p. 149.

* Fellowes, p. 478; Bally, pp. 90; 449.

¹⁹⁶ Bally, p. 75.

Alfonzo da Maria, p. 122.

1804.

Four persons from Cadiz fled to Puerto de Santa Maria in 1804, and were taken ill with yellow fever shortly after their arrival. They infected the inhabitants, but the epidemic does not seem to have been severe, as the total number of cases and deaths is not given.¹⁹⁷

1819.

A fugitive from Isla de Leon brought yellow fever to Puerto de Santa Maria in 1819. The developments were unimportant.¹⁹⁸

1820.

Several persons, who contracted yellow fever in Cadiz and Xeres de la Frontera, were taken ill and died at Puerto de Santa Maria in 1820. The inhabitants of the town were not affected.¹⁹⁹

1821.

Yellow fever invaded Puerto de Santa Maria in 1821, but the attacks were so limited as scarcely to deserve the denomination of an epidemic. Details are not available.²⁰⁰

PUERTO REAL.

1800.

In 1880, Puerto Real had a population of 1,000. According to Alfonso de Maria, the first case manifested itself on August 11, in the person of a youth, who died on the seventh day of the onset. His case was diagnosed

¹⁹⁷ Bally, p. 90; Bally, Francois and Pariset, p. 80.

¹⁹⁸ Berenger-Feraud, p. 90.

¹⁹⁹ Robert: Guide Sanitaire, vol. 1, p. 272; O'Halloran, p. 133.

²⁰⁰ O'Halloran, p. 70.

by the authorities as "ardent fever, caused by insolation."* Perez, Pariset and others, claim that the first case was that of a carpenter who had been on board the corvette *Dauphin*, from Havana, who was taken ill August 21 and died on the 27th.

From these two foci, the disease spread far and wide, resulting in the death of 1,621 persons.²⁰¹

1819.

A few cases were observed in 1819. Some authorities place the mortality at 10, while others claim that the disease was more widespread. Authentic details are lacking.²⁰²

REGENS.

1821.

Regens, situated five miles from Tortosa, must have been free from *Stegomyia Calopae* in 1821, for, according to O'Holloran, not a single case erupted in the village, although many refugees from Tortosa who took up their abode there, died of yellow fever. Some of the inhabitants who communicated with the infected city was stricken, but those who remained aloof enjoyed total immunity from the disease.²⁰³

RICOTE.

At some time or other, during the first years of the last century, yellow fever was brought to Ricote by refugees. The works we have consulted fail to specify the date.

* * * * la fiebre de ardiente por insolacion."

²⁰¹ Alfonso da Maria, loc. cit.; La Roche, vol. 1, p. 534; Chervin, Examen Critique, etc., p. 34; Robert, p. 279; Pariset, p. 92; Perez, Theses de Paris, No. 127 (1825), p. 15.

²⁰² Chervin, Examen Critique, p. 47.

²⁰³ O'Halloran, p. 122.

RONDA.

1800.

In 1800, Ronda was infected by refugees from near-by localities. The outbreak was confined to a limited area, resulting in 20 cases, of which 19 proved fatal.²⁰⁴

1803.

A few cases were also observed in 1803. No details are obtainable.²⁰⁵

1804.

The first person whose case gave suspicion of the existence of yellow at Ronda in 1804, was Maria de Rio. She was attacked on July 27, and died on August 4; the disease was denominated "black erysipelas" by the medical attendant. She vomited black matter before death; and is said to have recollected that two persons from Malaga lodged at her house some time previous. The woman was ignorant of their character, or the state of their health at the time.

Francisco Ruiz, another inhabitant of Ronda, was taken ill on September 4, and died on the 7th. He became indisposed in four or five hours after his return from Malaga; he was deeply jaundiced, and matter which he vomited was of a black color. Besides Ruiz, a lady arrived from Malaga, on the 19th of August, at the house of her mother and was taken ill with yellow fever shortly afterwards.

From these foci, the disease pursued a slow course until the first days of October resulting in about 50 deaths.²⁰⁶

²⁰⁴ Chervin: Examen Critique, p. 88.

²⁰⁵ Ibid.

²⁰⁶ Jackson, loc. cit., p. 23; Chervin, Examen Critique, p. 88; Bally, Francois and Pariset, p. 78; Eager, p. 20.

ROQUETAS.

1821.

Roquetas, a hamlet on the Ebro, opposite Tortosa, was contaminated by refugees from that city in 1821. The first victims were two women, named De Juari. After these, the village barber was stricken and then the mayor. The infection did not spread to the inhabitants, being confined to these four imported cases.²⁰⁷

ROTA.

1800.

Rota, which had 6,000 souls in 1800, was contaminated that year by refugees from Cadiz and Isla de Leon. Many fled, but the disease seems to have been imbued with unusual virulency, for out of the small remaining population, there were 1,116 deaths.²⁰⁸

1804.

Yellow fever invaded Rota in 1804, but no reliable details are obtainable. Perez gives a resume of twenty-three autopsies, but does not touch upon the historical phase of the epidemic.²⁰⁹

SAINT ELOY.

During the first years of the nineteenth century, yellow fever was imported to Saint Eloy. No details or dates given by the authorities we have consulted.²¹⁰

²⁰⁷ O'Halloran, p. 21.

²⁰⁸ La Roche, vol. 1, p. 534; Alfonso da Maria, p. 122.

²⁰⁹ Perez: Journal General de Medecine, 1820, vol. 71, p. 3.

²¹⁰ Second Report on Quarantine, p. 209.

SAN ANDERO.

1813.

In the autumn of 1813, being the close of the Peninsular War, sporadic cases of yellow fever appeared in the depot barrack in San Andero, in Spain, and after the Christmas holidays, became numerous. The troops were removed to a healthy situation, and the epidemic was soon under control.

Out of about 700 persons who were exposed to the infection, 50 were attacked and 11 died.²¹¹

Our authority does not attempt to give the source of infection, but as yellow fever ravaged several cities of southern Spain in 1813 (Cadiz, Gibraltar and Medina-Sidonia) and the events of the Peninsular War rendered rigid quarantines impracticable, we can safely incriminate one of the above named foci in this importation.

SALOU.

1821.

On July 28, 1821, the *Nuestra Senora de Begona* arrived at Salou from Barcelona, where yellow fever was prevailing. Owing to the high tide, the crew was unable to land. This was fortunate for the inhabitants of the village, for the captain of the little craft was taken ill with yellow fever during the night and died the following morning. The boat was immediately quarantined by the health authorities. A sailor, taken ill on the day of the captain's death, died on August 2. The disease was not communicated to the inhabitants of Salou.²¹²

²¹¹ Second Report on Quarantine, p. 235.

²¹² Chervin: Examen des Principes de l'Administration Sanitaire, p. 57.

SAN GERVAISO.

1821.

A refugee from Barcelona died of yellow fever at San Gervaiso in 1821. Only a few cases resulted from this infection.²¹³

SAN JUAN DEL PUERTO.

1804.

Yellow fever was introduced into San Juan (which had then a population of 3,476) by refugees from neighboring cities on September 17, 1804. The epidemic lasted until December 17, resulting in 219 deaths, of which 136 were men and 83 women.²¹⁴

SAN LUCAR DE BARAMEDA.

1800.

San Lucar de Barameda, which had a population of 18,000 in 1800, lost 2,303 from yellow fever that year.²¹⁵

1819.

In 1819, sporadic cases were observed. No authentic details are obtainable.²¹⁶

1821.

The last appearance of yellow fever in San Lucar de Barameda took place in 1821, when a few cases, probably refugees, caused some apprehension. There was no diffusion of the disease.²¹⁷

²¹³ O'Halloran, p. 88; Bally, Francois and Pariset, p. 434; Chervin, Examen Critique, p. 200.

²¹⁴ Fellowes, p. 478.

²¹⁵ La Roche, vol. 1, p. 534; Bally, p. 75.

²¹⁶ Medico-Chirurgical Journal and Review, 1821, vol. 2, p. 439.

²¹⁷ Robert, loc. cit., vol. 1, p. 272.

SAN ROQUE.

1804.

In 1804, a resident of San Roque went to Algezirás, where yellow fever was prevailing, to see his son, who was ill. On his return home, he was taken ill and infected five persons living in his immediate neighborhood. From these foci, the disease spread throughout the town.²¹⁸

SANS.

1821.

A resident of Sans went to Barcelona on business during the epidemic which devastated the latter city in 1821. He remained but a few hours. On his return home, he was taken ill and died in a few days. His wife, who nursed him, also contracted the malady and died. It was afterward proved that this man's wife often accompanied him to Barcelona, and it was no doubt on one of these trips that she was infected, as none of the five children of the couple, nor their servants or friends who visited them, were attacked. No other inhabitant of Sans contracted the malady.²¹⁸

SARRIA.

1652.

Was it yellow fever which ravaged Sarria in 1652?

In 1652, a pestilence "of an unknown character" raged in Barcelona and was brought by refugees to Sarria. This epidemic is commented upon by Rochoux.* The little suburban village was almost depopulated. To commemorate their escape from the scourge, the survivors erected a singular monument in the gardens of the Capu-

* Berenger-Feraud, p. 78.

²¹⁸ Chervin: Examen des Principes, etc., p. 47.

Bally, Francois and Pariset, p. 50.

Pariset: Histoire Medicale de la Fievre Jaune, pp. 50; 107.

* Rochoux: Recherches sur les Differentes Maladies qu'on Appelle Fievre Jaune. Paris, 1828, p. 75.

cins at Sarria. This monument, even to this day, is an object of curious pilgrimage to the tourist and the inhabitants of Barcelona and neighboring villages. The allegorical figures are of terra cotta and represent a procession in solemn march, the largest personages being quarter life-size, others much smaller. The processionists are grouped around a church. In their midst is a personage who appears to have been suddenly stricken with the scourge. All about him are people either dying or dead. The moribund are being attended to in their last moments by surpliced friars. A peculiar feature of this group is that all the personages have bleeding sores, either on the sides, the nape of the neck, the arms or legs. Two of the stricken ones are vomiting. One of the latter, *whose features are painted yellow*, is ejecting *black matter* from the stomach, while the other, whose distended cheeks show that his mouth is full, has placed a hand over the oriface, as if in a vain effort to stop the escape of the fluid. A monk supports his head with one hand while with the other he offers him a draught out of a cup containing a beverage which he seems to coax him to take.

Near this remarkable group is a small two-story edifice, covered with a shroud, which is open on one side. Through this opening can be seen eleven skeletons habited in monkish garments—three in the first story, four in the second and four in the basement. At the base of this mausoleum, is the following scription, written in the picturesque language of Catalonia:

NOMS DELS ONSE RELIGIOUS
QUE MORIREN DE PESTA,
EN LO ANY 1652,
ASSISTIN EN LO SPIRITUAL Y TETMPORAL AL POBLE
DE SARRIA ESSENT AFFLIGIT DE TAL CONTAGI;
Y SON ENTERRATS BAIX EST PANTAON.*

* Translation:

“Names of the eleven religious who died of the pest in 1652, while bringing spiritual and temporal assistance to the inhabitants of Sarraia, afflicted with this contagion; they rest beneath this pantheon.”

Although Spanish archives are silent as to the real character of this pestilential visitation, the pantheon above noted certainly leads to the suspicion that a malady bearing two of the pronounced characteristics of yellow fever—black vomit and jaundice—devastated Barcelona and Sarria in 1652. The running sores, however, preclude the diagnosis of yellow fever. But it does not follow that these latter symptoms were really present. The exalted temperament of the Catalonians may have imbued the artist (or artists) who moulded this remarkable group with ultra extravagant ideals, and induced him to add the running sores to the other symptoms for effect. The Spaniards are proverbially fond of *coups de theatres*, and do not hesitate to give their imaginations free rein to effect a soul stirring climax, even at the sacrifice of truth.

As the real diagnosis of this epidemic has never been satisfactorily established, we do not include it in our chronology, but simply give it a niche in this volume as one of the "curiosities" of epidemiology.

1800.

Five persons, fleeing from Barcelona, died from yellow fever at Sarria in 1800. The inhabitants were not contaminated.²¹⁹

1821.

A doctor of Sarria, on the eve of being married, went to Barcelona with his fiancee on September 7, 1821. The couple spent the day in going from shop to shop making purchases. They were married the following day and took up their residence in Sarria. On the 9th, the day after the ceremony, the bride was taken ill with yellow fever and died on the 13th. The husband, stricken on the 11th, died on the 20th. There were altogether 18 deaths in the village, all in persons who had been to Barcelona. Those who remained at home did not contract the malady.²²⁰

²¹⁹ La Roche, vol. 1, p. 534.

²²⁰ Chervin: Examen des Principes de l'Administration, etc., p. 48. Bally, Francois and Pariset, pp. 50; 57.

SEVILLE.

Historical Resume.

Seville, the *Romula* of Julius Cæsar, is one of the most ancient cities of Spain, and has been made famous in song and story from the time it was the capital of a Mohammedan emirate to the age of de Musset. Even to this day, a glamour of romance pervades this historic place, whose old Moorish houses, Gothic cathedral and famous aqueduct, are the only vestiges of an old-time splendor, when it boasted of a population of 600,000 souls. Its decadence began with the capture of the city by Ferdinand III in 1248, when 300,000 Moors fled from the sabres of the cruel Castillians. The discovery of America gave Seville renewed energy and for a time it was again flourishing, but the superior advantages of the port of Cadiz induced the government to order the galleons to be stationed at the latter place, and the decline of the ancient metropolis of Andalusia was rapid from that date. In 1800, the population was only 80,568. During the one hundred and eight years which have elapsed since, the increase has been slow, the estimated population of the town in 1908 being 148,315.

YELLOW FEVER YEARS.

1649 (not authentic); 1800; 1801; 1819; 1821.

SUMMARY OF EPIDEMICS.

1649.

According to Spanish tradition, yellow fever was observed in Seville as early as 1649, but authentic documents are lacking to substantiate this statement. According to the most reliable authorities we have consulted, yellow fever had never invaded the ancient Moorish city previous to 1800. But there is a strong possibility, nevertheless, that the disease was imported to the Spanish coast prior to that date. Before it was superseded by Cadiz, the port of Seville was the principal shipping and receiving point for the extensive commerce between Spain and her colo-

nial possessions in the New World, and it is natural to surmise that the dreaded Antillean pestilence was imported within its walls, but, owing to its mildness or its sporadic nature, was unnoticed by the historians of the period, whose time was more occupied in watching and recording court intrigues than in making history.

The only modern author who refers, in a roundabout way, to the Seville epidemic of 1649, is O'Halloran, in a small monograph published in 1821 (*Yellow Fever in Andalusia in 1820*, p. 165), in which he gives Lind as his authority. A perusal of the works of the famous English physician fails to throw any satisfactory light on the subject.

1800.

The first epidemic of yellow fever in Seville of which there is authentic record, took place in 1800. The original cases were observed August 23, in the suburb of Triana, which is separated from the city proper by the Guadalquivir River, and inhabited principally by bull-fighters, seamen and smugglers. Smugglers from Cadiz are said to have infected Triana. Communication between both banks of the river being uninterrupted, the infection was soon brought to the suburb of Los Humeros, opposite Triana, also inhabited by seamen and the working classes, whence it was propagated throughout the town.

Seville had then a population of 80,568. As is always the case when compiling statistics showing the ravages of great epidemics, authorities differ as to the total number of cases and deaths.²²¹ The majority, however, unite in placing the cases at 76,488 and the deaths at 14,685.

²²¹ La Roche, vol. 1, pp. 534; 536; 538.

Bally: Typhus d'Amerique, p. 72.

Caisergues: Memoire sur la Contagion de la Fievre Jaune. Paris, 1817, pp. 190; 214.

Fellowes: Pestilential Disorder of Andalusia, p. 421.

Arejula, p. 434.

Alfonzo da Maria, p. 122.

Berthe: Precis Historique de la Maladie qui a Renee en Andalousie en 1800. Paris, 1800. p. 64.

Fellowes (p. 421) gives the following tableau of deaths:

From August 23 to the end of the month.....	165
In September	2,106
In October	9,236
In November	1,223
Dates not specified	1,955

Total deaths from August 23 to November 30.. 14,685

La Roche (p. 538), in commenting on the above mortality, states that when we read the statement here recorded, authentic as it appears to be, we can with difficulty divest ourselves of the idea of error having crept in somewhere. "Not that I feel disposed to swell the mortality to 20,000, as was done by Dumeril (Humboldt, 779), and thereby diminish the ratio of recoveries; but I am inclined to regard it as probable that the number of those stricken down with the real malignant yellow fever did not reach the amount mentioned." The idea of an epidemic extending its baneful influence to all but 4,000 in a population of 80,000, La Roche finds difficult to reconcile with the facts known respecting the diffusion of the same disease elsewhere. He thinks it is more natural to presume that in the number of cases recorded, are included many of the other and milder complaints. Should this be true, the proportion of deaths to recoveries would be larger than stated; while the number of cases might still be very large in proportion to the population. To this opinion, he is the more inclined, because, so far as he could ascertain, the Spanish physicians, of those times at least, were not noted for accuracy in matters of diagnosis, and their success in the treatment of the disease had not usually been such as to induce the belief that they would lose but 1 in 5.21 during a wide-spreading and highly malignant epidemic.

1801.

In 1801, yellow fever reappeared in Seville. The malady affected principally those who had fled the preceding year. There were in all 1,100 cases, of which 660 proved fatal.²²²

1819.

The epidemic of 1819 broke out in the quarter of Santa Cruz, where it was brought by a woman who had fled from Cadiz, and who died on September 18 in the home of a friend in Baraba Street. The friend contracted the malady and in his turn contaminated those who visited him. By this means, the fever was disseminated throughout the quarter, where it raged until November 21, resulting in 546 cases and 217 deaths, out of a population of 1,650. The disease was confined exclusively to the Santa Cruz quarter.²²³

1821.

A few cases were observed in 1821. The developments were unimportant.²²⁴

SITGES.

1821.

Sitges is located on the Mediterranean, eighteen miles from Barcelona. On August 1, 1821, a woman who had been in the latter place returned to her home in Sitges and was taken ill with yellow fever. She died on the 5th. Three persons who had nursed her were immediately dispatched to the country by the health authorities, but none

²²² Bally, p. 77; Berenger-Feraud, p. 71; Keating, p. 81.

²²³ La Roche, vol. 1, p. 536, and vol. 2, p. 387; Berenger-Feraud, p. 90; Chervin, Examen Critique, p. 11; Cotens, Decad. de Med. et de Cirug. Prac (Madrid), 1828, vol. 4, p. 68.

²²⁴ O'Halloran, p. 70.

of them contracted the disease. No other case occurred in the town.²²⁵

TABARCA.

1804.

The diminutive island of Tabarca, in the Mediterranean, five miles south of Alicante, was infected by yellow fever from the latter place in 1804. The mortality was small.²²⁶

TOBARRA.

1811.

Yellow fever was carried as far as Tobarra, in Murcia, in 1811. There was no extensive spread of the disease.²²⁷

TORRE DEL MAR.

1804.

Fugitives from Malaga died from yellow fever at Torre del Mar in 1804. The inhabitants of the village were not affected.²²⁸

TORRE MOLINO.

1804.

Persons who had communicated with Malaga died from yellow fever at Torre Molino in 1804. The villagers who remained at home were not affected.²²⁹

²²⁵ Chervin, *Examen des Principes de l'Administration*, p. 58; Berenger-Feraud, p. 94.

²²⁶ Bally, pp. 90; 449.

²²⁷ Bally Francois and Pariset, p. 560; Berenger-Feraud, p. 84.

²²⁸ Bally, p. 87.

²²⁹ Fellowes, pp. 181; 182.

TORTOSA.

Historical Resume.

The picturesque city of Tortosa, in Catalonia, on the Ebro, 22 miles from its mouth, and 63 miles southwest of Tarragona, occupies a romantic niche in history. Originally a Moorish stronghold, it was wrested from the infidels by Louis le Debonaire in 811, but was recaptured by the Moors and became a nest of pirates. Eugenius III proclaimed a crusade against the place, and it was retaken by the Christians in 1148. In 1149, the Moors made a desperate effort to regain possession of the city, but were frustrated, partly through the bravery of the women. In 1798, the French invaded the city. Population, 24,702.

SUMMARY OF EPIDEMICS.

1821.

In 1821, for the first time in its history, Tortosa was invaded by the Saffron Scourge and suffered one of the most destructive epidemics on record. The population was then 15,000, of which 10,000 fled when the real nature of the malady became known to the inhabitants.

The facts of this epidemic are as follows:²³⁰

The first case developed in the person of a soap dealer named Curto, who had communicated with Barcelona on August 1, and arrived at Tortosa on the 4th. He was taken ill on the 6th, in the soap manufactory in the Calle de Cerced and died on the 11th in the country, where he had been transported by the health authorities.

The second case was that of a sailor named Puich, who belonged to the brig *Ventura*. This vessel sailed from San Felin de Guixols, Spain, early in July, and was

²³⁰ O'Halloran, p. 110; Chervin, *Examen des Principes*, etc., p. 66; Bally, *Francois and Pariset*, p. 34.

detained fifteen days in the Ebro River, for want of water to float her to the city* There was no epidemic disease at the port of departure and it is said that Puich held no communication with Curto. He was, therefore, infected at Tortosa. He was taken ill on August 11. He was visited on the 13th by two physicians of Tortosa, who unhesitatingly pronounced his disease to be yellow fever. When black vomiting and other unequivocal symptoms of the Antillean pestilence made their appearance, the unfortunate sailor was forcibly taken from his bed at eight o'clock at night, compelled to dress himself, and with a rope around his neck (for the emissaries of the health authorities were afraid to touch him), was dragged by four armed soldiers to a lazaretto in the country, at which he arrived after a march of three hours. The lazaretto, being unoccupied, was forced open, and the unhappy and helpless victim, without assistance or even water to allay his thirst, was left to his fate for the remainder of the night, without even a bed on which to repose. He died on the 15th.

The third case was that of a sailor who had arrived with the soap-maker, Curto, from Barcelona, who died a few days after the onset of the malady.

Cases then appeared in various parts of the city, making slow progress, until August 29, when thirty persons were suddenly seized with the symptoms of the dreadful scourge, all of whom died within a short time after being attacked.

Panic, terror and despair seized the populace. Of the 15,000 persons which constituted the population of Tortosa, 10,000 fled. It was well that this wholesale exodus took place, for of the 5,000 who remained, 2,356 perished.

The epidemic came to an end about the middle of October.

* "Hacia 15 días que se hallaba en el río."—Official Report of Tortosa Board of Health.

1870.

For almost half a century, yellow fever was kept out of Tortosa. That year occurred the memorable epidemic of Barcelona, and the disease was imported from the latter place to the former, on September 17. From that date until November 30, when the last case was observed, sporadic cases erupted here and there, but at no time was the disease epidemic. There were in all 41 cases, of which 32 proved fatal. Of those attacked, 23 were men and 18 women; of those who died, 20 were men and 12 women.²³¹

TOTANA.

1811.

In 1811, yellow fever was imported to Cadiz from the Canary Islands, and thence to the neighboring cities in Southern Spain. A few cases were observed at Totana, but the disease did not spread to the inhabitants.²³²

TRIANA.

(A Suburb of Seville, which see).

TRIBUJENA.

1800.

During the general epidemic of yellow fever which devastated Spain in 1800, Tribujena was invaded by the pestilence and lost 68 inhabitants.²³³

²³¹ Ferandez y Domingo: *Siglo Medica*, 1873, vol. 20, p. 261.

²³² Bally, Francois and Pariset, p. 559; Berenger-Feraud, p. 84.

²³³ La Roche, vol. 1, p. 534.

TURRIANO.

1804.

Turianno, where nearly all the bread consumed in Malaga was baked in the beginning of the last century, had uninterrupted communication with that city during the great epidemic of 1804, but none of the inhabitants who remained at home contracted the disease. Most of the persons who brought and delivered the bread at Malaga, contracted yellow fever and died on their return to their native town, but in no instance did they infect others.²³⁴

A similar state of affairs prevailed at Alcala de los Panaderos, near Turriano, where were also located numerous bakeries which supplied Seville with the "staff of life." The chroniclers of the period attributed this singular immunity to have resulted from the burning of aromatic herbs in the bakers' ovens, but it is useless to observe that had all the spices of the Molacca Islands been incinerated, Turriano would not have escaped infection if the *Stegomyia Calopus* had established itself within the precincts of the town.

UBRIQUE.

1800.

The epidemic of 1800 also invaded Ubrique, 46 miles northeast of Cadiz. Only a few cases, all refugees from the latter place, were observed.²³⁵

UTRERA.

1800.

A regiment of infantry from Cadiz infected Utrera in 1800, resulting in 1,689 deaths.²³⁶

²³⁴ Bancroft: Essay on Yellow Fever, p. 460.

²³⁵ Rougeau, Theses de Paris, 1827, No. 119.

²³⁶ La Roche, vol. 1, p. 534; Chervin, Examen Critique, p. 54.

VALENCIA.

1870.

A sailor arrived at Valencia from Barcelona, where yellow fever was prevailing, in the latter part of September, 1870. He took lodgings at No. 3 Calle Ruy Dom Pedro, where he developed the disease. On October 1, other sailors who had come from Barcelona took lodgings at No. 23 of the same street, and were taken ill with yellow fever. Quarantine against Barcelona was then established and no other cases appeared. The inhabitants of Valencia were not affected.²³⁷

VEJER DE LA FRONTERA.

1800.

In 1800, refugees from Cadiz died of yellow fever at Vejer de la Frontera. There was no diffusion of the disease.²³⁸

VELEZ MALAGA.

1804.

Velez Malaga, 14 miles east of Malaga, was infected by refugees from the latter place in 1804. Out of a population of 12,700, there were 5,245 deaths from yellow fever, of which 3,496 were men and 1,749 women. The first case was observed August 20; the last, December 4. The greatest mortality took place on September 24.²³⁹

²³⁷ Siglo Medica, 1871, vol. 18, p. 630; Deutsch Klinik, Berlin, vol. 23, p. 117.

²³⁸ Rougeau, loc. cit.; Chervin, Examen Critique, p. 49; Pariset, Obs. sur la Fievre Jaune, pp. 67; 76.

²³⁹ Fellowes, p. 478; Bally, pp. 88; 90; Berenger-Feraud, p. 76.

VERA.

1804.

On September 17, 1804, the wife of a marine officer arrived at Vera from Cartagena, where yellow fever was committing fearful ravages, and was taken ill on the 20th of the same month. Almost all the members of the household contracted the malady and died. The neighboring houses were soon contaminated, but rigid measures were instituted by the health authorities and the infected quarter completely isolated. The infection was thus restricted to the original focus, resulting in 208 deaths out of a population of 4,000. Of the fatal cases, 111 were men and 97 women. The epidemic came to an end on January 4, 1805.²⁴⁰

1811.

Vera was infected by a man who arrived from Seville in the latter part of 1821, and who died of yellow fever on the same day. From this focus, the malady diffused itself throughout the town.²⁴¹

VIGO.

1856.

Yellow fever was imported into Vigo in April, 1856. The first cases appeared among the prisoners at the penal institution. Sotelo, the officer in charge, states that he carefully studied the cases, but gives only a resume of the clinical features of the disease. The epidemic lasted for "more than nine months," the last death occurring in January, 1857. There were 833 cases, of which 106 proved fatal.²⁴²

²⁴⁰ Fellowes, p. 478; Bally, p. 90; Eager, loc. cit.; Berenger-Feraud, p. 77.

²⁴¹ Bally, p. 97 (foot-note).

²⁴² Sotelo: *Siglo Medica*, 1858, vol. 5, p. 100.

1889.

On September 7, 1889, cases of "alleged" yellow began to be officially observed in the town, although it is said that the disease had been sporadically present for some time previously. The origin of this outbreak has never clearly established and many doubt that this was actually an epidemic of yellow fever. The Portugese assert that it was, while the Spanish government as vehemently declared it was not. About 1,000 persons in Vigo and the neighboring coast villages were attacked, and about 10 or 12 per cent. of these died. Northerly winds and the cool weather caused the fever to subside, and it had entirely disappeared before the end of September.²⁴³

A search through Spanish papers and official documents of the period fails to throw any satisfactory light on the subject. We looked carefully for records of the alleged epidemic which the U. S. Consular representative claims to have ravaged Vigo and "neighboring sea-coast towns," but find nothing authentic. It is doubtful whether even the bulletin given out by the United States Public Health authorities is authentic. It was probably merely a statement made on hearsay, as we can find no corroboration of same.

VILLA MARTIN.

1800.

A solitary case of yellow fever, resulting in death, was observed in Villamartin in 1800. It was probably imported from Seville, 43 miles distant.²⁴⁴

1804.

In 1804, Villamartin had a population of 1,880. The first case was observed October 5. From that date until December 25, 168 deaths are recorded, of which 93 were men and 75 women.²⁴⁵

²⁴³ U. S. Public Health Reports, vol. 4, 1889, pp. 286; 370.

²⁴⁴ La Roche, vol. 1, p. 534.

²⁴⁵ Fellowes, p. 478.

VILLANUEVA DEL ARISCAL.

1800.

A few cases of yellow fever, undoubtedly imported from Seville, occurred in Vilalunueva del Ariscal in 1800. The population of the town was not affected.²⁴⁶

VILLASECA DE LA SAGRA.

1821.

Villaseca de la Sagra was infected by refugees in 1821. The disease did not spread.²⁴⁷

XERES DE LA FRONTERA.

Historical Resume.

Xeres de la Frontera (commonly called Xeres or Jerez), is a famous town of Andalusia, 16 miles by rail northeast of Cadiz. The *Asta Regia* of the Romans, it owes its modern name to the Moors, who fought a seven days' battle near the town in 711, in which they defeated Roderic, the last of the Goths. The present fame of Xeres rests upon the delicious wine known as sherry, which it exports in enormous quantities to all parts of the world.

YELLOW FEVER YEARS.

1800; 1804; 1808; 1813; 1819; 1820; 1821.

SUMMARY OF EPIDEMICS.

1800.

Fugitives from Cadiz introduced yellow fever into Xeres de la Frontera about the middle of August, 1800.

²⁴⁶ Rougeau, loc. cit.²⁴⁷ Berenger-Feraud, p. 94.

The first death took place August 25. From that date until the close of the epidemic, out of a population of 42,000, there resulted 32,000 cases, of which 14,000 proved fatal.²⁴⁸

1804.

In 1804, fugitives from Cadiz died from yellow fever at Xeres. From September 23 to December 1, there were 71 deaths, of which 63 were males and 8 females. The inhabitants of the town were not affected.²⁴⁹

1808.

An individual from Cadiz died from yellow fever at Xeres in 1808. Rigorous prophylactic measures were taken to protect the large prison, and were successful until near the decline of the outbreak. At that point some prisoners slipped away, but were captured and returned to their cells. They brought back yellow fever with them, and so terrible was its effect within the prison walls that only a few of the convicts escaped death. (*Eager, loc. cit., p. 21*).

1813.

In 1813, five individuals from Cadiz died from yellow fever in Xeres. There was no diffusion of the disease.²⁵⁰

1819.

A gypsy and her daughter, originally from Isla de Leon, are accused of having brought yellow fever to Xeres

²⁴⁸ Bally, p. 75.

La Roche, vol. 1, pp. 534; 536.

Chervin, Examen Critique, p. 57.

Proudfoot, Edinburgh Medical Journal, vol. 28, p. 295.

Caisergues, loc. cit., p. 214.

Pariset, Preces Historique, p. 163.

²⁴⁹ Fellowes, p. 478; Bally, p. 90.

²⁵⁰ Chervin, Examen Critique, p. 70.

in 1819. Chervin (*Examen Critique*, p. 68) denies this, but the official report of the Xeres health authorities assert that such was the case,* an opinion also shared by Berenger-Feraud (p. 901). Whether the Bohemians were guilty or not, it is, nevertheless, true that the first cases were observed in the persons of two soldiers who had taken lodgings at the house of the women located in the Calle de Pavia, and who died shortly afterwards. From this focus, the disease spread to other quarters of the town, but the advent of the cool season prevented a general diffusion of the malady. Out of a population of 45,000, there were 1,262 cases, of which 408 proved fatal.²⁵¹

1820.

On August 10, 1820, a woman arrived at Xeres de la Frontera from Cadiz, where yellow fever was prevailing, and hired herself as a servant to a woman named Rameiro in the Calle Torneria. Feeling indisposed she only remained two days at this house and repaired to the abode of an old friend in the Calle de Arcos. She remained there two days, when she was removed to the hospital de la Sangre, where she shortly afterwards died.

On the 14th, 15th and 16th of the same month (August), eight persons living in the house in Calle de Arcos and two in the house of the Rameiro woman, were attacked by "a mysterious disease." Five of these patients died.

The official records state that there were 201 cases, of which 102 proved fatal, but Jackson (*Remarks on the Epidemic Yellow, etc.*, p. 137), states that the mortality

* En la Calle de Pavia se hospodo una gitana procedente de la ciudad de San-Fernando con una bija que trais la enfermedad, de la qui murio a pocos dias, y la comunico.

²⁵¹ La Roche, vol. 1, p. 536.

Berenger-Feraud, p. 90.

Pariset, Observations, p. 66.

Chervin, Examen Critique, p. 67.

Bonneau and Sulpicy: Recherches sur la Contagion de la Fievre Jaune. Paris, 1823, p. 302.

was in reality much higher, for only those who were buried without the corporate limits of the town were included in the dead list. Private burial was obtained for many, and such were not registered as yellow fever deaths.²⁵²

1821.

The first case of yellow fever in Xeres in 1821, erupted in the person of a man living in the Plaza de la Constitucion, who was attacked on August 13 and died August 20. There is no authentic record whence the man came.

The second case, a child four years old, was observed in Porvera Street a month later, September 13, and died on the 18th. The source of infection could not be traced.

The third case, that of a young girl, erupted on September 15, in a house a few yards distant from the second case. The patient recovered. In this particular instance, the infection was traced to Puerto de Santa Maria, where yellow fever was epidemic, where the girl had remained two days before coming to Xeres.

From these foci, the disease spread to other quarters of the town. Our authorities do not give the total number of cases and deaths, from which fact we infer that the malady did not attain the proportions of an epidemic.²⁵³

XIMENA DE LA FRONTERA.

1804.

Ximena de la Frontera, 46 miles east of Cadiz, was infected by fugitives from the latter place, on October 27, 1804. The last case was observed December 30. Out of a population of 7,500, there were only fifty deaths

²⁵² Periodico de la Sociedad Quirurgica de Cadiz, 1822, p. 24.

La Roche, vol. 1, p. 536.

Jackson, p. 137.

O'Halloran: Yellow Fever in Andalusia in 1820, p. 153.

²⁵³ O'Halloran, p. 70.

Ferran: Annales de Medecine Physiologique, Paris, 1825, vol. 7, p. 298.

(29 men and 21 women), which naturally leads to the belief that the disease was not communicated to the inhabitants of the town, but was confined solely to refugees.²⁵⁴

YECLA.

1812.

In 1812, after the battle of Salamanca, the French army which occupied Andalusia retreated through the Kingdom of Valencia. The fourth division of this corps reached the Kingdom of Murcia, where yellow fever was prevailing, about the 1st of October. They passed through the town of Ziezar (which was also infected), and camped on the outskirts, where they remained about two days. They reached Jumilla where yellow fever was also present, but did not enter the town, on account of its unhealthiness. Continuing their march, the soldiers finally reached Yecla, 44 miles north of Murcia, on the Jumilla River, where they concluded to camp. Some of the soldiers were soon taken ill and the disease diagnosed as yellow fever by the army surgeon. A baker attached to the division died on the 9th. This case was rapidly followed by others. Between October 8 and 15, about one hundred deaths occurred. The malady then gradually subsided and became extinct by the latter part of October.²⁵⁵

ZIEZA.

1811.

Zieza (or Ciezar), erroneously called Zuzar by Berenger-Feraud, was infected by refugees during the epidemic wave of yellow fever which passed over southern Spain in 1811. No details are given by our authority.²⁵⁶

²⁵⁴ Fellowes, p. 478.

Bally, Francois and Pariset, p. 79.

²⁵⁵ Peyson: *Journal General de Medecine*, 1820, vol. 71, p. 343.

²⁵⁶ Berenger-Feraud, p. 83.

1812.

Two refugees from Cartagena brought yellow fever to Zieza in the beginning of September, 1812. Almost the entire population fled to the country, but there were still some sick left when the French army passed through the town on October 1. They found the place deserted, with unburied corpses in many of the houses. The troops did not stop at this place, but they were, nevertheless, infected and carried the disease to Yecla (q. v.), where many of the soldiers perished from the prevailing sickness.²⁵⁷

²⁵⁷ Berenger-Feraud, p. 85; Peyson, loc. cit., p. 343.

HISTORY
OF
YELLOW FEVER
IN
NORTH AMERICA.

PROOFS THAT YELLOW FEVER IS AN AMERICAN PRODUCT
AND WAS UNKNOWN TO EUROPEANS BEFORE THE
TIME OF COLUMBUS.

The history of yellow fever in America dates from the second voyage of Columbus, 1493. Before that time the disease was presumably unknown to the civilized world. Traditional accounts given by the Aztecs and other Indian tribes of the countries and islands washed by the Gulf of Mexico, state that a disease possessing all the characteristics of yellow fever committed fearful ravages among the tribesmen long before the discovery of America, being known under the name of *Cocolitzle* and *Matlazahuatl* by the aborigines. We have not the slightest doubt of the identity of this affliction with the malady now known as yellow fever, as the pest was unknown to Europeans before the colonization of the New World; but Science, after over four hundred years of investigation, has failed to establish a connecting link between the two diseases.

Finlay makes a valuable contribution to the literature on the subject of American origin of yellow fever in the *Climatologist*,* in which, after reviewing what others have said about the origin of the disease, and giving his own views, goes on to show that yellow fever was known to the American Indians before the discovery of America. Dr. Finlay's conclusions are based upon his interpretation of a philological study on the the names of "America" and "Yucatan," by the Bishop of Yucatan, Dr. Crescencio Carillo y Ancona. While reading this scholarly work, Dr. Finlay came across a quotation from the "Chumayel manuscript," which reads as follows:

"There was black vomit, which began to occasion deaths among us in 1648."

This statement immediately suggested the idea that among the Indian manuscripts of Yucatan, might be

found the evidence that was wanted to prove that yellow fever was not unknown to the American Indians before the advent of Columbus. Accordingly, the matter was submitted to the learned Bishop himself, acquainting him with the state of the question and begging for information on the following points:

Whether among the Maya documents that he had examined in the course of his other researches, any data had been met confirmatory of Dr. Finlay's conjectures, or throwing light on the subject of the epidemics called *cocolitzle*, which, according to Herrera (*Decada 4, Lib. 9, Cap. 6*), used to attack the Mexican Indians on the coast of New Spain before the arrival of the Spaniards.

In answer to this request, the Rev. Bishop wrote a most interesting and instructive letter, containing a full discussion of the subject and valuable data not to be found in the literature of the period. Dr. Finlay's article in the *Climatologist* was inspired by this important communication, which is here reproduced, and we hold that it has such an important bearing upon the question under discussion, that we summarize it in these pages.

After proving, upon the best testimony, that Yucatan, until the year 1648, had been pronounced by all the Spanish writers a most salubrious country, exempt from the diseases that prevailed in other places, no epidemic of any kind having been observed in it from the commencement of the Spanish colonization in 1517 until 1648, the Rev. Bishop Carrillo concludes that the disease called *cocolitzle* by the Mexicans, and which prevailed annually at Vera Cruz before the Spanish invasion, did not habitually manifest itself in Yucatan. Regarding the disease, he calls attention to the circumstance that, from Herrera's own account, it is easily seen that a distinction was made by the Mexicans between the local endemic, properly designated under the name of *cocolitzle*, and a broader application of the same term, qualified by some expletive such as "general" or "universal" whenever it was used to designate other epidemic invasions that extended over the whole country, as subsequently

happened with small-pox. The local endemic, the *cocolitzle* proper, existed at Vera Cruz, "some years more violent than others;" and the reason why the Spaniards found so large a population on that coast was that, on occasions when the *cocolitzle* had been particularly severe, Montezuma used to send 8000 families from the interior to repeople the coast, exempting them from taxes during a term of years and granting them other privileges. This *cocolitzle* may, therefore, have been yellow fever, but at any rate it did not occur at Yucatan between the years 1517 and 1748. He next goes on to prove the epidemic of 1648, alluded to as "black vomit" in the "Chumayel manuscript," was in reality yellow fever; and does so very effectively by reproducing a most remarkable description of the epidemic by an eye-witness, the Yucatan historian, Fray Diego Lopez de Cogolludo, who was himself attacked by the disease. This account is so graphic, so rich in sagacious remarks, and so accurate in its clinical details, that it well deserves to be given here. It runs thus:

"1648. Shortly after the commencement of the solar year, in the month of March, the sun appeared for several days to be eclipsed, the air being so thick that it had the appearance of a mist or condensed smoke. This was so general that every part of the land, from Cozumel to Tobasco, offered the same unwholesome condition.* * * In the city of Merida, especially towards evening, when the winds generally set from the sea, a bad smell was brought with it that could scarcely be borne, and penetrated everywhere. The cause of this smell was unknown until a Spanish vessel happened to run aground over an immense heap of dead fish near the shore. It was from these fish, which were being washed ashore by the tide, that the smell had proceeded, extending as far as the city, and even beyond. In April and May some sudden deaths occurred, which caused alarm in the city of Merida. At the beginning of June the scourge of the *peste* commenced in the town of Campeche, and in a few days became so severe that the place was completely

ravaged. * * * The roads to Campeche were guarded for fear that the contagion should spread; but if the Lord guards not the city, what shall human efforts avail! With this fear of Divine justice the month of July passed, until towards the end a few persons began to sicken, dying very soon; but the disease was not considered epidemic until the month of August. With such violence and rapidity were the people attacked, big and small, rich and poor, that in less than eight days the whole population were sick at the same time, and many citizens of the highest rank and authority died. * * * While the city was thus afflicted by this calamity, *never before seen since this country was conquered by the Spanish nation*, permission was asked that the image of Our Lady of Itzamal might be brought. * * * Very great was the tribulation, *such a calamity having never been experienced before*. * * * In other countries epidemics occur as a common evil which attacks uniformly all the people, but such was not the case in Yucatan, which caused greater confusion. *It was impossible to say what the disease was, for the physicians did not recognize it*. In most of the cases the patients were taken with a most severe and intense headache, and pains in all the bones of their bodies, so violent that their limbs felt as if torn asunder or squeezed in a press. A few moments after the pains came on a very intense fever which in most instances produced delirium, though not in all. This was followed by vomiting of blood, as if putrefied, and of such cases very few survived. Some were attacked with discharges from the bowels of a bilious humor, which being corrupt occasioned dysentery without vomiting, while others again made violent efforts to vomit without being able to discharge anything, and many suffered the fever and pains in the bones without any of the other symptoms. * * * In the majority the fever seemed to remit completely on the third day; they would say that they felt no pains whatever, the delirium would cease, the patients conversing in their full senses, but they were unable to eat or drink anything; they would continue

this for one or several days, and while still talking and saying they were quite well, they expired. A great number did not pass the third day, the majority died on the fifth, and very few reached the seventh, excepting those who survived, and these were mostly advanced in years. The most robust and healthy of the young men were most violently attacked and died soonest. * * * Although a great many women were taken sick, the disease was less severe in them than in men. * * * Some cases occurred in which the patient passed the fever in a sleep, until they recovered, having no one to administer remedies to them. In houses of large families there were scarcely any one to attend to the sick or to fetch the sacraments for them. This spiritual difficulty was remedied by the charity of the priests, both secular and regular, who went about the street by day and night carrying with them the Holy Viaticum and the Holy Oils, and visited the houses to administer the same to such as required them. * * * When the laity began to improve, the disease broke out among the priests. Of eight members of the Jesuits college, six died. * * * Of our own Order (Franciscans) twenty died in the city. Almost all the heads of institutions and persons of highest ranks, both ecclesiastics and seculars, were carried away by the epidemic. * * * While it lasted in its full intensity among the Spaniards, the Indians were not attacked, excepting those who lived with the former, or who, having visited the city, left it already touched by the disease; most of these died in their villages, but did not communicate their illness to those who attended them. This emboldened the Indians to declare that the scourge was a punishment of God, and that only the people of cities and town were attacked for their ill-treatment to the Indians. * * * A deceitful Indian spread the report that all the Spaniards in Yucatan would die, and the Indians would be left by themselves. * * * Finally, this man was taken up and the rumor ceased. * * * Soon, however, did our Lord undeceive the Indians of their presumption, for a few days after the above occurrence the illness broke out in many of the Indian villages, causing fearful havoc, as

was to be expected, considering their want of comfort or medicine. * * * The disease continued over the whole country during the space of two years. * * * Few that lived in this land or visited it in the course of those two years escaped being sick, and it *rarely happened that any one died of a second attack after having recovered from the first.* All remained pale as ghosts, without hair, many lost their eyebrows, and all were so pulled down that even after two days' fever with moderate pains (such as happened to myself), it was many days before they could recover their strength. * * * In the year of 1650, on our way to visit the province of Guatemala * * * having to pass through an extensive pine wood * * * we observed that since the year of 1648, in which the epidemic had commenced, some pestilential air or other noxious influence had dried up all the full grown pine-trees, * * * only the young ones remained with life. I then reflected that of the young children who were attacked by the *peste* in Yucatan only a few had died, as compared with the adults." (*Cogolludo-Historia de Yucatan, Libro, XII, Capitulo XII; XIII; XIV*).

The Rev. Bishop, after this quotation, states that the Spanish historian finding himself at a loss to classify or to name the curious malady which, after the lapse of over a century, affected the Spaniards of Yucatan, found himself constrained to give a minute account of its symptoms and circumstances; whereas, the "Chumayel manuscript" only needs one single word, both graphic and appropriate, in order to record the occurrence of the epidemic, by its special name, in the corresponding chronological note which it has been his good fortune to give to the learned world in the fac-simile that accompanies his *Philological Study on the names of America and Yucatan—Uchei xekik hoppei cimil toon 1648 anos*—which means: There was black vomit, which began to cause death among us in the year 1648.

Even without knowing the Maya language, read carefully that line of text and observe the second word, *xekik*.

In the Dictionary of Don Juan Pio Verez, you will find it rendered by *vomito prieto*, *vomitar sangre* (black vomit, to vomit blood). The words that follow means: "And we ourselves began to die—" referring to the Indians; for which reason Cogolludo has said that at the commencement of the epidemic, only the Spaniards were attacked, but subsequently the Indians also began to suffer.

This philological demonstration must be continued in the Bishop's own words:

"Notwithstanding that from this statement alone of the *Chumayel manuscript*, I infer that the *vomito negro* was known to the indigenous historians, though new to the Spaniards of Yucatan, this would only constitute a conjecture, more or less grounded; whereas, what is required, as you say, is a *decisive fact*. This brings us to the essential and culminating point of the present letter."

"The *Maya manuscripts* that I possess, like all the sacred books of the ancient *Yucatecos* or *Chilam-balam* books, as they are vulgarly known, have precisely for their principal object the recording of chronological notes concerning their feasts to their gods, wars, pestilences, famines and invasions by the Spaniards. They are chronicles and calendars. I therefore proceeded to examine them more particularly in such parts as concord with the *Chumayel* regarding the seventeenth century and the occurrence of the great epidemic, and find the following conclusive statement in the *Tzimin manuscript* (which I have so named because it proceeds from the Tzimin Indians (Tzimincah), between the folios 16 (*verso*) and 17:

"In English: 'In the 4th ahau (year of the Mayas), at the expiration of a katun (*their century*) which is counted towards the well of Chichenitza, at the placing of the stone katan, arrival of Kuk, arrival of Yaxum (*mythological and historical characters who gave their names to the epochs*) arrival of Kantenal, OCCURRED THE ARRIVAL OF BLACK VOMIT FOR THE FOURTH TIME, arrival of Kukulcan, after the Ytzaes, at the fourth placing and signification of the katun.'

"This statement throws much light on that of the *Chumayel*, for, in speaking of the same epidemic corresponding to the year 1648, it says most positively that *it was the fourth time* that it had visited this country; and considering that since the discovery in 1517 until the said year of 1648, in which the epidemic broke out, it had never been seen by the Spaniards, it must follow that the three previous invasions had occurred before the discovery."

The Rev. Bishop goes on to say that so true is this, that the same historians he has quoted before to prove the constant healthiness of the climate of the Yucatan peninsula, and *that in it were not experienced the disease that occurred in other lands*—all are equally agreed in stating that great epidemics had been suffered in Yucatan before the discovery, thereby confirming the words in the *Tziman* manuscript.

The Rev. Fray Don Diego de Landa, who, it must be remembered, was a missionary in Yucatan during the first epoch after the discovery, expressed himself in the following terms:

"Various calamities were experienced in Yucatan *in the century before the conquest*, hurricanes, pestilences, wars, etc. * * * There came all over the land *certain pestilential fevers*, which lasted twenty-four hours, and after the patients would smell and break out full of worms, and from *this pestilence* a great number died, and a great part of the crops could not be gathered; that after the epidemic had ceased they had a period of sixteen good years, during which their quarrels and dissensions were renewed, so that one hundred and fifty thousand men were killed in wars, after which they were quieted, made peace and rested during twenty years, and when they were attacked *by a pestilence* of large boils, which rotted their bodies with great fetidness, so that their limbs would drop off in pieces in the course of four or five years." (*Landa, Relacion de las cosas de Yucatan. Ano de 1566*).

The same account is given by Herera (*Decada IV, Libro*

X, *Cap.*, 111) and other historians, and it must be particularly remembered that the Rev. Bishop Landa had at his disposal a great number of *Maya manuscripts*, painted skins, and other historical relics of the Yucatan people; a notorious fact, which is attested both by his important work, just quoted, and by the accusation brought up against him of having burned such documents in the *auto da fe* that took place in Man.

The author holds, therefore, as sufficiently proven and for a certain and unquestionable fact, that the Indians of Yucatan suffered from the *vomito negro* as an epidemic, before the advent of Columbus, and consequently yellow fever is a disease properly belonging to America.

There is another statement, though only of an accessory character, is the Maya manuscript, which the Rev. Bishop found in the *Prescription Books of the Indians*, of which he possessed several ancient copies, in the Maya language. In almost all these books, the following prescriptions appears:

..“*U cacal xekik ti unic, ma hach chaci, maix kiki bay u kab ybacna,*” which means: ‘medicine for the vomiting of blood for the persons who discharge it; not properly of a red color, nor resembling red blood, but *like a liquid mixed with soot.*’

If one will notice the last word, *ybacna*, and consult the dictionary of Don Juan Pio Peres, he will find that it is rendered by *Hollin* which in Spanish signifies “a black substance, thick and oily, which the smoke leaves in chimneys.” So that *kik bay u kab y bacna* means “black vomit, like an infusion of soot.” Thanks, therefore, to this unexpected application of the Rev. Bishop Carrillo’s extensive philological and bibliographical learning, the vexed question of the origin of yellow fever and the true nature of the early epidemics experienced by the Spaniards, on their arrival to these parts of America, ever since the days of Columbus, may be considered as definitely settled.

Dr. Finlay states that notwithstanding that the chronological system of the Mayas and the concordance of their

dates with our Christian era are but imperfectly understood, the learned bishop, in a subsequent letter, informed him that he had other grounds for his assertion and absolute conviction that the epidemic of black vomit, referred to in the *Tzimin manuscript*, is the same that we find recorded in the *Chumayel* under the date of 1648. He wrote Dr. Finlay that although the quotation from the *Tzimin manuscript* does not contain the date (expressed in years of the Christian era), the book commences its chronological notes with the year "1593," so written, in the hand of the Indian author and with the same figures that we now use (*folio 1, line 2*). If we follow the text, page after page, and without omitting a single word, it is observed that no *invasion* of "vomiting of blood" is recorded until folio 17 is reached; here the author for the first time mentions such an invasion, adverting that it was the *fourth* that had occurred. Now, that it is a proven fact that after the year 1593, and even since the discovery of Yucatan in 1517, no epidemic of *black vomit* had occurred until 1648, to this same year must correspond the *fourth* epidemic mentioned in the *Tzimin manuscript*, and the three previous ones must have taken place before the year 1593, at which time chronological record begins.

If the *Tzimin* text does allude to "black vomit" or yellow fever, before the invasion which the author qualifies as the fourth, he does so not in a historical sense; but as a calamity to be dreaded in evil times. It must be remembered that these *Chilam belam* books are calendars, which not only contain chronological and historical notes, but also predictions that in a prophetic style had been made in their ancient times. This one, for instance, is a literal translation from the same *Tzimin manuscript*:

"At the end of the 2nd *ahau* * * * it will happen that the people will have to seek laboriously for food as far as the shores of the sea, eating the young leaves of plants, and with setting of the *katun*, days will come when great *vomiting of blood* will afflict the people, and

all joy will cease; then, in order to find food, it will be necessary to solve enigmas that will be proposed; and after those troubles are passed, after the *katum*, days of consolation will come."

The fact that the Indians introduced in their prognostics of evil days the threat of *vomiting of blood*, concludes Dr. Finlay, is another proof that the disease had been well known to them since a long time, and precisely under its epidemic form, not as the endemic that it has now become.

It is thus paramount, from Dr. Finlay's important work, that yellow fever is an American product, was unknown to Europeans previous to the discovery of America by Columbus, and that Mexico, Central America and the West Indies may be considered as the original cradle of the awesome scourge.

CANADA

HISTORY OF YELLOW IN CANADA.

Canada enjoys the distinction of being the northernmost part of the American Continent where yellow fever has been observed. It is true that only sporadic imported cases of the disease have appeared within its domain, but had the *Stegomyia Calopus* been present at the time of these isolated manifestations, there is no doubt that a different story would have been told in these pages.

In most works on epidemiology, Quebec, which is in latitude $46^{\circ} 49' 6''$, is given as the northernmost point in America where yellow fever has ever been imported. Such was, until very recently, also our belief, as will be seen by referring to page 63 of this volume, where we give Quebec as the most northern port in the Western Hemisphere where yellow fever has made its appearance.* While "nosing about" musty times and cobwebby documents, we came across an old work by the distinguished French naval surgeon Keraudren, published in 1823. This valuable contribution to epidemiology is entitled *De la Fievre Jaune Observee aux Antilles et sur les Vaisseaux, Consideree Principalement Sous le Rapport de sa Transmission*. Keraudren, who was then Physician-in-Chief of the French Navy and Inspector General of the Health Department of the Navy, gives an interesting account of the outbreak of yellow on board the *Tarn*, which became infected at Martinique in 1819. At that period, whenever practicable, as soon as the terrible disease manifested itself on board a ship attached to the French squadron, orders were at once received to set sail for a colder clime, the point of refuge being generally either New Foundland or the islands of Saint Pierre and Miquelon, which lie off the south coast of the former. Keraudren states that, thanks to this wise precaution, the lives of many seamen were saved, for, as the infected vessel approached the northern seas, the disease gradually abated, generally ceasing altogether before reaching its

destination. A sojourn of a few weeks was then sufficient to purify the ship.

Kraudren informs us (*loc. cit.*, page 18), that the *Tarn*, of the French West Indian Squadron, left Martinique July 15, 1819. Two days later, a sailor was stricken with yellow fever and died the following day. On July 28 while in 33° 34' north latitude, four seamen were taken sick with yellow fever, followed the next day by six others. Two of these patients died, one on the fourth and the other on the fifth day after being attacked. Two died while the *Tarn* was actually in the harbor of Saint-Pierre, one on the seventh and the other on the tenth day after the onset of the malady.

Saint-Pierre-de-Miquelon which is in latitude 47° 30', is therefore the most northern point in America where yellow fever has ever been observed. The disease was not communicated to the shore nor to the other vessels in the harbor, but had the same conditions which prevailed at Martinique, the original point of infection, existed at Saint-Pierre-de-Miquelon, the importation would undoubtedly have been followed by disastrous results. This point is incontestably upheld by the fact that, although yellow fever ceased entirely while vessels infected in the West Indies or other southern latitudes were in the harbors of Saint-Pierre, Miquelon or New Foundland, many instances are recorded where the disease reappeared with renewed energy when these same vessels returned to the southern seas, before any communication whatever with the shore. This phenomenon is attributed by Keraudren to the torrid heat of the southern latitudes; we, basking in the lime-light of the twentieth century knowledge, phlegmatically attribute it to the re-awakening of the *Stegomyia Calopus*, whose sphere of misdirected usefulness had been nullified by the rigors of a boreal clime.

We have found it amusing, when analyzing the theories of the thousands of learned epidemiologists of the past who have written *ab libitum* about the transission of yellow fever, to observe how nicely their views dovetail into the mosquito theory of the glorious twentieth century. Ac-

ording to what they consider incontestable proof that the disease, in such and such an instance had been transmitted by the wind, foul odors, old clothes, personal contact, casks of sugar and other odds and ends, the earmarks of the *calopus* can be distinguished without the aid of a microscope and what was deemed impenetrable darkness suddenly becomes unclouded daylight.

Verily, times *do* change.

CHRONOLOGY OF YELLOW FEVER IN CANADA.

- 1805. Quebec.
- 1812. Quebec.
- 1819. Saint-Pierre and Miquelon.
- 1861. Halifax.
- 1864. Quebec.
- 1878. Halifax.
- 1880. Prince Edward Island.

By Localities.

- Halifax. 1861; 1878.
- Quebec. 1804; 1812; 1864.
- Prince Edward Island. 1880.
- Saint-Piere and Miquelon. 1819.

NOVA SCOTIA.

HALIFAX.

YELLOW FEVER YEARS.

1842; 1861; 1878.

SUMMARY OF IMPORTATIONS.

1842.

*The Case of the Volage.*¹

The British ship, *Volage*, was commissioned at Chat-ham, England, August 2, 1841, and sailed for the West Indies on January 2, 1842, calling on her way at Madeira and Bermuda, and remaining some time at the latter

place to refit. She anchored at Port Royal, Jamaica, on March 3, 1842, and remained there until the 26th of April; she then sailed for Santa Martha and Carthagena, Colombia, and returned to Port Royal on the 12th of May. On the 19th she again took her departure for Colombia, where she arrived on the 23rd, and where she stopped eight days at Chagres, revisiting afterwards Carthagena and Santa Martha. This cruise occupied nearly a month.

In the month of March, April and May, 1842, a few cases of fever occurred which were of a mild character, and yielded readily to the customary remedies. These, however, proved the precursors of an alarming outbreak of yellow fever, which commenced on the 18th day of May, and continued to spread, at first slowly, but afterwards rapidly and extensively amongst the officers and crew.

Two cases, which terminated fatally, with yellow suffusion and black vomit, occurred on the 25th of June, at Port Royal. There were then 17 cases on the sick list, exclusive of four at sick quarters. An immediate change to a cooler climate was thought advisable, not only for the recovery of those already seized, but absolutely necessary to arrest further progress of the disease. Orders were, therefore, given to sail on the following morning for Halifax, Nova Scotia, proceeding via the Florida Channel.

In spite of the ship having gone to a higher latitude, the disease advanced with increased force; numerous fresh cases were added daily to the sick-list, and continued to be so even for some time after her arrival at Halifax, and did not completely cease until "all hands" were landed on Navy Island.

It is difficult to come to a perfectly satisfactory conclusion as to when the fever originally broke out on the *Volage*, but it is evident that the primary infection was Chagres, Carthagena or Santa Martha, where the fever first seriously presented itself, and where the disease is endemic.

It will be perceived that the fever had gone on unchecked for nearly three months. The cases at Halifax were as virulent as those which took place at sea.

That the infected *Stegomyia Calopus* never left the vessel, is proved by the fact that two officers who came on board to assist in nursing the sick, were taken ill within four days, and that two visitors who were only on board an hour or two, having been exposed to the same cause which operated on the two officers, were also stricken.

Outside of these four cases, no other inhabitant of Halifax contracted the disease.

1861.

In the summer of 1861—a very sickly yellow fever year—many ships of war of the British West Indian Squadron arrived at the port of Halifax, Nova Scotia, with cases of yellow fever on board. Some of the ships had suffered very disastrously during the voyage. The history of these importations is as follows:²

The Case of the Firebrand.

The ship *Firebrand* arrived at Halifax from Jamaica, on July 4, 1861, after a passage of twelve days. There were then seventy-nine of the crew on the sick list—all fever cases. Ten deaths had occurred during the voyage from Port Royal. Many of the sick were moribund. All the sick were at once transferred to a hulk moored off the naval hospital, and the convalescents and others sent to a storehouse in the dockyard. There were fifteen convalescents, thirty convalescing and thirty-four seriously ill at the time.

Several fresh cases occurred subsequently, and two were fatal, with black vomit. Besides these deaths in the hospital on shore, sixteen took place amongst the sick in the hulk. From the commencement of the disease, the *Firebrand* lost forty-nine of her crew out of one hundred and seven attacked.

The Case of the Spiteful.

The *Spiteful* arrived at Halifax on August 16, 1861, from the Bahamas, which she had left seven days before. Eleven deaths had occurred on the passage, and forty-six cases were on the sick list on arrival; two died that night. The sick were at once sent to the hulk, and the convalescent and the well to the dockyard. Some of these sickened with the fever on shore, and were then transferred to the hulk. Altogether thirty-three sick were treated at Halifax, and of these, twelve died. The *Spiteful* lost in all thirty-six of her crew, out of eighty-eight attacked.

The Case of the Racer.

The *Racer* arrived at Halifax from Nassau on September 3, 1861. During the passage, nineteen cases and five deaths occurred. Several fresh attacks took place after arrival. The total number of attacks among the crew of this ship was sixty-one, of which twenty proved fatal.

The Case of the Jason.

The *Jason* reached Halifax on September 2, 1861, from the Gulf of Mexico, which she had left sixteen days before in consequence of fever having broken out on board. During the voyage forty-six fresh cases and ten deaths took place. On arrival at Halifax, all the sick were sent to a building in the dockyard. A good many fresh attacks occurred after arrival. The total number of attacks among the crew was seventy-nine, and seventeen proved fatal.

Recapitulation of Cases at Halifax in 1861.

<i>Firebrand</i>	28	16
<i>Spiteful</i>	33	12
<i>Racer</i>	42	5
<i>Jason</i>	?	?
	103	33

Five vessels in all having an aggregate crew of 855, were found to be infected with yellow fever on their arrival at Halifax in 1861. Of this number, 499 were attacked and 162 died. It is interesting to note that not a solitary case of yellow fever occurred among any of the people about the dockyard at Halifax, or in any other inhabitant of the town. This proves that the *Stegomyia Calopus* did not migrate to the shore.

1878.

In 1878, H. M. S. *Bullfinch*, from the West Indies, had a large number of yellow fever cases while in the harbor of Halifax. The mortality was heavy.³ The outbreak was confined to the original source of infection.

PRINCE EDWARD ISLAND.

CHARLOTTETOWN.

1880.

"A vessel from the West Indies" had two cases of yellow fever while in the harbor of Charlottetown, in the month of June, 1880. Two deaths resulted from the outbreak.⁴

QUEBEC.

YELLOW FEVER YEARS.

1805; 1812; 1864.

SUMMARY OF IMPORTATIONS.

1805.

One of the most noteworthy outbreaks of yellow fever in Canada took place at Quebec in 1805. Whence the infection came, authorities are silent, but they all agree that it was a genuine manifestation of the disease. Quebec then carried on a considerable trade with the West Indies and was probably contaminated by some of the not over-clean vessels plying between the two localities.

What makes the incident still more remarkable, is the fact that the fever was confined solely to the 59th Regiment, not a single inhabitant of the quaint French town contracting the disease. There were in all 55 cases, of which 6 proved fatal.⁵

In the same old medical journal where we gathered the above facts,⁶ is the relation of a strange epidemic which ravaged Montreal in 1799, and which, it is claimed, came from Quebec. In the fall of that year, the *Asia*, a large troop ship, arrived at Quebec from the Cove of Cork, having the 41st Regiment and two companies of the 6th on board. The transport was crowded, and not over-clean, and some recruits from a prison ship were suspected of having introduced the fever on board. Immediately on the *Asia's* arrival at Quebec, the men were transferred from the ship to bateaux and sent up the river to Montreal. Scarcely were they settled in quarters, when a "malignant putrid fever" broke out. Numbers of the men and many inhabitants died. Entire families fled from the town, and the impression the pestilential fever made on the people was so forcible, that for two years afterwards the inhabitants of Montreal shunned the approach of a soldier.

1812.

Berenger-Feraud⁷ states that yellow fever was observed at Quebec in 1812. The learned epidemiologist gives no further details, and the logical conclusion is that it was probably a solitary case on board the proverbial "vessel from the West Indies." Had the disease obtained a foothold on shore, such men as Bally, Chervin, Laroche, Manson, Clemow, Sternberg, Gorgas, Finlay and scores of others who have written at length on the history of yellow fever, would certainly not have allowed such a notable incident to remain unnoticed.

1864.

The third and last appearance of yellow fever at Quebec took place in 1864. In August of that year, the ship *Montgomery* from Nassau, one of the Bahama Islands (West Indies), arrived at the Canadian port. Yellow fever was epidemic at Nassau when the ship sailed, and there had been several deaths from the disease during the voyage. On August 15, a man by the name of MacClusty, who lived in a house opposite the wharf where the *Montgomery* was moored, was taken ill with yellow fever and died on the 19th. The infection did not spread.⁸

It is not stated whether or not MacClusty visited the *Montgomery*, but as he contracted the fever and no other case manifested itself, either on the vessel or at Quebec, the natural inference is that he did.

Saint-Pierre and Miquelon.

Description.

Saint-Pierre and Miquelon is a French colony, off the southeast of New Foundland, composed of the islands of that name and the islands of Langley and Isle-au-Chien. The importance of Saint-Pierre lies in the fact that it is the western terminus of three Atlantic cables. Population of the colony, 4,748, of which 3,743 reside on Saint-Pierre, 776 on Miquelon and Langley, and 499 on Isle-au-Chien.

Saint-Pierre-de-Miquelon, so called to distinguish the town from Saint-Pierre, Martinique, is the capital of the colony. It is on the southeast side of the island of Saint-Pierre, is compactly built of stone and has a good harbor. Population, 3,187, or almost the entire population of the island.

SUMMARY OF IMPORTATION.

1819.

The *Tarn*, attached to the French West Indian Squadron, left Martinique W. I., on July 19, 1819. Two

days later, a sailor was stricken with yellow fever and died the following day. On July 26, four cases erupted among the sailors, followed the next day by six additional cases. In the meantime, the *Tarn* reached Saint-Pierre-de-Miquelon with many of her crew down with the fever. Two died while the vessel was in the harbor, one on the seventh and the other on the tenth day of the attack. The disease then subsided without infecting the town.⁹

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CENTRAL AMERICA.

HISTORY OF YELLOW FEVER IN CENTRAL AMERICA.

Contrary to general expectations, Central America presents a sterile field for the study of yellow fever from a point of widespread prevalence. Although within a stone's throw from the West Indies, whence yellow fever radiated in the past to the four points of the compass, it has been remarkably free from the disease. Save for a fringe of coast-line bordering on the Atlantic, it can be said that the Central American States have enjoyed comparative freedom from invasions of the yellow scourge and one can, in almost every outbreak, place the onus on importation. What renders the situation still more perplexing, is that both to the north and south of the bellicose little republics which compose the Central American dis-Union, yellow fever is almost endemic, Mexico, the Isthmus of Panama and Venezuela having been notorious foci of the American Pestilence since the days of the buccancers.

How can this almost total exemption be accounted for? Surely not by the absence of the usual causes favorable to the propagation of yellow fever, for we find them all in Central America, even the pestiferous *Stegomyia Calopus*. Yet the Latin republics have had only two widespread epidemics in the past four hundred years. The yellow fever outbreak of 1878 was almost a pandemic, a case being imported even to London, England; yet there is no record of any invasion of the Central American States that year. Again, during the widespread epidemic of 1897, when the Mississippi Valley was invaded as far north as Cairo, and cases were imported to New York, Philadelphia, San Francisco, Baltimore and other localities hostile to yellow fever propagation, only a few isolated cases were observed in Salvador and Nicaragua, the balance of the States escaping infection altogether. In 1905, however, Honduras, Guatemala and Nicaragua were pretty widely infected, while Costa Rica and Salvador escaped contamination.

CHRONOLOGY OF YELLOW FEVER IN CENTRAL AMERICA.

1596. Locality not mentioned.

No Authentic Details Available between 1596 and 1803.

1803. HONDURAS.

No details.

1839. GENERAL.

No details.

1850. HONDURAS.

No details.

1860. HONDURAS.

No details.

1860. BRITISH HONDURAS.

Belize.

1868. NICARAGUA.

No details.

“ SALVADOR.

San Salvador.

1869. NICARAGUA.

No details.

1870. NICARAGUA.

No details.

“ SALVADOR.

No details.

1883. COSTA RICA.

San Jose.

1887. GUATEMALA.

Livingston.

1890. BRITISH HONDURAS.
Belize.
- “ COSTA RICA.
Port Limon.
1891. COSTA RICA.
Punta Arenas.
1892. COSTA RICA.
Alajuela.
Heredia.
Livingston.
Port Limon.
1893. GUATEMALA.
Livingston.
- “ HONDURAS.
Ceiba.
1894. HONDURAS.
No details.
- “ NICARAGUA.
General, but epidemic in:
Granada.
Managua.
- “ SALVADOR.
General, but epidemic in:
La Libertad.
San Salvador.
1895. GUATEMALA.
Champirico.
- “ SALVADOR.
Acajutla.
La Libertad.
San Salvador.
1897. NICARAGUA.
Corinto.
Leon.
Managua.

- “ SALVADOR.
San Salvador.
1898. COSTA RICA.
Port Limon.
- “ SALVADOR.
San Salvador.
1899. COSTA RICA.
Alajuela.
Heredia.
Port Limon.
Punta Arenas.
- “ SALVADOR.
San Salvador.
1900. COSTA RICA.
Alajuela.
Port Limon.
Punta Arenas.
San Juan.
San Jose.
- “ SALVADOR.
San Salvador.
1901. COSTA RICA.
Alajuela.
Jacunapa.
Liberia.
Port Limon.
- “ SALVADOR.
San Jose.
1902. COSTA RICA.
Port Limon.
1903. COSTA RICA.
Matina.
Port Limon.
San Jose.
Zent.

- “ NICARAGUA.
Bluefields.
1904. COSTA RICA.
Alajuela.
Port Limon.
1905. BRITISH HONDURAS.
Belize.
- “ GUATEMALA.
Gualan.
Livingston.
Tucura.
Zacapa.
- “ HONDURAS.
Ceiba.
Chamelicon.
Cienaguita.
Cholona.
Puerto Cortez.
- “ NICARAGUA.
Leon.
Managua.
San Francisco.
San Pedro.
1906. COSTA RICA.
Port Limon.
San Juan.
- “ HONDURAS.
Ceiba.
Choloma.
El Pariso.
Pimenta.
Puerto Cortez.
San Pedro.
- “ GUATEMALA.
Gualan.
- “ NICARAGUA.
Managua.

1907. COSTA RICA.
San Jose.
San Mateo.
- “ GUATEMALA.
Gualan.
Puerto Barrios.
Zacapa.
- “ NICARAGUA.
Managua.
1908. GUATEMALA.
Chiquimula.
Zacapa.

BRITISH HONDURAS.

British Honduras (also known as Balize or Belize), a British Colony of Central America, borders on the Bay of Honduras, an arm of the Gulf of Mexico, and lies between Mexico and Guatemala. Capital, Belize, on the Bay of Honduras, which has a population of about 6,000, mostly blacks.

SUMMARY OF EPIDEMICS.

BELIZE.

The history of yellow fever in Belize can be summed up in a very few words. The only white people in the town are English officers and traders and a few Americans. The balance of the population are negroes, who are proverbially immune from yellow fever and which accounts for the few outbreaks of the fever recorded in this history.

1860.

In the middle of July, 1860, yellow fever broke out in Belize, and in a short time decimated the white population, especially new-comers. The negroes and acclimated whites nearly all escaped, as did also the troops. The latter, with the exception of the officers, were black. An army assistant sergeant died. No statistics are given by our authority.¹

1890.

Yellow fever broke out among the British colonists at Belize in February, 1890. The first death occurred on February 17. There were altogether five cases, of which four proved fatal. The last case erupted May 23, and the last death took place June 1.²

1905.

From June 20, when the first case was reported, to November 30, 1905, there were five cases of yellow fever in Belize, of which three proved fatal. The victims were Englishmen.³

COSTA RICA.

Description.

Costa Rica (rich coast) the most southern republic of Central America, lies between the Caribbean Sea and the Pacific Ocean and is bounded on the north by Nicaragua and on the south by Panama. Capital, San Jose. Punta Arenas, on the Pacific and Port Limon on the Caribbean, are its principal ports.⁴

SUMMARY OF EPIDEMICS.

ALAJUELA.

1892.

Alajuela, 3,000 feet above the sea-level, was thought for a long time to be immune from invasions of yellow fever, owing to its elevation. In 1892, however, the disease was imported to the town. The infection was not widespread. The number of cases and deaths is not given by our authority.⁴

1899.

In 1899, Alajuela had a population of about 10,000. In the middle of August, a man arrived from Punta Arenas, where there had been sporadic cases of yellow fever for some time previous to his departure. He was taken ill with yellow fever shortly after arriving at Alajuela. From August 4 to September 24, 60 cases resulted, of which 21 proved fatal.⁵ Another authority states that there were 100 deaths, but does not give the number of cases.⁶

1901.

A solitary case of yellow fever was observed in Alajuela on June 7, 1901. The patient died.⁷

1904.

Yellow fever suddenly made its appearance at Alajuela about the middle of April, 1904. From the 18th to the 24th of the month, there were 11 cases, of which 6 died.⁸ The outbreak subsided as suddenly as it had begun.

HEREDIA.

1892.

Yellow fever "prevailed" in Heredia (six miles from San Jose) in 1892, but to what extent, our source of information⁹ does not state.

1899.

A solitary case was imported to Heredia from Alajuela in 1899. The ultimate fate of this case is left to conjecture.¹⁰

LIBERIA.

1901.

Liberia, a city of about 6,000 inhabitants, located in the "hot lands" near the Pacific Coast, was invaded by yellow fever for the only time in its history in 1901. The number of cases is not stated, but 66 deaths were recorded between March 21 and August 15. As the white population of Liberia is very sparse and the natives of Central America are seldom attacked by yellow fever, this mortality may certainly be considered excessive.¹¹

MATINA.

The village of Matina, 10 miles from Limon, on the Matina River, had 2 cases of yellow fever in 1903. The infection probably came from Port Limon.¹²

PORT LIMON.

Port Limon is on the east coast of Costa Rica, on the Caribbean Sea. It has a good harbor and is the eastern terminus of the Costa Rica Railway. It is surrounded by dense forests and does an extensive exporting trade in fruit, coffee, rubber, sarsaparilla and skins. Population, 5,000.

Port Limon is not an endemic focus of yellow fever, the disease always having been imported in every recorded instance. Of late years, however, or, to be more precise, since 1900, yellow fever has been present almost every year in the port. In 1901, the infection was widespread, thirty-two foci being created within the corporate limits of the town, resulting in 63 cases and 17 deaths. In 1903, another widespread epidemic took place. As three-fourths of the population of Port Limon are negroes—a race commonly immune from attacks of yellow fever—and the whites generally flee whenever an outbreak of yellow fever assumes a malignant phase—there is certainly ground for alarm that the disease may become endemic. Only the modern measures intelligently directed against the inroads of the yellow plague—the screening of first cases and the total extermination of the *Stegomyia Calopus*—can save the beautiful metropolis of Central America from becoming, like her South American neighbors, the endemic home of a disease which modern science has proved can be eradicated from a community. The brilliant victories achieved in Havana, New Orleans and Panama are monumental examples of what well-directed preventive measures can accomplish. The same thing can be done in Central America.

SUMMARY OF EPIDEMICS.

1890.

Although yellow fever undoubtedly prevailed at Port Limon in former years, no authentic record can be found previous to 1890. In December of that year, 2 cases were

observed, but whether they proved fatal or not, is not stated.¹³

1893.

Sporadic cases of yellow fever broke out in Port Limon at the end of May, 1893. An old man, an employe of the customhouse, a native unacclimated to Limon, died of the fever on the 28th. On the report of this death, there was a general exodus of the white residents into the interior, most of them migrating to San Jose. By means of this partial depopulation, only acclimated negroes remaining, the progress of the outbreak was checked.¹⁴

1898.

From June 14 to September 1, 1898, there were six deaths from yellow fever in Port Limon.¹⁵

1899.

From August 18 to August 29, 1899, 2 cases and 1 death.¹⁶

1900.

The first case in 1900 was in the person of a Costa Rican, aged 76, who was taken ill on April 19, less than three days after his arrival from the interior of the country, and is presumed to have been infected at Punta Arenas. The patient died on the 20th.

The steamship *Holstein* arrived at Port Limon from Mobile, Alabama, August 16. Two days later the captain of the vessel died of yellow fever. There was no yellow fever at Mobile in 1900, so the vessel was evidently infected at another port of call.

On August 21 a case of yellow fever erupted on board the steamship *Cunard*, from Colon, and was transferred to the quarantine station. The patient died on the 23rd.

Between October 31 and November 4, a case of yellow fever developed on shore and a case was reported on board

the steamship Adler, from Bocas del Tora, Colombia. The patients recovered.

Resume for 1900: Total cases, 5; total deaths, 2¹⁷

1901.

A small epidemic of yellow fever prevailed at Port Limon in 1901.¹⁸

The first case was reported on March 31, in the person of a Canadian who had been in Port Limon one month. Recovery. The second case, an Englishman, who had been in the town about a year, was taken ill June 9. While a resident of Port Limon, the patient had been employed on the railroad near Alajuela, where yellow fever was prevailing, and evidently contracted the disease there. He recovered.

The third case, which marked the real beginning of the epidemic, erupted in the person of an American, of English parentage, who had been in Port Limon only a few months. He was admitted to the Hospital of the United Fruit Company on July 1, suffering from yellow fever. He recovered. A sister of the above case, who lived in the same house in which he spent the first two days of his illness, was taken ill on the eighteenth day from the initial chill of her brother, and had a typical, though mild fever. She had had no further communication with the patient from the time of his removal to the hospital, and her case is one of the thousands illustrations of the truth of the mosquito theory of the transmission of yellow fever.

From this focus, the fever gradually extended throughout the town. From July 1 to October 12, there were altogether 61 cases, of which 17 proved fatal. Adding to this the cases observed on March 31 and June 9, gives a total of 63 cases for 1901.

Yellow Fever in Port Limon During the Quarantine Season of 1901.

The following comprehensive summary of this remarkable outbreak, made by Dr. Goodman, then Assistant

United States Marine Hospital Surgeon at Port Limon, will be found interesting and instructive:¹⁹

During the quarantine season of 1901—that is, from April 1 to November 1, there were 63 cases of yellow fever in Port Limon, Costa Rica, to my personal knowledge. Of these, 45 contracted the disease in Port Limon, and 18 came or were brought from stations on the railroad, distant 2 to 30 miles. These cases occurred by months as follows: April, 1 case; May, none; June, 2; July, 5; August, 26; September, 25; October, 4. About September 15 the heavy and continued rains set in and the mortality rate from all diseases was very much lessened. For instance, there were from all causes, 39 deaths from August 15 to September 15, and only 19 from September 15 to October 15.

Of these 45 cases of yellow fever, originating in Port Limon, 20 were natives and 25 Americans and Europeans. The disease appeared in 22 houses or foci, a brief history or description of which follows:

Focus I.—A second-class hotel, block No. 43, 1 one-story building, close to the ground, in a badly drained lot; thence we had case No. 1, April 1, 1901, Englishman; case No. 3, June 16, 1901, Englishman; case No. 30, August 28, 1901, American; case No. 59, October 28, 1901, American; case No. 60, October 3, 1901, American.

Focus II.—In the extreme western end of the town, 7 1/2 blocks, or about 750 yards, from Focus I, on a hill surrounded by shrubbery; rain water, caught in barrels and in a tank, is used for drinking; it is a one-story dwelling house, and here we had case No. 2, June 12, American; case No. 33, August 29, native, wife of an American.

Focus III.—One hundred and twenty-five yards north of Focus II, higher up the hill; dense foliage close to the house; rain water used and mosquitoes plentiful; communication between Foci II and III by no means easy, owing to undergrowth and the steep hillside; here we had case No. 4, July 4, American; case No. 5, July 18, American; case No. 9, August 1, American.

Focus IV.—Two hundred and sixty yards south of Focus I, a two-story house on the railroad in a low, badly drained spot, mosquitoes plentiful; here we had case No. 6, August 1, native; case No. 11, August 5, native; case No. 10, August 15, native; case No. 35, September 1, native.

Focus V.—In the middle of block 17, 60 yards west of the park, 120 yards NE. of Focus IV, and 250 yards south of Focus I, one of several rooms in a long row, partitions going up only partly to the top. Case No. 12, August 8, native. No attempt at disinfection was made at this house, it being impossible from its construction. The roof was thrown open and strong winds and bright sunlight allowed to pass through.

Focus VI.—City jail, between seawall and park, 160 yards SE. of Focus V, 220 yards S. of E. of Focus IV. The first floor used for prisoners, the second is sleeping rooms for the policemen. Case No. 13, August 9, native; case No. 47, September 20, native.

Focus VII.—One hundred yards southeast of Focus I, and in the same block; offices on the ground floor, sleeping rooms above. Case No. 7, August 8, American; case No. 28, August 23, American.

Focus VIII.—The United Fruit Company's Hospital, to which most of the yellow fever patients were carried and put into wards isolated and provided with screened doors and windows; only 1 case originated here, that of a white nurse; all other nurses were negroes. Case No. 51, August 7, Englishman.

Focus IX.—In block 35, 15 yards south of Focus III; a two-story house on the hill, surrounded by shrubbery; cistern water used; the house had been vacant for months until occupied by this patient a few days prior to her illness. Case No. 18, August 10, Englishman.

Focus X.—Southeast half of the Grand Hotel, a three-story building, one room deep, 300 feet long; attached to this southeast end is the hospital of the Costa Rica Railroad. All cases occurring in this building, whether from Foci X, XVIII or XX, were in the second-story,

where mosquitoes were troublesome at times. On the third floor the very strong zreezes kept the rooms free of them. Case No. 20, August 16, Englishman; case No. 22, August 17, Englishman; case No. 44, September 12, American; case No. 62, October 4, American.

Focus XI.—Custom-house; second floor used as residence; 80 yards east of Focus VI. Case No. 21, August 16, native; case No. 58, September 28, native.

Foci XII and XIII.—Thirty yards south of Focus I and about 60 yards west of Focus VII, all in the same block; Focus XII downstairs and to the rear, Focus XIII upstairs and to the front. Case No. 26, August 20, native; case No. 27, August 20, native.

Focus XIV.—Twenty-five yards north of Focus V. Case No. 29, August 24, native.

Focus XV.—Twenty yards south of Focus VIII. Case No. 37, September 3, native.

Focus XVI.—Forty yards northeast of Focus XIV. Case No. 31, August 31, native; case No. 34, September 2, native.

Focus XVII.—Sixty yards E. of Focus XVI, 120 yards NW. of Focus X. Case No. 38, September 9, native; case No. 39, September 9, native.

Focus XVIII.—Twenty yards SE. of Focus X. Case No. 7, August 1, native; case No. 40, September 6, Englishman.

Focus XIX.—One hundred and twenty yards N. of Focus IX. Case No. 42, September 9, American; case No. 43, September 11, American.

Focus XX.—Northwest half of Grand Hotel, this with Foci X and XVIII may properly be considered as one building. Case No. 53, September 27, American; case No. 61, October 4, American.

Focus XXI.—One hundred and twenty yards N. of Focus XIX and 100 yards W. of Foci I and XII. Case 54, September 24, native.

Focus XXII.—One hundred and twenty yards N. of Focus VIII. Case No. 57, September 30, German.

In drawing deductions from the above facts the following should be borne in mind:

Strong western and southwestern land breezes prevail at night, and eastern or sea breezes during the day—much personal intercommunication between the natives is probable, but between them and Americans it is at most very limited.

With few exceptions the patients were removed on the first or second day of illness to the isolated yellow fever wards of the hospital, and disinfection of the vacated rooms done.

The population of Port Limon is about 4,000, made up of, say, 3,000 Jamaican negroes, who seemed to be immune, and 1,000 Americans, Europeans and natives of Spanish ancestry. Many of the inhabitants who could give no cause for immunity escaped the disease.

Those physicians having the largest practice and the quarantine officials provisionally, at least, accepted the mosquitoes as a means of propagation of yellow fever and advised the general use of mosquito netting.

1902.

The year 1902 witnessed another stubborn outbreak of yellow fever at Port Limon.

According to Acting Assistant Surgeon Carson,²⁰ cases began showing themselves as early as March, but were not reported as such. The first case to receive official recognition was that of a native laborer, aged about 25, who had been sick two days without medical attention, and who was admitted to the United Fruit Company's hospital on April 14, where the nature of his illness was at once recognized as yellow fever. Death on the 16th.

Between April 16 and 23, three more cases were admitted into the hospital. All recovered.

Week ending May 1: One case, brought from Cairo Junction, about 40 miles by rail from Port Limon; not recognized as yellow fever until after admission into the hospital.

July 5, one death, an imported case from the Zent District, 20 miles from Limon, on the Costa Rica Railroad.

July 10, two cases were admitted into the United Fruit Company's hospital, brought, respectively, from Zent Junction and Guasimo, 20 and 51 miles by rail from Port Limon.

July 17, two new cases.

July 22, one death at hospital.

August 8, one death at hospital. Imported from Cairo Junction.

August 22, one case, from Zent Junction, admitted to hospital.

September 7, two cases, originating at Port Limon.

Three new cases were admitted to the hospital on October 6 and 7, one Italian and two Costa Ricans.

October 6 to 30, 4 cases and 3 deaths.

Cases broke out sporadically as late as December, the last case being reported on the 6th. Altogether, from July 4 to December 6, there were 27 cases, of which 14 died.

1903.

In 1903, yellow fever broke out in April. Among the first to be attacked was Dr. Allan Jumel, of New Orleans, then Inspector of the Louisiana State Board of Health at Port Limon, who made an uneventful recovery. The first death occurred on April 17, in the person of an employe of the Costa Rican Railroad. From that date, the fever gained rapid headway, the type becoming graver and less amenable to preventive treatment. The epidemic came to an end on October 29, with the following record: Cases, 99; deaths, 50.²¹

1904.

As early as March, a case of yellow fever was treated at the United Fruit Company's hospital. Nothing untoward happened until the end of May, when three cases were reported on the 28th. One was imported from a banana farm near Port Limon; the others originated in town. All recovered.

No cases reported until July 9, when an American missionary, who had lived for some months in Port Limon, was attacked. Recovery.

For week ending July 16, one case, a Spanish-American woman, a resident of Port Limon who had been two months in Port Limon.

Week ending October 15, one case, imported from Squires, 36 miles from Limon. Recovery.

Total for 1904: Cases, 7; deaths, 1.²²

1905.

An American, who had been for a few months resident in and about Port Limon, with a positive history of having been in the town since the morning of June 16, was found in a public park very sick on the 19th, and taken to the hospital. Sporadic cases were observed from that date until October 12, a total of 6 cases, of which 2 proved fatal, being recorded.²³

PUNTA ARENAS.

Only vague information can be had concerning the history of yellow fever in Punta Arenas. The disease was present in the town in 1892, 1899 and 1900, but to what extent is not stated.²⁴

SAN JOSE.

1883.

During the widespread epidemic of yellow fever in Mexico and Central America in 1883, a few cases were observed at San Jose.²⁵

1900.

In the early days of August, 1900, a Costa Rican came to San Jose from Port Limon, where yellow fever was

prevailing. He was taken ill on the 6th and died on the 9th, with black vomit.²⁶ This was the only case in San Jose in 1900.

1901.

In August, 1901, a few cases of yellow fever were imported to San Jose from Port Limon. The infection did not spread.²⁷

1903.

Three years later, another case was imported to San Jose from Port Limon. Dr. Bentel, a chemist in the employ of the Costa Rican government came to Port Limon from the capital, on official business in 1903. On May 27, he was taken ill and returned to San Jose, where he died on the 30th. Another case was brought to the town in August 3, and died two days later. There was no diffusion of the malady.²⁸

1906.

Two cases of yellow fever were imported to San Jose in 1906.²⁹

1907.

A physician contracted yellow fever in the banana district, about 45 miles from Port Limon, in September, 1907, and went to San Jose for treatment. The report does not state what ultimately became of the case.³⁰

SAN JUAN.

1900.

A case of yellow fever was imported to San Juan in May, 1900. The patient recovered.³¹

ZENT.

1903.

There were 4 deaths from yellow fever at Zent Junction in 1903. There must have been a widespread infection in the village, as several cases were imported therefrom to Port Limon and the surrounding country.

GUATEMALA.

Guatemala lies south of Mexico and borders on the Pacific, and has a small coast line on the Bay of Honduras. Capital, Guatemala. Puerto Barrios on the Bay of Honduras, is the principal port.

The history of yellow fever in Guatemala can be told in a very few words. The following summary is made from the records of the United States Marine Hospital Service:

CHAMPERICO.

1895.

Yellow fever reported "present."³³ No details available.

CHIQUIMULA.

1907.

A few cases of yellow fever reported.³⁴

1908.

Population, 6,000. A few cases of yellow fever, imported from Zacapa.³⁵

GUALAN.

1905.

A severe epidemic of yellow fever ravaged Gualan, 80 miles from Puerto Barrios, in 1905. The number of cases is not given, but the estimated number of deaths, from August 20 to November 9, is placed at 200. No exact statistics could be obtained.³⁶

The first cases of yellow fever in the history of the town, came under observation in August, 1905. The cases in the railroad hospital were kept under bars, and every pre-

caution used to prevent the spread of the infection, no standing water being allowed around the buildings; but in the town itself nothing was done.

1906.

August 24, two cases; one died. Sporadic cases observed during the year³⁷

1907.

Between May 15 and 21, three cases; one died.³⁸

LIVINGSTON.

1887.

August 7, four cases; August 27, "several cases."³⁹

1889.

July 28, one case, followed by death. No developments.⁴⁰

1892.

Yellow fever broke out in May and "raged most malignantly." No statistics given.⁴¹

1905.

Yellow fever was epidemic in many cities of Guatemala in 1905. A total of 27 cases, of which 12 died, is recorded for Livingston.⁴²

PUERTO BARRIOS.

1907.

Diligent research has failed to find any history of yellow fever so far as Puerto Barrios is concerned, previous

to 1907. On June 27, a solitary case was reported, in the person of a Spanish officer in charge of the curatel. Original source of infection not stated.⁴³

TUCARA.

1905.

Tucara suffered from yellow fever during the epidemic of 1905. The first case was reported August 7. Statistics are not given.⁴⁴

ZUCAPA.

1905.

The Guatemalan yellow fever epidemic of 1905 was quite extensive in Zucapa, a town of about 6,000 inhabitants, in the interior, 100 miles by rail from Puerto Barrios.

The disease made its appearance in Zacapa the latter part of June. The infection was introduced from Livingston through natives who were permitted to return to their homes in Zacapa after the outbreak of the fever in Livingston. The fever was not recognized as yellow fever until August, by which time the infection was thoroughly disseminated throughout the town, there being hardly a house in the place which had not had a case. No reliable information as to the number of cases or deaths could be obtained, but reliable reports estimate the number of deaths at about 700.⁴⁵ At the time of the outbreak a great number of people left and went to the mountains, leaving only about 3,500 in the place during the height of the fever. This is the first time yellow fever has ever appeared in Zacapa.

1907.

The second appearance of yellow fever in Zacapa took place in 1907. On May 16, a case was imported from Gualan. In the latter part of May, the disease was re-

ported epidemic, with about two deaths daily. No reliable statistics could be obtained. Sporadic cases were observed as late as November.⁴⁶

HONDURAS.

Honduras, one of the Central American Republics, lies between Nicaragua and San Salvador and the Pacific Ocean and the Caribbean Sea. Capital, Tegucigalpa.

Although discovered by Columbus on his fourth voyage (1502), and in close proximity to the West Indies, it is only within very recent years that yellow fever has been observed in Honduras. Berenger-Feraud⁴⁷ speaks of a "severe epidemic" in that country in 1803, imported by the ship *Hibber*, but gives no details. The same authority (page 119) says that Honduras was "contaminated" in 1850, but in what manner and to what extent, is left to the imagination. With the exception of 1905, no general epidemic of yellow fever has ever been observed in Honduras.

CEIBA.

1905.

From August 1 to 24, 1905, there were six cases of yellow fever in Ceiba, of which three proved fatal. One of the cases was imported by the steamship *Nicaragie*, from New Orleans. Last death, August 22. The outbreak was not very extensive.⁴⁸

1906.

Yellow fever was reported "present" in Ceiba from July 21 to 29; no details given.⁴⁹

CHAMELICON.

1905.

From June 18 to October 10, 1905, there were 143 cases of yellow fever in Chamelicon; 49 died.⁵⁰

CHOLONA.

1905; 1906.

Cholona, which has a population of about 4,000, has been visited twice by yellow fever—1905 and 1906.

In 1905, from June 18 to December 12, 150 cases were observed; 59 died.⁵¹

In 1906, from April 6 to April 19, there were 7 cases; 1 died.⁵²

CIENAGUITA.

1905.

March 21 to September 7, 20 cases; 5 deaths.⁵³

EL PARISO.

1906.

Present between June 15 and June 19. No record of cases; 1 death.⁵⁴

NACAOME.

1894.

April 8 to 28, 5 deaths; number of cases-not reported.⁵⁵

PIMENTA.

1906.

May 23, 20 cases reported, which proves that the town must have been infected for some time previously. From that date to June 6, a total of 85 cases and 20 deaths is recorded. The epidemic lasted until October, but complete statistics are not obtainable.⁵⁶

PUERTO CORTEZ.

1905.

Imported cases of yellow fever may have been observed at Puerto Cortez previous to 1905, but no authentic records could be found bearing on the subject.

The only epidemic which has ever visited the port, took place in 1905, and is thus described in the United States Public Health Reports:⁵⁷

The first case to come under observation was reported May 25. The patient a young man was taken sick suddenly with a chill in the night, violent pains in the back and head, vomiting and delirium. On the third day urinal examination showed 15 per cent. albumen. He died on the eighth day, in convulsions. This was a typical case throughout.

The next case was an old man at a hotel. He had all the symptoms. Was taken ill suddenly; on the third day albumen showing as much as 4 per cent. He died on the sixth day in coma.

The next patient was a custom-house inspector, who was taken ill with the same symptoms and about the same time as the second case. On the fifth day albumen showed 25 per cent.; temperature, 102; pulse, 46; died in coma.

Another case was that of a native boy, reported by the Government surgeon at about the same time. He also died. All had black vomit, except the old man at the hotel. Four other cases were taken sick about the same time and recovered. The first, a woman boarding at the hotel, was taken violently ill with a chill in the night, with vomiting, violent pains in the back, limbs, head and delirium. On the third day albumen from 10 to 15 per cent. This case recovered. The daughter of this patient was attacked in the same way, with the same train of symptoms, during her mother's convalescence. Albumen about 10 per cent.; urine cleared up on the 6th day; went on to recovery.

An Italian at the hotel was attacked about the same

time. His was a typical case. Albumen, 25 per cent.; pulse went as low as 40, with a slow convalescence.

The eighth case was that of the surgeon of the United Fruit Company and is of much interest, showing the enormous quantity of sulphate of quinine a person of long experience in the Tropics can stand without injury in yellow fever. This patient had lived in the Tropics about fifteen years, having spent five years of his life at Limon, going through three epidemics there without contracting the disease. He considered himself immune. On May 30 he was taken violently ill with all the train of symptoms of yellow fever. Two days before this he complained of feeling very badly, but still remained at work, and said he supposed he was going to have a sharp spell of remittent fever, as he had not had an attack for a long time. He began taking large does of sulphate of quinine to reduce the temperature, but he complained he could not bring his temperature to normal and lower than 101 1/2, and during the two days before he was taken ill, he told me that he took 280 grains of sulphate of quinine and 1 ounce of Warburg's tincture to reduce his temperature. On Thursday night he had the preliminary chill, temperature going to 104 1/2, and from that time on during his illness he never showed the bad effects of the quinine, although he had a very serious attack of yellow fever and at one time the urine test showed 25 per cent. albumen.

Of the first eight cases of the epidemic, four recovered and four died.

From the date of the breaking out of the epidemic (May 25) to June 18, 10 additional cases were reported, of which 4 died.

The epidemic came to an end on December 12, with a record of 148 cases, of which 50 died.

1906.

On March 7, 1906, a case of yellow fever was reported in Puerto Cortez. It was a mild case and the patient

made an uneventful recovery. No other cases are recorded.⁵⁸

SAN PEDRO.

1905.

San Pedro, 35 miles from Puerto Cortez, experienced its first extensive epidemic of yellow fever in 1905. From June 18 to December 12, there were 625 cases, of which 153 proved fatal.⁵⁹

1906.

March 18 to March 24. Yellow fever present. No statistics.⁶⁰

NICARAGUA.

Description.

Nicaragua lies between Honduras and Costa Rica and extends from the Caribbean Sea to the Pacific Ocean. Principal cities: Bluefields, Leon, Granada, Nicaragua and Managua, the capital.

Berenger-Feraud says that yellow fever was imported to Nicaragua in 1868 by voyagers from infected localities, but gives no details, merely mentioning this fact and stating that "several localities" were affected.⁶¹

According to Lawson, the disease was also present in Nicaragua in 1869.⁶²

Cornilliac notes the fact that many localities were affected in 1870.⁶³

BLUEFIELDS.

1903.

Bluefields is on the Caribbean coast of Nicaragua, and has a population of about 3,000. Yellow fever has rarely been observed at this port, and in every instance it was imported. Statistics are meager and unreliable concerning the prevalence of the disease at Bluefields, the only authentic case on record being in 1903, when the Schooner *Sunbeam*, from Limon, brought a case to the town on May 8. Proper sanitary measures were instituted and there was no spread.⁶⁴

CORINTO.

1897.

Corinto, like other ports on the Pacific coast of Nicaragua, has been almost immune from yellow fever. The only instance when the disease made any headway in this port was in 1897, when it was introduced by vessels com-

ing from infected Mexican and South American ports. Reliable statistics as to the extent of this outbreak are lacking.⁶⁵

GRANADA.

1894.

Granada has a population of 15,000 and is on the north-west shore of Lake Nicaragua, about 30 miles from the city of Nicaragua. Yellow fever prevailed to a limited extent in this place in 1894. No statistics obtainable.⁶⁶

JUCUNAPA.

1901.

A case of yellow fever was brought to Jucunapa in 1901. As soon as the inhabitants became aware of the state of affairs, they fled to various parts of the republic, leaving the town practically deserted. Only one case is recorded.⁶⁷

LEON.

1897.

Leon lies between Lake Managua and the Pacific Ocean and has a population of 25,000. Yellow fever was brought to Leon by refugees in August, 1897, and prevailed epidemically to the end of September, according to official reports. No statistics could be obtained.⁶⁸

1905.

Yellow fever prevailed for the second time in the history of Leon in 1905. Like other epidemics of this kind in Central America, details are lacking.⁶⁹

MANAGUA.

The history of yellow fever as it concerns Managua may be briefly summarized as follows, as no details are obtainable:⁷⁰

1894. Present.

1897. Present.

1905. Thirty cases; number of deaths not stated.

1906. Present.

1907. Present.

SAN FRANCISCO.

1905.

The extensive yellow fever epidemic of 1905 invaded San Francisco, a small town near the Pacific coast, during the last days of August. The number of cases is not given; deaths, 2.⁷¹

SALVADOR.

Salvador is bounded on the north by Honduras and Guatemala, east by Nicaragua and south by the Pacific Ocean. Capital, San Salvador.

Salvador has suffered less from yellow fever than the other countries of Central America. The outbreaks so far as could be collected from the scant literature on the subject, were as follows:

ACAJITLA.

1896. Yellow fever reported as prevailing extensively. No statistics.⁷²

LA LIBERTAD.

1894. Yellow fever "present."⁷³

1896. Yellow fever reported as "making rapid progress." No statistics.⁷⁴

SAN SALVADOR.

The city of San Salvador is one of the oldest in Central America, having been founded by the Spanish in 1523. It is 105 miles southeast from Guatemala, near the Pacific Ocean. San Salvador was moved from its original site near the base of the volcano of the same name in 1854, on account of the prevalence of destructive earthquakes, but it has since twice been partially destroyed by these mysterious convulsions of nature. Before the last earthquake (1873) the population was 40,000; it is now about half that figure.

1868.

The first record of yellow fever having prevailed in San Salvador is given by Guzman, who states that 401 cases were treated at the Casa Amarilla (yellow fever hospital) in 1868. Of these cases, 296 were males and 85 females. The mortality was 132 (85 males and 47 females). The source of infection is not given.⁷⁵

1870.

Cornilliac states that yellow fever was observed in San Salvador in 1870. No statistics.⁷⁶

1894.

After a lapse of 24 years, yellow fever again made its appearance in San Salvador. The first person attacked was one of the mail-service boys, who caught the infection at La Libertad. Beyond the statement that the mortality was 60 per cent., no other information is given by our authority.⁷⁷

1896.

Yellow fever was reported "present" in San Salvador in October 19, 1906. Further details not obtainable.⁷⁸

1897.

Yellow fever broke out with much virulence in July and raged until December. Cases and deaths were as follows:

July	38 cases.	11 deaths.
August	54 cases.	16 deaths.
September	34 cases.	12 deaths.

Total for three months..	126	39
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The epidemic decimated the foreign population. Among the prominent victims were the Russian Princess Dolgorouky, who had come to San Salvador to give concerts, and Mr. Baker, the manager of the London Bank. The American Colony did not suffer much.

The epidemic came to an end in December. Complete statistics not given.⁷⁹

1898.

Yellow fever again broke out in San Salvador in 1898. Following statistics are furnished by the United States Marine Hospital Service.⁸⁰

To June 4, total of 34 cases and 8 deaths.

From that date to August 7, 38 new cases, of which 8 proved fatal.

Total, 72 cases; 16 deaths.

1899.

June 30 to August 1, a total of 3 cases and 1 death is reported.⁸¹

1900.

Yellow fever broke out as early as February; five deaths being reported between the 11th of that month and March 3. Between the last mentioned date and April 11, there were 38 new cases. After this, the epidemic subsided, only 3 new cases and 1 death being reported to August 1. Sporadic cases were subsequently observed, but no complete statistics are obtainable.⁸²

1901.

In 1901 the fever broke out during the last week of March, and from that time to the end of June, 10 cases and 6 deaths were reported. As in other outbreaks of the disease, it is impossible to give exact statistics. In every eruption of yellow fever in Central America, the policy of concealment is adhered to by the authorities, and it is only by constant vigilance that the representatives of foreign governments are able to arrive at the truth.⁸³

That yellow fever prevailed to a considerable extent in San Salvador in 1901, is evidenced by the fact that a certain college in that city was ordered closed by the government; five cases and one death having occurred among the students.

1907.

Yellow fever was reported epidemic in the Republic of Salvador in January, 1907.⁸⁴ No further information is furnished, but the outbreak could not have been very

severe, for even the most guarded policy of concealment could not have kept the facts from the public during the two years which have elapsed since the first news were telegraphed to the United States Marine Hospital Service at Washington.

SANTIAGO DE MARIA.

1901.

Refugees from Jucunapa infected Santiago de Maria in 1901, for the first time in its history. No statistics.⁸⁵

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MEXICO.

HISTORY OF YELLOW FEVER IN MEXICO.

Mexico presents an interesting and prolific field for the study of yellow fever.

Yellow fever (*the vomito prieto*) of the early Spanish colonists, has prevailed from time immemorial between the mouth of the Rio Antigua and the present port of Vera Cruz. The Abbe Chavigero, whose History of Mexico is a classic, affirms that the disease under discussion appeared for the first time in Mexico in 1725. It is a matter of history, however, that long before the arrival of Cortez and his murderous band of pillagers, there prevailed periodically in "New Spain" an epidemical disease called by the natives *Matlazahuatl*, which was no doubt the same as the yellow fever of the present day.

Endemic Foci of Yellow Fever in Mexico.

In a paper read before the American Public Health Association, at its Annual Convention in 1893, Dr. Eduardo Liceaga, of Mexico, gives a minute and elaborate history of the ravages of yellow fever in Mexico. The learned scientist covers every point so fully and admirably, that we take the liberty of appropriating his thunder in making this summary.

Dr. Liceaga states that investigations which have been undertaken by historians have never been able clearly to determine whether the yellow fever originated in Vera Cruz, or was imported from other parts. Many authors are inclined to adopt the latter opinion, and especially Dr. Charles Heinemann, a distinguished German physician, who for many years practised his profession in that port, and from whose interesting works Dr. Liceaga took many of the data for his paper. However this may be, the fact is that Vera Cruz, for more than two centuries, has been the most important hot-bed of yellow fever in the whole coast. From this point the troops started in 1843, and introduced the disease for the first time in the

port of Tampico. The epidemics which ravaged the same port in the years 1847-48, and in 1863-64, owe their origin to the same circumstances. In the same way, the disease was carried to Tuxpan in the year 1863, and to Jicaltepec in the years 1861 and 1868.

In Vera Cruz the greater part of the epidemics take place in the summer time, between March and October; but on some occasions, as in the years 1867-68, and in 1877-78, the epidemics raged through the winter.

According to Dr. Heinemann, the port of Alvarado, situated eighteen leagues to the southeast of Vera Cruz, and near the mouth of the River Papaloapam, is another center of the disease.

Tlacotalpam is a city situated on the left bank of the same river, and at a distance of twenty-five miles from Alvarado. It is also considered as a cradle of yellow fever.

Laguna is the principal town on the Island of Carmen, and derives its importance from the exportation of dye-woods. This is another permanent center of the disease, which causes numerous victims, every year, among the foreign sailors.

Campeche is the capital of the state of the same name, in the peninsula of Yucatan, and is another source of yellow fever at those times when federal troops are stationed here, proceeding from the more elevated parts of the country, or from abroad. This happened in the year 1865, when two companies of Austrian troops lost the greater part of their numbers through yellow fever.

The City of Merida, capital of the State of Yucatan, which covers the northern part of the peninsula of the same name, as well as the districts comprised within that state under the name of Unucma, Progreso, Temax, Tizimin and Valladolid are considered as centers of yellow fever by Dr. Jese Palomeque, a distinguished physician of Merida, and who declares that the disease in that place finds its greatest development amongst the foreigners who have not already had it, the natives of the elevated tablelands in the central part of the republic, and the Indians from the other towns of the same state.

To the districts of the states of Yucatan above mentioned, Dr. Domingo Orvananos, in his recent work, adds the districts of Motul and Mazcanu as being centers of yellow fever.

The preceding lines will have demonstrated that in the Gulf of Mexico, and out of a length of 2,580 kilometres of coast, only that small part belonging to the canton of Vera Cruz, to the district of Frontera, to Campeche, and the northern coast of the peninsula of Yucatan, can be considered as *centers* of yellow fever, as they are in constant communication, by sea, with each other, and with the Island of Cuba. It is to be noted that these last mentioned localities are only separated from Cuba by a narrow strait, and that it is natural to suppose that the disease was originally imported from that island.

In contrast to the narrow limits of the centers of infection, we can present the enormous coast line of the Gulf, and of the Pacific, where yellow fever prevails only transported from those places in which the disease prevails in an endemic form.

Along the Pacific Coast.

The port of Matamoros, situated opposite Brownsville, United States, has suffered from epidemics of yellow fever in the years 1858, 1863 and 1867.

Altamira went through its first epidemic of black vomit in the month of October, 1821, shortly after the arrival in that port of a vessel from Havana. More than fifteen hundred persons, both native and foreign, succumbed during the ravages of the epidemic.

Tampico, situated on the left bank of the river Panuco, was visited, as previously mentioned, by its first epidemic of yellow fever in the year 1843, twenty years after its foundation.

Tuxpan, on the left bank of the river of the same name, was visited by an epidemic in the year 1838, which was not repeated until the year 1863, and was then imported by vessels arriving from Vera Cruz. It attacked the natives of the locality, the Mexicans newly arrived from

the table-land and foreign sailors, and it afterwards spread to the villages of Jico and Huauchinango.

Papantla and Misantla were visited by an epidemic of yellow fever of the most deadly character, which was imported by the troops passing through those districts during the revolution of 1876.

Naulta was visited by the epidemic in 1859; Jicaltepec, in the years 1861 and 1868.

Trusting to the information given by Dr. Heinemann, below is given a list of the following towns in which yellow fever has never appeared within the memory of man:

Santecomapan, La Barilla, Cupilguillo, Dos Bocas, Chiltepec, San Pedro y San Pablo, Barro del Rio Palizada and Champoton. According to many other numerous and reliable reports, the foreign sailors in these ports have hitherto escaped the disease, in spite of the hard work they have to perform under a burning sun, receiving and stowing the goods with which the ships are loaded.

Coatzacoalcos and Minatitlan were invaded by the epidemic in September, 1892, imported by persons who had arrived from Vera Cruz in the steamer *May*.

Frontera has from time to time been visited by mild epidemics, which have attacked both natives and foreigners.

San Juan Bautista de Tabasco had never been visited by yellow fever until the year 1877, when it was imported by the troops under the command of General Enriquez, coming from Campeche, and touching in Frontera.

The disease attacked the inhabitants of this town, without distinction of race, and afterwards spread to Micaltepec, Huimanguillo, San Antonio, Cardenas, Nacayuca, Jalapa, Pichucalco. Doctor Castanares, who has lived in that locality, believes that the Mexicans who are natives of the old country, and those of the neighboring State of Chiapas, are the first to be attacked by the epidemic, while it respects the natives of the State of Tabasco.

During the construction of the Vera Cruz-Mexico Railroad, and as the works advanced, the disease presented itself in all the stations excepting that of Tejeria, although it is only situated at a distance of fifteen kilo-

metres from Vera Cruz. This station preserves its immunity to this day, while in La Soledad, El Camaron, Paso del Macho and Atoyac, a few cases of yellow fever are observed almost every year.

But the city situated on this road in which the epidemic has presented itself on several occasions, and where it has carried off the largest number of victims, is Cordova. Situated at a distance of 105 kilometres from Vera Cruz, and at an altitude of 827 metres above the sea level. It has undergone epidemics imported from that port, in the years 1866-67, 1876-77, 1880-81 and 1892-93.

In the year 1876, more than two thousand persons perished in the epidemic, which spread to many of the neighboring towns and villages.

Following the ways of communication by the road from Vera Cruz to Jalapa, the epidemic was carried to the towns of San Juan and Paso de Ovejas, but did not reach Jalapa, which is almost at the same distance from Vera Cruz as Cordova, but at an elevation of 3,960 feet above the sea level. This is the highest point in which the yellow fever has, up to the present date, been found susceptible of development.

The extensive coast of the Pacific had always enjoyed an immunity from this epidemic, with the exception of short stretches belonging to the States of Michoacan, Oaxaca and Chiapas, which on two distinct occasions had been visited by yellow fever.

In the localities mentioned below, all memory had disappeared of an epidemic of this class, if they ever had known such a thing, so that when it presented itself in Mazatlan, the local physicians did not recognize it, believing that it was not a disease special to that climate. Nevertheless, in August, 1883, the Pacific mail steamer, *San Juan*, arrived with sick people on board, who imported yellow fever in Mazatlan. The epidemic spread with such rapidity that within five days, three thousand persons were attacked with the disease. From Mazatlan it extended to Guaymas, San Blas, Acapulco, Manzanille and other places. Among these latter, I would especially

mention Culiacan and Hermosillo on account of the distance at which they are situated from the coast. The epidemic ceased in the month of October, in the same year, and has never been repeated.

General Retrospect.

From the preceding remarks, it will be seen that the immense coast of the republic washed by the two oceans, is always liable to be invaded by epidemics of yellow fever when it is imported.

Matamoras was visited by epidemics in the years 1858, 1863 and 1867.

As we have already seen, the epidemic appeared in Altamira during the year 1821, after the arrival of a vessel from Havana.

The first epidemic was carried to Tampico in the year 1843, by troops from Vera Cruz.

To the same circumstance we attribute the great ravages among the American troops in 1847-48, who garrisoned that town during the war.

The epidemic was also imported into Tampico during the years 1863-64, by two battalions of the French army. The great epidemic that ravaged Tampico in September, 1878, was imported from New Orleans.

In June, 1879, yellow fever was again imported to Tampico, and caused an epidemic which lasted until the month of December.

From that date no new epidemic has appeared in Tampico, although isolated cases have been observed in persons who carried the disease with them from Vera Cruz.

Tuxpan was visited by an epidemic in the year 1838. Dr. Ordezgoiti does not state how the epidemic was brought to the town, but he clearly declares that the epidemic of 1863 was imported from ships arriving from Vera Cruz. Muleteers carried the disease as far as Jico and Huauchinango. Troops arriving at Tuxpan from Vera Cruz introduced the epidemic in the years 1877 and 1878.

Papantla: A detachment of troops passing through this town in the year 1876, brought an epidemic of yellow fever with them which developed the most deadly characteristics.

Nautla: An epidemic took place here in the year 1859.

Jicaltepec: An epidemic appeared in this town in the year 1861, which was limited to the right bank of the river Nautla. It was also visited by an epidemic in the year 1868.

Coatzacoalcos: The yellow fever was carried to this port in the month of September, 1892, by some sick men on board the steamer *May*, from Vera Cruz.

Minatitlan: The disease was carried to this port at the same time and under the circumstances as the one last mentioned.

Frontera: From time to time mild epidemics are observed in this town, the disease affecting both foreigners and natives alike.

San Juan Bautista: An epidemic raged in the year 1877, having been imported by Mexican troops which had touched at Frontera on their way from Campeche. From San Juan Bautista the epidemic spread to Micaltepec, Huimanguillo, San Antonio, Cardenas, Nacayuca, Jalapa and Pichucalco.

Dr. Castanares, who practiced his profession for twenty-three years in Tabasco, says that the epidemics only appear in that state when there occurs a great crowding of people under unhealthy conditions, as for instance, in a military encampment. Dr. Castanares believes that the epidemic attacks with greater facility the natives of the neighboring State of Chiapas. According to Dr. Orvananos, epidemics of yellow fever have visited the State of Yucatan in the years 1855, 1857, 1881-82 and 1883, and have also appeared in the State of Vera Cruz in the years 1863, 1872, 1873, 1875, 1878 and 1879, and in Campeche in the year 1865. The author does not give any details as to the manner in which the epidemics developed themselves.

Dr. Orvananos speaks of epidemics having appeared in the State of Michoacan, during the years 1813, 1814 and

1860, but this can only have taken place along a short stretch of coast, as no record can be found of these epidemics. The same remark applies to the state of Oaxaca during the years 1850 and 1857.

The General Epidemic of 1883.

The epidemic which spread during the year 1883 along the entire coast of the Pacific, is of the greatest interest. If any previous epidemics had ever appeared, the memory of them was so completely lost, that when the first cases of yellow fever presented themselves in the port of Mazatlan, the physicians did not recognize them, founding their doubts on the fact that this disease had never been on the west coast of Mexico. Another great point of interest presented by this special epidemic, is found by following up the way in which the disease was introduced, that is to say, Dr. Praslow maintains that the yellow fever may have been imported, from the year 1882, by the steamers of the Pacific mail, which brought yellow fever patients from Panama, who did not land. He proves this assertion by letters from persons who had traveled in the steamer *Colima*, on board of which the captain and six stewards fell sick.

The same did not happen in August, 1883. In that month the steamer *San Juan*, belonging to the same company, reached Mazatlan with thirty-three sick people on board, coming from Panama. Some of them landed, and the consequent epidemic spread with such force that, as before said, more than three thousand people were attacked in the port within the first five days, while twenty-two died in one day. The epidemic rapidly extended itself to other ports on that coast, and visited the ports of La Paz, Guaymas, Altata, San Blas, Manzanillo, Santiago, Acaponeta, Puerto Angel, Salina Cruz, Tonala, Soconusco, Tapacñula and San Benito and in the interior at Hermessille and Culiacan. A very important fact to be borne in mind is, that in all the territory included between the Yaqui and Mayo Rivers, which is inhabited by Yaqui Indians, the epidemic did not put in an appear-

ance. This was due to the energetic attitude assumed by the chief of the tribe, who prohibited all communication with the outside world, either by sea or land, under penalty of death.

HISTORY OF YELLOW FEVER IN MEXICO, BY LOCALITIES.

ACAPULCO.

1853. Yellow fever was imported to Acapulco by a vessel coming from Guayaquil, Ecuador, in 1853, for the first time in its history. About sixty cases resulted.

1883. Thirty years later (1883), refugees from Mazatlan infected Acapulco. The disease prevailed quite extensively.

1887. In April, 1887, a case of yellow fever was brought to Acapulco and died on the 17th. Source of infection not stated. There was no spread.

1895. A vessel from Panama brought a case of yellow fever to Acapulco on September 8th. Death on the 15th.

1896. Three cases in 1896 completes the history of yellow fever in Acapulco.

ACAYUCAN.

1902. A case of yellow fever was brought to Acayucan from Vera Cruz in 1902. The patient recovered.

ALTATA.

Altata was infected by refugees from Mazatlan in 1883. The disease prevailed epidemically. The number of cases could not be ascertained, but the deaths were 1,981. Of 150 soldiers stationed in the town, 148 had the fever; 47 died.

ALTAMERA.

1821. Altamera, which was an important port previous to the foundation of Tampico (1824), is now a place of minor importance, the new city having taken away its

commercial prestige. Yellow fever was observed for the first time in Altamera in 1821. The infection was brought from Havana in October, and an extensive epidemic resulted. The mortality was 1500.

1903. Yellow fever broke out in July. The outbreak was neither severe nor extensive.

ALVARDO.

1902. Three cases of yellow fever were observed in Alvarado in 1902. The infection came from Vera Cruz.

AMALCO.

1899. Sporadic cases.

ATAI.

1883. Atai, in Sonora, near the borders of Arizona, suffered to a considerable extent from yellow fever in 1883. No statistics are given, but it is stated that there were "several thousand cases," and that the mortality went into the hundreds.

CAMARGA.

1882. The village of Camarga, three miles from Rio Grande City, which had a population of 300 in 1882, was infected in September, by refugees from Matamoros. The virulent nature of the fever may be judged from the fact that out of this small population, there were 225 cases, of which 33 died.

CAMPECHE.

1865. Yellow fever was epidemic in 1865. No reliable details are available.

1883. Yellow fever was carried to Campeche "by a Norwegian vessel" in 1883. Beyond this statement, no other information is given.

CARDENAS.

1877. Cardenas was infected by refugees from San Juan in 1877. Developments were unimportant.

1903. In July, 1 fatal case.

CHILPANZINGO.

1853. Refugees from Acapulco carried yellow fever to Chilpanzingo, capital of the State of Guerrero, in 1853. No details obtainable.

1896. At the end of August, 1896, and without any antecedents whatever, two cases of a disease, which at once spread itself and which at first was diagnosed under the name of yellow fever, simultaneously appeared in different places, remote from each other, in Chilpanzingo. The malady assumed a most alarming character, in view of the limited extent of the town and the small number of its inhabitants, and because it indistinctly attacked persons belonging to all social classes.

The Mexican Board of Health immediately ordered Dr. Yglesias, an authority on yellow fever, to proceed at once to Chilpanzingo for the purpose of making an exact diagnosis of the disease. After a careful investigation, the doctor reported that the epidemic in question was a manifestation of grave paludism; but as the military physician then resident in the town was of a contrary opinion, it was decided that Dr. Mejia, Professor of Clinics in the National School of Medicine, Mexico, should join Dr. Yglesias for the purpose of making a study of the epidemic. Dr. Mejia was accompanied by Drs. Beristain and Loeza, who took with them the necessary instruments for a microscopical study of the blood of the fever patients, and for the forwarding of the blood under the conditions that would facilitate cultivation under proper means in the laboratory of the Board of Health in the City of Mexico.

The Commission presented three reports, in which it was shown that the epidemic in question was produced by the hematozoria of Laveran.

1899. A few sporadic cases of yellow fever observed in September.

CILAS.

1903. Yellow fever was imported to Cilas in 1903 for the first time in its history and raged for two months—August 25 to October 24. A total of 148 cases, of which 56 died, is recorded.

CINCHAPA.

1899. Yellow fever broke out in August. Only sporadic cases were observed.

CLINIDAS.

1903. Yellow fever claimed 60 victims in Clinidas in 1903. The number of cases not stated.

COATZACOALCOS.

1892. The steamship *May*, from Vera Cruz, brought yellow fever to Coatzacoalcos in 1892. Only a few cases resulted.

1900. Sporadic cases in May.

1902. Refugees from Vera Cruz infected Coatzacoalcos in 1902. Forty-two cases are recorded; deaths not stated.

1903. Six cases; 3 deaths.

1904. Six cases; 1 death.

1905. Six cases; 2 deaths.

COLINA.

1884.

Yellow fever suddenly broke out in Colina in August, 1884. How the disease originated, authentic information is lacking; but that it was imported there is no doubt, as this thriving Mexican town had never suffered from

a visitation of the disease before. The infection probably came from Manzanillo, fifty miles distant, on the Pacific coast.

When the 30,000 inhabitants of Colina realized that they were face to face with an epidemic of the dreaded *vomito*, terror and consternation seized them. Inside of a week, 10,000 had fled to the surrounding country, where, unfortunately, the spread of the infection helped to swell the frightful mortality which characterized the Mexican epidemic of 1884. In two months, more than 1,000 died in Colina alone, among whom were some of its best citizens—the chief justice of the “superior tribuna de justicia,” a lawyer of some national reputation and his wife, the federal district attorney, a colonel of the federal troops, his son and daughter and scores of other prominent people. The houses were closed, the city deserted, the streets lifeless (save for the lumbering funeral carts) and business paralyzed. At one time, the new cases were in the hundreds and the mortality from 15 to 20 every twenty-four hours.

Complete statistics could not be obtained, but as the mortality is said to have been about 1,000, there certainly must have been at least 10,000 cases, as hardly a household escaped invasion. And, even to this day, the inhabitants of the beautiful mountain city, speak with a shudder of the “great epidemic,” and mourn the loss of some dear relative who fell victim to its baneful influence.

CARACO.

1883.

The City of Caraco, in the State of Jalisco, suffered greatly during the epidemic of 1884. Statistics, which also include the neighboring town of Gualian, place the number of cases at 3,000, with a mortality of 521 within the space of three months.

CONCORDIA.

1883.

Concordia, in Linaloa, suffered severely, an average of three cases daily being recorded during the height of the epidemic, a period of three months. Complete statistics not obtainable.

CORDOVA.

Cordova is 66 miles west of Vera Cruz, and has about 5,000 inhabitants. This history of the epidemics of yellow fever which have from time to time decimated the town is taken from the elaborate paper read by Dr. Mendizabal, of Vera Cruz, at the 1896 meeting of the American Public Health Association and brought up to date by the compiler of this work. It is to be regretted that no statistics are given showing the cases and deaths in these epidemics.

The City of Cordova is situated on the boundary of the yellow fever zone, near the railway which connects Vera Cruz with the City of Mexico, and on the margin of the old high road.

The city was founded in the seventeenth century, and there is no record or knowledge of any epidemic of yellow fever during that century.

The epidemics of yellow fever in Cordova have nearly always commenced in the autumn, very seldom before the end of the summer. It has never been generated there, the infection having always been imported from Vera Cruz.

1772.

The first epidemic of which the date is recorded was in July, in the year 1772, and lasted three months.

1795.

It reappeared in the autumn of the year 1795, in which year five thousand persons were attacked, of whom six hundred died.

1796-1800.

During the years 1796, '97 and '98, some isolated cases continued to occur, but the epidemic faded in the years 1799 and 1800, being a total during the eighteenth century of two great epidemics and four small ones.

1801-1860.

During 1801 and 1802, the epidemic which existed at the end of the previous century continued under the form of a small epidemic, which in 1803 took the character of a large epidemic, soon subsiding into small epidemics, which appeared at irregular intervals in the years 1805, 1809, 1813 and 1818, '21, '24, '54 and '60.

1865-1867.

In the year 1865, in the month of June, there was a great epidemic, which ceased during the winter and re-appeared in the summer of the year '66, and faded in the autumn of the same year. Sporadic cases in 1867.

The frequency and gravity of the epidemics date from the year '65, which was the period of the principal work for the construction of the Mexican Railroad from Vera Cruz to the City of Mexico.

The frequent and severe outbreaks at this epoch are easily explained when we consider the conditions existing in Cordova at that time; viz.: an accumulation of un-acclimatized persons living under the worst possible conditions of hygiene; the rapid and frequent communications with Vera Cruz; the neglect of all precautions, especially in not isolating the sick persons immediately on their arrival, each of whom became a center of infection.

These circumstances combined, formed elements of combustion of the worst form; all the ensuing misery, the result of neglect of timely precaution, might have been avoided by stopping the lodgment of that spark, or suffocating it at its birth.

1875-1882.

The same circumstances were observed during the years '75 and '76, and the years '81 and '82. Total for the nineteenth century seven great and sixteen small epidemics.

1893-1896.

Sporadic cases were observed in 1893 and 1896.

1899.

This is the first instance in which reliable statistics were obtained. The epidemic broke out in May. Beginning with the 10th of May, the following number of cases was reported:

May	8 cases.	September	197 cases.
June	37 "	October	132 "
July	90 "	November	39 "
August	220 "	December	7 "
		—	
		Total	
		730	

The mortality was 350, making a death-rate of 48 1/2 per cent. Eleven per cent. of the inhabitants were attacked.

1902.

Limited outbreak, a total of 13 cases being recorded.

1905.

Five cases; 1 death.

1906.

Sporadic cases in January.

CORRIENTES.

1883.

Limited outbreak.

COSMALOAPAM.

1899. August 21, 1 imported case; recovery.

1902. April 11, 1 case, imported from Vera Cruz; recovery.

COSALA.

1883. Sporadic cases.

CULICAN.

1883. Infected by refugees from Matanzas, in September. The mortality was three daily to October 1, after which date it went as high as nine daily for a while. Complete statistics not obtainable.

DOFIA CECILIA.

1903. Between July 15 and November 4, two cases of yellow fever were imported to Dofia Cecilia. There was no spread of the disease.

EL HIGO.

1903. August 15. Sporadic cases.

EQUADOR.

1853. Equador was infected by Acapulco in 1853. The outbreak was not extensive.

FRONTERA.

1895. A fatal case of yellow fever was observed in Frontera in 1895. It was imported from the surrounding country.

1902. One case, imported from Tabasco.

GUALIAN.

1883. Gualian suffered considerably from yellow fever in 1883. The total number of cases and deaths could not be ascertained, but the former were considerable and the latter went into the hundreds. The garrison, which consisted of 600 soldiers, was nearly decimated, 150 falling victims to the pestilence. An opera company of 31 members lost 25. Out of eight doctors, two died.

GUAYMAS.

1883. Guaymas was infected by refugees from Mazatlan in 1883 and suffered the first yellow fever visitation in its history. The epidemic was so severe, that many perished from want of attendance, the dead being buried by the carload by Indians. The fever was particularly fatal to Americans in the employ of the railroad company.

1884. Recrudescence of the epidemic.

1885. Sporadic cases observed.

1891. Yellow fever reported as epidemic in August.

1895. Yellow fever reported present on May 20.

GUERRERA.

1882. One case; recovery. Imported.

GUICHICORI.

1902. One case. Imported.

HERMOSILLO.

1883. The extensive epidemic of 1883 reached Hermosillo in August and lasted until the beginning of November. At times the mortality mounted up to twenty daily.

HIDALGO.

1899. Sporadic cases in August.

HUACHINANGO.

1863. Sporadic cases. Imported.

HUIMANGUILLO.

1877. Infected by San Juan. Sporadic cases.

IXCALLAN.

Ixcallan, which had then a population of 13,000 suffered for the first time in 1883. During the height of the epidemic, 33 cases were reported daily. The mortality is not stated.

JALAPA.

1877. Yellow fever imported from San Juan. Limited outbreak.

1899. Five deaths in August. Imported.

1902. Infected by Vera Cruz; 27 deaths.

JICALTEPEC.

1861. Infected by Vera Cruz. Epidemic confined to right bank of the Naulta River.

1868. Infected by Vera Cruz. Limited epidemic.

JICO.

1863. Jico was infected by muleteers from Tuxpan in

1863. Limited outbreak.

JIMINEZ.

1898. Sporadic cases in September. Imported.

JOLTIPAN.

1904. Sporadic cases. Imported.

JUCHITAN.

1899. Sporadic cases. Imported.

LAGUNA DEL CARMEN.

1894. Sporadic cases.

1900. Several cases and one death in March.

1902. One case; imported from Campeche.

1908. Five cases and three deaths in May, on bark *Lembit*, from Tucacas, Venezuela. The disease did not spread to the town.

LA JUNTA.

1899. Sporadic cases.

LAMPASAS.

1903. Five deaths from yellow fever between October 1 and December 31.

1904. Sporadic cases; imported.

LA PAZ.

1883. The great yellow fever epidemic of 1883, which committed ravages on the Pacific Coast of Mexico, was brought to La Paz, a town of about 2,000 inhabitants, in Lower California. About 1,000 cases resulted. The type of the disease was not very severe, only 71 deaths being recorded.

1895. La Paz was visited by yellow fever for the second and last time in its history in 1895. The outbreak was limited to 3 cases, all imported from Mazatlan.

LAS ANIMAS.

Yellow fever has been observed in Las Animas on one or two occasions, but the exact date could not be ascertained.

LINARES.

1903. Linares is situated in the State of Nueva Leon, 35 miles southeast of Monterey, and has a population of 6,000. Yellow fever was imported to this town in 1903, and from August until the end of the epidemic (December), there were 2,011 cases, of which 366 died.

1904. Sporadic cases.

MANZANILLO.

1883. Manzanillo, which had a population of 76,000 in 1883, was visited by a disastrous epidemic of yellow fever that year. No reliable statistics could be obtained. Infection came from Mazatlan.

1884. Sporadic cases.

1896. Sporadic cases.

1902. One case; imported.

1907. One case, on steamship *San Juan*.

MATAMORAS.

Matamoras is situated on the Rio Grande, opposite Brownsville, Texas, 40 miles from the Gulf of Mexico, and has a population of about 25,000. Owing to its close business relations with Brownsville, whenever yellow fever prevailed in Matamoras, it was invariably brought to the American city.

SUMMARY OF EPIDEMICS.

1853. In 1853 Matamoras had a population of 6,500. Yellow fever was introduced into the town on September 22 and raged epidemically until the end of the year. No

statistics were kept of the number of cases, but the mortality is recorded at 322. Source of infection not stated.

Infection carried to Brownsville, Texas, (deaths, 50).

1858. Mild epidemic. No statistics. Brownsville infected (deaths, 41).

1863. Mild epidemic. No statistics.

1867. Mild epidemic. No statistics.

1882. Severe epidemic. No statistics. Brownsville infected (1,072 cases; 63 deaths).

MAZATLAN.

Mazatlan is an important commercial port of Mexico, in Cinaloa, on the Gulf of California, and has a population of about 15,000 souls. Previous to 1883, in common with other localities on the Pacific Coast, Mazatlan had never experienced yellow fever.

SUMMARY OF EPIDEMICS.

1883. The steamship *San Juan*, from Panama, brought yellow fever to Mazatlan in August. The Italian Opera Company, which was to open the season, had just landed. Paralta, the prima donna, and seventeen members of her company, contracted the disease and died at the Hotel Iturbide. The epidemic lasted until December, causing 500 deaths.

1884. Reappearance of yellow fever, but not extensive.

1885. In July and August, sporadic cases.

1895. Sporadic cases in September.

1897. September 26 to October 2, sporadic cases; 9 deaths.

MERIDA.

Merida, capital of the State of Yucatan, has a population of about 50,000. It is 26 miles south of Progreso, with which it is connected by rail.

SUMMARY OF EPIDEMICS.

1880. One case, imported; death, January 31.
 1887. May 14 to August 2, six deaths.
 1888. January 26, one death.
 1890. Twelve cases reported in June; total cases and deaths not stated.
 1891. Two cases in January.
 1894. One death.
 1895. Three cases; no deaths.
 1898. Seven deaths.
 1899. One death, week ending July 1.
 1900. Seven cases and four deaths in July.
 1901. June 14 to September 28; sixteen deaths.
 1902. Nineteen cases; eight deaths.
 1903. January 1 to December 5, 214 cases; 85 deaths.
 1904. June 13 to December 3, 119 cases, of which 39 died, distributed as followed:

Nationality	Cases.	Deaths.
Mexican	44	19
Italian	6	4
Spanish	50	13
Turk	12	2
English	1	0
American	3	0
Porto Rican	1	0
French	1	0
Greek	1	1
Total	119	39

1905. January to December, nine cases, of which five died. The case in December was imported from Vera Cruz on the 23rd, and established a focus from which other cases developed later.

1906. January 16, the first case occurred and was traced to the focus of December 23, 1905. Cases and deaths were as follows:

Month.	Cases.	Deaths.
January	3	3
February	3	0
March	2	1
April	1	1
May	5	3
June to December	107	63
	—	—
Total	121	71

1907. Two cases and one death in March.

1908. August 23 to December 26, 69 cases; 25 deaths.

1909. January 1 to March 6, 15 cases; 8 deaths. (*At the time of going to press, April 15, the epidemic was still in progress*).

CITY OF MEXICO.

The City of Mexico, 7,460 feet above the level of the sea, is the highest point in the world where yellow fever has been observed. The disease has never originated in the place, but in every instance was brought either from Vera Cruz or towns adjacent to that seaport, and was confined to the imported cases. This is fortunate, for Mexico has nearly half a million souls, all non-immunes, and the importation of a few *Stegomyia Calopus* simultaneously with cases of yellow fever, would result in an epidemic whose ravages would undoubtedly be appalling.

Can the Yellow Fever Mosquito Thrive in Mexico City?

Can the *Stegomyia Calopus*, once introduced in the City of Mexico, where it is now a stranger, be acclimatized? This momentous question has been agitating the scientists of the entire civilized world since the adoption of the Mosquito Doctrine of the transmission of Yellow Fever.

Drs. Fernando Lopez, of Mexico City, and Narcisso del Rio, of Vera Cruz, made special studies in this direction,

and gave the result of their labors in an elaborate paper read by Dr. Lopez at the Havana Meeting of the American Public Health Association in 1905. The statistics presented prove that the *Stegomyia Calopus* race of mosquitoes have thrived in altitudes hitherto thought to be antagonistic to its existence since the construction of railroads throughout the Republic and that though until lately it was admitted that these insects could not be found except in some places on the coast, the facility and rapidity of communication have acclimated them in places more or less distant and in more or less elevated altitudes, thus enlarging the Yellow Fever Zone.

That the spread of yellow fever to localities in Mexico where it was hitherto unknown, can be placed at the doors of the railroads, is made clear by the following deductions arrived at by these eminent scientists:

Along the Mexican Railroad, it has been observed that, from time to time, yellow fever was spreading, first to Cordova, which has an altitude of 2,481 feet above the sea level. It did not pass the limits of that station until 1899, when an epidemic broke out in Orizaba, 3,684 feet above the sea level.

Along the Inter-oceanic Railroad, it has been observed that the *Stegomyia Calopus* has been acclimating itself from station to station, until it reached Carrizal station, with an altitude of 2,481 feet above the sea level. Similar cases have been noted in the states of Tamaulipas and Nuevo Leon, where the traffic of the railroads have facilitated the enlarging of the Yellow Fever Zone.

Having come to an agreement with Dr. del Rio, Dr. Lopez formed the following program for a careful study of the question:

1st. To investigate if the *Stegomyia* larva brought to Mexico City would hatch into mosquitoes, and in case they should, to see if these would live, if they would bite and reproduce.

2nd. To investigate if the adult mosquito brought from Vera Cruz to Mexico City will live, bite and reproduce.

3rd. To investigate if the mosquitoes infected with yellow fever biting a person in Mexico City, who was non-immune will produce the disease, if it presents the same characteristics which it does on the coast, and if an immunity may be found.

In order to solve the first part of the problem, Dr. del Rio sent Dr. Lopez from Vera Cruz a flask containing a multitude of *Stegomyia* larvæ, which were received in Mexico City on June 24, 1905; the larvæ, were collected from a deposit of water in a house in Vera Cruz, and were preserved in the same water.

The larvæ were placed in a fine wire cage 50 c.m. in height, 30 c.m. in length and 40 c.m. wide, having an iron sheeting floor and roof. In one side of the cage there was an opening over which was sewed a cloth bag through which the hand might be put into the cage without fear of letting the mosquitoes escape.

The cage was placed in an ample, well ventilated room where there was sufficient light.

The mosquitoes which began to hatch out in great numbers were fed on bananas, the juice of which they greedily sucked out. When there were quite a number of mosquitoes four or five days old, Dr. Lopez put his hand into the cage through the opening already mentioned, and with no little surprise saw that the females rushed to it and, raising their bills, bit him greedily. This was something the doctor was not prepared to expect, owing to the statements which have been admitted heretofore, that the *Stegomyia* loses its power of biting when it is found in an altitude of more than 6,000 feet above the sea level, and Mexico City is more than 7,300 feet high. Watching the mosquito, the doctor could easily see that its abdomen was filled with blood, after which it would retire.

The sting was painful, forming a pimple which lasted from five to six days and produced an insupportable itching. Dr. Lopez repeated this experiment various times, always obtaining the same results.

In order that the mosquitoes might reproduce, Dr. Lopez put a bowl of water which contained some little

pebbles barely coming up out of the top of the water into the cage. He did this with the object that the females which had sucked the blood might find a place to deposit their eggs. A few days later, he was convinced that this had happened; for using a lens, he could see a certain number of isolated eggs upon the surface of the water, which were of a blackish color. Then he took out the bowl containing the eggs and put it in another cage, in order to observe them better; in ten days, the eggs had been converted into larvæ, which hatched into mosquitoes, thus constituting the second generation of *Stegomyia* bred and hatched in Mexico City.

Only a few mosquitoes were obtained in this way, for an unlooked for accident overturned the receptacle in which the doctor had placed the larvæ, unfortunately causing the death of all that remained. These mosquitoes, even when the investigator had put them in conditions which he thought favorable for their reproduction, died without leaving any young. They retained the power of biting as long as they lived.

On the 8th day of August of the same year (1905), two other flasks containing larvæ arrived from Vera Cruz, having been sent by Dr. del Rio. That Dr. Lopez might change somewhat the conditions of the former experiment, he put these larvæ in wooden cages covered with tarlatan. Very soon the mosquitoes began to hatch, and as soon as each one was hatched they were passed over into a new cage of the same kind, in order to observe them minutely. Three days after they were hatched they began to bite. Dr. Lopez had then observed friendly struggles between the females and the males.

On the first day of September, the experimenter observed that there were already many groups of eggs, which transformed into larvæ and the latter into mosquitoes, notwithstanding the fact that the temperature had descended to 15 degrees centigrade in the room in which he placed them for observation. He preserved many larvæ until the middle of December, the date in which this was written. From this last generation no eggs were

secured, which was probably due to the fact that winter had set in.

The temperature and the degree of dampness of the air in the room in which the mosquitoes were, was from the beginning of the experiments taken regularly, and was found to vary between 15 and 21 degrees centigrade for the former; the latter between 50 and 70 degrees.

Having for his object the study of isolated mosquitoes, specimens were placed in proof tubes, closing the entrance with a simple gauzy material every day. At different hours of the day, the doctor applied the mouth of the tube to his bared arm, to observe the mosquito while it was biting. With this system he saw that the mosquitoes bite the same at night as in the day, and that they do not do it except every three or four days. The mosquitoes remained alive inside the tubes from 24 to 28 days.

The doctor also made experiments to determine how long the larvæ and pupæ will live without breathing atmospheric air. He placed some larvæ in trial tubes, which were completely filled with water and stopped them with a rubber, without leaving on the inside the least bubble of atmospheric air. The others were closed with tarltan and inverted it in a vessel of water so that the atmospheric pressure would always keep it full without permitting a bubble of air on the inside; the tarltan kept the larvæ from coming out. Multiplying these experiments, Dr. Lopez was able to observe that the larvæ lived a longer or less time in proportion to their age, varying from 12 to 50 hours. The pupæ averaged from 40 minutes to an hour.

In all of these experiments, Dr. Lopez observed the following very curious phenomenon in the larvæ pupæ: As soon as the larva was shut up in the tube, it would go to the top and not finding any air to breathe, it would descend slowly, curling itself up until it formed a complete circle; it would rub the extremity of its breathing tube with the tufts of filaments which it has on its mouth, with such violence that one would suppose that it was trying to remove some obstacle from it, after this it would

make repeated trials, continuing this operation until its death.

Owing to its form and brisk movements, the pupæ was still more interesting. As soon as it reached the top of the tube in which it was enclosed and found no air to breathe, it descended slowly, curving its body backwards and with the two flaps at the end of the abdomen eagerly brushed its breathing tubes. It repeats these struggles with less and less energy until its death.

These experiments which Dr. Lopez described to the American Public Health Association, prove that the *Stegomyia Calopus* was able to live, bite and breed for at least two generations in Mexico City, notwithstanding the fact that the aforesaid city has an altitude of more than 7,300 feet above the sea level.

The other two points remain yet to be solved.

SUMMARY OF IMPORTATIONS OF YELLOW FEVER TO THE CITY OF MEXICO.

- 1883. One case; death.
- 1898. Between October 10 and 16, sporadic cases; 1 death. There was no spread of the disease.
- 1899. One case; death.
- 1900. May 7 to November 23, four deaths from imported cases.
- 1903. August 10 to October 4, four deaths.
- 1905. One case, week ending December 2, one case; death.

MICALTEPEC.

1877. Infected by refugees from San Juan; limited epidemic.

MHER.

1882. Infected in September by refugees from Matamoras; 28 deaths.

MINATILTAN.

1892. A solitary case, imported by the steamship *May*, from Vera Cruz. No developments.

MISANTLA.

1876. Sporadic cases, brought into the town by troops from Vera Cruz. No developments.

MONCLAVA.

1903. Yellow fever was brought to Monclava from Monterey in the beginning of November. The only thing which saved the town from a disastrous epidemic was the absence of the *Stegomyia Calopus*, and the fact the winter season had already set in and the few imported *Stegomyia* did not survive. Monclava is 1,970 feet above the level of the sea, and the nights are generally cold, even in summer. There were in all 6 cases, of which 4 died, the last on November 19, with black vomit. On the last date, ice was half an inch thick in the town.

1904. Sporadic cases. No developments.

MONTEREY.

Although Monterey was settled by the Spaniards in 1568, yellow fever has been observed in the city on three occasions only, being imported in each instance. Situated 700 miles from the City of Mexico, at an altitude of 1,630 feet, it is outside of the Yellow Fever Zone; but railroads and the rapidity of modern travel may in time cause the *Stegomyia Calopus* to become a permanent denizen of the place, and cause Monterey to align itself with Vera Cruz and other endemic foci of the Mexican Republic.

SUMMARY OF EPIDEMICS.

1898.

Yellow fever broke out in Monterey during the last week of July, and lasted until December. The cases and death were as follows:

	Cases.	Deaths.
To October 25	40	0
November 1	0	4
“ 2	11	8
“ 5	1	5
“ 6	0	3
“ 8	0	2
“ 25 to December 1	0	3
	—	—
Total	52	25

The source of infection is not stated.

1903.

Monterey was infected by refugees from Linares in July 1903. There were about 500 cases. No authentic statistics as to the mortality could be obtained.

1904. Sporadic cases.

MOTUL.

1903. One case, September 6.

MONTZORONGO.

1903. Sporadic cases in July.

NAULTA.

1859. Sporadic cases.

NICAYUCA.

1877. Infected by San Juan. Limited outbreak.

NUEVA LAREDO.

1903. September 15 to November 28: Sixty-six cases; 29 deaths.

1904. Sporadic cases.

OCUS.

1895. Sporadic cases.

OMEALCA.

1905. October 8 to November 4: Sixteen cases; 7 deaths.

ORIZABA.

Orizaba has a population of about 25,000 and is 70 miles southeast of Vera Cruz.

1883.

Sporadic cases, imported from Vera Cruz.

1899.

Previous to 1899, yellow fever had never been observed epidemically in Orizaba. The sudden appearance of the disease in the year above mentioned was caused by importation, but whether from Vera Cruz, Cordova or Coatzacoalcos, has not been satisfactorily determined to this day. The Mexican government sent a Commission to Orizaba, headed by Dr. Narcisso del Rio, in order to study the causes of the disease and ascertain whether the *Stegomyia Calopus* existed in Orizaba, or if the immunity which until that year had prevailed in that locality was due to the fact that the insects in question can not live there or reproduce themselves at the height at which the city is located.

When Dr. del Rio arrived at Orizaba, he was informed that the first case was that of an unknown man, who entered the hospital in a dying condition, where he died a few moments after his arrival. The symptoms of the fever which had caused the death of the patient being very suspicious, an autopsy was made, all the characteristics, traces and features of yellow fever were found; but it was not known where the unfortunate had contracted the disease, nor the place whence he came—nobody knew him. This case was undoubtedly the origin of the others which followed shortly afterwards, but the medium of transmission from the first case to the others was never determined.

At the time of Dr. del Rico's arrival, he was informed by the Mayor that 12 cases had already occurred in the town, of which 10 had died, and that there still remained a woman at the hospital and another convalescent patient in another part of the city.

Dr. del Rio visited the woman at the hospital. She had been attacked four days previously, and her illness was an acute case of yellow fever. She had not been outside of the city limits, so it was clear that the infection was local. Two cases were also discovered in the central part of the city, in another district where the other cases had been observed. The patients were husband and wife. The woman recovered, but the husband died.

Here was unmistakable proof that the Yellow Fever Mosquito was present in Orizaba. To assure himself of this fact, Dr. del Rio, accompanied by Dr. Labardini, a member of the local Board of Health, and sanitary agents appointed by the Chief of Police, visited the houses where there had been some cases of the disease.

In all of these houses, the doctor found larvæ of the *Stegomyia Calopus*, and in one instance two mosquitoes of this kind entirely developed. These two mosquitoes furnished the explanation of the two cases which were noted in the central part of the city, quite distinct from the original focus, namely, the married couple, already referred to, and concerning which the following data was secured:

The husband was a coachman who had charge of carrying to the hospital in his carriage a sick woman who lived in the infected district, and whom he had to carry in his arms, because her condition was so serious that she could not walk. The room which said patient had occupied was disinfected by means of sprinkling bichloride of mercury, and it was in said room that was found the specimen of the *Stegomyia Calopus* entirely developed, it being very probable that the coachman was bitten there by one of the infected mosquitoes.

The Commission concluded that two conclusions were generally acceptable, viz.: Either the first case came from Vera Cruz, Cordova or Coatzacoalcas, and from said case were infected the mosquitoes found at Orizaba, thereby propagating the epidemic, or the mosquitoes already infected at Vera Cruz were carried by rail to Orizaba, where the first patient contracted the disease from the mosquitoes which arrived in the manner already described.

The last theory is most acceptable and it is to be wondered at that the disease has not appeared more frequently at Orizaba, owing to the facility of communication between that city and Vera Cruz.

Dr. del Rio does not give any statistics regarding the cases and deaths, but according to the records of the United States Marine Hospital Service, the mortality was as follows:

May 1 to September 30	77
October 1 to November 8	36
	—
Total	113

This was the only extensive epidemic of yellow fever which has ever visited Orizaba.

1902.

Yellow fever was imported to Orizaba in 1902, either from Cordova, Vera Cruz or Tehuantepec. It spread to the neighboring villages and lasted from the end of August to the beginning of November, resulting in 700

cases and 286 deaths. There were 18 cases in Orizaba. Number of deaths not given.

An examination by the authorities revealed the fact that *Stegomyia Calopac* were found in abundant quantities in all the localities visited by the fever.

1903.

From May 17 to July 6, twelve cases of yellow fever were observed in Orizaba. Eleven of these cases were traced directly to Vera Cruz. Number of deaths, if any, not stated.

1905.

October 9 to December 9, five cases; 1 death.

1906.

One case in January; death.

PAPANTLA.

1876. Sporadic cases.

1895. Cases in August; imported from Vera Cruz.

PARAJE NUEVO.

1907. May 1, one case; death.

PASO DE OVIJAS.

1876. Sporadic cases.

PINCHUCALCO.

1877. Infected by San Juan; limited outbreak.

PRESIDIO.

1883. Limited epidemic.

PROGRESO.

Progreso is an important port in the State of Yucatan, 26 miles by rail from Merida, the Capital. It is a regular port of sail for American and British steamships.

Yellow fever has never prevailed epidemically in Progreso, the few manifestations of the disease in that port having been as follows:

1899. Two cases and one death in July.

1900. June 9 to September 30: Nine deaths; number of cases not stated.

1901. July 23 to October 6: 5 cases; 3 deaths. Two of these cases were from the steamship *Mathilde*, from Tampico via Vera Cruz.

1902. Three cases; deaths not stated.

1903. January 1 to November 7: Nineteen cases; 5 deaths.

1904. April 28 to December 8: Sixteen cases; 3 deaths.

1906. August 4 to November: Sporadic cases; imported.

PUEBLO-VEJO.

1865. Six cases; focus of infection, Tampico.

PUERTO ANGEL.

1883. Infected by Mazatlan; limited outbreak.

QUANTANA ROO.

1903. One case, September 25; death. Imported.

1906. Sporadic cases.

REATA.

1903. One case, November 26; imported.

REYNOSA.

1859. The town of Reynosa, on the Rio Grande, forty miles above Matamoras, suffered from yellow fever in 1859, but beyond the statement that "over 130 had died," no further information could be obtained.

ROSARIO.

1883. During the great epidemic of 1883. Rosario was infected by refugees from Mazatlan. Statistics incomplete.

1885. A case occurred in July.

1902. Fourteen cases; deaths not stated.

1903. August 9 to November 28: Twenty-three cases; eleven deaths.

1904. April 3 to June 4: Two cases; death.

SALINA CRUZ.

1883. Infected by Mazatlan; limited outbreak.

1906. March 18: One case, imported from Santa Lucretia.

SAN ANTONIO.

1877. Infected by San Juan. Limited outbreak.

SAN BENITO.

1883. Refugees from Mazatlan infected San Benito in September, 1883. Sporadic cases occurred until the beginning of November.

SAN BLAS.

1883. Yellow fever reached San Blas, the first part south of Mazatlan, by a small schooner carrying fleeing people from the larger town. A case appeared, than the usual explosion took place—and the disease was epidemic. The first case erupted September 23; the last in November.

During the epidemic, so great was the terror of the inhabitants, that the sick were abandoned by their relatives and died unattended. Bodies remained unburied for days. All those who could do so, fled to the interior, spreading the pestilence wherever favorable conditions presented themselves. As the same thing invariably happened in every afflicted town on the Pacific Coast of Mexico during the outbreak of 1883, it will readily be seen why the epidemic became so widespread, and its progress so difficult to check.

SAN FERNANDO.

1898. Yellow fever reported present in September; no statistics.

SAN GEROMINO.

1902. One case; imported.

SAN IGNACIO.

1883. Sporadic cases; imported.

SAN JUAN BAUTISTA.

1876. Sporadic cases; imported.

1877. Infected by Campeche; limited outbreak.

1899. Sporadic cases in August.

1902. Eight cases; imported.

SAN LORENZO.

1899. Sporadic cases in August; imported.

SAN LUIS POTOSI.

1903. Sporadic cases in July; imported.

SANTA CRUZ DE LOS ROSALES.

1906. One case in March, imported from Santa Lucretia.

SANTA LUCRETIA.

1906. Sporadic cases; source of infection not stated. Several villages in the neighborhood were infected from this focus.

SANTIAGO ACAPEMETA.

1883. Infected by refugees from Mazatlan; limited out-

SOCONUSCO.

1883. Infected by refugees from Mazatlan; limited outbreak.

1905. Six cases and three deaths in October; imported.

TAMPICO.

Tampico is an important commercial port of eastern Mexico, in the State of Tamaulipas, 215 miles northwest of Vera Cruz, on the south shore of the Lake of Tampico. Population, about 12,000. It was founded by Santa Anna in 1823, who gave it the name of Santa Anna de Tamaulipas. After the downfall of Santa Anna, the name of the town was changed to Tampico Pueblo Nuevo, but it is popularly known as Tampico.

Tampico is said by some writers to be one of the endemic foci of yellow fever in Mexico, but such is not the case, as in nearly every instance when the disease appeared in the locality, it could either be traced to importation or a recrudescence of a previous outbreak.

SUMMARY OF EPIDEMICS.

1836.

Although Liceaga (*Am. Pub. Health Assn. Reports*, 1893, p. 123) asserts that yellow fever first appeared in

Tampico in 1843, Goupilleau, of Tampico, in his elaborate work (*Remarques et Observations sur la Fievre Jaune du Mexique*), gives histories of cases as early as 1836. Tampico had then a population of 5,000, of which 1,250 were Europeans and the balance native Mexicans (Indians). How the fever was brought to the town, our authority does not state. Six cases and one death occurred in July, after which there was a lull, the epidemic reappearing in September. The fever was particularly fatal to the European population and especially to those who had lived for many years in Havana and other West Indian localities. This is one of the most remarkable phases of the epidemic, as the newcomers, having previously lived within the endemic yellow fever centers, should have been less susceptible to the influences of the disease. Humnoldt (*Political Essay on the Kingdom of New Spain*) comments on this peculiarity as regards Vera Cruz, having noted that residents of Havana who settle in the Mexican city, and who had never experienced yellow fever in their natal place, generally contract the disease in their new abode. The same thing happens to natives of Vera Cruz who migrate to Havana. This proves that immunity is confined solely to one's native place.

1843.

Yellow fever was introduced in Tampico by troops from Vera Cruz in 1843. The extent of the outbreak is not stated.

1847.

Troops from Vera Cruz again introduced the disease in 1847. The war between Mexico and the United States was then in progress and the American soldiers who occupied Tampico suffered greatly.

1848.

Vera Cruz again infected Tampico. As in the previous year, the American troops were the greatest sufferers.

1853.

Sporadic cases.

1863.

Two battalions of the French army brought the disease from Vera Cruz. The outbreak was not severe.

1864.

Infection from Vera Cruz. No statistics.

1865.

The French Army arrived at Tampico from Vera Cruz in August. The following day yellow fever broke out among the soldiers and the epidemic spread through the town. The disease disappeared after the withdrawal of the troops.

1878.

New Orleans is accused of having infected Tampico in 1878. The epidemic was extensive, about 1,000 deaths being recorded.

1879.

No source of infection can be traced. The fever broke out in June and lasted until December. The outbreak was not as widespread as in 1878.

1898.

The fever appeared in July and lasted until the beginning of December. Following is a resume of the mortality:

To July 24	7
Week ending July 31	9
August to September 1	122
September 2 to October 2	61
October 3 to October 23	21
October 24 to November 30	10

Total mortality 230

Number of cases not stated.

1899. April 20 to October 2: Seventeen cases; three deaths.

1901. July 26 to August 22: Two cases; one death. One case imported from Progreso; the other from Vera Cruz.

1902. Mortality: November, 52; December, 60; total, 112.

1903. Mortality: January, 10. Subsidence until May, when the disease again made its appearance and lasted until October. Last death, October 24. Total deaths, 259.

1904.

First case was observed in the beginning of May. Four cases are recorded for the year.

TAMUÍN.

1903. Sporadic cases in August; imported.

TAPACHULA.

1883. Infected by Mazatlan; limited outbreak.

1895. Sporadic cases; imported.

TEPEC.

1883. Limited outbreak; imported.

TEHUANTEPEC.

1883. Tehuantepec has 12,000 inhabitants and is one of the oldest towns in Mexico. It certainly is dilapidated looking, and its antiquity is undoubted, but considering that it has survived wars, floods and earthquakes innumerable, and has lived through epidemics of cholera, small-pox, beriberi and yellow fever, it is really wonderful that it is still in existence.

Tehuantepec is situated on the river bearing the same name about 12 miles from the Pacific Ocean, and is built of adobe and cane houses with tiled and thatched roofs. It is clustered on the hillside, and is naturally well drained. It was built without regard to street formation and before sewers and waterworks were known. The water supply is obtained from a few wells, but the majority of the inhabitants bring their water from the river in jars and barrels. The majority of the population are women, and with the exception of a few foreigners and some Mexicans, the population is composed of Tehuantepec Indians.

In December, 1882, an epidemic of Asiatic cholera occurred, and by March of the following year 297 deaths were recorded. An epidemic of yellow fever followed the cholera, and when it ended, the town was about depopulated. From an old resident who lived through both epidemics it was learned that the mortality statistics were not kept at the time, and that the mortality in Tehuantepec and vicinity must have been in the thousands, judging from the information that he received at the time.

- 1899. Sporadic cases.
- 1900. Scattered cases.
- 1902. Eight cases.
- 1903. August 9 to November 28: Ten deaths.
- 1904. January 1 to December 17: Sixty-six cases; 53 deaths.
- 1905. June 24 to December 2: Five case; 2 deaths.
- 1906. Infected by Santa Lucretia in March; sporadic cases.

TERAN.

- 1903. Sporadic cases in August.

TEXISTOPEC.

- 1904. Scattered cases; imported.

TEZONAPA.

1905. October 1 to December 9: Twelve cases; 4 deaths.

TIERRA BLANCA.

1903. Sporadic cases in July; imported.

1906. October 22 to November 18: Eight cases; 2 deaths.

1906. August 11 to September 22: Two cases; 1 death. Imported from Santa Lucretia.

TAPONA.

1899. Sporadic cases; imported.

1900. One case; imported.

TLACOLTIPAN.

1877. Sporadic cases; imported.

1883. Limited outbreak; cases imported.

TPISLAN.

1853. Infected by Acapulco; limited outbreak.

TONALA.

1883. Infected by Mazatlan; limited outbreak.

1902. One imported case.

TUXPAN.

Tuxpan is situated on the north bank of the Tuxpan River, about seven miles from its mouth, one hundred and ten miles north of Vera Cruz, and about the same distance south of Tampico. The town is only about fifteen feet above the sea level of the Gulf, and has a population of 12,000.

SUMMARY OF EPIDEMICS.

1838. Sporadic cases; imported.
 1863. Infected by troops from Vera Cruz. The French Army suffered greatly from the disease.
 1873. Severe epidemic; no details.
 1875. Infected by troops from Vera Cruz; limited outbreak.
 1877. Mild epidemic.
 1878. Infected by troops from Vera Cruz; mild outbreak.
 1880. Infected by Tampico; limited outbreak, being confined to imported cases.
 1892. A traveler arrived at Tuxpan from Papantla on August 10. He was taken ill shortly afterward and died of yellow fever. There was no spread of the disease.
 1899. July 30 to November 8, sixty-nine deaths.
 1902. One case, from Vera Cruz.
 1907. One case, January 23; death. Imported.

TUXTEPEC.

1877. Infected by Tlacotalpan; limited outbreak.
 1905. October 8 to December 9: Thirty-two cases; 21 deaths.
 1906. August 26 to October 6: Seventeen cases; 13 deaths.

VALLADOLID.

1901. September 25-28: Four deaths.
 1903. August 9 to September 26: Sporadic cases.
 1906. August 25 to September 1: Three cases; one death.

VERA CRUZ.

Vera Cruz, the chief seaport of Mexico, is situated on the Gulf of Mexico, in a sandy, marshy, unhealthy place, 185 miles east of Mexico City. The fact that after four hundred years of strenuous existence, Vera Cruz is a city

of only 32,000 inhabitants, notwithstanding its commanding position on the great American Inland Sea, is sufficient proof of the unfitness of the locality as a place of abode for the average human being. Although founded by Cortez in 1520, the site of the City of Vera Cruz was occupied by the Spaniards as early as 1509, during which year the unfortunate settlers were decimated by the first epidemic of yellow fever to attack Europeans on Continental America.

Yellow fever has prevailed in Vera Cruz almost every year since its occupation by the Spaniards, and the place may be unhesitatingly considered as one of the most fruitful foci in America. Even at the time this report is being prepared for the printer (April 8, 1909), the disease has attained epidemiological proportions in the insalubrious Mexican city—and this, too, in the face of the fact that everybody in Vera Cruz ought to have had yellow fever by this time. But strangers are constantly arriving—especially native Indians from the interior—feeding the fires of pestilence, and finding untimely sepulture in that unfriendly soil. And thus will it be until time is no more—unless the Mosquito Doctrine triumphs over indolence and stubbornness, and removes the only stumbling block to the future greatness of the “rich city of the true cross.”*

CHRONOLOGY OF YELLOW FEVER IN VERA CRUZ FOR A PERIOD OF FOUR HUNDRED YEARS, 1509 TO 1909.

1509. According to Parker, Beyer and Pothier (*Report of Working Party No. 1, Yellow Fever Institute, Washington, D. C., 1903*), the earliest record that can be found showing the presence of yellow fever in Vera Cruz was in 1509, when Diego de Nicues occupied the place, then called New Spain. During the first days of the colony, 400 of the settlers died from a “pestilential disease;” shortly afterward, 200 more. At the end of fifteen months, there

remained only 60 survivors. From descriptions given by early writers, there can be no doubt that this was yellow fever.

1510 to 1698. A search through the works of historians who have written on the epidemics of Mexico, fails to reveal any authentic reference regarding the appearance of yellow fever in Vera Cruz from 1510 to 1698. The disease was undoubtedly present, as, even to this day, the infection is kept virulent and constant by the presence of native Indians, who came from the mountains and adjoining villages. Parker, Pothier and Beyer (*loc. cit.*) state that while many foreigners and the better class of Mexicans from the *tierras templadas* die annually of yellow fever in Vera Cruz, it is the unacclimated natives above mentioned who come from the mountains to work on the harbor improvements or to sell their wares that makes the death-rate of Vera Cruz excessive.

The Indians certainly came to Vera Cruz during the silent years above noted, and it is the natural inference to conclude that they died of yellow fever, just as their descendants do at the present age.

1699. First appearance of yellow fever in Vera Cruz, according to Berenger-Feraud (*Fievre Jaune, etc., Paris, 1890, p. 37*). No details.

1700 to 1724. Another hiatus.

1725. Most authors date the first appearance of yellow fever in Vera Cruz from 1725, prominent among whom being the Abbe Clavigero, historian of note, who mentions the fact in his *History of Mexico*. But Humboldt, Berenger-Feraud and other well-posted chroniclers, assert that the eminent ecclesiastic is mistaken, for, long before the Seventeenth Century, the pestilential disease known as *romito prieto* by the Spaniards, showed itself many times in the locality. No records are available, however, tradition and unofficial documents being the only beacons to guide us through the darkness of that period.

1726 to 1739. Present, but no record.

1740. Severe epidemic. (Berenger-Feraud).

1741 to 1743. Present, but no record.

1744. Severe epidemic. (Feraud).
 1745 to 1761. Present, but no record.
 1762. Severe epidemic. (*Humboldt; Morcau, de Jonnes*).
 1763. No record.
 1764. Epidemic.
 1765 to 1773. No record.
 1774. Epidemic.
 1775 to 1792. No record.
 1793; 1794; 1795; 1796; 1797; 1798; 1799; 1800; 1801; 1802; 1803; 1804; 1805. Epidemics of more or less intensity.
 1806 to 1808. No record.
 1809; 1810; 1811; 1812; 1813. Epidemics of more or less intensity.
 1814. No record.
 1815. Epidemic.
 1816. No record.
 1817; 1818; 1819. Epidemic period.
 1820. No record.
 1821; 1822; 1823. Epidemic period.
 1824. No record.
 1825; 1826; 1827; 1828. Epidemic period.
 1828. No record.
 1829. Epidemic.
 1830. No record.
 1831. Epidemic.
 1832 to 1835. No record.
 1836; 1837. Epidemic.
 1838. No record.
 1840; 1841; 1842. Epidemic.
 1843. No record.
 1844; 1845; 1846; 1847. Epidemic.
 1848 to 1849. No record.
 1850. Epidemic.
 1851 to 1852. No record.
 1853; 1854. Epidemic.
 1855 to 1856. No record.
 1857. Epidemic.

1858. No record.

1859; 1860. Epidemic.

1861. No record.

1862; 1863; 1864; 1865. Epidemic

From 1866 to the present day, more definite information could be obtained, the mortality by months from 1866 to 1900 being as follows:

Years.	Months.												Total deaths from yellow fever.
	January.	February.	March	April.	May.	June.	July.	August.	September.	October.	November.	December.	
1866.....	0	0	2	11	26	40	54	48	20	12	21	20	254
1867.....	12	4	16	54	64	12	8	32	38	17	11	8	212
1868.....	7	6	7	30	40	16	26	20	21	9	2	3	187
1869.....	0	0	0	2	0	0	1	1	2	1	2	0	9
1870.....	0	0	0	0	0	0	0	0	1	3	5	2	11
1871.....	3	0	1	6	29	113	71	17	10	15	2	4	271
1872.....	2	2	4	5	14	45	53	39	29	11	5	6	215
1873.....	1	0	0	3	1	19	58	59	41	20	10	7	222
1874.....	1	2	0	0	2	3	11	24	7	12	11	6	79
1875.....	7	1	4	11	29	93	118	105	41	13	2	0	425
1876.....	0	1	1	0	0	2	4	7	9	6	1	3	34
1877.....	0	1	0	0	4	7	54	144	164	77	50	27	523
1878.....	16	5	0	1	7	58	113	110	62	45	24	7	448
1879.....	6	4	2	1	1	1	2	1	3	0	0	0	21
1880.....	2	0	1	0	0	0	1	3	10	42	92	103	254
1881.....	28	21	27	29	94	235	183	39	22	25	17	3	723
1882.....	1	1	2	1	5	11	7	14	8	3	5	12	72
1883.....	5	3	7	16	90	261	200	67	39	31	21	7	747
1884.....	3	2	0	0	3	2	4	3	17	44	39	19	136
1885.....	6	5	8	5	21	25	84	84	48	19	14	9	328
1886.....	7	3	7	12	18	31	19	26	25	37	13	10	208
1887.....	0	0	1	0	0	1	0	0	1	1	0	0	4
1888.....	0	0	0	0	0	0	0	0	1	2	0	0	3
1889.....	0	0	0	1	0	0	0	0	0	0	1	0	2
1890.....	0	0	0	0	0	1	1	5	0	6	9	19	41
1891.....	1	4	2	3	10	39	40	19	13	18	20	10	179
1892.....	0	2	1	7	20	41	75	53	27	13	10	10	260
1893.....	5	1	6	8	17	32	29	8	9	11	5	0	131
1894.....	0	0	0	8	39	55	41	38	15	5	3	3	210
1895.....	5	1	1	2	12	23	40	36	17	3	3	0	143
1896.....	0	0	0	0	0	0	0	0	0	0	0	0	0
1897.....	0	0	0	0	0	0	0	0	0	1	1	0	2
1898.....	0	0	0	0	0	0	0	9	24	39	32	23	127
1899.....	9	5	7	8	101	246	90	68	31	14	5	7	670
Total.....	133	75	107	224	617	1,412	1,390	1,079	759	557	436	328	7,156

1900. No yellow fever.

1901. Epidemic; 102 deaths.

1902. Severe epidemic: 721 cases; 274 deaths.

1903. Severe epidemic: January to December, 1,123 cases; 357 deaths.

1904. Only one death.

1905. Sporadic cases; 10 deaths.

1906. January 1 to December 8: Twenty-one cases; 10 deaths. Three of these cases were imported from Yucatan and 7 from Quintana.

1907. February 9 to March 22: Two cases; 1 death. One case was imported from Paraje Nuevo. One new case, September 1. Total: Cases, 3; deaths, 1.

1908. July 7 to December 5: Thirty-four cases; 18 deaths.

1909. Epidemic.

VICTORIA.

Victoria, or Nueva Santander, is the capital of the State of Tamaulipas, 120 miles northwest of Tampico. It has suffered very little from yellow fever. The few instances were as follows:

1899. Sporadic cases in October; imported.

1903. Three cases and one death in August; imported.

1904. Infected by Tampico. December 6 to 19: Four cases; two deaths.

XUMPICH.

1908. November 1 to November 30: Two cases; imported.

YUKI.

1883. Yuki, in Sonora, near the Arizona border, was invaded for the first and only time by yellow fever during the epidemic of 1883. The mortality is said to have been heavy, considering the smallness of the place, but no statistics were kept.

ZONGOLICA.

1903. Five cases in July; imported.

ZUCATULA.

1883. Zucatula, on the Pacific coast, suffered from yellow fever for the first and only time in 1883. No statistics are available.

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UNITED STATES.

HISTORY OF YELLOW FEVER IN THE UNITED STATES, BY LOCALITIES, FROM 1668 TO 1909.

General Summary.

Yellow fever has never been known to originate *de novo* in the United States of America. Previous to 1668, it was unknown in this country. It was imported from Havana to New York that year and caused much mortality. Twenty-three years later (1691) Boston was infected by the West Indies, and in 1693 Philadelphia and Charleston experienced their first visitations of the disease, the infection in both instances being carried from the West Indies.

In December, 1493, fourteen months after the discovery of America, while on his second voyage, Columbus landed on the island of San Domingo and founded the town of Ysabella. This was the first settlement by Europeans in the Western Hemisphere. That same month, the little band of adventurers was attacked by a pestilential disease whose symptoms were new to medical science, and which was no doubt the malady now known as yellow fever. This pestilence lasted three years, mowing down the Spaniards as fast as they arrived from the Old World. Ysabella was finally abandoned in 1496, on account of its insalubriety and never rebuilt.

Oviedo, Gomara and Herrera, chroniclers of the period, in their description of the pestilential sickness which decimated the Spaniards from 1493 to 1496, specially mention the yellowness of the skin of those afflicted at Ysabella.

This is the first epidemic of yellow fever recorded in history.

While cruising along the coast of San Domingo in 1494, Columbus was attacked by the "American Pestilence," and narrowly escaped death. His son, Ferdinand Columbus, in his interesting account of the voyages of the great explorer, speaks of the coma which accompanied the fever.

On March 27, 1495, was fought the battle of Vega-Real, in which the handful of Spanish soldiers under Columbus put to flight "a multitude of Indians." The natives, who looked upon the white men as gods, fled precipitatedly before the advancing foreigners. Shortly after the encounter, the Spaniards were decimated by a worst enemy than the unoffending islanders—yellow fever, which from that day proved the greatest and almost unsurmountable obstacle to the colonization of the New World.

The pestilence at Vega-Real was so murderous and the epidemics which followed wherever the Spaniards attempted to establish a settlement in the West Indies were so frightfully mortal, that the King of Spain decided to send all the malefactors of his kingdom to Hispanola (San Domingo), promising a full pardon to murderers after sojourning two years on the island. Those guilty of minor offenses were given their freedom if they escaped the terrors of the "Yellow Demon" after one year. It is a significant fact that few returned to their native land.

The following resume, made by the United States Marine Hospital Service, shows that in almost every instance the disease under discussion was carried to the seaboard cities of the United States by vessels from the West Indies:

TABLE SHOWING YEARS IN WHICH YELLOW FEVER HAS INVADDED THE SEABOARD CITIES OF THE UNITED STATES, CITIES VISITED, AND SOURCE OF INFECTION (1668-1893), CHRONOLOGICALLY ARRANGED.

[In this table cases of yellow fever which have been detected and detained at quarantine stations are not considered. Epidemic years are marked with an E.]

Year.	Locality.	Origin.	Remarks.
1668	New York.....	West Indies.....	According to Toner the first appearance of yellow fever in the United States. (Report U. S. Marine-Hospital Service, 1873; J. H. Griscom, M. Rep., 1856, p. 561.)
1691	Boston.....	do.....	Infected for the first time by a vessel from the West Indies. (B. Dowler, Tableau of Yellow Fever, 1853, p. 7.)
1693	do.....	do.....	Wheeler's fleet brought the disease from Barbados and Martinique. (Hutchinson, History of New England, Vol. II, p. 72; and Ledird, New History of England, III, p. 110; also Ed. N. Y. J. M., 1856, p. 278, Toner.)
1693	Philadelphia.....	do.....	La Roche (Vol. I, p. 48) according to Toner the disease first visited Philadelphia in 1695 and Charleston in 1699. Both authors attribute the origin of the epidemic to boats coming from the Antilles.
1693	Charleston, S. C.....	do.....	
1695	Philadelphia.....	do.....	According to Toner the first appearance of yellow fever on the Delaware (J. N. Schoolfield, Va. Med. Jour., 1857, p. 358), brought by boat from the West Indies. (Bérenger-Féraud, p. 36.)
1697	Virginia.....	do.....	The fleet of Admiral Nevil brought the disease from the West Indies to Virginia. The mortality was considerable. The admiral himself died, and of all the captains only one survived. (Bérenger-Féraud, Traite theoretique et clinique de la fièvre jaune, 1890, p. 37.)
1699 E	Philadelphia.....	do.....	220 out of 2,000 or 3,000 inhabitants died of yellow fever, called at the time the Barbados fever, because it was brought by a ship from that island. (Bally, after Lytler, American Registers, Vol. I; R. La Roche, Ch. M. J. and Rev., 1852, p. 58, Toner.)
1699	Charleston, S. C.....	do.....	Simon's Trans. S. C. Med. Assn., 1851, p. 37, Toner.
1702 E	New York.....	West Indies.....	A severe epidemic, said to have been brought to the city by a bale of cotton from St. Thomas. The fever this year was carried along the lines of trade as far as Biloxi. (Bérenger-Féraud, loc. cit., p. 39.) 570 deaths. (J. H. Griscom, Visitation of Yellow Fever, p. 2.)
1702	Biloxi, Miss.....	do.....	Drake Dis. Int. Valley of N. A., 191. (Toner.)
1703	Charleston, S. C.....	do.....	According to Kewell the disease was brought by way of the sea. (Bérenger-Féraud, loc. cit.) Simon's Trans. S. C. Med. Assn., 1851, p. 37. (Toner.)
1705	Mobile.....	do.....	(P. H. Lewis, N. O. Med. Jour., 1845, Vol. I, p. 283.)
1728	Charleston, S. C.....	do.....	(Carpenter, sketches from the history of yellow fever, 1844, p. 11. Simon's Trans. S. C. Med. Assn., 1851, p. 37. Toner.)
1729	Louisiana.....	do.....	Bérenger-Féraud, loc. cit., p. 43.
1732 E	Charleston, S. C.....	West Indies.....	Severe epidemic, 8 to 12 deaths daily from May to October. (Toner.) Brought to port by a vessel from the West Indies (Montrie and Lanning) and Simon's Trans. S. C. Med. Assn., 1851, p. 37. (Toner.)
1732 E	Philadelphia.....	do.....	Carpenter, loc. cit., p. 11. Daily Shreveport Times, Vol. II, No. 311, 1873. (Toner.) 250 deaths. (Bérenger-Féraud, loc. cit.)

TABLE SHOWING YEARS IN WHICH YELLOW FEVER HAS INVADDED THE SEABOARD CITIES OF THE UNITED STATES, ETC.—Continued.

Year.	Locality.	Origin.	Remarks.
1732	New York		J. H. Griscom, Visitation of Yellow Fever, p. 3. (Toner.)
1734	Charleston, S. C.		T. Harris. (Philadelphia M. and P. J., No. 5, p. 21.)
1735	New Haven, Conn.		Pariset, quoted by Bérenger-Féraud, loc. cit., p. 45.
1737	Norfolk	West Indies	The disease was brought to Virginia from the Antilles, according to Mitchell & Rush. (An account of the Billious Vomiting Yellow Fever.)
1739	Charleston, S. C.	do	According to Linning and Ramsay. (Description of yellow fever, Vol. II, p. 379.) The disease came from the West Indies. II. Hume, Ch. M. J. and Rev. 1854, p. 145. (Toner.) Carpenter, loc. cit., p. 11.
1741 E	Philadelphia	do	Carpenter, loc. cit., p. 12. The disease was brought to the city in June, presumably in a trunk of clothing from the West Indies. (Bérenger-Féraud, loc. cit.) 250 deaths. (J. H. Griscom, Visitation of Yellow Fever, p. 3.)
1741	Norfolk		Bérenger-Féraud. (Med. Repos., Aug. 1810.)
1741	New York		Ed. N. Y. J. M., 1856, p. 278. (Toner.)
1741	Boston		15 deaths. (Bérenger-Féraud, loc. cit., p. 47.)
1742	Norfolk		Bérenger-Féraud, loc. cit., p. 46.
1742	New York		Ed. N. Y. J. M., 1856, p. 278. (Toner.)
1742	Philadelphia		B. Dowler, Tableau of Yellow Fever, p. 3. (Toner.)
1743	do		Do
1743 E	New York		217 deaths, J. H. Griscom, Visitation of Yellow Fever, p. 3. (Toner.)
1743	New Haven		Bérenger-Féraud, loc. cit., p. 48.
1744	Philadelphia	West Indies	Brought to the city by an infected ship from the West Indies. (Bérenger-Féraud, loc. cit., p. 48.) R. La Roche, Ch. M. J. and Rev., 1852, p. 458. (Toner.)
1745 E	Charleston, S. C.	do	According to Linning, brought to port by an infected ship from the West Indies. (Bérenger-Féraud, loc. cit.) W. Hume, Ch. M. J. and Rev., 1854, p. 145. (Toner.)
1745	New York		J. H. Griscom, Visitation of Yellow Fever, p. 3. (Toner.)
1747 E	Philadelphia		Currie, Rush, and Bally. (Bérenger-Féraud, loc. cit.) R. La Roche, Ch. M. J. and Rev., 1852, p. 458. (Toner.)
1747	Norfolk		Bally. (Bérenger-Féraud, loc. cit.) Daily Shreveport Times, Vol. II, No. 311, 1873. (Toner.)
1747	New York		J. H. Griscom, Visitation of Yellow Fever, p. 4. (Toner.)
1748	Charleston, S. C.	West Indies	The disease this year was, according to Moultrie and Linning, imported by a contaminated vessel from the West Indies. Bérenger-Féraud, loc. cit.) W. Hume, Ch. M. J. and Rev., 1854, p. 145. (Toner.)
1748	New York		Daily Shreveport Times, Vol. II, No. 311, 1873. (Toner.)
1749	Charleston, S. C.		Moreau de Jonnés. (Monographie historique et médicale de la fièvre jaune, Paris, 1820, p. 56.)
1753	do		Sporadic. (Linning and Ramsay.) W. Hume, Ch. M. J. and Rev., 1854, p. 145. (Toner.)
1755	do		Do
1761	do		Harris, Philadelphia M. and Ph. J., 1805, p. 21. (Toner.)
1762 E	Philadelphia	West Indies	Severe epidemic started by a sailor from Havana, who communicated the disease to his family. (Redman, quoted by Pally.) J. H. Griscom, Visitation of Yellow Fever, p. 5. (Toner.)
1762	Charleston, S. C.		Dawson and De Saussure, Census of Charleston. (Toner.)
1762	New York		Daily Shreveport Times, Vol. II, No. 311, 1873. (Toner.)
1763	Philadelphia		Sporadic. (Rush.)
1763 E	Nantucket, Mass.		259 deaths (Toner), Med. Rep. 1853, p. 107.
1764	Pensacola		P. S. Townsend, N. Y. M. and Ph. J., 1823, p. 315. (Toner.)
1765	MoTo		Drake, Dis. Int. Valley of N. A., p. 216. (Toner.)

TABLE SHOWING YEARS IN WHICH YELLOW FEVER HAS INVADED THE SEABOARD CITIES OF THE UNITED STATES, ETC.—Continued.

Year.	Locality.	Origin.	Remarks.
1765 E	Pensacola.....	West Indies.....	A British garrison was sent from England to occupy the city, and coming by the way of the West Indies, introduced the disease. (Monette-Williams, Carpenter, loc. cit., p. 12.) 125 deaths. (Lind, Vol. I, p. 45; Bérenger-Féraud, loc. cit., and Drake Dis. Int. Valley of N. A., p. 190.)
1766	Mobile.....		P. H. Lewis, N. O. M. J., Vol. I, No. 4, 1845, p. 283. (Toner.)
1768	Charleston, S. C.....		M. M. Dowler, N. O. M. J., 1859, p. 305. (Toner.)
1769	New Orleans.....		The first appearance of yellow fever in New Orleans. (S. Chaille, Va. M. J., 1858, p. 498. Toner.)
1770	Charleston, S. C.....		T. Harris, Phila. M. and Ph. J., 1805, p. 21. (Toner.)
1783	Baltimore.....		Webster, quoted by Bérenger-Féraud, loc. cit., p. 57.
1789	Norfolk.....		Bérenger-Féraud, loc. cit., p. 58.
1789	Baltimore.....		Do.
1789	Philadelphia.....		Do.
1789 E	New York.....		W. Hume, Ch. M. J. and Rev., 1860, p. 24. (Toner.)
1790	.....do.....		Sporadic. (Bally.)
1791	New Orleans.....		S. Chaille, Va. M. J., 1858, p. 498. (Toner.)
1791	Philadelphia.....		Bérenger-Féraud, loc. cit., p. 58.
1791 E	New York.....		Ed. N. Y. J. M., 1856, p. 278. Report on Quarantine on the Southern and Gulf Coasts of the U. S. (H. E. Brown, 1873.)
1792	Charleston, S. C.....		W. Hume, Ch. M. J. and Rev., 1852, p. 145. (Toner.)
1792	New York.....		Ed. N. Y. J. M., 1856, p. 278.
1793 E	New Orleans.....		Trans. A. M. A., Vol. II, 1853, p. 665. (Toner.)
1793 E	Philadelphia.....	West Indies.....	Carpenter, loc. cit., p. 12. 4,044 deaths in 3 months in a population of 55,000. (Rush.) The epidemic is said to have started in a sailors' boarding house, where the crew of a French corsair (which had been contaminated at the West Indies) were stopping. Bérenger-Féraud, loc. cit., p. 60. Carey, Account of the Malignant Fever, p. 116. (Toner.)
1793	Portsmouth, N. H.....	do.....	The infection was brought to this port by a vessel from Martinique. One of the crew died en route. All were well upon arrival. The first case occurred at the house where the captain was stopping. (Bérenger-Féraud, loc. cit., p. 62.)
1793	New York.....	do.....	Introduced by vessels from the West Indies, many of which brought refugees who fled from Santo Domingo. A vessel entered from Santo Domingo with several cases of yellow fever on board. (Carey; Carpenter, loc. cit., p. 13.) Sporadic, Ed. N. Y. J. M., 1856, p. 278. (Toner.)
1794 E	New Orleans.....		Stethoscope, Vol. III, No. 11, 1853, p. 665. (Toner.)
1794 E	Charleston, S. C.....		W. Hume, Ch. M. J. and Rev., 1852, p. 145. (Toner.)
1794	Norfolk.....		J. H. Griscom, N. Y. J. M., 1856, p. 369. (Toner.)
1794	Baltimore.....		W. Hume, Ch. M. J. and Rev., 1860, p. 24. (Toner.)
1794 E	Philadelphia.....		La Roche, B. of H. Rep., Phila., 1870, p. 53. (Toner.)
1794	New York.....		Ed. N. Y. J. M., 1856, p. 278. (Toner.)
1794	Providence, R. I.....	West Indies.....	by boat from the Antilles. (Med. Jour. 1812, p. 28.)
1794	New Haven, Conn.....	do.....	Brought there by a trunk of effects of an individual who died of the disease at Martinique. Three persons who assisted in opening the trunk died of yellow fever in a few days. (Bérenger-Féraud, loc. cit., p. 63; W. Hume, Ch. M. J. and Rev., 1860, p. 24.) (Toner.)
1795 E	New Orleans.....		Stethoscope, Vol. III, No. 11, 1853, p. 665. (Toner.)
1795	Charleston, S. C.....		W. Hume, Ch. M. J. and Rev., 1852, p. 145. (Toner.)
1795	Norfolk.....		J. H. Griscom, N. Y. J. M., 1856, p. 369. (Toner.)
1795	Baltimore.....		Toner (U. S. M. H. S. Rep., 1873) and Bérenger-Féraud, loc. cit.

TABLE SHOWING YEARS IN WHICH YELLOW FEVER HAS INVADED THE SEABOARD CITIES OF THE UNITED STATES, ETC.—Continued.

Year.	Locality.	Origin.	Remarks.
1795 E	New York	West Indies.....	The disease was brought here by the brig Zephyr from Port au Prince. There were 700 deaths in 3 months in a population of 40,000. (Bérenger-Féraud, loc. cit., p. 64; Bayley's Account of Yellow Fever, 1795.)
1795 E	Philadelphia.....		Bérenger-Féraud, p. 64.
1795	Providence, R. I.		W. Hume, Ch. M. J. and Rev., 1860, p. 24. (Toner.)
1795	Boston.....		Dowler, Tableau of Yellow Fever, 1853, p. 7. (Toner.)
1796 E	New Orleans.....		Stethoscope, Vol. III, No. 11, 1853, p. 665.
1796	Wilmington, N. C.		J. H. Griscom, N. Y. J. M., p. 369
1796	Norfolk.....		Va. M. J., 1857, p. 95. (Toner.)
1796	Philadelphia.....		J. H. Griscom, N. Y. J. M., 1856, p. 368 and 369. (Toner.)
1796	New York.....		Ed. N. Y. J. M., 1856, p. 278.
1796	Providence, R. I.		Bérenger-Féraud, loc. cit., p. 64.
1796	Newburyport, Mass.		J. H. Griscom, N. Y. J. M., 1856, p. 369.
1796	Portsmouth, N. H.		Bérenger-Féraud, loc. cit., p. 65.
1796	Charleston, S. C.	West Indies.....	Brought by a vessel from Havana. (Bérenger-Féraud, loc. cit., p. 65.) W. Hume, Ch. M. J. and Rev., 1852, p. 145.
1796	Boston.....	do	According to Warren, brought by a vessel from St. Domingo. (Bérenger-Féraud, loc. cit., p. 65.) J. H. Griscom, N. Y. J. M., 1856, p. 369.
1797	New Orleans.....		Stethoscope, Vol. III, No. 11, 1853, p. 665. (Toner.)
1797	Charleston, S. C.		W. Hume, Ch. M. J. and Rev., 1852, p. 145. (Toner.)
1797	Norfolk.....		J. H. Griscom, N. Y. J. M., 1856, p. 369. (Toner.)
1797	Baltimore.....		J. H. Griscom, Visitation of Yellow Fever, p. 8. (Toner.)
1797	New York.....		Ed. N. Y. J. M., 1856, p. 278. (Toner.)
1797 E	Providence, R. I.	West Indies.....	The disease was brought here by the Betsy from the West Indies. (Bérenger-Féraud, loc. cit., p. 65.) 45 deaths, Dowler, Tableau of Yellow Fever, p. 10.
1797 E	Philadelphia.....	do	The college of physicians of Philadelphia attributed the introduction of the disease this year to the L'Arethuse with slaves from Jamaica and Havana. (Bérenger-Féraud, loc. cit., p. 65.) 1,300 deaths, Rush, Epidemic of 1797. (Toner.) Dowler, p. 10, loc. cit.
1798 E ¹	Charleston, S. C.		T. Y. Simons, Ch. M. J. and Rev., 1851, p. 779. (Toner.)
1798	Norfolk.....		Va. M. J., 1857, p. 95. (Toner.)
1798	Baltimore.....		W. Hume, Ch. M. J. and Rev., 1860, p. 24.
1798 E	Philadelphia.....	West Indies	The disease was brought by a vessel from St. Domingo. (Caillot, p. 213, and Currie, quoted by Bérenger-Féraud, loc. cit., p. 66.) 3,500 deaths, Rush, epidemic of 1798. (Toner.)
1798 E	Chester, Pa.		50 deaths, J. H. Griscom., Visitation of Yellow Fever, p. 9. (Toner.)
1798	Newcastle, Del.		J. Stephens, Med. Mus., 1809, p. 153. (Toner.)
1798 E	Wilmington, Del.		250 deaths, Med. Mus., 1809, p. 153. (Toner.)
1798 E	New York.....	West Indies	2,080 deaths, Ed. N. Y. J. M., 1856, p. 278. (Toner.) Carpenter, loc. cit., p. 13.
1798 E	Boston.....		200 deaths, J. H. Griscom, N. Y. J. M., 1856, p. 369. (Toner.)
1798 E	Salem, Mass.		J. Gotham, jr., Med. Rep., 1856, p. 563. (Toner.)
1798 E	Portsmouth, N. H.	West Indies	100 deaths, brought by a ship from Martinique. (Moreau de Jonnes, p. 178.)
1798	Newburyport, Mass.		Brought to the city by an infected vessel, the Sally, with sick aboard. Five days after her arrival the disease declared itself. (Bérenger-Féraud, loc. cit., p. 67.)
1798	Hartford, Conn.		Brown, Quarantine, p. 8. (Toner.)
1798 E	New London, Conn.		81 deaths, Ed. M. Repos., 1799, p. 211. (Toner.)
1798	Stonington, Conn.		J. Comstock, M. Repos., 1807, p. 23. (Toner.)
1798 E	New Orleans.....		A severe epidemic year. Old acclimated inhabitants died of the disease. (Bérenger-Féraud, loc. cit., p. 67.) S. Chaillé, Va. M. J., 1858, p. 498. (Toner.)
1798 E	Charleston, S. C.		Contaminated by a Spanish vessel; 239 deaths. (Bérenger-Féraud, loc. cit., p. 67.) 239 deaths. W. Hume, Ch. M. J. and Rev., 1854, p. 145. (Toner.)

¹A severe epidemic year.

TABLE SHOWING YEARS IN WHICH YELLOW FEVER HAS INVADDED THE SEABOARD CITIES OF THE UNITED STATES, ETC.—Continued.

Year.	Locality.	Origin.	Remarks.
1799	Norfolk.....		Va. M. J., 1857, p. 95. (Toner.)
1799	Baltimore.....		W. Hume, Ch. M. J. and Rev., 1860, p. 24. (Toner.)
1799 E	Philadelphia.....		The disease is said to have been brought here this year by the sloop La Marie taken by the Le Gange. (Bérenger-Féraud, loc. cit., p. 67.) 1,000 deaths, La Roche, Ch. M. J. and Rev., 1852, p. 458. (Toner.)
1799 E	New York.....		76 deaths, Ed. N. Y. J. M., 1856, p. 278. (Toner.)
1800	New Orleans.....	West Indies	Infected by a vessel from Havana. (Bérenger-Féraud, loc. cit., p. 68.) S. Chaillé, Va. M. J., 1858, p. 498. (Toner.)
1800 E	Charleston, S. C.....		184 deaths, W. Hume, Ch. M. J. and Rev., 1854, p. 145. (Toner.)
1800	Wilmington, N. C.....		M. Repos., 1800, p. 197. (Toner.)
1800 E	Norfolk.....		250 deaths, Med. Repos., Vol. IV, p. 320. (Toner.)
1800	Baltimore.....		W. Hume, Ch. M. J. and Rev., 1860, p. 24. (Toner.)
1800	Philadelphia.....		Dowler, loc. cit., 1854, p. 10.
1800	New York.....		21 deaths, Ed. N. Y. J. M., 1856, p. 278. (Toner.)
1800	New Bedford, Conn.....		Brown, Quarantine, p. 9. (Toner.)
1800	Hartford, Conn.....		M. Repos., 1800, p. 197. (Toner.)
1800	Providence, B. I.....		W. Hume, Ch. M. J. and Rev., 1860, p. 24. (Toner.)
1800	Boston.....		S. Emlen, N. A. M. and S. J., 1828, p. 321. (Toner.)
1801	New Orleans.....		S. Chaillé, Va. M. J., 1858, p. 498. (Toner.)
1801	Norfolk.....		Va. M. J., 1857, p. 95. (Toner.)
1801	Baltimore.....		W. Hume, Ch. M. J. and Rev., 1860, p. 24. (Toner.)
1801	Philadelphia.....		Do.
1801	New York.....		140 victims, Dowler, loc. cit., 1854, p. 11.
1801	Block Island, R. I.....		Aaron C. Willey, M. Repos., 1860, p. 24. (Toner.)
1801	New Bedford, Mass.....		B. Dowler, loc. cit., 1854, p. 11.
1801	Savannah, Ga.....		B. Dowler, loc. cit., p. 11.
1801	Norwich, Conn.....		Do.
1802 E	Philadelphia.....	West Indies	Probably brought to the city this year by the corsair le Sans-Culottes de Nantes, which captured the Spanish ship la Flore, with yellow fever, from the Antilles, and brought the prize to the city. On the 3d of August, four days after the arrival of the corsair, the disease appeared in a hostelry frequented by the crew; 307 deaths followed. (Cathral and Currie, Bally, p. 455; Bérenger-Féraud, p. 71; Carpenter, sketches from history of yellow fever; also W. Hume, Ch. M. J. and Rev., 1860, p. 24. (Toner.)
1802	New Orleans.....		B. Dowler, Tableau of Yellow Fever, 1853, p. 12. (Toner.)
1802 E	Charleston.....		90 deaths, W. Hume, Ch. M. J. and Rev., 1854, p. 145. (Toner.)
1802	Norfolk.....		Va. M. J., 1857, p. 95. (Toner.)
1802 E	Wilmington, Del.....		86 deaths. Med. Repos., 1803, p. 235. (Toner.)
1802	Baltimore.....		M. Repos., 1803, p. 100. (Toner.)
1802 E	Boston.....		60 deaths, J. Gotham, Med. Rep., 1856, p. 563. (Toner.)
1802	New York.....		2 deaths at Marine Hospital, W. Hume, Ch. M. J. and Rev., 1860, p. 24. (Toner.)
1803	New Orleans.....		Bérenger-Féraud, loc. cit., p. 73.
1803	Charleston, S. C.....		Simon's Trans. S. C. Med. Assn., 1851, p. 37. (Toner.)
1803 E	Norfolk.....		200 deaths. (Bérenger-Féraud, loc. cit., p. 73.) Va. M. J., 1857, p. 95. (Toner.)
1803 E	Philadelphia.....		195 deaths, W. Hume, Ch. M. J. and Rev., 1860, p. 24. (Toner.)
1803 E	New York.....		600 to 700 deaths, Ed. N. Y. J. M., 1856, p. 278. (Toner.)
1803	New Haven, Conn.....		Brown, Quarantine, 1872, p. 9. (Toner.)
1804	New Orleans.....		S. Chaillé, Va. M. J., 1858, p. 498. (Toner.)
1804 E	Charleston.....		148 deaths, Simons Trans. S. C. Med. Assn., 1851, p. 37. (Toner.)
1804	Norfolk.....		Va. M. J., 1857, p. 95. (Toner.)
1804	New Haven, Conn.....		Brown, Quarantine, 1872, p. 9. (Toner.)
1805	Charleston.....		Simon's Trans. S. C. Med. Assn., 1851, p. 37. (Toner.)
1805	Norfolk.....		Va. M. J., 1857, p. 95. (Toner.)
1805	Baltimore.....		J. H. Griscom, Visitation of Yellow Fever, p. 13. (Toner.)

TABLE SHOWING YEARS IN WHICH YELLOW FEVER HAS INVADED THE SEABOARD CITIES OF THE UNITED STATES, ETC.—Continued.

Year.	Locality.	Origin.	Remarks.
1805 E	Philadelphia.....	West Indies	Brought to the city by the schooner Nancy from St. Domingo. The disease extended along the Delaware to Chester. (Bérenger-Féraud, loc. cit., p. 80.) 300 to 400 deaths, Hume, Ch. M. J. and Rev., 1860, p. 24. (Toner.)
1805	New Haven, Conn		B. Dowler, Tableau of Yellow Fever, p. 13. (Toner.)
1805	Providence, R. I	West Indies	Presumably brought to the city by three vessels, Sainte-Croix, Antigua, and La Havane, from the West Indies, Med. Journal, 1812, p. 28. (Bérenger-Féraud, loc. cit., p. 81.)
1805	Boston.....		J. H. Griscom, Visitation of Yellow Fever, p. 13. (Toner.)
1805 E	New York		340 deaths, J. H. Griscom, M. Rep., 1856, p. 561. (Toner.)
1806	Richmond, Va.		M. Repos, 1807, p. 215.
1806	Newport, R. I		Toner (U. S. M. H. S. Rep., 1873), and Bérenger-Féraud, loc. cit., p. 81. (Toner.)
1807	St. Augustine, Fla		Brown, Quarantine, p. 32. (Toner.)
1807	Savannah.....		B. Dowler, Tableau of Yellow Fever, p. 14. (Toner.)
1807 E	Charleston, S. C		162 deaths, Simon's Trans. S. C. Med. Assn., p. 38. (Toner.)
1807	Philadelphia.....		3 deaths, B. Dowler, Tableau of Yellow Fever, 1853, p. 14. (Toner.)
1807	New York.....		3 deaths at Marine Hospital, J. H. Griscom, M. Rep., 1856, p. 561. (Toner.)
1808 E	St. Marys, Ga	Savannah.....	The Polly arrived at St. Marys, Ga., from Savannah with two cases on board. The sick disembarked and communicated the disease to the village; of 350 white inhabitants over 300 died; of 150 negroes, only 3 died of the disease. (Bérenger-Féraud, loc. cit., p. 82.)
1808	New York.....		One death at Marine Hospital, Ed. N. Y. J. M., 1856, p. 284. (Toner.)
1808	Savannah.....		B. Dowler, Tableau of Yellow Fever, p. 14. (Toner.)
1809	New Orleans.....		S. Chaillé, Va. M. J., 1858, p. 498. (Toner.)
1809	Philadelphia.....		B. Dowler, Tableau of Yellow Fever, 1853, p. 14. (Toner.)
1809	New York.....	West Indies.....	Byship Concord from Havana, Ed. N. Y. J. M., 1856, p. 284. (Toner.)
1809 E	Brooklyn.....		40 deaths, Ed. N. Y. J. M., 1856, p. 278. (Toner.)
1810	Pensacola.....		Bérenger-Féraud, loc. cit., p. 83.
1810	Philadelphia.....		3 deaths, B. Dowler, Tableau of Yellow Fever, 1853, p. 14. (Toner.)
1810	New York.....		1 death at Marine Hospital, Ed. N. Y. J. M., 1856, p. 284. (Toner.)
1811	Pensacola.....		Drake Dis. Int. Valley of N. A., p. 190. (Toner.)
1811	New Orleans.....		S. Chaillé, Va. M. J., 1858, p. 498. (Toner.)
1811	Philadelphia.....		5 deaths, B. Dowler, Tableau of Yellow Fever, 1853, p. 14. (Toner.)
1811	Perth Amboy, N. J	West Indies	The brig Favorite brought the disease from Havana to Perth Amboy. (Bowen on the Yellow Fever.) (Reports of the N. Y. B. of H., Vol. IV, p. 335.) (Bérenger-Féraud, loc. cit., p. 83.)
1812	New Orleans.....		S. Chaillé, Va. M. J., 1858, p. 498. (Toner.)
1812	Charleston, S. C		W. Hume, Ch. M. J. and Rev., 1854, p. 145. (Toner.)
1813	Philadelphia.....		6 deaths, B. Dowler, Tableau of Yellow Fever, 1853, p. 14. (Toner.)
1814	Philadelphia.....		7 deaths, B. Dowler, Tableau of Yellow Fever, 1853, p. 14. (Toner.)
1815	Philadelphia.....		2 deaths, B. Dowler, Tableau of Yellow Fever, 1853, p. 14. (Toner.)
1815	New York.....		7 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 284. (Toner.)
1816	Philadelphia.....		2 deaths, B. Dowler, Tableau of Yellow Fever, 1853, p. 14. (Toner.)
1816	New York.....		Ed. N. Y. J. M., 1856, p. 284. (Toner.)
1817 E	New Orleans.....	West Indies	Brought by the English cutter Phoenix from Havana. (Carpenter, loc. cit., p. 17.) 800 deaths, S. Chaillé, Va. M. J., 1858, p. 498. (Toner.)
1817	Savannah.....		Bérenger-Féraud, loc. cit., p. 88.
1817 E	Charleston, S. C		272 deaths, Dowler, N. O. M. J., 1859, p. 597. (Toner.)
1817	New York.....		4 deaths at marine hospital, Ed. N. Y. J. M., 1856, p. 281. (Toner.)

TABLE SHOWING YEARS IN WHICH YELLOW FEVER HAS INVADDED THE SEABOARD CITIES OF THE UNITED STATES, ETC.—Continued.

Year.	Locality.	Origin.	Remarks.
1818 E	Charleston, S. C.		115 deaths. (Béranger-Féraud, loc. cit., p. 88.)
1818	New York		4 deaths at marine hospital, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1818	Baltimore	Havana	Carpenter, loc. cit., p. 13.
1818 E	New Orleans		115 deaths, Dowler, N. O. M. J., 1859, p. 308. (Toner.)
1819 E	do	West Indies	Infected by a vessel from Havana. (Béranger-Féraud, loc. cit., p. 89.) There were 2,190 deaths. (S. Chaillé, Va. M. J., 1858, p. 493, Toner.)
1819 E	Mobile		274 deaths, P. H. Lewis, N. O. M. J., Vol. I, No. 4, 1845, p. 284. (Toner.)
1819	Savannah		A. M. Rec., 1820, p. 212. (Toner.)
1819 E	Charleston, S. C.		117 deaths, Dowler, N. O. M. J., 1859, p. 597. (Toner.)
1819	Philadelphia		13 deaths, S. Emlen, N. A. M. and S. J., 1828, p. 321. (Toner.)
1819	Baltimore		D. M. Reese, Yellow Fever, 1819, p. 27. (Toner.)
1819 E	New York		37 deaths, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1819	New Haven, Conn.		F. Pascalis, M. Repos., 1820, p. 239. (Toner.)
1819	Boston		S. Emlen, N. A. M. and S. J., 1828, p. 321. (Toner.)
1820	New Orleans	Havana	Carpenter, loc. cit. (S. Chaillé, Va. M. J., 1858, p. 498.)
1820	Savannah		N. O. M. and S. J., 1827, p. 1. (Toner.)
1820	Baltimore		H. G. Jameson, A. J. M. C., 1856, p. 372. (Toner.)
1820 E	Philadelphia		83 deaths, S. Jackson, A. M. Rec., 1821, p. 689. (Toner.)
1820	New York		2 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1820	Middletown, Conn.	Santiago de Cuba	Carpenter, loc. cit., and M. Tully, N. Y. M. and Ph. J., 1822, p. 153.
1821 E	St. Augustine, Fla.	Havana	Carpenter, loc. cit. The disease was brought to the United States from Havana, and was severe in several localities. (Béranger-Féraud, loc. cit., p. 90.) 140 deaths, J. Gotham M. Rep., 1856, p. 564. (Toner.)
1821	Savannah		Béranger-Féraud, loc. cit., p. 89.
1821	Mobile		Drake, Dis. Int. Valley of N. A., p. 191. (Toner.)
1821	Wilmington, N. C.		J. B. Hill, A. M. Rec., 1822, and Brown, Quarantine, p. 18. (Toner.)
1821	Baltimore		H. G. Jameson, A. J. M. C., 1856, p. 372. (Toner.)
1821	Norfolk		Va. M. J., 1857, p. 95. (Toner.)
1821	New York		16 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1822 E	Pensacola	Havana	Brought to the United States by emigrants from the West Indies. (Béranger-Féraud, loc. cit., p. 100.) Carpenter, loc. cit., 259 deaths, Drake, Dis. Int. Valley of N. A., p. 229. (Toner.)
1822 E	New Orleans	Pensacola	233 deaths, Trans. A. M. A., 1851, p. 207. (Toner.) Refugees from Pensacola carried the disease on the Ann and Elisa to New Orleans. (Béranger-Féraud, loc. cit., p. 100, and Carpenter.)
1822	Mobile		Drake, Dis. Int. Valley of N. A., p. 191. (Toner.)
1822	Charleston, S. C.		2 deaths, N. O. M. J., 1859, p. 597. (Toner.)
1822	Baltimore		H. G. Jameson, A. J. M. C., 1856, p. 372. (Toner.)
1822 E	New York	Havana	The ship Enterprise from Havana brought the disease into port. (Béranger-Féraud, loc. cit., p. 100, and Carpenter, loc. cit.) 230 deaths, Ed. N. Y. J. M., 1856, p. 281.
1823	New Orleans	West Indies	The first case occurred among West Indies' shipping. (Carpenter.) 1 death, Trans. A. M. A., 1851, p. 207. (Toner.)
1823	Key West		Béranger-Féraud, loc. cit., p. 100.
1823	New York		5 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 281.
1823	Brooklyn, N. Y.	New Orleans	Infected by the Diana, which left New Orleans at the height of the epidemic. The vessel was detained in quarantine 30 days without disinfection. (Béranger-Féraud, loc. cit., p. 100.) Carpenter, Sketches of Yellow Fever. (Toner.)
1823	Natchez, Miss.	do	Béranger-Féraud, loc. cit., p. 100, and Carpenter.

TABLE SHOWING YEARS IN WHICH YELLOW FEVER HAS INVADDED THE SEABOARD CITIES OF THE UNITED STATES, ETC.—Continued.

Year.	Locality.	Origin.	Remarks.
1824 E	New Orleans.....	Havana.....	118 deaths. Brought to the city this year by one of the crew of a barge. The man had communication with the schooner Emigrant from Havana, which boat had yellow fever cases on board. (Bérenger-Féraud, loc. cit., p. 102; also Carpenter and Trans. A. M. A., 1851, p. 207.)
1824	Key West.....		B. Ticknor, N. A. M. and S. J., 1827, p. 213.
1824	Mobile.....		Drake, Dis. Int. Valley of N. A., p. 191. (Toner.)
1824 E	Charleston.....		235 deaths, Dowler N. O. M. J., 1859, p. 597. (Toner.)
1824	New York.....		8 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1825 E	New Orleans.....		49 deaths, Trans. A. M. A., 1851, and Drake, p. 197. (Toner.)
1825	Mobile.....		Drake, Dis. Int. Valley of N. A., p. 219. (Toner.)
1825	Pensacola.....	West Indies	West Indian vessel. (Am. Pub. Health Assn., Vol. IV.) Brown, Quarantine, p. 36. (Toner.)
1825	Charleston, S. C.....		2 deaths, Dowler, N. O. M. J., 1859, p. 597. (Toner.)
1825	New York.....		1 death at Marine Hospital, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1826	New Orleans.....		5 deaths, Trans. A. M. A., 1851, p. 207, and Drake, p. 197. (Toner.)
1826	Norfolk.....		Committee's report, p. 14. (Toner.)
1826	New York.....		2 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1827 E	New Orleans.....		109 deaths, Trans. A. M. A., 1851, p. 207, and Drake, p. 197. (Toner.)
1827	Mobile.....		Drake, Dis. Int. Valley of N. A., p. 219. (Toner.)
1827	Pensacola.....		Med. Statistics, U. S. Army, p. 58.
1827	Savannah.....		N. O. M. and S. J., Vol. X, p. 145. (Toner.)
1827	Charleston, S. C.....		64 deaths, Dowler, N. O. M. J., 1859, p. 597. (Toner.)
1827	New York.....		4 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1828 E	New Orleans.....		130 deaths, Trans. A. M. A., 1851, p. 207 and Drake, p. 197. (Toner.)
1828 E	Charleston.....		26 deaths, Dowler, N. O. M. J., 1859, p. 597. (Toner.)
1828	Mobile.....		Drake, Dis. Int. Valley of N. A., p. 191. (Toner.)
1828	New York.....		Several cases (Bérenger-Féraud, loc. cit. p. 105), no deaths, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1829 E	New Orleans.....		215 deaths, Trans. A. M. A. 1851, p. 207 and Drake, p. 197. (Toner.)
1829 E	Mobile.....		139 deaths, Drake, Dis. Int. Valley of N. A., p. 191. (Toner.)
1829	Key West.....		C. C. Dupré, Am. J. of Med. Sci., 1841, p. 380. (Toner.)
1829	New York.....		No deaths, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1830 E	New Orleans.....		Few cases. (Bérenger-Féraud, loc. cit., p. 106.)
1830 E	Charleston.....		117 deaths, Trans. A. M. A., 1851, p. 207, and Drake, p. 197. (Toner.)
1830	New York.....		39 deaths, Dowler, N. O. M. J., 1859, p. 597. (Toner.)
1830	New York.....		Several cases (Bérenger-Féraud, loc. cit., p. 107), 1 death, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1831	New Orleans.....		2 deaths, Trans. A. M. A., 1851, p. 207, and Drake, p. 107. (Toner.)
1831	Savannah.....		Bérenger-Féraud, loc. cit., p. 108.
1832	New York.....		1 death at Marine Hospital, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1832	New Orleans.....		18 deaths, Trans. A. M. A., 1851, p. 207, and Drake, p. 197. (Toner.)
1833 E	do.....		210 deaths, Trans. A. M. A., 1851, p. 207, and Drake, p. 197. (Toner.)
1833	New York.....		2 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1834 E	do.....		95 deaths, Trans. A. M. A., 1851, p. 207, and Drake, p. 197. (Toner.)
1834 E	Charleston.....		49 deaths, Dowler, N. O. M. J., 1859, p. 597. (Toner.)

TABLE SHOWING YEARS IN WHICH YELLOW FEVER HAS INVADIED THE SEABOARD CITIES OF THE UNITED STATES, ETC.—Continued.

Year.	Locality.	Origin.	Remarks.
1834	New York.....		1 death at Marine Hospital, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1834	Pensacola.....		Drake, Dis. Int. Valley of N. A., p. 232. (Toner.)
1835 E	New Orleans.....		284 deaths, Trans. A. M. A., p. 207, 1851, and Drake, p. 197. (Toner.)
1835	Charleston.....		25 deaths, Dowler, N. O. M. J., 1859, p. 597. (Toner.)
1835	New York.....		2 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 281. (Toner.)
1836	New Orleans.....		5 deaths, Trans. A. M. A., 1851, p. 207, and Drake, p. 197. (Toner.)
1837 J	do.....	Havana.....	Brought to the city by boats from Havana to New Orleans. There were 442 deaths from the disease, Trans. A. M. A., 1851, p. 207, and Drake, p. 197. (Toner.) Carpenter (loc. cit.). The disease was brought by West Indian vessels.
1837 E	Mobile.....	New Orleans.....	130 deaths, Drake, Dis. Int. Valley of N. A., p. 220. (Toner.)
1838 E	Charleston.....		351 deaths, Dowler, N. O. M. J., 1859, p. 597. (Toner.)
1838	New Orleans.....		17 deaths, Trans. A. M. A., 1851, p. 207, and Drake, p. 197. (Toner.)
1838	Mobile.....		Drake, Dis. Int. Valley of N. A., p. 191. (Toner.)
1838	St. Augustine.....		C. C. Dupré, Ann. J. Med. Sci., 1841, p. 384. (Toner.)
1838	New York.....		8 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 284. (Toner.)
1839 E	New Orleans.....	Havana.....	452 deaths. Brought from Havana. (Béranger-Feraud, loc. cit., p. 111; also Carpenter and Trans. A. M. A., 1851.)
1839 E	Galveston.....	New Orleans.....	250 deaths, Galv. M. J., 1867, p. 856. (Toner.)
1839	Biloxi, Miss.....		Drake, Dis. Int. Valley of N. A., 191. (Toner.)
1839	Pensacola.....		Drake, Dis. Int. Valley of N. A., p. 233. (Toner.)
1839 E	Mobile.....	New Orleans.....	650 deaths, Drake and Brown, Quarantine, 1872. (Toner.) Carpenter, loc. cit.
1839	St. Augustine.....		C. C. Dupré, Am. J. Med. Sci., 1841, p. 384. (Toner.)
1839	Tampa.....		Drake, Dis. Int. Valley of N. A., p. 191. (Toner.)
1839	New York.....		4 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 284. (Toner.)
1839 E	Charleston.....	Havana.....	131 deaths, Dowler, N. O. M. J., 1859, p. 597. (Toner.) West Indian vessels. (Carpenter.)
1840	New Orleans.....		3 deaths, Trans. A. M. A., 1851, p. 207. (Toner.)
1840	Charleston.....		22 deaths, Dowler, N. O. M. J., 1859, p. 597. (Toner.)
1841 E	New Orleans.....	Havana.....	594 deaths, Trans. A. M. A., 1851, p. 207. (Toner.) Carpenter.
1841	Pensacola.....		Drake, Dis. Int. Valley of N. A., p. 233. (Toner.)
1841	Mobile.....		J. H. Lewis, N. O. M. J., 1844, p. 31.
1841 E	St. Augustine.....		26 deaths, C. C. Dupré, Am. J. Med. Sci., 1841, p. 384. (Toner.)
1841 E	Key West.....		26 deaths, C. C. Dupré, Am. J. of Med. Sci., 1841, p. 380. (Toner.)
1841	Charleston.....		Simons Trans. S. C. Med. Assn., p. 59. (Toner.)
1842 E	New Orleans.....	West Indies.....	211 deaths, Trans. A. M. A., 1851, p. 207. (Toner.) Carpenter.
1842	Pensacola.....		S. C. Lanrason, Maryland M. and S. J., 1843, p. 393. (Toner.)
1842 E	Mobile.....		60 deaths, Drake, p. 202, Brown, Quarantine, 1872. (Toner.)
1843 E	New Orleans.....	Havana, Vera Cruz.....	487 deaths, Trans. A. M. A., 1851, p. 207. (Toner.) Carpenter.
1843 E	Mobile.....		240 deaths, Drake, loc. cit. (Toner.)
1843	Pensacola.....		Dr. Wedderburn, Rep. of San. Com., p. 125. (Toner.)
1843	Charleston.....		1 death, Dowler, N. O. M. J., p. 597. (Toner.)
1843	New York.....		5 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 284. (Toner.)
1844 E	Galveston.....		400 deaths, Galv. M. J., 1867, p. 838. (Toner.)
1844 E	New Orleans.....		148 deaths, Trans. A. M. A., 1851, p. 207, and Drake. (Toner.)
1844	Mobile.....		Drake, Dis. Int. Valley of N. A., p. 191. (Toner.)
1844	Pensacola.....		Dr. Wedderburn, Rep. of San. Com., p. 125. (Toner.)
1844	New York.....		2 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 284. (Toner.)
1845 E	New Orleans.....		148 deaths, Chaillé, Va. M. J., 1856, p. 499. (Toner.)

TABLE SHOWING YEARS IN WHICH YELLOW FEVER HAS INVADDED THE SEABOARD CITIES OF THE UNITED STATES, ETC.—Continued.

Year.	Locality.	Origin.	Remarks.
1845	Pensacola		Several cases, Brown, Quarantine, p. 36. (Toner.)
1846 E	New Orleans		146 deaths, Chaillé, Va. M. J., 1856, p. 400. (Toner.)
1846	Pensacola		Brown, Quarantine, p. 36. (Toner.)
1847 E	Galveston		200 deaths, Galy, M. J., 1867, p. 838. (Toner.)
1847	New Orleans	Vera Cruz	Brought from Vera Cruz this year to New Orleans according to Faget, quoted by Bérenger-Féraud, loc. cit., p. 118. There were 2,259 deaths, Chaillé, Va. M. J., 1856, p. 449. (Toner.)
1847	Biloxi, Miss.		E. D. Fenner, N. O. M. and S. J., 1848, p. 1192. (Toner.)
1847 E	Mobile		76 deaths, Brown, Quarantine, and Fenner's South. Med. Reports, Vol. II, p. 304. (Toner.)
1847	Pensacola		Dr. Wedderburn, Rep. of San. Com., p. 125. (Toner.)
1848 E	New Orleans		850 deaths, Chaillé, Va. M. J., 1856, p. 499. (Toner.)
1848 E	Mobile		75 deaths, Fenner, South. Med. Rep., Vol. II, p. 304. (Toner.)
1848	Pensacola		Dr. Wedderburn, Rep. of San. Com., p. 125. (Toner.)
1848	Charleston		Bérenger-Féraud, loc. cit., p. 118.
1848	New York		12 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 284, and Trans. A. M. A., Vol. VII, p. 162. (Toner.)
1848	Staten Island, N. Y.		Bérenger-Féraud, loc. cit., p. 118.
1849 E	New Orleans		737 deaths, Chaillé, Va. M. J., 1856, p. 499. (Toner.)
1849 E	Mobile		50 deaths, Fenner, South. Med. Rep., Vol. II, p. 304. (Toner.)
1849 E	Charleston		125 deaths, Dowler, N. O. M. J., 1859, p. 597. (Toner.)
1850 E	New Orleans		102 deaths, Chaillé, Va. M. J., 1856, p. 499. (Toner.)
1851	do		16 deaths, Chaillé, Va. M. J., 1856, p. 499. (Toner.)
1851	Mobile		Brown, Quarantine, 1872, p. 43.
1852 E	New Orleans		415 deaths, Chaillé, Va. M. J., 1856, p. 499. (Toner.)
1852	Savannah		19 deaths, R. C. Mackall, Ch. M. J. and Rev., 1855, p. 150. (Toner.)
1852 E	Charleston		310 deaths, Dowler, N. O. M. J., p. 597. (Toner.)
1852	Norfolk		Va. M. J., 1857, p. 95. (Toner.)
1852	Portsmouth, Va.		Portsmouth Relief Assn. Report, p. 91. (Toner.)
1852	New York		1 death at Marine Hospital, Ed. N. Y. J. M., 1856, p. 284. (Toner.)
1853 E ¹	Galveston		536 deaths, Ed. M. and S. Rep., Vol. XVII, 1867, No. 14, p. 297. (Toner.)
1853 E	New Orleans	West Indies	7,970 deaths, Chaillé, Va. M. J., 1856, p. 499. (Toner.) Many cities in Texas and Louisiana were visited by the disease this year. According to Faget, the disease was brought this year by the English vessel Caboden Castle from Jamaica. (Bérenger-Féraud, loc. cit., p. 123.)
1853	Biloxi, Miss.		J. C. Mott, N. O. M. and S. J., 1854, p. 571. (Toner.)
1853 E	Norfolk	West Indies	Infected by a vessel from the Antilles. There were 1,600 deaths.
1853 E	Mobile		115 deaths, N. O. M. and S. J., 1854, p. 571.
1853	Pensacola		E. D. Fenner, History of Yellow Fever, N. O., 1853, p. 49. (Toner.)
1853 E	Key West		112 deaths, Army Med. Statistics, p. 323. (Toner.)
1853	Tampa		Army Med. Statistics, p. 323. (Toner.)
1853	Savannah		R. C. Mackall, Ch. M. J. and Rev., 1855, p. 150. (Toner.)
1853 E	Philadelphia		128 deaths, W. Jewell, N. Y. J. M., 1856, pp. 149, 246, and Brown, Quarantine, p. 10. (Toner.)
1853	New York		14 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 284. (Toner.)
1854 E	New Orleans		The disease was carried up the Mississippi Valley as far as St. Louis, Mo. (Bérenger-Féraud, loc. cit.) 2,423 deaths, Chaillé, Va. M. J., 1856, p. 499. (Toner.)
1854	Key West		Ed. N. O. M. and S. J., 1851, p. 423. (Toner.)

¹ A widespread epidemic year.

TABLE SHOWING YEARS IN WHICH YELLOW FEVER HAS INVADIED THE SEABOARD CITIES OF THE UNITED STATES, ETC.—Continued.

Year.	Locality.	Origin.	Remarks.
1851	Mobile		Ed. Nash, J. M. and S., 1854, p. 245. (Toner.)
1854 E	Savannah		580 deaths, Hume, Charleston, M. J., Vol. X, p. 31. (Toner.)
1854	Pensacola		R. B. S. Hargis, N. O. M. J., 1859, p. 727. (Toner.)
1854 E	Charleston		627 deaths, Dowler, N. O. M. J., p. 597. (Toner.)
1854	Norfolk		Va. M. J., 1857, p. 95. (Toner.)
1854 E	Galveston		401 deaths, Ed. M. and S. Rep., Vol. 17, 1867, No. 14, p. 297. (Toner.)
1854	Philadelphia		Ed. Nash, J. M. and S., 1854, p. 345. (Toner.)
1854	New York		20 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 284. (Toner.)
1854	Portsmouth, Va.		Portsmouth Relief Assn., Rep., p. 91. (Toner.)
1855 E	New Orleans		The Mississippi Valley was again infected this year as far north as Memphis. (Bérenger-Féraud, loc. cit.) 2,670 deaths, Chaillé, Va. M. J., 1856, p. 499. (Toner.)
1855 E	Norfolk	St. Thomas	1,807 deaths, Portsmouth Relief Assn., Report, (Toner.) Amer. P. H. A., Vol. IV, p. 286.
1855 E	Portsmouth, Va.	do	1,000 deaths, Portsmouth Relief Assn., Report, p. 77. Amer. P. H. A., Vol. IV, p. 286.
1855	New York		5 deaths at Marine Hospital, Ed. N. Y. J. M., 1856, p. 284. (Toner.)
1856 E	New Orleans		74 deaths, Chaillé, Va. M. J., 1856, p. 499. (Toner.)
1856 E	Charleston		211 deaths, Dowler, N. O. M. J., p. 597. (Toner.)
1856	Brooklyn		3d Nat. Quarant. and San. Convention, p. 41.
1857 E	New Orleans		199 deaths, Chaillé, Va. M. J., 1856, p. 499. (Toner.)
1857	Charleston		13 deaths, Dowler, N. O. M. J., p. 597. (Toner.)
1858 E	Galveston		344 deaths, Ed. M. and S. Rep., Vol. XVII, 1867, No. 14, p. 297. (Toner.)
1858	Pensacola		R. B. S. Hargis, N. O. M. J., 1859, p. 727. (Toner.)
1858 E	New Orleans	St. Thomas	The Elisabeth Helen, contaminated at St. Thomas, brought the fever to New Orleans; 3,889 deaths followed. (Bérenger-Féraud, loc. cit., p. 134; also Ed. Med. Rep., 1858, Vol. I, No. 4, p. 72.)
1858	Biloxi, Miss.		S. Chaillé, Va. M. J., 1858, p. 77. (Toner.)
1858	Savannah		S. Chaillé, Va. M. J., 1858, p. 491. (Toner.)
1858	Boston		F. E. Oliver, B. M. and S. J., 1858, p. 140. (Toner.)
1858 E	Charleston		717 deaths, Dowler, N. O. M. J., p. 597. (Toner.)
1858	Mobile		Ed. Va. M. J., 1858, p. 517. (Toner.)
1859 E	Galveston		186 deaths, Ed. M. and S. Rep., Vol. XVII, 1867, No. 14, p. 297. (Toner.)
1862 E	Key West	Havana	71 deaths, Ed. M. and S. Rep., 1862, p. 513. (Toner.) A. P. H. A., Vol. IV.
1862	Charleston		Brown, Quarantine, p. 29. (Toner.)
1862	New Orleans		Fenner, S. J. of M. S. May, 1866. (Toner.)
1862	Wilmington, N. C.	Havana	446 deaths, W. T. Wragg, N. Y. J. M., 1869, p. 478; A. P. H. A., Vol. IV, and p. 225. (Toner.)
1863	Pensacola		B. F. Gibbs, Am. J. M. Sci., 1866, p. 310. (Toner.)
1863	New Orleans		Chaillé, p. 8. (Toner.)
1864 E	Galveston		239 deaths, Ed. M. and S. Rep., Vol. XVII, 1867, No. 14, p. 297. (Toner.)
1864	Key West		E. B. Hunt, Med. Rep., 1864, p. 340. (Toner.)
1864	Charleston		Trans. A. M. A., Vol. XXIII, p. 292. (Toner.)
1864 E	Newbern, N. C.		700 deaths, Rep. Med. Inspector, T. S. A., Dec. 31, 1864. (Toner.)
1864	New Orleans		Harris Sanitary Com., p. 261. (Toner.)
1865	Key West	Havana	A. P. H. A., Vol. IV, and Brown, Quarantine, p. 40. (Toner.)
1866	Galveston		Galv. M. J., 1866, p. 338. (Toner.)
1867 E	New Orleans		The freedom from yellow fever during the years of the war is accounted for by the blockade of the city. A fact brought forward by Dr. Formento to prove that the disease was not endemic in that city. (Bérenger-Féraud, loc. cit., p. 149.) 3,093 deaths, Ed. N. O. M. J., 1865, p. 194. (Toner.)
1867 E	Pensacola		34 deaths, M. Rep., 1868, p. 227. (Toner.)
1867	Mobile		Brown, Quarantine, 1872, p. 44. (Toner.)
1867	Key West		Surg. Gen'l's Office Circular No. 1, 1868, p. 452 (Toner.)
1867 E	Galveston		1,159 deaths, S. M. Welch, Galv. M. J., Vol. I, No. 2, p. 83. (Toner.)
1868	Baltimore		Bérenger-Féraud, loc. cit., p. 141. and Brown, Quarantine, p. 14. (Toner.)
1869	Key West	Cuba	A. P. H. A., Vol. IV; Brown, Quarantine, p. 41. (Toner.)

TABLE SHOWING YEARS IN WHICH YELLOW FEVER HAS INVADED THE SEABOARD CITIES OF THE UNITED STATES, ETC.—Continued.

Year.	Locality.	Origin.	Remarks.
1869	New Orleans.....	Cuba.....	A. P. H. A., Vol. IV.
1870 E	.....do.....	Honduras.....	587 deaths, J. C. Faget, N. O. Med. and S. J., Vol. I, No. 2, 1873. (Toner.) Board of Health La., 1870.
1870	Mobile.....	.....do.....	Bérenger-Féraud, loc. cit., p. 115.
1870	Philadelphia.....	West Indies.....	18 deaths, La Roche, Yellow Fever, 1870, pp. 20, 26.
1871	Cedar Keys, Fla.....	Havana.....	A. P. H. A., Vol. IV. Med. and Surg. Rep., No. 17, p. 377, Vol. XXV. (Toner.)
1871	Tampa, Fla.....	.....do.....	A. P. H. A., Vol. IV.
1871 E	Charleston.....	.....do.....	213 deaths, Trans. A. M. A., Vol. XXIII, p. 293. (Toner.)
1871 E	New Orleans.....	Cienfuegos, Havana	Board of Health La., 1871, 55 deaths, Rep. N. O. B. of H., 1871. (Toner.)
1872 E	.....do.....	.....do.....	40 deaths, Rep. N. O. B. of H., 1872, p. 17. (Toner.)
1872	New York.....	.....do.....	B. M. and S. J., Vol. LXXX, No. 23, p. 587. (Toner.)
1873 E	New Orleans.....	Havana.....	U. S. M. H. S. Rep., 1873, 225 deaths; B. of H. La., 1873; A. P. H. A., Vol. IV.
1873 E	Pensacola.....	.....do.....	61 deaths, R. F. Michel, Charleston M. J. and R., 1874, Vol. I, p. 289. (Toner.) A. P. H. A., Vol. IV; J. M. Woodworth, U. S. M. H. S. Rep., 1873.
1874	.....do.....	.....do.....	The city was infected through the Castropoe from Havana. (Rep. U. S. Med. Com., U. S. M. H. S. Rep., 1874; A. P. H. A., Vol. IV.)
1874	New Orleans.....	.....do.....	B. of H. La., 1874.
1875 E	Barrancas, Fla.....	.....do.....	U. S. M. H. S. Rep., 1875.
1875 E	Pasadenoula, Miss.....	.....do.....	U. S. M. H. S. Rep., 1875, 60 deaths.
1875 E	Key West.....	.....do.....	38 deaths. (U. S. M. H. S. Rep., 1875.)
1876 E	Brunswick.....	Havana.....	112 deaths. (Smith in the U. S. M. H. S. Rep., 1876-77, p. 185.)
1876	Doboy, Ga.....	.....do.....	A. P. H. A., Vol. IV, p. 251, and U. S. M. H. S. Rep., 1876-77.
1876	Savannah.....	.....do.....	U. S. M. H. S. Rep., 1876-77, p. 180; A. P. H. A., Vol. IV, 251.
1877	Fernandina.....	.....do.....	A. P. H. A., Vol. IV.
1878 E	Memphis and all the Mississippi Valley to Cairo, Ill.	.....do.....	A. P. H. A., Vol. IV.
1878	New Orleans.....	.....do.....	A. P. H. A., Vol. IV, and Sternberg. The steamer Emily Souder brought the disease to the city from the Antilles. (Bérenger-Féraud, loc. cit.) A severe epidemic year. There were in the United States 125,000 cases and 12,000 deaths. (N. Y. Med. R., Dec., 1878; Bérenger-Féraud, loc. cit., p. 152).
1878	New York.....	.....do.....	Bérenger-Féraud, loc. cit., p. 152.
1879	New Orleans.....	West Indies	The disease extended along the Mississippi as far as Memphis. The disease was brought from the Antilles to New Orleans by the Plymouth. (Med. Rep. U. S. Navy, 1879, Dr. Woolverton.)
1880	Key West.....	.....do.....	.....do.....
1882	Galveston.....	.....do.....	.....do.....
1882	New Orleans.....	Havana.....	National B. of H. Rep., 1882.
1882 E	Pensacola.....	Matanzas.....	U. S. M. H. S. Rep., 1883, 192 deaths.
1883 E	Brewton, Ala.....	Pensacola.....	M. H. S. Rep., 1884.
1883	Pensacola.....	Havana.....	Sporadic cases, but there was an epidemic at the navy-yard, 9 miles from Pensacola. (M. H. S. Rep., 1884, p. 260.)
1884	Pensacola (?).....	.....do.....	.....do.....
1887 E	Key West.....	Havana.....	Abstract of San. Rep., U. S. M. H. S., 1887, and U. S. M. H. S. Rep., pp. 12, 13, 1887; 280 cases and 62 deaths up to September.
1887	Tampa, Fla.....	.....do.....	U. S. M. H. S. Rep., 1887-88.
1888 E	Jacksonville, Fla.....	.....do.....	Plant City and neighboring cities. U. S. M. H. S. Rep., 1888.
1888	Tampa Fla.....	.....do.....	Probably from Tampa epidemic of 1887.
1890	Brunswick, Ga.....	.....do.....	.....do.....
1893 E	Brunswick, Ga., and adjacent islands.	.....do.....	52 deaths. Abstract of San. Rep., 1894, p. 81; U. S. M. H. S. Rep., 1893.
1893	Satilla River, Ga.....	.....do.....	Do.

ALABAMA.

SUMMARY OF YELLOW FEVER IN ALABAMA, BY LOCALITIES.

ALCO.

1897. Cases, 1; death, 0.

ATHENS.

1878. Cases, 2; deaths, 2.

BAY MINETTE.

1897. Cases, 1; deaths, 1.

BLADEN SPRINGS.

1853. Sporadic cases, solely among refugees.

BLAKELY.

1822. Severe epidemic. No statistics.

BREWTON.

1883. First case, September 12; first death, September 19. Last case, November 6. Cases, 70; deaths, 28.

CAHAWBA.

1853. No record of cases and deaths.

CASTLEBERRY.

1905. Cases, 2; deaths, 2.

CITRONELLE.

1853. No record of cases and deaths.

COURTLAND.

1878. Infected by Memphis. Cases, 1; deaths, 1.

DECATUR.

1878. Population, 1,200. Cases, 187; deaths, 51.

1888. First case, September 4th; first death, September 11. Cases, 10; deaths, 1. At the beginning of the outbreak, nearly the whole population fled.

DEMOPOLIS.

1853. No record of cases and deaths.

DOG RIVER.

1853. Population, 300. First case, August 18th; first death, August 22nd. Cases, 69; deaths, 23.

FLOMATON.

1897. Cases, 98; deaths, 5.

FLORENCE.

1878. Population, 2,500. Cases, 1,409; deaths, 50.

FORT CLAIBORNE.

1819. First case, July 4; last case, December 1. No statistics.

FORT BAYON.

1893. First case, July 30; first death, August 3; last death, November 16. Cases, 6; deaths, 5.

FORT MORGAN.

1867. First case, August 13. No statistics.

1893. Cases, 2; deaths, 1.

FORT ST. STEPHEN.

1819. First case, July 4; last case, December 1.

FULTON.

1853. No record of cases and deaths.

GREENSBORO.

1897. Cases, 1; deaths, 1.

HOLLY WOOD.

1853. Infected by New Orleans. First case, August 15th; first death, August 29th. Last case, September 20th. Cases, 10; deaths, 6.

HUNTSVILLE.

1873. Cases, 3; deaths, 1.

1878. Cases, 33; deaths, 13. All imported cases.

JUNCTION.

1873. Population, 35. Cases, 22; deaths, 14.

LEIGHTON.

1878. First case, August 18; first death, August 24. Cases, 4; deaths, 1.

MOBILE.

1705. Several historians state that yellow fever made "great havoc" in Mobile in 1705. No statistics are given.

1765. Epidemic. No record of cases and deaths.

1766. Severe epidemic. Very fatal among new comers.

1819. Population, 1,200. Number who fled, 300. First case, August 19; last case in November. On October 22, there was a light frost, but the disease continued un-

abated until the end of November. Many persons were lured to the city by the frost and fell victims to the fever.

1821. Sporadic cases; 7 deaths in October.

1822. "Only 4 or 5 cases."

1824. Six fatal cases in September; last case on the 25th, notwithstanding that there was no frost until the latter part of October.

1825. Severe epidemic. The Board of Health concealed the real state of things from the public, and although yellow fever had made its appearance as early as July, official announcement was made on August 10, "that though the bilious fever prevails to considerable extent, and in many instances fatal, yet the Board takes pleasure in assuring the public that no case of yellow fever has yet occurred." It was only on September 2, after the disease had become epidemic, that "one case of yellow fever" was reported. Three cases were reported on the 5th, four cases on the 8th, and on the 11th of September, the "painful announcement that the disease is epidemic" was made. As no true statistics were kept, it is impossible to give the number of cases and deaths.

1826. Sporadic cases in September.

1827. A few cases in September.

1828. Mild epidemic. No statistics.

1829. Population, 4,000. Epidemic. First case, August 14. Deaths, 130.

1837. For eight years, Mobile was free from epidemic disease. On September 20, 1837, four cases of yellow fever suddenly made their appearance. After this outbreak the disease disappeared, and the public mind was reassured. There was a light frost on October 2, and those who had fled returned to the city, feeling certain that all danger was over. On October 10, cases erupted in nearly every section of the town, and the disease was soon epidemic, running its course until the end of November. Deaths, 350.

1838. Sporadic cases. No statistics.

1839. Population, 11,000. The new population was composed chiefly of people from the North, and German

and Irish laborers. The first case of yellow fever occurred on August 11. In ten days the disease became general throughout the city. Last case, October 20. Deaths, 450.

1841. Scattered cases. The subjects were from the interior, no inhabitant of Mobile being affected.

1842. First case, August 20. Limited manifestation confined to the southern section of the city. Cases, 160; deaths, 70.

1843. Population, 11,500. The first case of the epidemic of 1843 occurred on August 24, followed by a second case on the 26; both terminated fatally. It was not generally known that the disease had broken out, the public being kept in ignorance of the fact. About September 10, many cases, accompanied by black vomit, were observed, and the disease soon became widespread. Last case erupted November 5. Cases, 1,350; deaths, 750.

1844. First case, August 14. Deaths, 40.

1845. Population, 12,000. First case, November 9. Deaths, 1.

1846. First case, September 11. Deaths, 4.

1847. First case, August 2. Deaths, 78.

1848. First case, August 18. Deaths, 24.

1849. First case, July 3. Deaths, 21.

1851. Mild outbreak. No statistics.

1853. Population 25,000. Number who fled, 8,000. Infected by bark *Milliades*, from New Orleans. First case, July 11; first death, July 11. Last case, December 16. Deaths, 1,191. There were many cases among the negro population, but only 50 died.

1854. Sporadic cases.

1858. First case, August 3; first death August 13. Deaths, 70.

1863. Sporadic cases, one imported from Key West; two deaths.

1864. Sporadic cases; six deaths.

1867. First case, August 13.

1870. First case, August 27; last case, November 19.

1873. Infected by New Orleans. First case, August 21; first death, August 26; last case, November 29. Cases, 50; deaths, 27.

1875. First case, September 1; first death, September 7; last case, October 20; last death, October 24. Cases, 16; deaths, 8.

1876. First case (refugee from New Orleans), September 5, terminating in death on the 9th; last case (refugee from Savannah) in December; recovered. Both cases at Battle House.

1878. Population, 31,034. The first case was a negro who had been on an excursion to Biloxi, Miss., July 24, was attacked early in August and died August 16. The health officer certified to the Board of Trade, August 19, that "there was not a case of yellow fever in the city or country," and Montgomery raised the quarantine she had against Mobile. From August 16 to September 21, there were only 5 deaths, but early in October, deaths began increasing; B. B. Fort, of the Board of Trade dying October 14, at Spring Hill. A majority of the cases were in the extreme southern portion of the city. A slight frost fell in the suburbs, October 23, on which day there were reported 3 deaths, 5 new cases, and 41 under treatment; Father Victor, of the Lutheran Church, was among the deaths. The death rate decreased till October 31, at which date no deaths were reported. Last death, October 30.

Total cases, 297; total deaths, 83.

1880. One case, on board British bark *R. W. Wood*, from Havana. No cases in city.

1897. Infected by Ocean Springs, Miss. Cases, 361; deaths, 48.

1903. Cases, 1; deaths, 1.

1905. July 24. Four cases at Quarantine Station, on board steamship *Columbia*, from Colon and LaBoca. No cases in city.

MONTGOMERY.

1853. First case, September —; last case, November —. deaths, 35.

1854. First case, September —; last case, November —. Deaths, 45.

1855. First case, September —; last case, November —. Deaths, 30.

1867. First case, August 13. Sporadic cases. Imported.

1870. First case, August 22; last case, November 19. Sporadic cases.

1873. Infected by Pensacola. First case, August 27; first death, August 27; last case, November 10. Cases, 500; deaths, 108. Whole population fled, except 1,800.

1897. First case, October 18; last case, November 10. Cases, 120; deaths, 11. •

1905. One case, a refugee

NOTSALUGA.

1897. Cases, 1; deaths, 0.

OAKFIELD.

1873. First case, September 22. Cases, 7; deaths, 1.

POLLARD.

1873. Sporadic cases. No statistics.

PORTERVILLE.

1853. Cases, 5; deaths, 2. All refugees from infected places. No case among inhabitants.

SELMA.

1853. Population, 3,000. Number who fled, 1,500.

First case, September 1; first death, September 1; last death, November 13. Deaths, 32.

1897. First case, October 23; last, October 31. Cases, 12; deaths, 2.

SANDY RIDGE.

1897. Cases, 1; deaths, 0.

SPRING HILL.

1853. As yellow fever has been epidemic only once in this beautiful place, the following account, summarized from the memoirs of Dr. J. C. Nott, who came so near expounding the mosquito doctrine of the transmission of yellow fever, over half a century ago, will be found interesting:

On the 12th of August, just about the time yellow fever began to assume the epidemic form in Mobile, and one month after the first imported case, Dr. Nott was called to see a young man, who had a well-marked attack of the disease, at a boarding house in Mobile, on St. Louis Street, near St. Joseph. On the 14th, the patient was removed on a stretcher to the house of his brother-in-law, in Spring Hill, about the center of the settlement. He recovered, and twenty days after he had entered the house, 5th of September, two children living there were attacked with the fever, and about two weeks after, two other children were attacked; three had black vomit and two died.

On August 22, a Mr. Stramler, of Mobile, moved his family to Spring Hill and occupied the house of John Toulmin.

Mr. Greer moved with his family to the same house on the 29th, from Mobile, carrying a daughter convalescing from yellow fever; another daughter sickened on the 8th; three of Mrs. Flemming's children in the same house, on the 10th; and Mrs. John Greer two or three days after.

Dr. Nott's father-in-law, Col. Deas, lived on a lot about 10 yards north of the original source of infection, and his

household, white and black, consisted of sixty persons. On the 7th of September, one of his negro women were attacked, on an adjoining lot; on the 8th, his daughter-in-law, Mrs. John Deas, and on the 9th, Mrs. Brown, his daughter; each being in a different lot, and one hundred yards from each other. The disease then spread rapidly through the families of the three adjoining premises, attacking whites and blacks indiscriminately. Fifty-four were attacked out of the sixty, and in fourteen days the whole tale was told—five whites, two mulattoes and one black were dead with black vomit, and the rest were convalescent. One-half of the whites attacked died.

Cases existed simultaneously at Wm. Stewart's, Mr. Wheeler's, and Mr. Purvis' and Toulmin's houses, widely separated from each other; and in the latter part of September and through October, the disease visited the houses of Capt. Stein, McMillan, Rev. Mr. Knapp, Mrs. George, Dubose's, John Battle's and some others. The disease skipped about in an extraordinary manner; some houses escaped entirely, some had but one or two cases.

Dr. Nott fails to give the number of cases and deaths.

1878. One death, October 14, a refugee from Mobile. No cases in the village.

STEVENSON.

1878. Population, 200. Probably infected by Memphis. First case, September 1. Cases, 11; deaths, 6.

ST STEPHEN'S ROAD.

1853. First case, August 23. Infected by Mobile.

TOWN CREEK.

1878. Population, 75. Deaths, 4.

TUSCALOOSA.

1878. Cases, 2; deaths, 2.

TUSCUMBIA.

1878. Population, 1,200. Infected by Memphis. First case, September 5. Cases, 97; deaths, 31.

WAGAR.

1897. Cases, 45; deaths, 3.

WHISTLER.

1878. A few cases among refugees; inhabitants not attacked. One death only, Father Marley, of Mobile, occurred on October 18.

1897. Cases, 122; deaths, 7.

WHITING.

1870. Sporadic cases; refugees.

1875. Cases among refugees.

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ARKANSAS.

AUGUSTA.

1878. Population, 1,200. Infected by steamboat *Ruth*, from Memphis. First case, October 12, followed by death two days later; last case, October 20. Cases, 7; death, 7.

COLUMBIA.

1853. Infected by steamboat *J. M. Reff*, from New Orleans, in June. Patient was an Irishman who developed the disease on board, and was left at a woodyard just above the town. He died with black vomit, but did not communicate the disease to any one. Six other cases were put off different steamboats at Columbia in July. The *H. D. Bacon* stopped at this place about September 1, having 20 cases of yellow fever on board. The captain and chambermaid were attacked while the boat was at the landing, and both died shortly after her departure. Fenner (*Epidemics, etc.*, p. 107), says that "nearly every boat from New Orleans" which stopped at Columbia during the terrible epidemic of 1853, had yellow fever on board. The people of the town visited the boats, but no one caught the disease.

FOREST CITY.

1873. Two cases, refugees from Memphis.

1879. Infected by Memphis. First case, October 2; first death, October 8; last case, November 25; last death, November 28. Cases, 23; deaths, 15.

FORT SMITH.

1823. Imported cases; no statistics.

GOLDEN LAKE.

1878. Three cases, refugees from New Orleans.

GRAND LAKE.

1853. Infected by steamboat *Bunker Hill*, from New Orleans. First case, August 24, in a man who had taken passage on the boat at Natchez, Miss. Patient died on the 24th. Three residents of Grand Lake, who visited the boat, were attacked, but recovered. There was no spread of the disease.

HAYNES BLUFF.

1878. Cases, 160; deaths, 19.

HELENA.

1878. Infected by Memphis. First case, August 17; first death, August 21. Cases, 77; deaths, 9.

HOPEFIELD.

1878. Infected by Memphis on September 1; last death, October 23. Cases, 117; deaths, 7. These figures also include the immediate vicinity.

1879. Two cases, about a mile from Hopefield. No cases in town.

LITTLE ROCK.

1878. A little boy, a refugee from Memphis, who died shortly after his arrival, is the only case of yellow fever ever observed at Little Rock. Shot-gun quarantine was in full force.

LORENZO.

1878. Cases, 1; deaths, 1.

NAPOLEON.

1853. Severe outbreak. No statistics.

OCEOLA.

1873. Infected by New Orleans. First case, August —; first death, August 11; last case, August —; last death, August 11. Cases, 1; deaths, 1.

SCANLONS.

1878. Cases, 4.

TERRENE.

1878. Cases, 21; deaths, 19.

WASHINGTON.

1878. One case from Humboldt, Ark.; death,

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CALIFORNIA.

The only cases of yellow fever ever observed in the State of California, were taken off vessels from South American or Mexican ports, and treated at the San Francisco Quarantine Station. The disease has never spread to the inhabitants.

YELLOW FEVER YEARS.

1883. According to Nelson (see Bibliography) *Le Courrier de San Francisco* published an account of a jury sitting on a body in that city, to determine the exact cause of death. While taking the evidence, it was shown that the dead man and another sick passenger had been landed from a steamship from the Pacific Coast of Mexico, and that the corpse before them was that of a victim of yellow fever. The *Courrier* graphically describes how that jury stampeded at the startling revelation. It was a regular *saure qui peut*.

1894. On August 23, the steamship *Bennington*, from La Union and other ports on the coast of Salvador, arrived at San Francisco and landed three cases of yellow fever. No further information.

1897. May 10, steamship "sent cases ashore." No history of subsequent developments. During the year, the following infected vessels, all from Panama, were detained for observation: *Acapulco*, *San Juan* and *City of Sydney*. All these vessels had heavy passenger lists, but no cases erupted at San Francisco.

June 2. *City of Para*, from Panama, infected with yellow fever, entered harbor. One case died as the vessel steamed into port. No developments.

July 11, the steamship arrived from San Juan de Guatemala. One case upon arrival. No further history.

1898. One case at Angel Island Quarantine Station, taken, from steamship *Newport*, from Panama. Death on arrival.

1902. May 20, *City of Para* arrived from Panama and was remanded for disinfection, owing to rumors of yellow fever on board. Three days later, the freight clerk (who had been ashore) had an attack and died May 2. No other cases reported.

1903. September 10, steamship *Colon*, from Panama, arrived in port with a case of yellow fever on board. Patient was immediately removed to Angel Island Quarantine Station, where he died the following day.

The case was certainly an interesting one from a quarantine standpoint. Patient was a strong, lithe man; age given upon articles, 23 years (probably 28 or 30); native of Chili. He shipped at Acapulco upon the down voyage. Was ashore at Panama, but at no port upon the up trip. Vessel loaded in open water from lighters at all ports en route. Fifteen days from Panama, in the early morning, the man reported to the ship's surgeon with headache, pains in back over liver and down right shoulder. History of chill during night or early morning; no history of malaria; pulse 65; temperature 40° (102°); appearance of slight icterus, which rapidly increased.

No written history kept nor examination of urine or blood made. Diagnosis of obstruction to bile duct. No vomiting noted.

When seen by Passed Assistant Surgeon Cumming, from whose report this history is summarized, the man had just been brought from the fore-castle in the gang-way in the cold wind. He was semi-conscious, responding to loud inquiry as to whether he wanted water. Body bronze yellow; eyes very yellow; tongue not enlarged, pointed, red around edge, some sores; left parotid gland enlarged and tender; some shrinking on pressure in epigastric region; spleen and liver not enlarged (percussion and palpation). Some blood signs on blanket, but possibly due to ulcer on left elbow.

After having been removed, catheterization brought 235 c.c. of urine highly colored, slightly cloudy. Specific gravity, 1010. Reaction, acid. Albumin in large quan-

tities by all tests used. Examination of blood for malaria by several officers, negative. Pus in parotid gland, ordinary diplococci.

Patient grew worse, during night had classical black vomit, died next day. Autopsy confirmed diagnosis. Cremated.

The interesting features from a sanitary point are: First attack fifteen days from the only place reported infected (Panama), and about three days after leaving Acapulco. The vessel was thoroughly searched by Surgeon Cumming, other officers, and attendants for mosquitoes, dead or alive, and not one was found, despite a considerable reward offered.

The original source of infection was evidently Panama.

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CONNECTICUT.

CHATHAM.

1796. First case, August 29. Infected by brig *Polly*, from San Domingo, West Indies. No record of cases and deaths.

HARTFORD.

1798. Sporadic cases, imported. No statistics.

1800. Old chroniclers say that yellow fever was imported to Hartford in 1800, and "created much alarm and raged for a time with considerable mortality." No statistics.

KNOWLES LANDING.

1796. First case, August. Deaths, 9.

MIDDLETOWN.

1820. First case in June. Infected by schooner *Milo*, from West Indies.

NEW HAVEN.

1735; 1743; 1794; 1803; 1804; 1805; 1819; 1845. Yellow fever was imported to New Haven in the years mentioned, but no reliable statistics could be obtained.

NEW LONDON.

1798. Source of infection not stated, writers of the period attributing the outbreak to "a lot dried fish, which had decomposed and exposed on the public wharves." First case, August 25; last case, October 28. Deaths, 81.

NORWALK.

1798. Mild outbreak. No statistics.

NORWICH.

1801. Importation. No record of cases and deaths.

STANFORD.

1745. Mild outbreak; no statistics.

STONINGTON.

1798. Mild outbreak; no record of cases and deaths.

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DELAWARE.

CHRISTIANA.

1798. Infected by Wilmington, Delaware. No statistics.

DELAWARE BREAKWATER.

Yellow fever cases were brought to Lewes (Delaware Breakwater Quarantine Station) by ships from the West Indies in the following years:

1878. Many cases were landed from ships. Deaths, 9, of which 7 were sailors.

1887. August 8, bark *Ada Gray*, from Havana. One case; recovery.

1888. Brig *Tencriffe*, from Havana. First case, July 22; first death, July 27; last case, July 23; last death, July 27. Cases, 3; deaths, 2.

1889. June 9. Steamship *Baltimore City*, from Santiago de Cuba. Two cases.

1892. During 1892, the following infected vessels were detained at this station:

May 10. Norwegian bark *Nor*, from Rio de Janeiro. Nine cases and two deaths at Rio and during passage.

June 1. British bark *Willow Bush*, from Rio de Janeiro. Had several cases at Rio and one death during voyage.

June 6. British ship *Elmbank* from Rio de Janeiro. Several cases during voyage.

June 28. German ship *Rudolph von Benniger*, from de Janeiro, via Barbados. Eleven cases and five deaths while at Rio.

July 25. British bark *Argenta*, from Pernambuco, via Santos. Several cases and one death after leaving Santos.

August 3. British barkentine *Frederica*, from Santos, via Guantanamo. Several cases during voyage.

It will thus be seen that six vessels, actually infected with yellow fever, reached Delaware Breakwater Quar-

antine during 1892. While no cases erupted during their detention, there is no telling what might have been the consequences if rigorous sanitary precautions had not been taken. While the *Stegomyia Calopus* no longer thrives in the locality, the epidemic which ravaged certain sections of Delaware a hundred years or so ago, prove that the insects, when imported during the summer months, can be domesticated long enough to propagate the disease under discussion.

1893. July 26. American schooner *Hannah McLoon*, from Havana and Matanzas. Captain had died from yellow fever and was buried on arrival. Five other cases en route; all convalescent when the ship arrived. Vessel disinfected. No other cases.

1897. June 24. German bark *Zion* from Rio de Janeiro. Two cases while at Rio and two en route. Quarantined and ordered to New York without pratique.

October 3. Norwegian steamship *John Wilson*, from Bocas del Toro, Colombia. Had previously left Mobile (an infected place), and had had a case of yellow fever before reaching the South American port, and another after leaving Bocas. Owing to the fact that yellow fever was widespread in the South that year, much excitement was caused at Delaware Breakwater Quarantine and vicinity, when news that an infected vessel had arrived became public. Th cargo, which consisted of bananas, was dumped five miles at sea and the vessel ordered to Reedy Island for observation. No other cases developed.

Since 1897, infected vessels have arrived at this station, but no interesting developments followed.

DUCK CREEK.

1720. Yellow fever imported, but beyond the statement that "the village was almost depopulated," no other information can be gleaned from the historians of the period.

NEW CASTLE.

1798. Severe outbreak; no statistics. Probably infected by Wilmington.

WILMINGTON.

1798. First case in September. Probably infected by refugees from Philadelphia. Deaths, 200.

1802. Mild epidemic "in the autumn." No statistics.

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DISTRICT OF COLUMBIA.

WASHINGTON.

1855. A few imported cases "from the South."
1878. Population, 179,402. First case, August 16.
Cases, 5; deaths, 5; all refugees from Southern cities.
1898. One fatal case, a refugee

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FLORIDA.

APALACHICOLA.

1826. Sporadic cases; no statistics.

BARTOW.

1888. Population, 2,500. A few imported cases.

BRAIDENTOWN.

1888. Scattered cases; imported.

BRENT.

1908. One fatal case, a refugee.

CALLAHAN.

1888. Infected by Fernandina. First case, September 10; last case, October —. A few cases, refugees.

1871. Infected by Havana. Mild epidemic. No statistics.

DRY TORTUGAS.

1893. One fatal case; imported.

ELLAVILLE.

1888. A fatal case in November; imported.

EGMONT KEY.

1887. First case in July; first death, July 11. Two cases, resulting in death.

ENTERPRISE.

1888. Severe outbreak, considering the limited number of inhabitants. No statistics.

FERNANDINA.

1877. Infected by Havana. Cases, 1,500; deaths, 112.

1878. Three deaths on a bark from Matanzas, Cuba.

1888. Infected by Jacksonville. First case, August 17, terminating fatally on the 22nd. Complete statistics lacking.

FORT BARRANCAS.

1822. Deaths, 7. Source of infection not stated, but probably Havana or Pensacola.

1853. Infected by Pensacola. Cases, 5.

1854. Two deaths; imported.

1873. First case, September 26; last case, November 12. Cases, 12; deaths, 3.

1875. There are different speculations relative to the origin of the fever in 1875, but it is the opinion of the majority of writers that it was brought by the *Von Moltke*, from the West Indies, which anchored between Forts Barrancas and Pickens, the pilot not being able to bring her to the quarantine station, owing to the adverse wind and tide. It is currently believed that a boat from Barrancas with enlisted men boarded the vessel during the night to obtain liquor. It is certainly peculiar the men who were supposed to have gone on board, were the first to have taken the fever. It proved to be of a very virulent type, and spread with fearful rapidity. The commandant of the Navy Yard making a call on the citizens, they responded at once, and formed a picket guard, cutting off what is known as Tartar Point, and extending from the present custom-house station to Bayou Grande. Not a case of yellow fever made its appearance in the adjacent villages or the Yard. Pensacola, having quarantined against Barrancas, was equally fortunate.

1897. Cases, 4; deaths, 1.

FORT JEFFERSON.

1873. First case, August 24; last death, October 6. Cases, 25; deaths, 13.

FORT PICKENS.

1875. Sporadic cases. No statistics.

GAINESVILLE.

1871. First case in August. No statistics.

1888. Infected by Jacksonville. First case, September 11, terminating fatally on the 17th; last case, November 28. Complete statistics lacking.

GREEN COVE SPRINGS.

1888. Sporadic cases.

INDIAN KEY.

1841. In the early part of the autumn of 1841, the brig *Jefferson*, from Mobile, Ala., where a mild outbreak of yellow fever was in progress, landed several cases at Indian Key. The disease did not spread.

About the same time, the schooner *Ostego*, "from the west coast of Florida," lost several of her crew at the Key from yellow fever, without contaminating the inhabitants of the village.

INTERLOCHEN.

1887. One case, October 7, from Tampa, terminating fatally on the 13th.

JACKSONVILLE.

1857. Severe epidemic. Probably imported from Havana by smugglers. No statistics.

1877. Epidemic. No statistics.

1888. First case in a man from Tampa, Florida, where "sporadic cases" had been observed, and who was taken ill July 29. A severe epidemic resulted. Complete statistics not given.

KEY WEST.

1823. Epidemic; probably imported from Havana. The fever was so fatal among the United States troops stationed at the place, that the post was abandoned by the government and the soldiers removed to Pensacola.

1824. Mild epidemic.

1828. Epidemic

1829. Population, 350. The epidemic of 1829 was probably imported from Cuba, between which Island and Key West much smuggling was then going on, as the first case was in a seaman who had been sent ashore from a vessel in the harbor. Deaths, 26.

1841. Mild outbreak. No statistics.

1853. Infected by Tampa. First case, August —; first death, August —. Deaths, 2.

1854. Cases, 240; deaths, 98.

1862. Infected by Havana. First case, June 20; last case, October —. Deaths, 75.

1864; 1865; 1867. Mild manifestations of the disease. No statistics.

1869. Infected by Havana. No statistics.

1875. Population 10,000. Infected by Kingston, Jamaica. First case, March 19; first death, March 21; last death, August 11. Deaths, 38.

1876. At Quarantine: Cases, 2; deaths, 1.

1878. Population, 5,000. Infected by New Orleans. First case, July 10; first death, July 11; last death, October 19. Cases, 162; deaths, 20.

1880. Population, 12,000. First case, July 16. Deaths, 34.

1881. First case, August 22; first death, August 27. Deaths, 8.

1887. Infected by Havana. First case, May 21; first death, May 23. Cases, 283; deaths, 64.

1889. Population, 25,000. First case, September 21; last case, November 15. Mild, sporadic manifestation. Cases, 7; no deaths.

1890. One death.

1892. Cases, 6; no deaths.

1893. Cases, 2; deaths, 2.

1894. A few cases on vessels in harbor. No cases in town.

1899. Cases, 1,291; deaths, 65.

1900. A case was observed as early as January 8, in the person of a civilian employed at the United States Army Post; second case, January 16. These were undoubtedly "echoes" of the epidemic of 1899, as no other cases occurred in 1900.

1901. Cases, 1.

LIVE OAK.

1888. Sporadic cases.

MACCLENNY.

1888. First case, August 8. Cases, 338; deaths, 23.

MANATEE.

1888. Population, 200. Infected by Tampa. First case, July —; first death, July 20. Cases 51.

MANGO.

1888. First case, September 2. Cases, 6; deaths, 0.

MANY LAKES.

1887. Cases, 2; deaths, 1.

MELLENVILLE.

1888. Cases, 2; deaths, 0.

MIAMI.

1899. Cases, 47; deaths, 4.

MICANOPI.

1888. Cases among refugees.

MILLVIEW.

1883. Population, 300. First case, September 7; last case, September 10. Cases, 70; deaths, 12.

MILTON.

1853; 1855; 1869. Mild outbreaks. No records of cases and deaths.

MOLINA.

1883. Infected by Pensacola. Most of the cases occurred in the country adjacent to Molina, but a few being observed in the town.

MULLET KEY.

1892. Cases, 3; deaths, 1.

PALATKA.

1887. Infected by Tampa. First case, October 7; last case, October 13. Only a few cases, all imported. Deaths, 1.

PALMETTO.

1888. Population, 250. Infected by Manatee. First case, November 19; last death, November 23. Cases, 85; deaths, 11.

PENSACOLA.

1764. First appearance of yellow fever in Pensacola. No record of cases and deaths.

1765. Deaths, 125.

1810; 1811. Mild epidemic. No record of cases and deaths.

1822. Infected by Havana. First case, August 12. Between the 13th and 20th of August, 20 deaths occurred; and on the 26th, the troops abandoned the town and encamped on a dry elevated position in the vicinity. As some men were necessarily left behind to guard the public property, many cases occurred among them. Three medical officers, Drs. Elliott, McMahon and Merrill, were attacked, the first of whom fell a victim to the disease. Last case, October 10. Deaths, 237.

1824. Deaths, 2.

1825. Yellow fever prevailed to a considerable extent in Pensacola during the summer of 1827. The soldiers suffered much. Among those attacked were Paymaster Wright and his whole family, his assistant, and also Dr. Lawson, the Army Surgeon of the post, and a sergeant. No record of cases and deaths.

1828; 1829; 1830. Severe on vessels in harbor; only a few cases in town.

1834. First case, August 23. Limited outbreak.

1835. Sporadic cases.

1839. Infected by New Orleans early in September. First death, September 5. Several doctors died during the course of the epidemic.

1841; 1842; 1843; 1844; 1845; 1846. Mild outbreaks.

1847. Infected by United States frigate, *Mississippi*, from Vera Cruz. Limited outbreak.

1848. Infected by ships from Vera Cruz.

1853. In July, 1853, the steamer *Vixen* arrived at Pensacola Navy Yard from the West Indies, both officers and men suffering severely from yellow fever. They were at once sent to the Naval Hospital, situated about one-half mile west of the yard. The vessel was put out of commission, hauled along side one of the yard wharves, and employes were sent aboard to tallow machinery and clean bilges. These men were, with scarcely an exception, taken sick with virulent yellow fever, and the spread

of the epidemic could be distinctly traced, step by step, to this focus. The scourge raged with fearful violence from the latter part of July to about the 10th of October, carrying off about 260 victims out of a population of only 1,200.

1854. Infected by ship *Vixen*, from Tampico, Mexico.

1858. Sporadic cases.

1863. Infected by United States ordnance supply vessel *Nightingale*. At the time the Civil War was in progress and there were some 4,500 people in the town, due to a heavy influx of refugees, besides a floating population of about 2,000 more. It is impossible to estimate the number of deaths, but the havoc caused by the pestilence was fearful, it being a common occurrence to see four or five coffins carried in a graveyard in an oxen-team, the only available conveyance at the time. Most of the men belonging to the mortar fleet were camped on the island, and it is said that more than 200 people were buried there. The fever was of a virulent kind, which did not spare the acclimated portion of the community. Strange to relate at that time there were about 3,000 troops stationed at and about Barrancas, and not a case of fever occurred at that point, owing to a strict quarantine picket being kept by cavalry extending from the hospital to the bayou, men being close enough to hail one another.

1867. Infected by Jamaica. The United States gun-boats *Tacony* and *Yucca* were at the Navy Yard at the time. The officers and men had free intercourse with Pensacola, little suspecting the danger to which they were exposing themselves, until two men belonging to the *Tacony*, who had been on liberty and in Pensacola, were taken sick with yellow fever. The infection spread rapidly. The total number of cases could not be ascertained, but the deaths were 227.

1873. Infected by Havana. First case, August 5; last case, October 15. Cases, 600; deaths, 62.

1874. Population, 3,347. Number who fled, 1,947.

Infected by Havana. First case, August 17; last case, November 9. Deaths, 354.

1878. Population, 5,000. American brig *A. K. Bar*, from Cuban ports, arrived August 17 with the mate dead and crew sick with yellow fever. The cases were sequestered, and Pensacola escaped an invasion.

1882. Infected by bark *Saletta*, from Matanza. First case, August 8; first death, August 26; last case, November 26; last death, November 29. Cases, 2,351; deaths, 198.

1883. The Pensacola Navy Yard was infected by Havana, the first case erupting May 27; first death, June 2. From this focus, the fever was carried to Pensacola. The first case being reported August 5, and the first death on the 14th. Cases, 261; deaths, 34.

1884. Sporadic cases.

1891. Cases, 2; deaths, 1.

1893. Cases, 2.

1897. One fatal case at Quarantine.

1905. Cases, 564; deaths, 81.

PLANT CITY.

1887. Population, 300. Infected by Tampa. First case, October —; first death, November 14; last case, August 18.

1888. Population, 300. Number who fled, 100. First case, June —; first death, June 22; last case, August 18. Deaths, 21.

PROGRESO.

1887. First case, September 30. Cases, 6; deaths, 1.

SANFORD.

1887. Infected by Tampa. First case, October 8. Cases, 150; deaths, 8.

1888. Among refugees. No record of cases and deaths.

1889. Population, 3,000. An imported case died April 23.

ST. AUGUSTINE.

1807. First invasion by yellow fever. No statistics.
 1819. Mild epidemic. No record of cases and deaths.
 1821. Infected by Havana. First case in August.
 Deaths, 140.
 1838. Mild outbreak. No record of case and deaths.
 1839. Infected by Charleston. First case, August 15.
 No statistics.
 1841. Infected by Havana. Deaths, 26.
 1877. Infected by Fernandina. First case, November
 9. Cases, 250; deaths, 50.

ST. JOSEPH.

1841. Sporadic cases. No statistics.

ST. MARKS.

1822. First cases in August. Cases, 68; deaths, 5.

SUWANEE.

1835. A few cases. No record.
 1836. First case, August —; last case, November, 10.

TALLAHASSEE.

1841. Infected by refugees from "towns along the coast." No record of cases and deaths.
 1867. A fatal case in September. Source of infection not stated.

TAMPA.

1839. Sporadic cases. No record.
 1871. Infected by Havana. No statistics.
 1887. October 7. Cases, 400; deaths, 75.
 1888. Last case, December 3; deaths, 10.
 1899. A fatal case; imported.
 1900. Refugees. No records of cases and deaths.
 1905. One case; imported.

TORTUGAS.

1862. Deaths, 4.
 1867. First case, July 4. Deaths, 38.
 1898. Cases, 5; deaths, 0.
 1897. At quarantine. No record of cases and deaths.

WARRINGTON.

1874. Population, 1,000. Deaths, 13.
 1883. Infected by Pensacola. Sporadic cases.

WOOLSEY.

1874. Population, 1,000. Deaths, 14.
 1883. Infected by Pensacola. Sporadic cases.

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GEORGIA.

ATLANTA.

1876. A few cases, refugees from Savannah.
1897. Refugees. Cases, 3; deaths, 0.
1905. One fatal case, a refugee.

AUGUSTA.

1825. At arsenal. Cases, 31; deaths, 7. No diffusion of the disease.

1839. During the summer of 1839, most of the cities of the Southern States suffered severely from yellow fever. Although the city of Augusta experienced its worst ravages, the garrison of this post, with the exception of one case, was exempt from the fatal epidemic. This man passed a night in the city, in a state of intoxication.

In regard to the origin of this epidemic which began in July, much diversity of opinion, as has been found to obtain at all periods existed. A committee consisting of physicians of August, by whom the question of its origin and cause was carefully investigated, reported that the disease was of domestic origin, a tenet which cannot be countenanced at the present day, but which was seriously accepted then. The *fons et origo mali* was traced to a point called "trash wharf," a slide or inclined plane, 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 the upwards of 200,000 cubic feet, it was resolved by the authorities of the city to have it removed. 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."

The excavation of this trash heap was given by the Commission as the cause of the epidemic, but we are more prone to accuse the proverbial "ship from the West Indies." The number of cases and deaths is not stated.

1854. A few imported cases.

1876. Infected by refugees from Savannah. Outbreak not general, but confined to persons residing in the neighborhood of the railroad freight yards. Cases, 20; deaths, 4.

BLACKSHEAR.

1887. One case; imported

BAINBRIDGE.

1873. Sporadic cases.

BRUNSWICK.

1876. Infected by Havana. First case, August 20; first death, August 21. Deaths, 112.

1881. A few cases at Quarantine.

1890. There is no "official" record of the prevalence of yellow fever in Brunswick in 1890, but during the examination of the mortuary records of the town by officials of the United States Marine Hospital Service in connection with the yellow fever epidemic there in 1893, it was demonstrated, by the peculiar "jumps" in the mortality, that the disease had prevailed in Brunswick in 1890, and had been kept concealed. Not only did the mortuary records show this, though the cases were not diagnosed as yellow fever, but evidence of creditable citizens was obtained to this effect; and reliable testimony, that one of the physicians of Brunswick had made the statement in the fall of 1890, that yellow fever was prevalent—almost epidemic—and "if the Lord did not send a frost soon, it would be impossible for them longer to conceal it." It is known now that yellow fever had existed in 1893, a month prior to its being declared epidemic.

1893. The American barkentine *Anita Berwind*, from

Havana, arrived at the Brunswick quarantine—good sanitary history—June 15, 1893. Cleared June 19, 1893, presumably three days after disinfection. The master, who is said to have been feeling badly before leaving, was in Brunswick. The vessel reached Conquest's wharf on the Satilla (only a wharf with no people living there) on the 20th, on the evening of which day the master took to his bed. On June 21 he was moved to Conquest Camp, a cross-tie camp, 8 miles distant from Brunswick, where he died on June 25. Diagnosis during sickness and an autopsy by Dr. Dunwoody, yellow fever.

Two colored women nursed the patient and several men were especially exposed towards the last of his life and after death; Drs. Atkinson and McKinnon attended him. With the exception of burning the mattress and bedding, no disinfection worth anything was practiced, and there was no isolation save what the fears of the people compelled; the two nurses sleeping in the house and circulating freely among the others. There were 73 persons in the camp, living in small houses scattered through the brush.

Suspicious cases subsequently erupted in the vicinity, and there undoubtedly were cases in Brunswick, but it was only on September 9, when Surgeon Brenham, of the United States Marine Hospital Service, was taken ill and his case diagnosed yellow fever, that the disease was officially declared present in the town. The first death among the inhabitants of Brunswick reported as yellow fever took place September 13. Dr. Brenham died on the 20th. The fever was not of a virulent character, for out of 1,001 reported cases, only 53 died—40 whites, 12 negroes and 1 Mongolian. A notable feature of this epidemic was the unusual mortality among the blacks.

1894. At quarantine, two deaths.

1897. A few cases at quarantine.

1899. Cases at quarantine.

CONQUEST CAMP.

(See *Brunswick*, 1893).

DARIEN.

1876. Infected by Doboy. First case, September 26; last death, November 7. Cases, 8; deaths, 2.

1879. On bark *Caspian*, from Havana. First case, August 24; last case, August 24. Cases, 4; no details.

DALTON.

1878. Infected by Chattanooga, Tenn. First case, October 2, terminating in death on the 4th. Cases, 3; deaths, 3.

BOBOY ISLAND.

1876. Infected by bark *Valentine*, from Havana. No record of cases and deaths.

FORT OGLETHORPE.

1828. Deaths, 10.

ISLE OF HOPE.

1876. The Isle of Hope is ten miles southeast of Savannah, with which city it is in constant railroad communication. It has always been considered a place of refuge during seasons of epidemic influence; in 1876 at least three thousand individuals were added to its population. The first case of yellow fever which occurred in this locality in 1876 was in the person of a man named De Gauge, a refugee from Savannah. This man slept on the island, but spent each day in the city. He died about the 22nd of September. The second case was in the person of a man named Grover, also a refugee from Savannah, who only slept on the island. He died on the 23rd of

September. From these cases the disease spread, and many fatal cases occurred.

Opposite the Isle of Hope, and at but a comparatively short distance from the houses in which the epidemic influence was most strongly exhibited, is the celebrated Bethesda School, at one time so dear to the heart of John Wesley. At this point a considerable number of persons were congregated, but no case of the disease occurred.

JEKYL ISLAND.

1893. Imported cases.

JESUP.

1893. Sporadic cases; imported.

MACON.

1876. Early in October two cases of yellow fever occurred in the persons of employees of a Macon cotton ginnery. At the residences of these persons were several refugees from Savannah. Both of these cases died with black vomit. After these deaths occurred, the refugees removed to other portions of the city, where they were subsequently taken with the disease, and in one instance a fatal case again occurred from their presence. During the prevalence of this slight outbreak, the greatest number of cases occurred on the two blocks between Fourth and Fifth Streets, and Pine and Oglethorpe Streets, immediately in front of the Southwestern Railroad depot, at which all freight from Savannah was received and delivered. A few cases occurred in the vicinity of the Macon and Brunswick Railroad depots, and other sporadic cases in the vicinity of the railroad yards.

OLIVER STATION.

1876. During the epidemic in Savannah, a case occurred at Oliver Station, on the Georgia Central Rail-

road. For the accommodation of the Central Railroad employees and the citizens of Savannah during the epidemic, a daily train was run to this station, which is some forty odd miles from the city. The train remained at Oliver over night and returned to the city in the morning.

On the night of September 10, a man named Lufburrow slept on board this train, and on the 16th was suddenly taken with yellow fever, of which he died on the 21st. This man had not been to the city, and the only contact which he had with infection was on the night he slept in the cars.

Two cases of the disease occurred among some United States troops who were encamped at this point, having evacuated their barracks in Savannah on account of the epidemic, but no other cases occurred in the locality.

SAVANNAH.

1801; 1807; 1808. Mild epidemics. No records.

1817. Cases were observed earlier than usual in 1817, and by July the disease was epidemic. No record of cases and deaths.

1818. Mild outbreaks.

1819. The epidemic of 1819 made its appearance in the latter part of June, and went on increasing in extent and destructiveness, until the frost came and ended it.

1820. Population, 5,000. The disease made its appearance in May. A death occurred on the 7th, another on the 10th, and another on the 30th of that month. In June, the mortality was augmented to a death on every second day, and the whole sum, at the end of the month, amounted to 14. In July, the number of deaths ran up to 39, being an advance to more than double the devastation of June. In August, it amounted to 111; in September, to 241; in October, to 268; in November, to 50, and in December, to 3. The degree of mortality, on the surface of this statement, appears to have undergone a gradual reduction after the month of September. But

when it is considered, that, in the course of this period, the population had been greatly diminished by absence and death, it becomes evident, that, so far from having sustained any diminution, it was really increased throughout the month of October. The whole aggregate of deaths resulting from the epidemic, from its commencement in May, to its conclusion in December, was at 666.

When the epidemic first appeared in May, the population of Savannah was computed at 5,000 whites. In June, and beginning of July, it was probably reduced, from emigration, to 2,500; and, on the 14th of September, when the Mayor's proclamation was published, the number was still further reduced, and could not have exceeded 1,500. The medial population, therefore, of white inhabitants, may be fairly estimated at 3,000, for the whole season; which would constitute a sum of mortality amounting to one in five.

1821; 1827; 1831; 1839; 1850. Epidemics of more or less intensity. No authentic records.

1852. Deaths, 19.

1853. Sporadic cases.

1854. The first case of yellow fever to precede the epidemic of 1854, occurred on August 5, at the corner of Lincoln and Broughton Streets. Regarded merely as a sporadic case, it was not reported as yellow fever, and no precautions were taken. Between that date and the middle of the month, a few more cases occurred, but the health authorities remained inactive, scoffing the idea of the disease becoming epidemic. Soon after that date, cases manifested themselves in almost every quarter of the town and the pestilence soon swept with fearful desolation over the entire city. Following is a record of the deaths:

August	132
September	381
October	67
	<hr/>
Total	580

Notwithstanding the large negro population of Savannah at the time, only about 15 of that race died from yellow fever during the epidemic.

The disease exhibited its greatest violence from the 20th of August to the 20th of September, having commenced as an epidemic in the northeastern part of the city; it advanced directly to the southwest, spreading north and south until its influence was felt in every part of the city.

The infection is said to have been brought from Havana by the brig *Charlotte Hugue*.

1858. Sporadic cases.

1876. The year 1876 witnessed the most mortal epidemic of yellow fever which has ever visited Savannah. Between August 21, the date of the first recorded death, to December 1, when the last death took place, the pestilence carried off 1,066 persons, of which 809 were white and 257 black.

The infection is said to have been brought by a vessel from Havana, either the brig *Ynez* (which arrived on July 16), the bark *Maria*, (July 17), or the brig *Pepe* (August 2). But which of these was the active agent of transmission, has never been definitely settled.

The first recorded death from yellow fever occurred on August 21, on Wright Street, a short *cul de sac*, about fifty yards long, the culmination of Bryan Street, in the northeastern part of the city. The *second* occurred in the same street and same locality, August 22. The *third* and *fourth*, August 26, same locality.. The *fifth*, August 26, on East Broad Street, two doors north of Broughton; the *sixth*, August 27, on Reynolds Street, next to Gas House; the *seventh*, August 27, on Broughton Street, three doors west of Reynolds; the *eighth*, August 27, on East Boundary Street, north end; the *ninth*, August 27, on Randolph and President Streets.

On August 28, five deaths were recorded, one on Stone Street, one on State Street, between Whitaker and Barnard, and the remaining three in the northeastern part of the city.

On August 28, the other two not specified.

After this the disease spread rapidly, and was not confined to any locality. The highest number of deaths in the city from yellow fever in any one day was thirty-three, on the 20th of September. These occurred in the fifth week of the epidemic, embracing the period between the 18th and 24th of September.

SOUTH ATLANTIC QUARANTINE STATION.

- 1887. Infected by Para. First case, May 22.
- 1889. One case, April 12; recovered.
- 1891. No record of cases and deaths.
- 1894. No record of cases and deaths.
- 1895. Cases, 1; deaths, 1.

ST. MARY'S.

1808. First case, September 5; last case, October —. Deaths, 84.

UPTONVILLE.

1888. First case, October 24. Cases, 2; no deaths.

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ILLINOIS.

CAIRO.

1873.

Infected by river boatmen from Memphis, New Orleans and intermediate points.

On the 1st of September, two cases of yellow fever were received at the hospital from the steamer *Mary Alice*; on the 10th, two cases from the tow-boat *B*; and on the 24th, one case from the *Keystone*. Four of these cases were fatal, being in the stage of collapse when brought in. The fatal cases all had black vomit.

The first fatal case among the citizens did not occur until September 13, when the cashier of the Illinois Central wharf-boat died. Then followed in rapid succession several other cases among persons employed in the same locality. Next, a man on Captain Phillips' wharf-boat sickened, and died on the fourth day. A colored woman, who did the washing of his clothing, took the disease and died one week after; and a child in the house where the nurse died, also took the disease, but recovered.

There were in all 13 deaths out of 43 cases of yellow fever among the citizens, making, with the four deaths among these landed here with the disease, seventeen deaths from yellow fever between September 1 and September 25.

It was especially noted that the disease was confined to persons employed about the river and the localities above described; the four or five exceptions which occurred being in the families of men who were thus employed.

The disease did not make its appearance among the citizens until after the first two cases were received at the hospital from the steamer; and no new fatal cases occurred among citizens after the establishment of quarantine.

1878.

Infected by steamboats from "points below," as follows:

On August 3, 1878, the steamboat *Golden Crown* anchored in the river opposite Cairo; was examined by the quarantine physician, and one case of yellow fever found on board. Two other cases of the disease were reported as being secreted on the boat at the same time. The steamer was not allowed to land. August 9, the steamboat *John A. Scudder* passed Cairo for St. Louis, having one case of yellow fever on board, a refugee from New Orleans. On the 8th inst., Martin Alphen applied at the office of the Marine Hospital Service and stated that he shipped from this port, on the steamboat *John D. Porter*, the 27th of July; that he continued on the vessel till the 6th inst., when he was taken sick, and returned to Cairo on the *Dora Cable*, which steamer met the *Porter* between Paducah and Cairo. He was sent to the hospital suffering from what was supposed to be a form of malarial fever. On the third day after admission the disease was pronounced to be yellow fever, and in about two hours afterwards black vomit occurred in profusion, and the patient died three hours subsequently in convulsions.

Lewis Clark arrived from Memphis, on the steamboat *James B. Parker*, on the 15th inst., and was taken ill with fever the same night at his mother's house. The case remained without treatment until the 4th inst., and when medical attendance was procured, the case was past recovery.

On September 4, four members of a family by the name of Porter, residing two miles outside of Cairo, on the banks of the Mississippi, were suddenly stricken with the fever.

On the 8th, Mr. Thomas Nalley, the editor of the Cairo "Bulletin," was taken ill with the fever and died on the 12th.

Isaac Mulkey, an employe of the same office, died on the morning of the 13th.

John Crafton and a man named Sullivan, both employes of the "Bulletin" office, becoming alarmed by the

death of Mr. Nalley, spent the night in a drunken debauch. The following morning, the 13th, Crafton appeared at the hospital as a private patient, and died on the afternoon of the 16th. Sullivan, on the morning of the 13th, went to Mound City, seven miles from Cairo, where he died on the 15th.

On the 10th, Houston Dickey, age 18, was attacked and died on the morning of the 15th.

On the morning of the 22nd, G. W. Craig was admitted to the hospital with well-marked symptoms of yellow fever. The man was a refugee from the South, had stopped at Clinton Station, Ky., and had engaged himself temporarily as a cook in a large boarding-house. He had also swept out some empty cars in which refugees had been brought from the South. As soon as he was taken sick he started for Cairo, crossing the river in a skiff during the night.

On the 29th of September, in a family by the name of Petree, residing in the city, a daughter, age about sixteen, was taken ill with what was pronounced to be bilious fever, but finally proved to be yellow fever. The girl's mother had been taken sick shortly before, the exact time not being obtained. She and her daughter had been sleeping together previous to their illness. The mother died October 2, of yellow fever.

Upon the same street as the "Bulletin" building, about two hundred feet distant, resided a Mr. Wilcox. This gentleman was of a very nervous temperament, and was greatly alarmed about the yellow fever. On the 21st of September he was seized with a chill, which was followed by high fever. On the 24th, he entered the hospital. The same evening his pulse stood at 112; temperature, 102°; very much prostrated. A violent thunder storm came on later in the evening which greatly alarmed him, and soon after he sank into collapse.

On October 10, Dr. Waldo was taken sick, admitted to the hospital, and, notwithstanding all care and attention, died the 18th.

It will be seen from the preceding report that there were two centers of infection, one proceeding from the "Bulletin" building, where the editor died on the 12th. This district covered an area of about three city blocks in the heart of the city, and the vicinity of the custom-house. The other infected district was located in the upper part of the town, between 20th and 21st Streets, and covered two or three blocks.

From August 8, to September 7, there were three cases of yellow fever and two deaths—all of them refugees. On September 7, the first case among the inhabitants occurred, and from that date to November 5, inclusive, there were 51 deaths among the inhabitants. The total number of cases was 88.

1897.

Four refugees from infected points in the South, had yellow fever in Cairo in 1897. There were only four cases with no deaths. The disease did not attack the inhabitants.

CHICAGO.

1878. One death, a refugee "from the South."

1905. Week ending October 7, one death, a refugee.

MOUNT CARMEL.

1888. A fatal case, a refugee from Decatur, Ala. September 25.

ROCKFORD.

1888. One case, a refugee, from Decatur, Ala., September 24, died 29th. There was no spread of the disease.

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INDIANA.

INDIANAPOLIS.

1878. Two cases, September 12, refugees; one case died on the 17th.

NEW ALBANY.

1878. Cases on steamboat *Mary Houston*, from infected points. There was no spread of the disease.

INDIAN TERRITORY.

MAYSVILLE.

1905. A fatal case, a refugee, September 1.

KENTUCKY.

BOWLING GREEN.

1878. First case, September 2. Cases, 42; deaths, 19.

CLINTON.

1878.

Two cases of yellow fever occurred October 25. There was much excitement, and many citizens left the town in great haste.

COVINGTON.

1878. One case, a refugee from New Orleans.

DANVILLE.

1878. One case, September 3; died on the 9th.

FILLMORE.

1878. One fatal case, a refugee from New Orleans.

FULTON.

1878. Cases, 12; deaths. 5.

HICKMAN.

1878. Yellow fever was never epidemic in Hickman, until 1878. The first case was Charlie Hendricks on August 13, supposed to have been infected on the railroad trains, as he peddled apples and mixed with passengers. He died August 16, on the 17th his little sister, Louisa, died, affected similarly; both had black vomit. No death until August 28, when Edward Mangel

died. Mrs. J. Witting died the 29th, Jimmie Young the 30th, and numerous new cases continued to occur throughout the town. A panic ensued, scores were dead or dying, hundreds ill and over a thousand fled. Nearly all the local physicians died, four of the volunteer doctors died, 450 citizens were prostrated with the fever, 150 died. Date of the last death, November 6th. Total cases, 454; total deaths, 180.

JORDAN STATION.

1878. Deaths, 2.

LEXINGTON.

1905. Cases, 2.

LOUISVILLE.

1873. First case, September 22; last case, October 15. Deaths, 5.

1878. Population, 160,896. Early in the yellow fever season, Louisville opened her gates as a "city of refuge" from the raging disease. Thousands flocked from the South, many bringing the disease. On the 17th of August, 3 cases of fever were sent to the United States Marine Hospital, from the steamer *Sunflower Belle*, 1 white and 2 colored. On the 23rd of August, Mr. H. R. Davis, of the firm of Bryant & Davis, Grenada, came to Louisville and put up at the Waverly Hotel. In a few days he was stricken. Drs. Walling and Gaillard were summoned and later Dr. Luke Blackburn was called to see him; he had black vomit and died on the 31st. A hearse was driven up the alley in the rear of the hotel and the coffin borne hurriedly away at midnight. When he was first taken ill, two nurses were employed. A young man, also from Grenada, who assisted in nursing, was also taken ill with fever, but recovered. On the 12th of September, Drs. Lloyd and Griffith were summoned to a refugee family on 33rd Street, and found 7 occupying a small room on

the ground floor of an old frame house. Three children with yellow fever lay in one corner, the father in the other, and the mother, with a babe in arms, watching and nursing them. Conveyances were telegraphed for, and in a little while two hacks carried them to the yellow fever hospital, an infirmary which the city had erected and equipped for this disease early in the season. Mr. Lutz died September 25, on 11th Street near Maple, also two cases (colored) on Bible Alley. Meta Flynn, Nathaniel Mudd, Wm. Shaw, Eddie Berryman, Mrs. Ryan and many others died of black vomit on or near Maple, Eleventh and Bible Alley, all being near the L. & N. R. R. depot; but a diversity of opinion existed as to the disease. Some excitement arose. Three physicians, Drs. Bell, Yandell and Foree, publishing a card endeavoring to allay excitement, caused a panic for a day or two, but the frightened ones were ridiculed out of their alarm, and returned. No case originated elsewhere in the city. Total cases, 126; total deaths, 34.

1879. Population, 175,000. A fatal case, a refugee from Memphis.

1888. Population, 200,000. A fatal case, a refugee, September 19.

1897. On August 14, 1897, a man came to Louisville from Ocean Springs, Mississippi, and was taken ill on his arrival. His case was diagnosed as yellow fever by the attending physician, who had lived in the South, and had clinical experience with the disease. The patient was immediately spirited away from the hotel, where he had been taken ill to a private sanitarium in the city, where he exhibited all the phenomena of yellow fever. He died on the 16th. He was quietly buried by the health authorities. There were no developments from this case.

At the time, there was no suspicion that yellow fever was prevalent in Ocean Springs, although "dengue" was said to be epidemic in the town. Nevertheless, the Louisville health officer immediately notified the health authorities of New Orleans of the circumstances, naturally concluding that this city would be vitally interested in

investigating the "suspicious cases," which had manifested themselves in Ocean Spring, and which had been diagnosed as dengue by the physicians. Acting on this information, and also alarmed by the fact that Dr. Theard, of New Orleans, had reported an unequivocal case of yellow fever in his practice, the President of the Louisiana State Board of Health, with members of his staff, went to Ocean Springs, made an investigation of the disease prevailing there. As a result of this tardy investigation by the health officers of New Orleans, the infection was brought to our doors and resulted in disastrous outbreak of yellow fever.

MEDLEY'S LANDING.

Only one case, that of a man who contracted the disease while nursing his brothers at Hickman.

TRENTON.

1878. One death, a refugee.

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LOUISIANA.

ABITA SPRINGS.

1905. Infected by New Orleans. First case, July 30. Cases, 4; no deaths.

ALEXANDRIA.

1819; 1822; 1827; 1831; 1837; 1839; 1847; 1853; 1854; 1855, yellow fever years. No record of cases and deaths.

1898. First case, October 6; last case, October 16. Cases, 200; deaths, 2.

1905. First case, July 28. Cases, 21; deaths, 3.

ALGIERS.

A District of New Orleans, which see.

AMITE CITY.

1898. First case, October 13; last death, October 13. Cases, 1; deaths, 1.

ARCENEUX PLACE.

1879. First case, August 10. Cases, 1; no deaths.

ASCENSION PARISH.

1823. Locality not stated. No record of cases and deaths.

AMELIA.

1905. First case, August 8. Cases, 86; deaths, 5.

AMESVILLE.

1905. First case, July 25. Cases, 3; deaths, 1.

ARDOYNE PLANTATION.

1905. First case, August 1. Cases, 206; deaths, 11.

ATHERTON.

1905. Cases, 8; deaths, 2.

ATTAKAPAS CANAL.

1879. Cases, 62; deaths, 18.

BALDWIN.

1905. First case, October 20. Cases, 1; deaths, 0.

BARATARIA.

1905. First case, August 15. Cases, 56; deaths, 7.

BATON ROUGE.

1817; 1819; 1820; 1821. Yellow fever years. No records of cases and deaths.

1822. Deaths, 60.

1827; 1829. No record of cases and deaths.

1829. Deaths, 7.

1837. No record of cases and deaths.

1843. First case, October. No statistics.

1847; 1858. No record of cases and deaths.

1878. Infected by New Orleans. First case, August 10; first death, August 18. Cases, 2,435; deaths, 193.

1897. Cases, 5; deaths, 2.

1898. First case, September 25; last case, October 15. Cases, 176; deaths, 4.

1905. First case, September 9. Cases, 8; deaths, 1.

BAYOU BOEUF.

1879. Population, 150. Infected by Morgan City. First case, September 5; first death, September 25; last

case, November 10; last death, November 10. Cases, 77; deaths, 21.

1905. First case, August 1. Cases, 15; deaths, 0.

BAYOU BRULO.

1905. First case, October 4. Cases, 40; deaths, 6.

BAYOU CANE.

1905. First case, September 3. Cases, 1; deaths, 0.

BAYOU COOK.

1905. First case, July 3. Cases, 2; deaths, 1.

BAYOU CYPREMORET.

1878. Infected by Thibodaux, La. First case, November —. Deaths, 7.

BAYOU GOULA.

1878. Deaths, 4.

1905. First case, August 1. Cases, 17; deaths, 3.

BAYOU NATCHEZ.

1905. First case, September 3. Cases, 20; deaths, 6.

BAYOU PLAQUEMINE.

1853. First case, September 17; last case, September 30. Cases, 9; deaths, 0.

BAYOU SARA.

1839; 1847; 1853. No record of cases and deaths.

1878. Population, 700. Cases, 250; deaths, 13.

BAYOU TERREBONNE.

1905. First case, September 4. Cases, 1; deaths, 0.

BEL AML.

1905. First case, September 8. Cases, 106; deaths, 15.

BELLE GROVE.

1905. First case, August 31. Cases, 74; deaths, 12.

BELLE HELENE.

1905. First case, October 17. Cases, 2; deaths, 0.

BELLESEIN PLANTATION.

1905. First case, August 26. Cases, 43; deaths, 5.

BELMONT.

1905. First case, August 29. Cases, 1; deaths, 0.

BERWICK CITY.

1878. Population, 150. Infected by Morgan City. First case, September 27; last case, November 4; first death, October 7. Cases, 99; deaths, 7.

1879. Population, 500. Infected by Morgan City. First case, September 8; first death, September 12; last case, December 1; last death, December 1. Cases, 75; deaths, 16.

1905. First case, September 7. Cases, 1; deaths, 1.

BIG BURNS.

1905. Cases, 1; deaths, 0.

BLANCHARD.

1879. Cases, 1; deaths, 1.

BON AML.

1905. First case, August 6. Cases, 56; deaths, 8.

BONNET CARRE.

1878. Several cases and deaths; no record.

BORGUEMOUTH.

1905. First case, September 20. Cases, 1; no deaths.

BORODINO.

1905. First case, September 24. Cases, 1; no deaths.

BOWIE.

1898. First case, October 6; last case, October 6.
Cases, 1; no deaths.

1905. First case, July 26. Cases, 1; deaths, 1.

BROUSSARD.

1878. Deaths, 1.

BRULE SACREMENTO.

1878. Deaths, 22.

BUNKIE.

1905. First case, July 20. Cases, 22; deaths, 8.

BURAS.

1847. Sporadic cases. No statistics.

1854. First case, September 22. No record.

1878. Infected by New Orleans. Cases, 14; deaths, 3.

CANAAN LANDING.

1878. Cases, 28; deaths, 6.

CAROLINE LANDING.

1878. A fatal case in October.

CARROLLTON.

(*A District of New Orleans, which see*).

CEDAR GROVE.

1905. First case, September 16. Cases, 2; deaths, 0.

CENTREVILLE.

1853. First case, September 15; last case, November 18. Cases, 45; deaths, 7.

1855. First case, September —; last case, October —.

1879. First case, September 21; first death, September 25; last case, December 4. Cases, 44; deaths, 14.

CHALMETTE.

1905. First case, September 30. Cases, 7; deaths, 0.

CHENIERE CAMINADA.

1905. First case, August 27. Cases, 62; deaths, 5.

CHENIERE CANE.

1878. No record.

CINCLARE.

1898. First case, October 15; last case October 25. Cases, 11; deaths, 1.

CLARK CHENIERE.

1905. First case, July 16. Cases, 44; deaths, 3.

CLINTON.

1854. First case, September 1; last case, December —.
 1878. Infected by New Orleans. First case, September 23. Cases, 96; deaths, 15.

CLOUTIERVILLE.

1853. First case, August 14; first death, December 14.
 1854. No record.

COLUMBIA.

1878. Infected by New Orleans. First case, October 3; last case, October 27. Cases, 2; deaths, 0.

COOK'S LANDING.

1878. Population, 35. Cases, 15; deaths, 4.

CORINNE.

1905. First case, July 20. Cases, 16; deaths, 4.

COTE BLANCHE.

1905. First case, August 18. Cases, 300; deaths, 51.

COVINGTON.

1847. Sporadic cases. No record.
 1905. Infected by New Orleans. First case, September 23. Cases, 4; deaths, 1. All refugees.

CRESCENT FARM.

1905. First case, August 30. Cases, 205; deaths, 1. It seems incredible that such a small mortality should

have resulted, but the figures are "official," and we can do no more than publish them. In our opinion, seventy-five per cent. of the cases reported as "yellow fever" were erroneously classified as such.

CYPREMORT.

1879. Infected by New Orleans. First case, October 17; first death, October 25; last case, November 22. Cases, 33; deaths, 9.

DELHI.

1878. Population, 500. Infected by Vicksburg. First case, August 11; first death, August 15. Cases, 164; deaths, 34.

DELOGNY.

1898. First case, October 1; last case, October 1. Cases, 1; deaths, 1.

DELTA.

1878. Population, 300. Infected by Vicksburg. First case, August 27; first death, September 2. Cases, 87; deaths, 47.

1905. Cases, 60; deaths, 6.

DES ALLEMANDS.

1878. Population, 60. First case, August 20; last case, October 27; first death, August 24; last death, October 30. Cases, 32; deaths, 17.

DESLONDE.

1879. First case, September 22. Cases, 40; deaths, 1.

DIAMOND.

1905. First case, August 16. Cases, 8; deaths, 0.

DIAMOND PLANTATION.

1905. First case, July 20. Cases, 55; deaths, 10.

DONALDSONVILLE.

1827. No record.

1839. Infected by New Orleans. Deaths, 15.

1878. Population, 1,500. Cases, 484; deaths, 83.

1905. First case, August 28.

DUNBOYNE.

1878. Deaths, 5.

EDGARD.

1905. First case, September 11. Cases, 3; deaths, 0.

ELLENDALE.

1905. First case, August 30. Cases, 27; deaths, 2.

EMPIRE.

1905. First case, July 31. Cases, 1; deaths, 0.

ESTELLE PLANTATION.

1905. First case, September 5. Cases, 3; deaths, 0.

EUREKA.

1878. Deaths, 1.

EVERETTE.

1905. First case, September 16. Cases, 1; deaths, 1.

EVERGREEN.

1905. Cases, 2; deaths, 0.

FISH RIVER.

1878. No record of cases and deaths.

FLORENVILLE.

1905. First case, September 3. Cases, 1 deaths, 1.

FOLEY PLANTATION.

1879. First case, October 10. Cases, 4; deaths, 1.

FORT PIKE.

1820. Sporadic cases among soldiers. No statistics.

FORT ST. PHILIP.

1820. Sporadic cases among troops. No record.

1905. Cases, 1; deaths, 0.

FRANKLIN.

1839. No record of cases and deaths.

1853. First case, October 16; first death, October 23; last case, October 24; last death, October 25. Cases, 3; deaths, 2.

1854; 1858; 1867. No record of cases and deaths.

1897. Cases, 3; deaths, 1.

1898. Cases, 607; deaths, 9.

1905. First case, September 25. Cases, 5; deaths, 0.

FRELISIN.

1906. First case, October 18. Cases, 1; deaths, 0.

PREMEAUX.

1879. First case, October 22. Cases, 2; deaths, 1.

FRENCH SETTLEMENT.

1879. First case, November 19; last case, December —.
Cases, 60; deaths, 5.

GLENWILD PLANTATION.

1905. First case, September 15. Cases, 2; deaths, 1.

GOOD HOPE PLANTATION.

1905. First case, August 10. Cases, 23; deaths, 1.

GRAMERCY.

1905. First case, September 1. Cases, 1; deaths, 0.

GRAND ISLE.

1905. First case, September 4. Cases, 74; deaths, 8.

GRAND LAKE.

1905. First case, July 25. Cases, 41; deaths, 7.

GREENWOOD.

1873. Infected by Shreveport. First case, September 29; first death, October 3; last death, October 29. Cases, 19; deaths, 4.

1905. First case, September 7. Cases, 1; deaths, 0.

GRETNA.

1878. Deaths, 53.

1905. First case, September 22. Cases, 5; deaths, 2.

GROSSE TETE.

1905. First case, September 2. Cases, 45; deaths, 5.

HAHNVILLE.

1878. Population, 200. No statistics.

HAMMOND.

1878. Infected by Ozyka, Miss. First case, September 18; first death, September 21; last death, November 1. Deaths, 5.

HARRISONBURG.

1878. Population, 275. Cases, 30; deaths, 10.

HARVEY'S CANAL.

1898. First case, September 24; last case, October 6. Cases, 14; deaths, 3.

1905. First case, September 1. Cases, 5; deaths, 0.

HENDERSON.

1878. Population, 400. First case, August 30. Cases, 75; deaths, 18.

HOUMA.

1878. First case, October —. Deaths, 6.

1898. First case, September 23; last case, October 5. Cases, 40; deaths, 2.

1905. First case, August 30. Cases, 7; deaths, 0.

JACKSON.

1898. First case, October 15. Cases, 15; deaths, 0.

JACKSON BARRACKS.

1834. Deaths, 3.

JEFFERSON PARISH.

1898. First case in September. Cases, 5; deaths, 0.

JEANERETTE.

1854. No record.

1857. First case, October 7.

JESUIT BEND.

1854. First case, September 12.

1878. First case, September 22. Cases, 2; deaths, 2.

KEMPA BEND.

1905. First case, September 17. Cases, 2; deaths, 0.

KENTWOOD.

1905. First case, September 18. Cases, 2; deaths, 0.

KENNER.

1905. First case, August 18. Cases, 360; deaths, 33.

LABADIEVILLE.

1878. Population, 180. Infected by New Orleans. First case, August 16; first death, August 21. Cases, 160; deaths, 24.

LAFAYETTE.

1905. First case, September 26. Cases, 4; deaths, 0.

LAFOURCHE CROSSING.

1878. First case, September 12; last case, December 18; first death, September 18; last death, December 21. Cases, 209; deaths, 26.

1879. Infected by Morgan City. First case, October 2; first death, October 5; last case, December 1; last death, November 27. Cases, 40; deaths, 9.

1905. First case, August 26. Cases, 35; deaths, 5.

LAKE CHARLES.

1898. First case, October 10. Cases, 1; deaths, 0.

LAGONDA PLANTATION.

1878. Infected by New Orleans. First case, September 5; first death, September 10. Cases, 591; deaths, 42.

LAKE PROVIDENCE.

1853. Population, 1,600. Infected by New Orleans. First case, August; first death, August 31.

1905. First case, July 21. Cases, 327; deaths, 23.

LAPLACE.

1905. First case, August 16. Cases, 163; deaths, 18.

LAROSE.

1905. First case, August 29. Cases, 13; deaths, 5.

LECOMPTE.

1905. First case, September 11. Cases, 2; deaths, 0.

LEEVILLE.

(Lafourche Parish).

1905. First case, May 24. Cases, 375; deaths, 67.

LOBDELL.

1898. First case, October 12; last case, October 12.
Only case recorded.

LOWER TEXAS.

1879. Cases, 30; deaths, 7.

LUCY.

1905. First case, October 5. Cases, 3; deaths, 0.

LUDINGTON.

1905. Cases, 38; deaths, 0.

LULING.

1878. First case, September 15. Cases, 2 deaths, 0.

LUTCHER.

1898. First case, October 15. Cases, 14; deaths, 2.

1905. First case, August 11. Cases, 5; deaths, 0.

MADISONVILLE.

1905. First case, August 14. Cases, 1; deaths, 0.

MALMOT.

1879. First case, November 1. Cases, 1; deaths, 0.

MANDEVILLE.

1847. No record of cases and deaths.

1878. Population, 300. Yellow fever made its appearance about the middle of September. A child died September 26, and a few scattering cases followed. A young lady from New Orleans died next, and a Catholic priest died October 2. Deaths, 3.

1905. First case, August 19. Cases, 2; deaths, 1.

MANSURA.

1905. First case, November 10. Cases, 1; deaths, 0.

MARINGOUIN.

1905. First case, Oct. 1. Cases, 1; deaths, 0.

MARY PLANTATION.

1879. Infected by Morgan City. First case, October 10; first death, October 13; last case, December —; last death, October 18. Cases, 45; deaths, 3.

McDONOGHVILLE.

1905. First case September 1. Cases, 20; deaths, 0.

1858. No record of cases and deaths.

MERAVILLE.

1905. First case, September 16. Cases, 6; deaths, 0.

MERRITT.

1905. First case, September 16. Cases, 2; deaths, 0.

MER ROUGE.

1905. First case, September 16. Cases, 1; deaths, 0.

MILLAUDON.

1905. First case, September 8. Cases, 2; deaths, 0.

MILLIKEN'S BEND.

1905. Cases, 27; deaths, 1.

MOREAUVILLE.

1905. Cases, 1; deaths, 0.

MORGAN CITY.

1878. Population, 3,600. Infected by New Orleans. First case, August 17; last case, November 10; first death, August 22; last death, November 14. Cases, 586; deaths, 109.

1879. Population, 3,000. First case, July 25; first death, August 16; last case, December 4; last death, December 4. Cases, 89; deaths, 25.

1905. First case, July 28. Cases, 11; deaths, 0.

MOISE SETTLEMENT.

1905. First case, August 30. Cases, 52; deaths, 3.

NAPOLEONVILLE.

1878. Population, 500. Infected by Lafourche Crossing. First case, August 10. Cases, 3; deaths, 0.

NATCHITOCHEs.

1839. No record of cases and deaths.

1905. No record of cases and deaths.

1905. First case, September 16. Cases, 1; deaths, 1.

NERO.

1905. Cases, 1.

NEW IBERIA.

1839. No record of cases and deaths.
 1867. No record of cases and deaths.
 1870. No record of cases and deaths.
 1905. First case, October 10. Cases, 18; deaths, 1.
 1906. First case, August 19. Cases, 1.

NEW IBERVILLE.

1905. Cases, 2; deaths, 0.

NEW ORLEANS.

HISTORICAL RESUME.

The Birth of the City.

In the spring of 1718, Bienville selected a site for a town on the banks of the Mississippi, and placed fifty men to clear off the grounds, as the location of the future capital of the province. The ground selected was that which is now covered by the lower portion, or French part, of the present City of New Orleans. The following spring, the river overflowed its banks, the new settlement was completed inundated, and the site seemed to present an uncertain location for a city, which remained for several years little more than a military post remote from the settlements. For three years Bienville's headquarters remained at Mobile.

The historian, M. Le Page Du Pratz, who came over with a colony of eight hundred men in 1718, under the auspices of the West India Company, states that six weeks before the arrival at Cape Francais, St. Domingo, fifteen hundred persons died of an epidemic called the Siam Distemper. Du Pratz gives, however, no facts to shew that any of the body of emigrants, some of whom settled at New Orleans and others at Natchez, suffered with yellow fever, for he states that after a passage of

three months, including the six weeks spent at Cape Francais, they arrived at the Island of Massacre, since called Isle of Dauphine, on August 25, after a prosperous voyage, no one having died, or having been even dangerously ill. Du Pratz describes the location of the future capital of Louisiana in 1718, as being marked out by a hut covered with palmetto leaves.

As early as the year 1718, when New Orleans was founded, a company ship had sailed from France with troops and one hundred convicts, destined for Louisiana, but had never been heard of. Toward the close of 1821, there arrived in Louisiana, a French officer who gave some account of this ill-fated vessel. It was now discovered that like the fleet of LaSalle, she had missed the Mississippi, and had been driven to the west. Her commander had mistaken the island of Cuba for that of St. Domingo, and had been compelled to pass through the old channel to get into the gulf. He made a large bay, in the 29th degree of latitude, and discovered that he had lost his way. His misfortune was increased by a disease breaking out among the convicts.

Five of the officers thought it less dangerous to land, with provisions for eight days and their arms, than to continue on board.

First Importation of African Slaves.

The first importation of African slaves numbering 500, was made in 1719, a large portion of which was sent to New Orleans, and transferred to the west bank of the river to a plantation owned by a company. The remainder were sold chiefly to the agricultural settlements of the lower Mississippi. We have no accounts of any importation of yellow fever by these or subsequent cargoes of slaves under the French reign.

The "Plague of Marsilles."

Benard de la Harpe states that on the 1st of July, 1720, the king's ships, *Le Comte de Toulouse*, sixty-four guns, commanded by M. de Vatel, after the death of M. de Cafaro, on the 17th of June, and the *Saint Henri*, seventy

guns, commanded by M. Douce, arrived in Louisiana. They brought with them from the island of St. Domingo, a contagious fever or malady, which carried off a great number of persons every day. After opening several bodies, it was discovered that the disease came from a corruption which engendered a quantity of worms in the stomach.

Francois Xavier Martin gives a wholly different account of the origin and nature of this malady, and classes it with the Oriental Plague. He says: "Two line-of-battle ships came in the latter part of June, 1720; from Toulon. They were in great distress; Caffaro, the commodore, and most of their crews had fallen to the plague, which some sailors in these ships who come from Marseilles, had communicated to the others; that city being ravaged by pestilence, brought there by a ship from Lyde, in the Levant. Father Laval, a Jesuit, royal professor of hydrography in the colleges of Toulon, had by the king's order, taken passage on board this fleet, with directions to make astronomical observations in Louisiana. The chaplains of the ship having died, the father, considering science an object of minor consideration to a minister of the altar, thought it his duty to bestow all his time in administering spiritual relief to the sick, who for a long time were very numerous, and he sailed back with the ships.

Origin of Slavery in Louisiana.

Experiment having shown that Europeans could not stand the labors of the field, but sickened and died under the burning suns of Louisiana, and the chilling dews and fogs of night; the Western Company was, therefore, compelled to introduce African negroes to cultivate the plantations scattered on the bayous and rivers of the delta of the Mississippi, and for several years it furnished the agricultural interests of the colony with several hundred annually, which was the origin of African slavery in Louisiana. In 1824, M. de Bienville drew up a code, containing all the legislation applicable to slaves in Louis-

iaba, which remained in force until 1803. It appears that during the year 1781, Louisiana received no less than 1,367 negroes from the coast of Africa. We have failed to discover in the writings of La Harpe, Du Pratz, Charlevoix, Martin, Gayarre and others, any facts sustaining the view advanced by some, that yellow fever was first imported into Louisiana by the slave ships.

Du Pratz, who visited New Orleans and Biloxi in 1722, states that at the latter place more than five hundred persons died of famine. He states that "the great plenty of oysters found upon the coast saved the lives of them, although obliged to wade up to their thighs for them, a gunshot from the shore. If this food nourished several of them, it threw numbers into sickness, which was still more heightened by the long time they were obliged to be in the water."

Famines and Hurricanes.

In the beginning of August, 1723, Bienville removed his headquarters to New Orleans. A most destructive hurricane desolated the province on the 11th of September, 1723. The church, hospital and thirty houses were levelled to the ground in New Orleans; three vessels that lay before it were driven onshore. The crops above and below were totally destroyed, and many houses of the planters blown down. Famine threatened the colonists with its horrors, but they were in some degree relieved by the appearance of an unexpected crop of rice. *Disease added in the fall, its horrors to those of impending death.*

In 1724, the white population of Louisiana, says La Harpe, amounted to about 1,700 souls, and the black population 3,300. If La Harpe's statement be true, it shows an astonishing diminution of the white population, which in 1721, was computed at 5,400.

An Early Deforestation Edict.

During the fall of 1726, Perrier, a lieutenant of the king's ships, having been appointed commandant general of Louisiana, shortly after, Bienville sailed for France;

one of the articles of instruction to Governor Perrier ran thus: "*Whereas it is maintained that the diseases which prevail in New Orleans during the summer proceed from the want of air, and from the city being smothered by the neighboring woods, which press so close around it, it shall be the care of M. Perrier to have them cut down, as far as Lake Pontchartrain.*" These instructions show: That at that remote time, the summer was the sickly season at New Orleans, as it has continued ever since up to very recently; and to make the city more healthy, the government as far back as 1726, was struck with the necessity of an improvement which was only finally executed to fulfill the necessities of the Federal troops during their hostile occupation in 1863, 1864 and 1865.

Colonial New Orleans.

In the year 1727, the land of which the City of New Orleans now stands, not being protected by an adequate levee, was subject to annual inundations, and was a perfect quagmire, presenting no better aspect than that of a vast sink or sewer. The waters of the Mississippi and those of Lake Pontchartrain, met at a ridge of high land, which by their common deposits they had formed between Bayou St. John and New Orleans, called the highland of the lepers. To drain the city, a wide ditch was dug on Bourbon Street, the third from and parallel to the river; each lot was surrounded by a small ditch, which in the course of time filled up, except the part fronting the street, so that every square instead of every lot was ditched in. The whole city was surrounded by a large ditch, and fenced in with sharp stakes wedged close together. In this way a convenient space was drained. In the language of Gayarre, "mesquitoses buzzed, and enormous frogs croaked incessantly in concert with other indescribable sounds; tall reeds and grasses of every variety grew in the streets, and in the yards, so as to intercept all communication, and offered a safe retreat and places of concealment to venomous reptiles, wild beasts and malefactors, who protected by these impene-

trable jungles, committed with impunity, all sorts of evil deeds." Is it any matter of surprise, therefore, that the hot months of summer and autumn were even at this early day, dreaded for their destructive, pestilential fevers?

The First Levee.

Governor Perrier signalized the beginning of his administration, by the completion on the 15th of November, 1727, in front of New Orleans, of a levee eighteen hundred yards in length, and so broad that its summit measured eighteen feet in width. This same levee, although considerably reduced in its proportion, he caused to be continued eighteen miles on both sides of the city above and below. He announced to the company that he would soon undertake to cut a canal from New Orleans to Bayou St. John, in order to open a communication with the sea, through the lakes, and he mentions the arrangements which he had made with the inhabitants in relation to the negroes they were to furnish for the execution of this work, which was actually begun, but to which subsequent events put a stop. Thus it is seen that the plan of the canal which now bears the name of Carondelet, did not originate with the Spanish governor.

Pestilence, Famine, Drouths and Hurricanes.

From a dispatch of Diron d'Artagnette, dated April 23, 1733, we learn that small-pox was then raging in Louisiana, and that from this cause and famine, the result of the destruction of the crops by a hurricane, the colony was on the eve of being depopulated.

Bienville and Salmon, in a joint dispatch of the 31st of August, 1735, say: "The mortality of cattle is frightful, the drought is excessive and the heat is suffocating. Such hot weather has never been known since the foundation of the colony, and it has now lasted four months without any change."

The "Mad Dog" Epidemic.

While the planters were suffering from drought, after having suffered from inundations, the inhabitants of New Orleans were laboring under a strange kind of infection. They could hardly venture out of their houses without being bitten by mad dogs. These animals had increased to such an extent, that they had become an intolerable nuisance, and to remedy the evil, the royal commissary, Salmon, ordered them to be hunted down, on certain days, from five o'clock to six o'clock in the morning. He also prohibited negroes and Indians from having dogs, under the penalty for the offender of being sentenced to wear an iron collar.

Pestilence More Fatal than War.

In 1734, Bienville was reappointed Governor of Louisiana.

The force which Bienville assembled in 1739, for the subjection of the Chickasaw Indians, consisted of upwards of 1,200 white, and double that number of Indian and black troops. This comparatively large army, unaccountably spent six months in making preparations for its march. In the meanwhile, the troops lately arrived from France became unhealthy, and many died, and the climate had an almost equally deleterious influence on those from Canada. Early the next fall, the regulars and militia of Canada and Louisiana, who had escaped the autumnal disease, were prostrated by fatigue, and Bienville was compelled to confine his call for service, to his red and black men. They were his only effective force. In the Chickasaw war, peace was purchased at the price of many valuable lives—estimated at 500, out of 1,200 white troops, not slain in battle, but destroyed by the fevers of the climate.

Cession to Spain.

On the third of November, 1763, a secret treaty was signed at Paris, between the French and Spanish Kings,

by which the former ceded to the latter, the part of the province of Louisiana which lies on the western side of the Mississippi, including the City of New Orleans.

The subsequent history of New Orleans, including the cession to the United States and other political events, is well known to the majority of our readers. This resume, taken from the memoirs of the late Joseph Jones, one of Louisiana's most distinguished surgeons and authors, covers the most interesting period in the life of the beautiful metropolis of the South.

SUMMARY OF EPIDEMICS.*

According to Chaille (*New Orleans Medical and Surgical Journal*, 1858, p. 818), there is authority for stating that cases of yellow fever occurred in New Orleans in 1769 and 1791; other authorities assert the fever was also present in 1793, 1794 and 1795—but the first unquestionable epidemic did not occur until 1796, at which time the city had a population of about 6,000.

The yellow fever years in New Orleans, from 1769 to the last epidemic (1905), may be summarized as follows:

1769. First traditional appearance of yellow fever in New Orleans. No statistics.

1791; 1793; 1794. No record of cases and deaths. The digging of the Carondelet Canal (Old Basin) was begun in 1794.

1795. Limited outbreak.

1796. First authentic invasion of New Orleans by yellow fever. No reliable statistics obtainable.

1797. No record of cases and deaths. The Old Basin, the present head of the Carondelet Canal, was excavated in 1797.

1799. No record of cases and deaths. Crevasse above the city.

1800; 1801; 1802; 1803; 1804; 1809; 1811. No record of cases and deaths. Hurricane, doing much damage to city, in 1811.

1812. Population, 19,229. War with Great Britain.

* Dates of important excavations, etc., are given because of their fanciful association, at the time, with yellow fever outbreaks.

1817. Population, 24,196. Infected by British Cutter *Phoenix*, from Havana. First case, June 18; last death, December —. Deaths, 80. Extensive crevasse above city the year previous.

1818. Population, 25,190. Mild epidemic. Deaths, 115.

1819. Population, 26,183. Infected by Havana. Severe epidemic. First case, July 1. Deaths, 2,190.

1820. Population, 27,176. First case, July —. That year, the wooden sidewalks in the business portion of the city were removed and bricks or flags substituted.

1821. No record of cases and deaths.

1822. Population, 31,706. First case, September 1. Cases, 337; deaths, 237.

1823. Population, 33,971. Infected by Pensacola. First case, August 23. Cases, 2,337; deaths, 239.

1824. Population, 36,236. Infected by Havana. First case, August 4. Cases, 167; deaths, 108.

1825. Population, 38,561. First case, June 23. Cases, 99; deaths, 49. Digging of Gormeley's Canal to drain upper part of city.

1826. Population, 40,766. First case, May 18. Cases, 24; deaths, 5. Digging of Melpomene Canal.

1827. Population, 43,031. First case, July 19. Cases, 372; deaths, 109.

1828. Population, 45,296. First case, June 18. Cases, 290; deaths, 150.

1829. Population, 47,561. First case, May 23. Cases, 435; deaths, 215.

1830. Population, 49,826. First case, July 15. Cases, 256; deaths, 117.

1831. Population, 52,455. First case, June 9. Cases, 3; deaths, 2.

1832. Population, 55,084. First case, August 15. Cases, 26; deaths, 18.

1833. Population, 57,713. First case, July 12. Cases, 422; deaths, 210. Heavy rains, lasting from June to September.

1834. Population, 60,342. First case, August 28. Cases, 150; deaths, 95.

1835. Population, 62,971. First case, August 23. Cases, 505; deaths, 284.

1836. Population, 65,600. First case, August 24. Cases, 6; deaths, 5.

1837. Population, 68,229. First case, July 24. Cases, 998; deaths, 412.

1838. Population, 70,858. First case, August 25. Cases, 22; deaths, 17.

1839. Population, 73,437. First case, July 23. Cases, 1,086; deaths, 452.

1840. Population, 76,116. First case, July 25. Cases, 3; deaths, 3.

1841. Population, 78,745. First case, July 27. Cases, 1,114; deaths, 594. Drainage Commission actively engaged in drainage and clearing.

1842. Population, 81,374. First case, July 30. Cases, 425; deaths, 211.

1843. Population, 84,003. First case, July. Cases, 1,096; deaths, 487.

1844. Population, 86,632. First case in July; last case, September. Cases, 169; deaths, 83. Overflow from Lake Pontchartrain; city flooded to Burgundy Street.

1845. Population, 89,261. Deaths, 2.

1846. Population, 102,070. First case in August; last case in October. Deaths, 146. Faubourg Lafayette annexed to city, increasing population.

1847. Population, 108,699. First case, July 6; last case in December. Deaths, 2,506. War with Mexico. Melpemene Canal cleaned out. Heavy rains.

1848. Population, 115,503. First case, June 21; last case in November. Deaths, 808. Extensive excavations made for foundations of United States Custom-house. This work went on uninterruptedly until September, 1849. Two acres, 20 by 7 feet wide and 8 feet, 7 inches deep, were excavated.

1849. Population, 122,511. First case, July 28; last case, December —. Deaths, 769.

1850. Population, 129,747. First case in January, terminating fatally; 2 deaths in March, 1 in May, 4 in

July, 62 in August, 33 in September and 4 in October. Total deaths, 107.

1851. Population, 138,599. Deaths, 17. Excavations for railroads, gas and waterworks.

1852. Population, 147,441. First case, July; last case, December —. Deaths, 456. Claiborne Canal dug.

1853. Population, 151,132. Infected by ship *Camboden Castle*, from Kingston, Jamaica. First case, May 22; last case, December. Deaths, 7,849.

The epidemic of 1853 was the most mortal which has ever afflicted New Orleans.

1854. First case, May; last case, December; first death, June 12. Deaths, 2,425.

1855. First case, June 19; last case, December. Deaths, 2,670.

1856. Population, 153,421. Infected by Vera Cruz. First case, June 28; last case, November —. Deaths, 74.

1857. Population, 157,242. Infected by Havana via Mobile. First case, January; last case, December. Deaths, 200.

1858. Population, 161,633. Infected by St. Thomas, West Indies. First case, June 10; first death, June 10; last case, October 10. Deaths, 4,845.

1859. Population, 164,864. Infected by brig *Elizabeth Ellen*, from Havana. First case, June —. Deaths, 91.

1860. Population, 168,675. Deaths, 15.

1861. Population, 170,949. Civil War. No cases.

1862. Infected by Key West. Deaths, 2.

1863. Population, 175,497. Deaths, 2.

1864. Population, 177,708. Deaths, 6.

1865. Population, 180,943. Cases, 1; deaths, 1.

1866. Population, 182,318. First case, August 10. Deaths, 185.

1867. Population, 184,503. First case, June 10; last case, December 22. Deaths, 3,107.

The first case died in the Charity Hospital on June the 10th, a seaman who had been employed in the navigation of the Lake. Three weeks before his death he had shipped upon the bark *Bessie*, loading with staves in the Fourth

District, and bound for Barcelona. This vessel had sailed from Havana in March, arriving here in April laden with sugar. She was reported clean and healthy. Soon after arriving, went into dry dock in Algiers. Inquiries were made as to her after her sailing. She arrived at her destination without mishap as to the lives of her crew.

The second case reported was by Dr. Brickell, as having been taken on the 13th of June, on St. Charles Street near Julia. The man, John Boddis, recovered.

The third case, reported by Dr. Folwell, on Julia Street, between Camp and St. Charles Streets, died on the 23rd of June.

The fourth case died on the 26th of June. His name was J. B. Bonnonan. He arrived upon the steamer *W. G. Hercules*, from Galveston, on the 21st, whence he came from Indianola direct. He had a chill at Galveston on the 19th and died on the 26th.

The fifth case, J. Dougherty, reported by Dr. L. H. Cohen, died on the 29th of June in the Charity Hospital. He came from No. 61 Girod Street, and was employed on coal barges at Algiers.

The sixth case was Lieut. Dewey, who died at the St. Charles Hotel. He came by steamer direct from Indianola, and was brought from the vessel to the hotel sick.

The vessel coming to this port, clearly infected, was the bark *Florence Peters*, which sailed from Havana on the 3rd of June laden with sugar. She was stopped at the Quarantine Station, June the 12th, where she was detained ten days, although reported clean and healthy, was fumigated and released. She arrived at Algiers, June 22. The wife of the captain, Mrs. Hooper, died of yellow fever on the 30th. This case was reported by Dr. Bruns. Her sister also was attacked on the 25th, but recovered. The second mate (Thomas) was taken ill July 4, and died in the Charity Hospital on the 9th. The captain also died on the 13th.

The fever existed throughout July in the city, and until near the middle of August before acquiring epidemic proportions.

From the middle of August to the end of September, the mortality was considerable.

1868. Population, 186,068. First death, October 5. Deaths, 5.

1869. Deaths, 3.

1870. Infected by steamship *Agnes*, from Honduras. First case, May 16; last case, December. Deaths, 588.

1871. Infected by brig *Mary Pratt*, from Cuba. First case, August 4; last case, October. Deaths, 54.

1872. First case, August 28; last case, November 30. Deaths, 39.

1873. Infected by bark *Valparaiso*, from Havana. First case, July 4; last case, November 19; first death, July 8. Cases, 368; deaths, 226.

1874.

The outbreak of 1874 is interesting, from a point of high rate of mortality, considering the limited number of cases. There were altogether 20 cases, of which 17 died. The first two cases were discovered by the Board of Health on the same day (August 19) at No. 470 Victory Street, in the persons of two Irish boys, aged 6 and 9, who had only been in the city six months. Yellow fever had been quite severe in that block the year previous (1873). The little patients died. On August 25, the mother of the tots, aged 30, contracted the disease and died shortly afterward. The other cases occurred as follows:

- September 21—No. 102 Front Levee Street—Died.
- September 22—No. 459 Julia Street—Died.
- September 23—No. 147 Magnolia Street—Died.
- September 26—No. 10 Dumaine Street—Died.
- September 29—No. 619 Goodchildren Street—Died.
- October 4—No. 390 Magazine Street—Died.
- October 7—No. 169 Baronne Street—Recovered.
- October 8—No. 412 Magazine Street—Died.
- October ..—No. 102 Old Levee Street—Died.
- October ..—Unknown—Died.

October 15—No. 15 Rousseau Street—Died.

October 17—No. 95 Spain Street—Recovered.

October 21—No. 163 Orleans Street—Died.

October 22—No. 619 Goodchildren Street—Died.

November 1—Bark *Queenstown*—Recovered.

November 2—Bark *Queenstown*—Died.

November 28—Chartres Street—Died.

According to the records of the Board of Health (1874), the fourth case occurred in the same square where yellow fever had prevailed the year before. Cases 5, and 6 were infected at Pascagoula, Miss., and cases 18 and 19 were imported from Havana by the bark *Queenstown*.

1875. First case, August 8; first death, August 12; last case, November 28. Cases, 100; deaths, 61.

1876. Deaths, 41.

1877. The history of yellow fever for the year 1877, in New Orleans, is limited to a single case. A man arrived on the steamship *St. Louis*, from Havana, November 6, and died the next morning at the corner of Rousseau and Philip Streets, with unmistakable symptoms of yellow fever. He had sickened four days previously, within a few hours after leaving Havana, where he had stayed three weeks; but continued to go about the ship until after passing the quarantine, and in this way failed to attract the attention of the resident physician.

1878.

This is one of the most notable epidemics of yellow fever in the history of New Orleans, owing to the numerous places which were infected from this focus.

On May 22, 1878, the ship *Emily B. Souder* arrived at quarantine below New Orleans, having called at Havana during her trip. Upon her arrival, Dr. Carrington, the quarantine officer, after making an examination, telegraphed Dr. Choppin, President of the Louisiana Board of Health, as follows:

"The *Souder* has a case of intermittent on board. What shall I do?"

Dr. Choppin replied:

“Fumigate and disinfect the ship and satisfy yourself of the character of the disease before you let her come up.”

The sick man was placed in the quarantine hospital and finally recovered.

The *Souder* after five hours' detention, and disinfection with sulphur burned in pans, was permitted to go up to the city.*

Soon after arrival at her wharf, Mr. Clark the purser, was taken ill, and Dr. Drew, of Pilet Town, who had taken passage at that point, was called to treat the case. The physician did not consider this a case of yellow fever, as he signed the certificate of death, “Malarial fever.” An investigation of the case at the house where he died, however, showed that the treatment was more suitable to yellow fever than to any other disease. This death was not brought to the notice of the Board of Health by any direct communication, official or otherwise, but from information received through rumor. It is a significant fact in connection with Clark's case, that he died at 2 o'clock, a. m., and was buried at 10 a. m., the same day. No public announcement of his death was made until the following Sunday.

Mr. Elliott, the second engineer of the *Souder*, was taken sick shortly after his arrival, and was attended by a private physician at his boarding-house, corner of Front and Girod Streets, until the evening before his death, without apparently a suspicion on the part of any one that he had yellow fever. Late in the evening of May 29, he was removed to Hotel Dieu, where he died within a few hours. A careful *post mortem* examination was made by two competent physicians, and the body was subsequently inspected by Dr. Choppin. No one of these physicians doubted the nature of the disease.

For about two months after the above occurrences, no

* Detention of passengers in quarantine, for observation, abolished by Legislature of 1876 and reliance placed on disinfection alone.

new cases developed. If yellow fever existed, it was not reported to the Board of Health, or was of such a mild nature as not to be differentiated from the malarial fevers common in those days.

About the middle of July some cases of a strongly suspicious character came to light on Constance Street, near its intersection with Terpsichore, and in a few days all doubt was removed of their true nature. About the 7th of July, a young man, named Cohn, came to the Touro Infirmary from Gasquet Street, between Villere and Marais, presenting strong appearances of yellow fever, but he recovered before attention was drawn to Constance Street, and his case was considered questionable. Within a few days, cases were found near the corner of Front and Girod, where Elliott had sickened; on Bienville, near where Clark had died and on Claiborne Street; a case on Robertson Street, near the home of Cohn, who had been at the Touro Infirmary, not much more than a quarter of a mile from where Clark died, and a still less distance from Hotel Dieu, where Elliott died.

The line of infection was tolerably clear, though long latent, from Clark to Cohn and subsequently to the cases on Bienville and Robertson Streets; also from Elliott, sick at his boarding-house, to the subsequent outbreak at the corner of Front and Girod; but the outbreak on Constance Street was so far from the wharf of the *Souder* (fully half a mile), and so long after her arrival (more than six weeks), that it was long considered out of question to establish a connection between them.

Investigations made afterward by the Board of Health, showed that some of the earliest cases on Constance Street, 122, occurred in the family of a Mr. Caven, who was engineer on the tugboat *Charlie Wood*. This boat lay at the same wharf occupied by the *Souder*, immediately after the departure of the latter for Havana, as stated by Caven himself at the time of his illness.

On July 24, the following communication was sent:

NEW ORLEANS, July 24, 1878.

Dr. J. M. Woodworth, Surgeon-General,
Marine Hospital Service, Washington, D. C.

Sir—It now becomes my duty to report the existence of yellow fever in New Orleans. About the 12th inst., cases began to occur in the practice of several of our physicians near the intersection of Constance and Terpichore Streets, which presented suspicious symptoms, and we now reckon fourteen cases at that focus of infection, with six deaths. In addition to those, seven other cases have come to light at different points, and much more scattered, four of which have already resulted fatally.

Respectfully, your obedient servant,
SAMUEL CHOPPIN, M. D.,
President, Board of Health.

Early in August the fever began spreading rapidly through the city and vicinity, and throughout all of September and most of October, raged furiously, attracting by its terrible death roll, the attention of this and many foreign nations. From all quarters, physicians, nurses and supplies came, but not until late in November did the demon of pestilence finally make his exit from the unfortunate city.

This memorable epidemic may be briefly summarized as follows:

Population of New Orleans in 1878, 210,000. Infected by ship *Emily B. Souder*, from Havana. First case, May 22; first death, May 25; last case and death, December 12. Cases, 27,000; deaths, 4,046.

1879. First case, March 26, on board steamship *Baltimore*, recovery. No other manifestation until June, when the first case in the city proper occurred at No. 184 Third Street, and was reported by Dr. Edmond Scouhen. The first death took place on July 27, corner Second and Constance Streets. The epidemic lasted until October, last case on the 21st and last death on the 23rd. Cases, 48; deaths, 19.

1880. Deaths, 2.

1883. One death.

1889.

One fatal case, imported from Livingston, Guatemala, under the following circumstances:

Mr. E. DeVilla, United States consular agent for the United States of Colombia, had been at Guatemala City, and from there went overland to Livingston, Guatemala, where he took passage on the steamship *City of Dallas* for New Orleans, on the 26th of September. The second day out he was taken with a chill followed by fever, but did not keep to his berth after the chill. He continued to feel ill during the voyage, but before arrival of the vessel at the Mississippi quarantine, he dressed himself and went on deck, thus passing inspection by the quarantine officer. The master of the vessel made affidavit that there had been no one sick during the voyage. The vessel had a clean bill of health, and there being no report of yellow fever at Livingston, the vessel, after being disinfected, was allowed to proceed to New Orleans, where she arrived at 8 p. m., October 1.

The patient was seen by Dr. J. J. Castellanos, October 2, had had fever, nausea, hicough, pain in the region of the stomach, and bilious vomiting. When seen again at night he was vomiting black vomit, followed by black hemorrhagic stools. The next morning, black vomit still persisted and he had urinary suppression, hicough and uræmic convulsions.

Dr. Castellanos reported the case to the Board of Health office, and a commission of experts, composed of Drs. J. P. Davidson, C. J. Bickham and George Howe, was summoned and requested to see the case and pass upon it.

In the mean time the man had died (October 3, 11:35 a. m.), and at 2 p. m. the above named physicians, with Dr. Castellanos and Dr. R. Matas, who had been called in consultation, proceeded to the house, No. 149 Decatur Street, and after obtaining a history of the case and holding an autopsy, unanimously declared that death had been caused by yellow fever.

There were no developments from this case and the city continued to be free from epidemic disease during

the eight following years, and would undoubtedly have enjoyed a longer immunity but for infection from outside sources in 1897.

1897.

The first authentic case of yellow fever in New Orleans in 1897, was reported by Dr. Sidney L. Theard, on September 4th. The biennial report of the Louisiana State Board of Health for the years 1896-97, published in February, 1898, recounts that an earlier case had been reported as suspicious on September 1st, by a prominent physician of New Orleans (Dr. E. T. Shepard), which, on investigation by members of the Commission of Experts of the State Board of Health, had been declared not to be yellow fever. Of this, however, no one had any knowledge at the time except those immediately connected with the public health service. Dr. Shepard's case ended in recovery.

The case of fever in Dr. Theard's practice was reported by him to the Secretary of the State Board of Health, on Saturday, September 4, (1897), at 3 o'clock p. m.; the President of the Board having left that same evening for Ocean Springs, to again investigate the prevailing fever at that point, believed to be dengue.*

Dr. Theard, having been engaged in practice about six years only, had had no occasion to see yellow fever, the last epidemic of that disease having occurred in 1878, and only had a book-knowledge of the disease. For that reason two members of the Commission of Yellow Fever Experts were delegated to consult with him. The patient was seen that same evening at 8 p. m., and the case pronounced to be one of malarial hemorrhagic fever.

A prolonged search was made the next morning by Drs. Theard and Pothier, the latter a distinguished pathologist, for malarial organism in the patient's blood, but none found.

* Previous investigations of the fever at Ocean Springs by the State health officials of Mississippi, Alabama and Louisiana, had resulted in a diagnosis of dengue fever.

On Monday morning the patient (Raoul Gelpi) died, and Dr. Theard notified the secretary of the Board of Health, by phone, that he would be down in person at the Board of Health office to sign the death return, and would ascribe the death to yellow fever. On his arrival there, shortly afterward, he found a number of physicians in waiting, seeking news about Ocean Springs, among them one of the experts who had seen the case on behalf of the Board of Health, and who was still of so strong a mind that the case was malaria that he offered to sign the death certificate as such. This Dr. Theard would not accept, unshaken in his own diagnosis of yellow fever.

Happening to enter the office of the Board of Health about this time, Dr. F. W. Parham, upon being made familiar with the facts in the case and the wide divergence of views of the experts and medical attendant, suggested the advisability of an autopsy under the circumstances, so that nothing could be left to opinion or conjecture. Pending a *post mortem* investigation, a telegram was sent to the President of the Board of Health, advising him of the facts.

An autopsy held at 10 o'clock a. m., by Drs. Pothier, Tonatre, Salomon, H. S. Giliphant, Parham and Theard, confirmed, beyond question, the latter's diagnosis of yellow fever.

The announcement of yellow fever shocked the commercial spirit of the community. It was a rude awakening for New Orleans after nineteen years of uninterrupted prosperity and freedom from epidemic disease, and severe and bitter criticism was directed at Dr. Theard from many quarters in consequence.

The date of report of this case is important in that the patient hailed from Ocean Springs, then under investigation, and that trainloads of persons who returned from the Gulf Coast resorts on Sunday, September 5th, would not have been permitted to enter New Orleans, had Dr. Theard's opinion prevailed on Saturday, September 4.

Nineteen hundred and eight cases of fever were reported in 1897, with 298 deaths, the last case being reported on December 25.

1898.

One fatal case in January. No cases were reported until September 17, when a death from yellow fever created consternation in the community. Cases continued to occur until October 22, when frost put an end to the activities of the *Stegomyia*. Cases, 118; deaths, 57.

1899.

According to the Annual Report of the Louisiana State Board of Health for 1898-99 (p. 46), the first case of yellow fever was reported on May 28, in the person of a young, white girl, residing at 1217 Royal Street, Second District.

On August 28, a second case was reported at 4520 Camp Street, in the Sixth District, fully three miles distant from the original case.

A third case was reported September 1, and a fourth on the 7th. Sporadic cases continued to erupt up to November 15, on which day the last case was reported.

The most searching inquiry failed to reveal the source of the primary infection. Cases, 81; deaths, 23.

1905.

The epidemic of 1905 is memorable in many ways, but what has stamped it indelibly in the minds of the great thinking public of the entire civilized world, is the grand victory which science, with the modern weapon intelligently wielded, has achieved against a disease which is foreign to this country and which, we sincerely hope, has been forever ostracised from our shores.

A detailed account of the operations of the United States Marine Hospital Service, ably guided by our local physicians, will be found in another part of this volume (Part IV). For the benefit of the layman and the busy practitioner, the following summary has been made by Mr. James M. Augustin, of the staff of the *New Orleans Picayune*:

When it became known to the public on July 21st, 1905, that there was yellow fever in New Orleans, an investigation by the health authorities brought out an estimate of one hundred cases and twenty deaths, up to that date. This supposition was borne out by the vital statistics for the month of July, in which the death-rate was abnormally large, the mortality from typhoid fever having been over twenty in excess of the normal; and it was on this record that Dr. Kohnke, the Health Officer of the City, based his estimate of twenty deaths from yellow fever, prior to July 21st. After that date, the number of cases and the death rate ran on even lines, possibly a little in excess of the same rates for the corresponding period of 1878, until the highest record was reached on August 12th, when 105 cases were reported, and many citizens believed that the disease was beyond control.

The work of eradication was begun by Dr. Kohnke in a small way, with such means as he had at his disposal, and when on July 26th, Dr. J. H. White, of the United States Public Health and Marine Hospital Service offered him such assistance as he could render, the offer was accepted. Passed Assistant Surgeon Richardson was detailed to help in the organization of the work in the infected quarter, bounded by St. Ann, Rampart, Barracks Streets and the Mississippi River; and a few days later on the arrival of Passed Assistant Surgeon Berry, he also was assigned to the same duty. About this time it became evident that the infection was widespread, not only in New Orleans, but in other part of Louisiana and Mississippi; and the State and City Boards of Health, realizing the tremendous task which confronted them, asked in conjunction with the business organizations, the aid of the National Government by sending a telegram to the President. This met with the prompt acquiescence of the President, and after an exchange of telegrams between the Citizens' Committee and the Surgeon General to whom the matter had been referred, it was arranged that the United States Public Health and Marine Hospital Service provide the number of officers estimated, by Dr.

White, to be necessary for the work, and that the City authorities and the citizens should meet the remainder of the expense. The work to be done under Dr. White's direction, with an absolutely free hand, no conditions whatever being imposed upon him.

While the task to be undertaken—the eradication of yellow fever after it had already had a start with 616 cases and a large number of foci—was the most stupendous of its kind ever attempted, the opportunity given by the people of New Orleans, the facilities extended, and the absolute non-interference on the part of politicians, constituted, altogether, a most remarkable exhibition of public spiritedness and presented a magnificent opportunity to do good work. Dr. White and his staff of forty surgeons took charge on the 8th of August, and formed an organization in each ward on the 9th. To the ward organizations, Dr. White transferred, from day to day, detachments of men from the original central office, which had been working under the City Board of Health as one unit for the whole City. This was done because Dr. White believed that the work to be done was too vast to be satisfactorily accomplished from a central office, and that it would be preferable to have a number of headquarters corresponding to the ward sub-divisions by wards. In order to guard against breakdown, the system of transferring, gradually, from the central office to the sub-stations, in each ward, was adopted, for the disinfecting, screening and oiling gangs, and this continued with the addition of new material to the ward headquarters until the central force was entirely eliminated and the work finally rested in the hands of the ward commanders. In addition, a force was maintained in the district originally infected, doing daily house to house inspection and disinfection, sometimes of whole blocks, until about the middle of September when the originally infected district became justly known as the "disinfected district," and from a sanitary standpoint, one of the cleanest places in the City.

As an illustration of the character of the work that was done, let it be supposed that a physician reports a

case of either yellow fever or of suspicious fever, to the central office or to the ward in which the case is located. The screening wagon immediately goes to the case. If the patient is not too ill to be removed, a room is screened and all the mosquitoes therein are killed by sulphur fumigation (two pounds of sulphur to one thousand cubic feet of air space). Then the screened room is properly ventilated to eliminate the last trace of the sulphur fumes and the sick person is moved into that room. The other rooms are similarly treated. If the patient is too ill to be removed from one room to the other, the preliminary fumigation is omitted; but as soon as possible without detriment to the sufferer, a thorough killing of mosquitoes is undertaken. The ward commander keeps in constant touch with the attending physicians. If the houses on either side are very close to the infected premises, they, too, are fumigated. Preliminary to the final disinfection, all cracks in doors and windows are sealed, as also the orifice of the fire-place. The workers are cautioned to make as little noise as possible, because the patient must not be disturbed, and the mosquitoes must not be frightened so as to seek safety in flight. Therefore, all pasting is done first, then all furniture, or any article or ornament liable to damage from sulphur fumes are removed, and then the sulphur pots are lit, and the door immediately closed.

If the occurrence of a group of cases in close proximity to one another indicated the existence of a new focus of infection, the fumigation was applied to whole blocks and this method effectually arrested the spread of the disease.

The State, the City and the citizens contributed more than \$310,000 to help in the work of stamping out yellow fever, and of that amount, at least four-fifths was subject to Dr. White's order. The State's appropriation was \$100,000, the City's \$60,000, and the citizens' contribution \$160,000. No outside aid was accepted, and several offers for assistance were declined with gratitude. Besides the above amounts, there was raised considerable

money by the volunteer ward organizations, who spent \$30,000 for screening of cistern, and oiling them, and in inspections for sanitary purposes. The fight against infection was extended to every parish in Louisiana, wherever the fever appeared, and some of the expenses were borne by local appropriations.

July 21st, an address was issued to the citizens of New Orleans, signed by Dr. Quitman Kohnke, health officer, and Dr. J. H. White, Surgeon U. S. P. H. & M. H. Service, and endorsed by the advisory committee of the Orleans Parish Medical Society, calling attention to the emergency existing in the city, and asking the help of every individual for the limiting and preventing of the spread of the disease. It having been scientifically proved that the mosquito is the only means of transmission of yellow fever, it is especially urged that the following simple directions be followed by the householders of the city, for the summer months:

1st. Empty all unused receptacles of water. Allow no stagnant water on the premises.

2nd. Screen cistern after placing a small quantity of insurance oil (a teacupful in each cistern), on the surface of the water.

3rd. Place a small quantity of insurance oil in cess-pool or privy vault.

4th. Sleep under mosquito nets.

5th. Screen doors and windows whenever possible, with fine screen wire.

July 26th an emergency hospital on Dumaine Street was opened in charge of Dr. Hamilton P. Jones and a staff of yellow fever experts. It had a capacity to accommodate eighty patients.

Rev. Paroli, a Catholic priest of Italian nationality, and immune, was installed as chaplain, and also for the purpose of visiting the sick Italians and inducing them to consent to removal to more hygienic surroundings. The chief men in the Italian colony aided greatly in this work of education among their countrymen, and also got

up a subscription which amounted to five thousand dollars to be used in relief work.

Besides his work of stamping out the fever by practical means, Dr. White disseminated good advice. He suggested: First. That the ward organizations be made permanent, and the work that is being done should continue.

Secondly. That throughout the entire City there should be a "mosquito-killing day," once a week. On that day, the entire population should make an effort to kill just as many mosquitoes as possible, by fumigating their houses with sulphur.

Thirdly. That all gutters be thoroughly flushed once a week.

Fourthly. That inspections of cisterns be made, in each ward, every week, to find out if they have been properly screened.

Fifthly. That all suspicious cases be reported at once to the central office.

Dr. White was solicitous in impressing the citizens with the absolute necessity of conforming to the rules and regulations based on the new doctrine of transmission of yellow fever by the mosquito, and with the assurance that the house quarantines of previous epidemics would not be resorted to. He also enlisted the co-operation of physicians by sending the following letter to every doctor in the city: "Considering the imperative necessity of instituting, at the earliest possible moment, prophylactic measures in the case of any person suffering of a fever which may, subsequently, be shown to be yellow fever, you are urgently requested to report to this office not only any case of fever which you may be sure is yellow fever, but also any case you may be unable, even at your first visit, to say is not yellow fever. We enclose you cards which will facilitate your report of such cases, and will, at the same time, give us your authorization to inspect the said premises and do whatever may be necessary to prevent the extension of the infection in the house or neighborhood. We desire simply to get the co-operation of the entire profession of this city in the checking of the multipli-

cation of new foci of infection, and the early destruction of those already existing.”

Dr. White made a persistent, systematic and scientific fight against yellow fever, and its agent of transmission—the mosquito—and won. From August 12th until frost occurred on December 5, there was a constant and steady decline in the number of cases, daily. The greatest number of cases was from August 12th to 16th, when for those five days the number was 338. The record for the last five days ending October 10th was 108.

The official record of deaths for these periods in 1878 and 1905 was:

	Aug. 16,		Oct. 10,	
	1878.	1905.	1878.	1905.
	27	4	54	4
	31	4	48	1
	22	6	41	0
	14	12	48	3
	20	12	39	4
	—	—	—	—
	114	38	230	12

There had been no frost, and yet the figures were dropping, not as rapidly as could be wished, but with a gratifying certainty, towards the vanishing point. And this, when the city of New Orleans had not quarantined against any infected point to any greater extent than to put on an observation of persons arriving from these points; and when many infected persons came here and were taken sick. It is highly probable that at least ten per cent. of cases were of people coming from infected localities.

Dr. White commended the idea and helped the people in carrying it out, of cleaning gutters, screening and oiling cisterns, cleaning up back yards, emptying vaults, draining low lands, &c., not because this sanitary work would tend to eliminate yellow fever *per se*, but because it served the purpose of destroying the mosquito family. The fight made on the mosquito was productive of notable results. In spite of the general ignorance of the principles of the mosquito doctrine of yellow fever infection,

and the amount of prejudice against the acceptance of a new theory, modern thought prevailed, and while prejudice paid its price in lives and suffering, that price was not nearly as great as would have been if the men of science had failed in their duty.

The epidemic, it was generally conceded, had its origin in infection brought into New Orleans during the latter part of May, 1905. The epidemic of 1878, also began in May. That of 1878 pursued its death-dealing course, unchecked, until the frost came. The death roll amounted to 4000 persons in the City of New Orleans alone. The visitation of 1905 had a larger non-immune population to feed upon, and double the number of inhabitants. It was discovered about the same time, in the middle of July, and side by side, the figures will show that if it had been allowed to continue its course, the record of 1878 would have been surpassed. As a matter of fact that record was surpassed in the total number of deaths up to August 10th. But that date was the turning point in the fight. The campaign started by Health Officer Kohnke, in July, and taken up by the Marine Hospital Service on August 8th, and enlarged and extended so to better meet the conditions, began to tell and, thenceforth, the followers of the new doctrine knew they had won. The City of New Orleans and the whole South were fortunate in the selection of the man who led them out of darkness, and showed them that yellow fever was no more the bugbear and terror of bygone days.

It is confidently predicted that yellow fever will never again be able to commit such ravages in New Orleans. The acceptance of the modern doctrine is universal since the complete demonstration in this City, by the stamping out of the fever before frost, something never heard of before, when it had gained such a foothold as it had, in 1905. The fight is now against the source of infection, which is Latin America.

How Was Yellow Fever Introduced in New Orleans in 1905?

From the report of Dr. Souchon, President of the Louisiana State Board of Health to Governor Blanchard, on

the 3rd of December, 1905, the following synopsis is had:

"The first knowledge of cases suspicious of fever reached President Souchon on Wednesday, July 12th, at 3:45 P. M., when two physicians called at the office and informed him that they each had a case presenting symptoms suspicious of yellow fever; one a woman who had died that day at 1039 Decatur Street, the other, a boy, son of a man who kept a grocery two doors from the home of the woman, and who lived at 2520 Bayou Road Street. The boy was expected to die at any moment, and died about the time of the interview. The two physicians stated that these two cases lacked one of the most important symptoms of yellow fever: want of correlation between the pulse and temperature, and that they had not called to report these cases as yellow fever, but to mention them as suspicious and confer with the health authorities about them.

On Thursday, July 13th, one of these same physicians told President Souchon that he thought he would have two more suspicious cases to report the next day. These cases were reported on the following day, at 1107 Decatur Street, suspicious of yellow fever, which he decided to see, himself, and he did so. Dr. Souchon's opinion was that these cases presented some symptoms of yellow fever. These four cases, each presenting some suspicious symptoms, had been reported direct to President Souchon by two physicians, but not one of the attending physicians was willing to shoulder the responsibility of pronouncing them, positively, yellow fever.

On Monday, July 17th, a physician notified President Souchon that there were two cases of yellow fever in the Hotel Dieu, and the president went to the Hotel Dieu, and saw two cases presenting symptoms of yellow fever.

The next day the State Board of Health, after hearing the report of Dr. Souchon, instructed him by resolution to write to Dr. Wymam, Dr. Tabor, of Texas; Dr. Hunter, of Mississippi, and Dr. Sanders, of Alabama, that there were cases, here, presenting symptoms of yellow fever.

After the arrival of health officers from other Southern States, an autopsy was held at the Charity Hospital, the

findings of which were indisputably yellow fever. This was wired to Dr. Wymam, and other health officers by President Souchon, and it was also made public.

In his report, Dr. Souchon asks "How yellow fever entered the State?"

He replies, "This the Board frankly admits, it does not know." Several hypotheses can be adduced, however.

It is probable that yellow fever existed in Belize and Puerto Cortez for several weeks before it was reported here, and that a case from Belize or Cortez, in period of incubation, was introduced here before the Marine Hospital advised the Board, on May 24th, that yellow fever existed in those places. In the light of subsequent events it is now a well-established belief, that yellow fever had existed here for quite a while before it was brought to the surface. It is said that a case died in the Charity Hospital on May 31st, presenting symptoms of yellow fever, but the house surgeon said it was not yellow fever, and one physician who had a large Italian practice, told President Souchon that the first two cases he knew presenting suspicious symptoms, were seen by him, accidentally, on July 1st, but that he had seen none before. Both died.

Report of Dr. Q. Kohnke, City Health Officer.

The report of Dr. Kohnke agrees, in the main with that of Dr. Souchon as to the date of discovery of the first case of yellow fever, and it goes on to give details of the preventive and precautionary measures taken; and speaks of the assistance given by the citizens, and the aid promptly rendered by the Italian Citizens' Committee; also the systematic fumigation, disinfection and other hygienic measures prosecuted. Dr. Kohnke speaks in high terms of the excellent work done by Dr. J. H. White, of the U. S. Public Health and Marine Hospital Service. He says:

"The splendid work of the corps headed by Dr. White cannot be too highly valued; the results obtained should not, however, be attributed to this cause alone; for, the volunteer ward organizations and the combined influ-

ences, organized and individual, of men and women, distinguished visitors and residents, all contributed importantly, to the successful issue of the first extensive campaign against yellow fever in a large American city."

With reference to the preventive measures by the campaign against the mosquito, Dr. Kohnke says:

"A comparison of the present visitation with that of 1878, and consideration of the fact that the infection, appearing on a given date, is modified by the preventive measures applied about fifteen days previously, shows the continuous effect of mosquito destruction instituted with our first knowledge of the possible presence of infection. The period of fifteen days after August 10 th, in 1878, was marked by an increase in number of cases reported daily to an average of 104 cases, while in 1905, the daily average for the same period, was sixty-one cases. The deaths (daily average), were, in 1878, thirty-two, while in 1905, the daily average was seven. In 1878 the fever increased markedly, toward September. In 1905 it decreased. The highest point reached was on September 12, when more than one hundred cases were reported.

After that date the cases dwindled down and ere many days the victory was won.

Report of Dr. Thomas, Quarantine Physician.

Under date of October 30th, 1905, Governor Blanchard made a request on Dr. John N. Thomas, State Quarantine Physician at the Mississippi Quarantine Station for a full and complete report of his administration of the Quarantine Station, insofar as the same is, or is not, responsible for the introduction of yellow fever into New Orleans.

The Governor presented five subjects to guide Dr. Thomas in the preparation of the report, viz.:

1st. Description of official duties.

2nd. Powers and duties of the State Board of Health in connection with the Quarantine Station.

3rd. Quarantine regulations, and by whom prescribed; also, detailed methods of enforcement, and names of subordinates.

4th. Details of the arrivals of ships with fever, aboard; what was done about them; what bills of health they carried; and, if fumigated at port of departure.

5th. Were there any modifications of quarantine regulations?

The substance of Dr. Thomas' report was that the laws and regulations were fully enforced; that he did not know how the fever got into New Orleans, but, if the infection came through infected mosquitoes, it came from Colon or from Havana; if through an infected individual, from Havana, most likely, or possibly from one of the ports within the five days' limit. He believed the period of detention should not be less than six days. He presented a great deal of evidence to show that Havana was infected, and he considered the Island of Cuba a constant menace.

Dr. Thomas submitted the following list of vessels which arrived at Quarantine with fever on board:

July 8. *Saphir*, from Colon, 1.

July 9. *Royal Exchange*, from Colon, via Mobile, 1.

July 31. *Teran*, from Vera Cruz, 1.

August 8. *Porto Rico*, from Vera Cruz, 1.

August 12. *Saphir*, from Colon, 3.

August 24. *Origen*, from Colon, 4.

September 8. *Ereclsior*, from Havana, 1.

October 27. *City of Tampico*, from Vera Cruz, 1.

October 27. *St. Croix*, from Vera Cruz, 1.

Total cases imported, 14.

All of these vessels, except the *Ereclsior*, and the *Porto Rico*, had been fumigated at the port of departure, and the disease broke out, on all of them, within five days after fumigation.

Dr. Thomas said "I believe that yellow fever is usually, if not always imported through an infected individual, with the disease incubating in his system, who passes through one of the many quarantine stations, and gets into the country before the initial attack of fever. Since it is known, however, beyond doubt, that the mosquito is the conveyor of the disease, I believe that, under favorable conditions, mosquitoes can be imported from infected ports, and be the means of conveying and spreading the

disease in the country. If this were not a possibility, what is the use of fumigating vessels, for we fumigate now, to kill mosquitoes only?

“We were infected this year through one of these sources; I am unable to say which, for I do not know. If however, it was through imported infected mosquitoes, I would say that we got our infection from Colon, or from Havana. If through an infected individual, from Havana, most likely—possibly from a port within the five days’ limit, and the case developed after five days.”

NEWTON.

1905. One case; recovery.

OLIVIA.

1905. Cases, 6; deaths, 1.

OMEGA AND RALEIGH LANDINGS.

1878. Deaths, 5.

OPELOUSAS.

1826. Infected by New Orleans. Cases, 3; deaths, 1.

1828. Infected by New Orleans. Cases, 4; deaths, 3.

1829. No record of cases and deaths.

1837. First case, October 20; last case in November.

1839. First case in August; last case in November.

1842; 1853; 1867. No record of cases and deaths.

OSTRICA.

1905. First case, July 26. Cases, 1; deaths, 0.

PAINCOURTVILLE.

1878. Population, 400. First case, August 14; last case, October 26. Cases, 181; deaths, 15.

PATTERSON.

1853. Infected by New Orleans. First case, August 13; last case in December. No statistics.

1854; 1855; 1857. First case, September. No statistics.

1863. First case, August 8; first death, August 13; last case and last death in December. Cases, 500; deaths, 45.

1878. The first case, Mrs. Dr. L. W. Tarleton, contracted the disease at Logonda Plantation, where the disease is supposed to have been brought from New Orleans, September 2. She died soon after. The disease spread rapidly and was very malignant. Cases, 125; deaths, 28, of which 5 were colored. Cases near town, white and colored, 175; deaths outside town, whites, 40; colored, 25. Date of last death, November 23.

1879. First case, November 26; last case, December 6. Cases, 2; deaths, 0.

PHARR PLANTATION.

1879. Infected by Berwick. First case, November 10; last case, December 2. Cases, 6; deaths, 5.

PILOT TOWN.

1878. Infected by Port Eads. First case, August 18; last case, October 16; first death, August 22. Cases, 113; deaths, 17.

PATTERSON.

1897. Cases, 1; no deaths.

1905. First case, July 31. Cases, 700; deaths, 52.

PECAN GROVE.

1878. Deaths, 2.

1905. First case, August 18. Cases, 20; deaths, 5.

PLAQUEMINE.

1837; 1839; 1847. No record of cases and deaths.

1853. First case, August 20; first death, August 26; last case, December 15; last death, December 9.

1858. No record of cases and deaths.

1878. Population, 1,500. Infected by New Orleans. First case, August 1. Cases, 1,159; deaths, 125.

1898. First case, October 15; last case, October 15. Cases, 6; deaths, 1.

POINTE MICHEL.

1880. Sporadic cases.

POINT PLEASANT.

1878. Fever appeared in August. There were about 60 cases and 13 deaths.

PLATTENVILLE.

1905. Cases, 1; deaths, 0.

POINTE-A-LA-HACHE.

1854. First case, October.

1878. Cases, 4; deaths, 4.

1905. First case, October 2. Cases, 1; deaths, 0.

POINT CELESTE.

1905. First case, July 30. Cases, 32; deaths, 6.

PONCHATOULA.

1878. Infected by New Orleans. First case, October 6; first death, October 10. Cases, 12; deaths, 3.

PORT BARRE.

1870. No record of cases and deaths.

PORT BARROW.

1878. Deaths, 7.
 1905. First case, July 24. Cases, 73, deaths, 10.

PORT EADS.

1878. August 5, one case of yellow fever appeared, and August 11, fourteen cases. Dr. Warren Stone, with two nurses, Mrs. Dupree and Mrs. Eastman, came from New Orleans to attend them. He telegraphed back, "fever increasing." The first fatal case was Mrs. Capt. Moran. The cases occurred rapidly. Many workmen went away, and work on the jetties was suspended. Total cases, 62; total deaths, 14. Date of last death, October 11.

PORT HUDSON.

1839. Infected by New Orleans.
 1841. No record of cases and deaths.
 1843. No record of cases and deaths.
 1878. First case, September 9; first death, September 13. Cases, 100; deaths, 11.

PUGH PLACE.

1879. First case, October 2. Cases, 33; deaths, 0.

PROSPECT PLANTATION.

1905. Cases, 8; deaths, 1.

RALEIGH LANDING.

1878. No record of cases and deaths.
 1905. One case, August 6.

REBECCA PLANTATION.

1905. First case, September 10. Cases, 20; deaths, 1.

RED RIVER LANDING.

1878. No record of cases and deaths.

RESERVE PLANTATION.

1905. First case, August 14. Cases, 14; deaths, 2.

RICHOC.

1878. Cases, 62; deaths, 18.

RIVERSIDE PLANTATION.

1905. First case, July 23. Cases, 218; deaths, 10.

ROSEDALE.

1905. First case, September 5. Cases, 5; deaths, 1.

SARPY.

1905. First case, August 19. Cases, 13; deaths, 2.

SHELBURN.

1905. Cases, 15; deaths, 1.

SHREVEPORT.

1853. No record of cases and deaths.

1873. Population, 9,000. Infected by New Orleans. First case, August 12; first death, August 19; last case, November 10. Cases, 3,000; deaths, 759.

1905. Cases, 3; deaths, 1.

SHREWSBURY.

1905. First case, August 15. Cases, 6; deaths, 2.

SMITHLAND.

1878. A plantation in Point Coupee Parish, La. The only fatal case reported is that of Dr. W. D. Smith, who died September 25.

SMITHVILLE.

1905. First case, September 6. Cases, 1; deaths, 0.

SMOKE BEND.

1905. First case, August 28. Cases, 3; deaths, 1.

SOUTHDOWN.

1905. First case, October 19. Cases, 1; deaths, 1.

SOUTH PASS.

1878. Cases, 42; deaths, 2.

SOUTHWEST PASS.

1878. Cases, 26; deaths, 8.

STEVENSON.

1878. Two fatal cases.

ST. BERNARD.

1878. Infected by New Orleans. First case, August 25; first death, August 29. Cases, 19; deaths, 7.

1905. First case, July 20. Cases, 54; deaths, 2.

ST. CLARE.

1905. Cases, 1; deaths, 0.

ST. ELIZABETH.

1905. First case, July 13. Cases, 21; deaths, 8.

ST. FRANCISVILLE.

1811; 1817; 1819; 1823; 1827; 1828. No record of cases and deaths.

1829. First case, September 22.

1839. First case, August 28.

1843. First case, August 28.

1846. Deaths, 1.

1848. Deaths, 1.

1853. No record of cases and deaths.

ST. GABRIEL.

1878. Population, 425. Cases, 132; deaths, 38.

1905. Cases, 2; deaths, 0.

ST. JAMES.

1878. Cases, 36; deaths, 4.

1898. First case, October 1; last case, October 1. Cases, 1; deaths, 0.

ST. JOSEPH.

1905. First case, September 18. Cases, 3; deaths, 0.

ST MARTINVILLE.

1839. No record of cases and deaths.

ST. ROSE.

1905. First case, August 22. Cases, 61; deaths, 6.

STORY'S.

1905. Cases, 2; deaths, 0.

SUNRISE.

1905. First case, July 30. Cases, 1; deaths, 0.

TALLULAH.

1878. Cases, 33; deaths, 4.

1905. First case, about August 8. Cases, 1,040; deaths, 23.

TANGIPAHOA.

1878. Population, 200. Infected by New Orleans. First case, September 1. Cases, 150; deaths, 50.

TECHE COUNTRY.

1878. Population, 1,033. First case, September 10; first death, September 13. Cases, 715; deaths, 81.

TERRE-AUX-BOEUF.

1905. First case, September 9. Cases, 1; deaths, 0.

THIBODAUX.

1839. Sporadic cases.

1846. First case, September 20; last case, October 15; last death, October 14.

1853. Deaths, 100.

1854. First case, September 12; last case, October.

1878. Population, 2,800. First case, July 30; first death, August 28. Cases, 750; deaths, 65.

1879. First case, October 15; last case, October 15. Cases, 1; deaths, 0.

1905. Cases, 1; deaths, 1.

TOCA.

1905. First case, September 8. Cases, 10; deaths, 0.

TRENTON.

1853. Population, 145. Infected by New Orleans. First case, August 1; first death, August 6. Cases, 52; deaths, 28.

UNION PLANTATION.

1905. First case, October 13. Cases, 1; deaths, 0.

UPPER TEXAS.

1879. First case, October 6; last case, October 6.
Cases, 2; deaths, 0.

VACCARO.

1905. First case, July 26. Cases, 2; deaths, 0.

VACHERIE.

1878. No record of cases and deaths.

VARNER.

1898. Cases, 1; deaths, 0.

VERRET.

1905. First case, September 4. Cases, 2; deaths, 0.

VIDALIA.

1853. Population, 60. Infected by Natchez, Miss.
First case, August 20; first death, August 25. Deaths, 16.

VILLE PLATTE.

1870. No record of cases and deaths.

VIVIAN.

1879. Cases, 4; deaths, 0.

WAGGAMAN.

1905. First case, July 16. Cases, 60; deaths, 5.

WASHINGTON.

1837. No record of cases and deaths.
 1852. Infected by New Orleans. First case, September 14; first death, September 16.
 1853. First case, August 15.
 1854; 1867. No record of cases and deaths.

WATERLOO.

1839. Infected by New Orleans.

WATERPROOF.

1905. First case, September 23. Cases, 1; deaths, 0.

WEEK'S ISLAND.

1879. No record of cases and deaths.

WESTWEGO.

1905. First case, July 25. Cases, 2; deaths, 2.

WILSON.

1898. First case, September 26; last case, October 15. Cases, 303; deaths, 7.

WOODLAWN.

1905. First case, July 30. Cases, 16; deaths, 2.
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MAINE.

EASTPORT.

1902.

For the first and only time in its history, yellow fever was brought to the doors of Eastport in 1902. The British bark *Birnam Wood* from Rio de Janeiro, June 19, in ballast for St. John, New Brunswick, anchored in Little Machias Bay, Sunday night, August 3, flying signals of distress. Dr. Shaw, of Machias boarded the vessel and found that the bark had yellow fever on board; three of the crew having died and the captain and cabin boy being down with the fever. After fumigating the vessel, she was towed to St. John, New Brunswick, and arrived at quarantine outside Partridge Island, on August 5.

There was no diffusion of the disease ashore.

PORTLAND.

1801.

On August 19, 1801, the ship *Occan* arrived at Portland from Havana via New York, where she had performed quarantine twenty days. The vessel had lost several of her crew from yellow fever during the voyage, and had left some sick at the hospital on Staten Island.

A merchant of Portland and his clerk who visited the ship on business, were attacked shortly afterward (August 24) with a disease which proved to be yellow fever. Both recovered.

The merchant's son, a lad of 12, who had accompanied his father on board the ship, next took the disease (August 25) and died on the 31st.

Two of the merchant's laborers were also attacked and died on the fifth day after the onset.

The next cases occurred in the persons of two young men, from a remote and healthy part of the State, who

went on board the *Ocean* soon after their arrival at Portland, and assisted in removing sundry articles from the ship's hold. Four days after, they were both attacked with yellow fever, but eventually recovered.

The disease did not spread to the other inhabitants of Portland, but was confined solely to persons who communicated with the vessel, which proves that the infected mosquitoes did not migrate to the shore.

Total case, 7; deaths, 3.

In addition to the above cases, it is worthy of note that the captain of a packet, who took goods out of the *Ocean* and carried them to Boston, was seized with yellow fever on his arrival at the Massachusetts town and died. One of his crew, who had assisted him in removing the cargo, also sickened and died. "His skin," says the old chronicler, "was of a deep yellow color."

1839.

In 1839, it is again "a ship from Havana," which brings yellow fever to the City of Portland. There were only a few cases, confined to the ship's crew. The inhabitants of Portland were not affected.

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MARYLAND.

BALTIMORE.

According to Carroll (*Old Maryland*, 1906, Vol. 2, p. 17), yellow fever must have been introduced a great many times in Baltimore, yet the only important epidemic outbreaks of the disease took place in 1794, 1797, 1800 and 1819. It is notable that all the outbreaks began at Locust Point or about the docks and wharves, and they can be traced directly or indirectly to the shipping. The relative high ground upon which the city is built and the distance at the time of the city proper from the wharves and shipping, explain why the inter-urban residents suffered but little, while those living upon the poorly-drained, low-lying districts near the river, were compelled upon such occasions to flee for safety.

SUMMARY OF EPIDEMICS.

1783; 1789.

Berenger-Feraud (*Fievre Jaune, etc.*, 1890, pp. 57 and 58), says that yellow fever prevailed for the first time in Baltimore in 1783, and reappeared in 1789, but gives no details.

1794.

The epidemic of 1794 is the first of which any authentic information is available.

According to Carroll (*loc. cit.*, p. 18) who quotes Drysdale as his authority (see Bibliography at the end of this article), the yellow fever epidemic of 1794 first made its appearance at two points, remote from each other, viz.: at Bowley's Wharf, in the town, and at Fell's Point. Many cases occurred throughout the town, but these originated either from communication with Bowley's Wharf or the Point, and the infection could be distinctly traced to one of those two places. Being puzzled to ex-

plain why the infection was confined to those two places, Dr. Drysdale found that the first cases on the Point were confined to houses whose cellars were filled with stagnant, putrid water, and he also found black, putrid and offensive water beneath the stores in which the sick resided at Bowley's Wharf. Almost all of these who were first affected were new-comers. Dr. Drysdale describes the Point as being low and flat; its streets generally not paved, its alleys filthy and the ground marshy in many places. The frequent warm rains kept the noxious places constantly moist under a hot sun.

Dr. Carroll observes that we can easily recognize these as conditions favorable to the multiplication of mosquitoes, and the domestic habits of the *Stegomyia* mosquito would tend to keep the infection rather closely confined to these localities.

Dr. Drysdale further makes the significant statement that remittents were present from a very early period. It is more than probable that many of these remittents were true yellow fever, because under the belief then prevailing, that these were simply the prevailing types of summer fever, they would not be reported. It is also probable that if occasional cases were known to have been yellow fever, some physicians would have concealed them, from the same motives that prevail to-day.

Dr. Drysdale saw the first case just before death, on the 7th of August at Bowley's Wharf, in the town, and on the 14th, 20th, 22nd and 23rd of the same month, he saw five additional cases at the same part of the wharf. There were also at the same place some other cases which did not come under his care. Dr. Drysdale states that there was considerable sickness at Fell's Point after the death of his first case, and many deaths had occurred suddenly or after a short indisposition. An investigation was made by three of the most respectable physicians who reported that the prevailing fever was the common endemic of the season, which visited the Southern and Middle States annually, viz.: the bilious remittent fever. The number of cases now rapidly increased so that by September 25th,

about seven weeks, five physicians were attacked and two of them died. The cases had become so numerous that Dr. Coulter visited and prescribed for more than 120 persons daily. By the end of the month many families had sought refuge in the country. During this time the city remained unusually healthy, and although some persons infected at the Point, died in the city proper, the disease failed to spread in that locality.

The infection is said to have been disseminated by the ship *Triumph*, which arrived at Fell's Point about the last of June, 1794, with almost all her crew indisposed, having previously been moored along side a schooner whose captain had died from yellow fever during the voyage from the West Indies.

The total number of deaths ascribed to yellow fever during this epidemic was 360.

The following quotation from Dr. Drysdale's work is of significant interest at this time of the known propagation of yellow fever by the *Stegomyia Calopus* race of mosquitoes:

"Locusts were not more numerous in the reign of Pharaoh, than *mosquitoes through the last few months*; yet these insects were very rare only a few years past, when a far greater portion of Baltimore was a marsh."

The fact that the mosquitoes were not widely diffused through the city, evidently saved Baltimore from a more disastrous epidemic.

1795.

Mild outbreak; no statistics.

1797.

First cases were observed in August; last, in November. Previous to September 17, the fever was confined to certain places and to "such as had breathed the air evolved from them;" on that day, a strong southeast wind "wafted the effluvia in a southwest direction, and diffused the infection among the inhabitants in the upper parts of Frederick, Gay and Calvert Streets, who became im-

mediately implicated in the horrors of yellow fever." (*Carroll, loc. cit., p. 21*).

The outbreak was limited and the mortality small.

1798.

Sporadic cases; developments unimportant.

1800.

Carroll (*Old Maryland, 1906, vol. 2, p. 21*) is authority for the statement that the epidemic of 1800 was the severest Baltimore has ever experienced. The mortality from yellow fever is recorded to have been 1,197, or about one in fifty of the population of 60,000. Again the disease began at Fell's Point, on the borders of the Cove, which extended from Jones' Falls to the interior. The Faculty of Medicine of Baltimore, after investigation, reported to the Mayor that in their belief the disease was not imported but originated in the Cove from the stagnation and putrefaction of filth, under a summer's sun. Of course, at this enlightened age, we know this theory to be wrong and the natural tendency is to incriminate our old friend, "a ship from the West Indies."

The first two cases appeared on the 2nd of May, another on the 8th of June, one on the 9th, 10th and 13th; then from the 22nd they became more numerous. It is unfortunate that there is no detailed description of this epidemic, the most disastrous that Baltimore ever experienced.

1800; 1801; 1802; 1805; 1818. Sporadic cases; no statistics.

1819.

The next general outbreak took place in 1819 (*Carroll, loc. cit., p. 21*), following the arrival of an infected ship from Havana. In a letter to the editors of the *Medical Repository* (1801, vol. 4, p. 351), Dr. Pierre Chatard, of Baltimore, writing October 19th, cites the first cases as follows: The fever commenced raging at Fell's Point in

the beginning of July, and never ceased there until the end of October. It appeared also at Smith's Dock, toward the end of July, carrying off five persons whose names are given, and others. The persons named had counting houses on the dock or in the vicinity. No other cases appeared at the dock for two months, at the end of which time two more appeared. Dr. Chatard attributes the absence of cases during this time to the great quantity of lime that had been strewn on the ground, by order of the Mayor. The lime was again applied and the cases ceased. At Fell's Point the disease raged for three months before it subsided. The greater part of the population retired to the healthier portions of the city and many of them sickened and died there, but none of their friends or relatives suffered in consequence.

1820; 1821; 1822. Sporadic cases. No statistics.

1858.

Sporadic cases. Ten cases are reported to have occurred at Fort McHenry, from infected vessels in quarantine.

1868; 1873.

Imported cases. No developments.

1876.

The last serious outbreak of yellow fever in Baltimore took place in 1876. The history of this epidemic is as follows (*Morris, Trans. American Public Health Association, 1877-8, vol. 4, p. 242*):

The first case (death) was reported by Dr. Winternitz, on the 14th of September, 1876. This was followed by forty-four cases of the disease, of which forty died. Then the authorities, thoroughly alarmed, had all the people living in the infected quarter, sick and well, numbering in all, one hundred and fifty persons, removed to the Quarantine Hospital, some miles from the city. A cordon was placed around the locality; the whole place was purified; nearly a hundred cart loads of filthy accumulations were removed; the privies were emptied and

filled up with clay; the homes and clothing of the people were cleansed and disinfected, and a certain portion of the latter destroyed, and every possible source of infection was removed. The result of these measures was that not a single case of the disease occurred afterwards, and the whole trouble disappeared as if by the power of a magician's wand. Though one hundred and fifty persons were removed to the Marine Hospital, and twenty-five cases were treated there, fifteen of which proved fatal, not a single one of those engaged in removing the sick—nurses, physicians, etc.—contracted the disease. Only one single death took place at a distance from the infected district, and that was a patient who had lived in one of the houses in which there had been several cases, and who died twenty-four hours after leaving it. "A ship from the Spanish Main" (South America) is accused of having brought the infection.

1878.

Two deaths on board the *May Queen*, from Rio de Janeiro.

1883.

July 27, four cases on board the ship *California*, from Vera Cruz.

1894.

The steamship *Samuel Tyzak*, from Havana, arrived on August 4, with four cases of yellow fever on board. One of the patients died at the Maryland University Hospital, and another occupied a bed in one of the wards before the nature of his illness was discovered.

About the same time, the bark *Alien*, also from Havana, had three cases of yellow fever on board while in the quarantine basin.

Since 1894, no cases of yellow fever have been observed in Baltimore or at the quarantine station.

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MASSACHUSETTS.

The Epidemics of New England in Colonial Times.

In 1618, two years before the landing of the Pilgrim Fathers at Plymouth, there appeared among the Indians of the country, one of the most remarkable epidemics on record. So fatal was the pestilence, that the warriors "were reduced from nine thousand to a few hundreds." The Massachusetts tribe alone was supposed to have lost 2,700 out of 3,000 persons. (*Hutchinson, History of Massachusetts*, vol. 1, p. 34).

The same authority states that in 1621, many places which had been populous Indian villages, were found "all deserted—all dead."

Noah Webster, in his work on Pestilence, attempts to decide that this pestilence was the fever which has since received the appellation of "yellow fever;" his reliance for this opinion being the statement of General Gookin (*Massachusetts Historical Collections*, vol. 1, p. 143), which reads as follows:

"What the disease was which so generally and mortally swept them away, I cannot learn; doubtless it was some pestilential disease. I discoursed with some Indians that were then youths, who say the bodies, all over, were exceeding yellow (describing it by a yellow garment they showed me) both before they died and afterwards."

That this was not small-pox (a frequent scourge of the aborigines), is evident from several circumstances; but the basis (above cited) for the inference that it was yellow fever, is too slight, especially when we remember what Webster ignores, that it raged in winter, which yellow fever never does, at least in Northern latitudes. It was most probably a malignant typhus, with bilious complications, jaundice and nasal hemorrhages of paludal origin.

At the commencement of the settlement of Plymouth, our venerable ancestors suffered very much from sick-

ness. At the end of three months after their arrival, 53 only survived of the 101 who came in the *Mayflower*.

"The sick were destitute of almost all the comforts which their miserable condition rendered indispensable. Their sufferings were increased by the want of well persons to perform the duties among the sick; there being, at one time, not more than six or seven persons in tolerable health." *Thatcher's History of Plymouth*, p. 32.

In 1631, small-pox, first breaking out at Saugus, spread from Narraganset to Piscataqua, and westward to Connecticut River, and swept off entire villages of the Indians. When Increase Mather wrote, there were living some old residents, who on that occasion helped to bury whole families of the natives at the same time.

At the close of 1633, small-pox again broke out, and made great devastations among the unfortunate native races of Massachusetts. Chickatabut, the great sachem of the tribe, was among the victims.

Plymouth was again visited with a mortal sickness in 1634, of which twenty men, women and children died; among whom was "that most excellent and pious man," Dr. Samuel Fuller, the first physician of New England. It must have been occasioned by a fever of domestic origin, as the colony had at that time no intercourse with foreign countries, except England.

Great sickness prevailed among the Indians at Martha's Vineyard in 1645. Few escaped.

In 1647 a malignant fever prevailed, "occasioned by the excessive heat of summer;" and an epidemic influenza passed through the whole country, and universally affected the colonists and natives; but it was not very mortal, "wherein a special providence of God appeared, for not a family nor but a few persons escaping it; our hay and corn had to be lost for want of help; but such was the mercy of God to his people, as few died—not above forty or fifty in the Massachusetts and near as many in Connecticut." *Winthrop's Journal*, vol. 2, p. 310.

Another epidemic distemper, similar to that of 1647, passed through New England in 1655. It began in June,

and few persons escaped. Among those who died was Rev. Nathaniel Rogers, of Ipswich.

Sickness and mortality throughout New England in 1658.

Croup is first mentioned in the annals of the country in 1659. Other malignant diseases also prevailed about this time. Thirty children died in Rowley, Mass. A day of thanksgiving was appointed in Connecticut, for the "abatement of the sickness in the country, and a supply of rain in time of drought."

Small-pox was very fatal in Charlestown, Mass., in 1677. The records state that thirty-one died of the disease, one of whom was the Rev. Thomas Shepard.

In 1678, small-pox in Boston; but we have seen no account of its victims. Seven or eight hundred are said to have died of it in Massachusetts. About this time "the seasons were unfavorable, and the fruits blasted, while malignant diseases prevailed among the people. The sickness and bad seasons were attributed by our pious ancestors to the irreligion of the times, and to their disuse of fasting; and a meeting was held to investigate the causes of God's judgments, and to propose a plan of reformation." Webster, vol. 1, p. 203.

The influenza began in November, 1697, and prevailed until February, in Massachusetts. Whole families and whole towns were seized nearly at the same time. In the following year (1698), a "mortal disease prevailed so much, in Fairfield, Connecticut, that well persons were not found to take care of the sick and bury the dead. Seventy died in three months, out of a population of less than one thousand. At the same time, a dreadful mortality occurred in Dover, New Hampshire.

Yellow fever prevailed at Holliston, Massachusetts, "of which died, Mr. Stone, the minister, and 14 of his congregation." How the fever was introduced, is left to conjecture.

In 1743 an "infectious fever" prevailed in Boston. Yellow fever prevailed in New York, Philadelphia, New Haven, Conn., and Stamford, Conn., was distressed by a

malignant dysentery, which swept away 70 inhabitants out of a few hundreds.

“About the same time (the precise year is not known) a malignant epidemic disease laid waste the Indian tribes, which, from the description given by the traders, would appear to be, though it probably was not, the infectious Yellow Fever. In consequence of it, the Senecas removed their quarters two or three times in a few years. The disease was said to have been confined to the Indians, the white people living and trading with them not being affected. (Griscom, p. 4).

The Mohegan tribe, between New London and Norwich, were “wasted by the same malady” in 1746. From an account given by a Mohegan priest, “a man of good sense and integrity,” as related by a Dr. Tracy, of Norwich, who attended them as a physician, and was the only white man affected, the following were the symptoms of this disease: The patient first complained of a severe pain in the head and back, which was followed by fever; in three or four days his skin turned as yellow as gold; a vomiting of black matter took place, and generally a bleeding of the nose and mouth, which continued till the patient died. One hundred of the tribe died..”

SUMMARY OF YELLOW FEVER YEARS.

BOSTON.

1621. According to Dowler (1853, p. 7), first appearance of yellow fever in Boston. No authentic statistics.

1693. An English squadron under Admiral Wheeler, after remaining a month at Barbadoes and twenty-one days at Martinique, brought yellow fever to Boston, where it caused great mortality. (*Hutchinson's History of New England*, vol. 5, p. 110).

1795. Infected by vessels from the West Indies. Only a few cases. The fever did not spread to the inhabitants.

1796. Yellow fever broke out on August 26, the first death taking place on the 29th. Source of infection

obscure. Warren (see *Bibliography*), like the majority of the good old souls of the period who have written on yellow fever, maintains that "it was caused by noxious substances exhaled into the atmosphere from putrefying animal or vegetable matter or both." Only 130 deaths are recorded, which proves that the disease was undoubtedly confined to imported cases.

1798. Serious outbreak. Deaths, 200.

1799; 1800. Imported cases; no important developments.

1801. The master of a packet plying between Boston and Portland, Maine, who took goods out of a ship infected with yellow fever, which was at the latter port, was taken ill with the disease on his arrival at Boston, and died shortly afterwards. One of his sailors sickened also at the same time and died. The marked yellow color of the skin of the latter is specially mentioned by the chroniclers of this episode (*Banker, New York Medical Repository*, 1803, vol. 6, p. 78).

The fever did not spread to the inhabitants of Boston.

1802. Limited outbreak. Deaths, 60.

1805; 1819; 1858. Infected by the shipping. No important developments.

1885. On September 24, the steamship *Craighill*, from Colon, Panama, anchored in Boston harbor. Four cases of yellow fever were discovered on board, and were transported to Gallup's Island Hospital, where they eventually recovered. The captain of the vessel had died from yellow fever during the voyage.

The city was not infected.

CHELSEA.

1877. Two yellow fever patients were disembarked at the Chelsea Hospital, on December 12, from the ship *Laura Wilson*, from San Domingo City. One of the patients died on the 16th, the other recovered.

HOLLISTON.

1741. Holliston, 25 miles from Boston, was the scene of a mild outbreak in 1741. Deaths, 15.

NANTUCKET.

1763. Deaths, 259.

NEW BEDFORD.

1800; 1801; 1821. Yellow fever outbreaks. No record of cases and deaths.

NEWBURYPORT.

1796. According to Brockway (*National Board of Health Bulletin*, 1881-2, vol. 3, p. 179), yellow fever visited Newburyport on several occasions. As early as 1793, at which time yellow fever was devastating Philadelphia, Governor Hancock, of Massachusetts, issued the following proclamation:

"Whereas a dangerous and infectious disease is prevalent at this time in the city of Philadelphia, and it being highly expedient that effectual measures should be adopted to prevent its introduction within this commonwealth [Massachusetts],

"I do, therefore, in pursuance to a resolution passed by the two branches of the legislature this day, require all sheriffs and their deputies, the selectmen and constables of the several towns in this commonwealth, to take effectual measures for examining all persons, with their baggage and other effects, by land or water, coming from Philadelphia or any other infected place, and where there is reason to apprehend that the infection may be communicated, that they take such measures as the law in such cases made and provided directs for detaining and cleansing the persons and baggage from which danger may be apprehended, so as to effectually prevent the introduction and spreading of said infectious disease among the good people of this commonwealth."

(Signed, etc.)

Newburyport, in response to this proclamation, and in view of the great mortality from yellow fever raging at Philadelphia, the accounts published from there, stating that one hundred persons were buried in one day at this time, and in the general alarm which prevailed, issued this "notification:"

"Whereas a dangerous and infectious disease is now prevailing, not only in Philadelphia, but also in the leeward and winward West India islands, this is to forbid all pilots, and others, on penalty of the law, from bringing any vessel from Philadelphia higher up the Merrimac River than the Black Rocks, or any vessel from a foreign port to any wharf in this town, but let them remain in the stream until examined by the health officer and certificate from him be obtained certifying her being, in his opinion, free from infection.

"By order of the selectmen.

"Published September 23, 1793."

The quarantine ground, so called, was about a mile and a half below the town.

The selectmen also reminded the inhabitants, at this date, to give special attention to cleanliness and recommended the most scrupulous examination of the streets, that no dead carcasses or other offensive things are suffered to remain, and to the "necessity of causing all drains and offensive, stagnant waters in yards or near houses to be cleansed," etc.

The selectmen of Newburyport, in the summers of 1794 and 1795, urge a strenuous enforcement of the quarantine regulations, as the yellow fever was prevailing in several of the cities in the United States, especially in New Haven, in 1784, to such an extent as to break up the college; and, as early as May 14, 1795, the pilots and masters were ordered by the selectmen of Newburyport "not to bring any vessel above Black Rocks then having, or during the voyage having had, any person on board infected with small-pox or any pestilential disease, or coming from any port where such diseases prevail, until liberty is obtained from the selectmen. On hoisting a color on the shrouds (of the vessel) a proper person will attend on board to see the vessel well cleansed and to make report of her situation."

SUMMARY OF EPIDEMICS.

1796.

The same authority quoted above (Brockway) states that yellow fever made its appearance in Newburyport in 1796, causing great alarm, but it was not until about the

middle of August that it was publicly noticed, although it commenced in June, and from the middle of that month until the 5th of October, fifty-five fatal cases were reported. Tradition says that some of the prominent citizens of the town at this time took steps to secure the services of an experienced French physician, Dr. Francis Vergnies, whom the local paper mentioned as having arrived in Newburyport in the summer of this year, from the island of Guadaloupe. That this gentleman rendered important service was evident, as the town at a public meeting of the citizens, in April of the following year, 1797, unanimously voted "that the thanks of the town be given to Dr. Vergnies, for his prompt assistance and advice the last summer (1796), when the town was visited with a malignant disorder."

Dr. Vergnies continued his residence in Newburyport in the general practice of his medical profession until his death in 1830.

These cases of yellow fever are the first which Dr. Brockway found publicly acknowledge as such, and reported in the history of the town. One of the historians of Newburyport remarks that "this malignant fever, a disease then practically unknown to the members of the medical faculty here, but which was thought to be similar, if not identical with the yellow fever of the South, first appeared in a house on Water Street, etc., in the immediate neighborhood of one of the wharves in the harbor, and its ravages were confined to a narrow locality and short distance in this street, which was closed or 'chained up' to prevent passage." It was conjectured by some that the disease originated on the spot, but the most reasonable conclusion was that it was brought in a vessel from one of the West India islands; and this opinion was generally entertained. That the fever was caused by decayed fish in the dock was believed in by many, there is no doubt, as the town, at a special meeting called July 21, 1796, chose an "inspector of police" to remove all nuisances, and to "prohibit fish being thrown into the river," etc. Among the victims to this disorder, which caused great excitement in the town, and widespread

alarm, were several prominent citizens of the town, including an eminent resident physician, Dr. J. Bernard Swett. The fever disappeared with the frost.

In 1797, July 27, the town voted to choose a health officer to carry into effect a law of the commonwealth passed the month previous, "to prevent the spreading of contagious sickness." Public attention in this town was again called in the following summer to the danger from yellow fever by its prevalence in Philadelphia, New York, Albany, Newport, Boston and several other places at the North, up to the middle of September.

1799.

In the summer of 1799 there was a return of yellow fever at Newburyport, which the petitioners for a special town meeting called "an alarming mortal sickness;" and a health committee was chosen to adopt measures to prevent the fever from spreading, and to secure a more rigid quarantine.

The reappearance of the yellow fever this summer in Philadelphia caused general alarm, and in this town the fear was not groundless, as the health committee reported nine persons "as having died of malignant fever" up to July 23. The health officer, meantime, had ordered the free use of unslacked lime in the streets of the town, and wherever there was any accumulation of filth, "and particularly in vaults." Up to the 6th of August there appear to have been fifteen fatal cases, and the health committee reported on that day "that the fever had not been communicated except in the vicinity of the lower Long Wharf," and they recommend that those persons who have left that neighborhood remain away until notified by the committee. A week later several of the traders advertise that they have returned to the town with their goods to their places of business in Water Street.

The fever in this instance was supposed to have been brought into town by a vessel which arrived from St. Thomas on the 29th of June, and is reported in the news-

paper as having discharged her cargo at the wharf mentioned above, and that nearly all those who had died, had labored on board of this vessel.

1829.

Two cases, in 1829, close the history of yellow fever in Newburyport. A prominent physician of the town, Dr. Bradstreet, who was then Health Officer of the port, visited a vessel "from the South," which was then at quarantine and contracted yellow fever, and died shortly after the onset. His daughter shared the same fate.

The disease did not spread to the other inhabitants of the place.

SALEM.

1798. Limited outbreak. No authentic statistics.

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MICHIGAN.

DETROIT.

1878.

A solitary case, "imported from the South," is the only record for Michigan. The incident happened during the great epidemic of 1878, which devastated the Southland. Our authority does not state whence the refugee came, but simply records the fact that he fled from some Southern city to escape the pestilence, and that he died shortly after reaching Detroit. (*Vide Annual Report Michigan State Board of Health, 1879, pp. 221, 224*).

MISSISSIPPI.

ANGUILLA.

1905. Cases, 1; deaths, 0.

BARKLEY.

1897. Cases, 10; deaths, 4.

BAY ST. LOUIS.

1820. Cases, 280.

1830. No record of cases and deaths.

1835. Cases, 9; deaths, 1.

1853. No record of cases and deaths.

1878. Population, 3,000. Infected by New Orleans.

First case, August 11; last case, December 24; first death, August 15. Cases, 630; deaths, 82.

1897. Cases, 40; deaths, 4.

BEACHLAND.

1878. Deaths, 24.

BELLE FONTAINE.

1878. No record of cases and deaths.

BENTON.

1853. No record of cases and deaths.

1878. First case, October 11. Cases, 3; deaths, 1.

BILOXI.

1702. Tradition says that yellow fever was present in Mississippi during the early years of the eighteenth century. The biographer of Iberville, in his memoirs, states that he had yellow fever at Biloxi in 1702, which made

such ravages on his constitution as to cause his return to France for the purpose of restoring his shattered health. This was the first appearance of yellow fever on the Gulf Coast of the United States.

1702; 1839; 1847; 1853; 1858. Yellow fever years. No record of cases and deaths.

1878. Population, 2,000. Infected by New Orleans. First death, August 17; last death, November 23. Cases, 600; deaths, 45.

1897. Cases, 592; deaths, 27.

1905. A few imported cases. No developments.

BLUFF SPRINGS.

1873. Population, 200. First case, September 9; deaths, 9.

BOLTON.

1878. Population, 200. First death, August 12. Cases, 144; deaths, 34.

BOVINA.

1878. Population, 100. Deaths, 7.

BRANDON.

1853. Population, 1,200. Infected by Vicksburg. First case, September 18; first death, September 23; last case, December 3; last death, December 3. Cases, 13; deaths, 9.

1854. First case, September 23; last case, November 18.

BROWN'S PLANTATION.

1878. Infected by Canton, Miss. First case, August 13; first death, August 18. Cases, 21; deaths, 4.

BRYAN.

1878. Infected by New Orleans. First case, September 29. Cases, 10; deaths, 1.

BYRAM.

1878. No record of cases and deaths.

CANTON.

1855. No record of cases and deaths.

1878. Population, 3,000. Infected by New Orleans. First case, August 1; last case, December. First death, August 19. Cases, 924; deaths, 180.

1898. First case, October 10; deaths, October 28. Cases, 9; deaths, 0.

CARSON'S CITY.

1879. No record of cases and deaths.

CARDIFF LANDING.

1878. Deaths, 8.

CARROLLTON.

1878. No record of cases and deaths.

CAYUGA.

1878. Cases, 38; deaths, 9.

1897. Cases, 25; deaths, 1.

CENTERVILLE.

1899. Cases, 2; deaths, 0.

CLIFTON.

1853. No record of cases and deaths.

CLINTON.

1897. Cases, 42; deaths, 2.

1898. First case, October 8; last case, October 15. Cases, 40; deaths, 0.

COOPER'S WELLS.

1855. Infected by New Orleans. First case, August 23; first death, August 31. Cases, 70; deaths, 13.

CONCORDIA.

1879. Population, 250. Number who fled, 130. First case, August 26; first death, August 31; last case, October 24. Cases, 75; deaths, 20.

CORINTH.

1873. Cases, 3; deaths, 0.

COUNTY FARM.

1897. Cases, 2; deaths, 0.

COX LANDING.

1878. Cases, 12; deaths, 4.

CRYSTAL SPRINGS.

1898. First case, October 11; last case, October 21. Cases, 7; deaths, 0.

DRY GROVE.

1878. Infected by Brown's Plantation. First case, September 2; first death, September 7. Cases, 75; deaths, 41.

DUCK HILL.

1878. Cases, 36; deaths, 14.

DURANT.

1878. Deaths, 1.

1897. Cases, 1; deaths, 1.

EDWARDS.

1878. Deaths, 3.

1897. Cases, 455; deaths, 29.

1898. First case, September 27; last case, October, 15.
Cases, 12; deaths, 1.

ENOKA.

1905. Cases, 1; deaths, 0.

EUCUTTA.

1898. First case, June 24; last case, June 24. Cases,
1; deaths, 0.

FAYETTE.

1898. Cases, 5; deaths, 0.

FLORA.

1899. No record of cases and deaths.

FORT ADAMS.

1839. Infected by New Orleans.

FRIAR'S POINT.

1878. Population, 550; first case, August 17; last case,
November 1. Cases, 25; deaths, 7.

GAINSVILLE.

1878. Cases, 5; deaths, 2.

GARNER STATION.

1878. Population, 200. Cases, 31; deaths, 13.

GOODRICH LANDING.

1878. Population, 1509. First case, August 1. Deaths,
42.

GRAND GULF.

1839. No record of cases and deaths.

1853. Infected by Port Gibson, La. First case, September 10.

GRAND PLAIN.

1878. No record of cases and deaths.

GRAVEL PIT.

1878. Population, 85. Cases, 20.

GREENVILLE.

1853. Population, 300. Number who fled, 100. First case, September. Cases, 17; deaths, 9.

1878. Population, 2,300. First case, August 18; last case, November 10; first death, August 24; last death, November 15. Cases, 1,000; deaths, 400.

GRENADA.

1878. Population, 2,500. First case, July 26; first death, July 31. Cases, 1,040; deaths, 326.

1878. Cases, 87; deaths, 17.

GULMAN STATION.

1878. Infected by Vicksburg.

HANSBORO.

1879. First case, June 17. Cases, 2.

HAMBURG.

1905. Cases, 50; deaths, 8.

HANSBORO.

1878. Infected by New Orleans. First case, August 31; last case, January 19; first death, September 24; last death, December 24. Cases, 200; deaths, 16.

1905. Cases, 5; deaths, 0.

HARRISON.

1898. First case, October 6; last case, October 30.

1905. Cases, 2; deaths, 0.

HATTIESBURG.

1898. First case, October 8; last case, October 21.

HERMANVILLE.

1898. First case, October 4; last case, October 13. Cases, 2; deaths, 0.

HENDERSON'S POINT.

1897. Cases, 3; deaths, 0.

HERNADO.

1878. Population, 1,200. First case, August 15; last case; August 21. Cases, 240; deaths, 80.

HINDS COUNTY.

Convict Camp.

1897. Cases, 6; deaths, 0.

HOLLY SPRINGS.

1873. Infected by Memphis. Only a few imported cases.

1878. Population, 3,000. First case, August 18; first death, August 25. Cases, 1,369; deaths, 309.

HORN LAKE.

1878. Cases, 30; deaths, 17.

1879. A few imported cases.

IUKA.

1878. Infected by Memphis. First case, September 18; first death, September 27. Cases, 6; deaths, 3.

JACKSON.

1853. Population, 3,000. First case, August 21; first death, September 5. Cases, 350; deaths, 112.

1854. Sporadic cases.

1878. Population, 2,250. Infected by New Orleans. First case, August 26; last case, December 4; first death, August 31; last death, November 28. Cases, 480; deaths, 86.

1888. Cases, 15; deaths, 5.

1898. First case, September 10; last case, November 10. Cases, 208; deaths, 11.

1899. Cases, 61; deaths, 9.

KING'S POINT.

Cases, 92; deaths, 6.

LAKE.

1878. Population, 325. Infected by Vicksburg. First case, August 24; first death, September 5. Cases, 300; deaths, 86.

LAWRENCE STATION.

1878. Cases, 16; deaths, 5.

LEBANON.

1878. First case, August 29. Cases, 90; deaths, 10.

LEOTA LANDING.

1878. Infected by Greenville. First case, November 21; last case, November 21; first death, November 26; last death, November 26. Cases, 1; deaths, 1.

LIVINGSTON.

1878. Infected by Canton. First case, August 28. Cases, 15; deaths, 10.

LOGTOWN.

1878. Cases, 40; deaths, 9.

LONG BEACH.

1905. Cases, 1; deaths, 0.

LUMBERTON.

1905. Cases, 1; deaths, 0.

MADISON.

1878. Population, 50. A few imported cases.

McCOMB CITY.

1878. Population, 1,000. First case, September 28; first death, October 2. Cases, 63; deaths, 21.

McHENRY.

1897. Cases, 30; deaths, 1.

1898. First case, June 9; last case, June 29. Cases, 22; deaths, 0.

McNIARY.

1878. Cases, 36; deaths, 9.

MERIDIAN.

1898. First case, October 15; last case, October 17.
Cases, 3; deaths, 0.

MICHIGAN CITY.

1878. Cases, 2; deaths, 2.

MISSISSIPPI CITY.

1878. Infected by New Orleans. First case, August 21; last case, December 10. Cases, 200; deaths, 15.

1879. Infected by New Orleans. First case, July 7; first death, July 16.

1899. Cases, 27; deaths, 2.

1905. Cases, 71; deaths, 0.

MOSS POINT.

1905. Cases, 3; deaths, 0.

MT. PLEASANT ROAD.

1879. No statistics.

MULATTO BAYOU.

1878. Cases, 1; deaths, 1.

NATCHEZ.

1817. First case, September —; last case, November 9.
Deaths, 9.

1819. First case, September —; last case, December —.
Deaths, 180.

1823. First case, August 10; last case, October 18.
Deaths, 312.

1825. Deaths, 130.

1827. No statistics.

1828. Deaths, 90.

1829. First case, September 1; last case, November.
Deaths, 90.

1837. First case, September 8; last case, November 25.
Deaths, 280.

1839. First case, September —; last case, November.
Deaths, 235.

1844. No statistics.

1848. First case, June —; last case, November.

1853; 1854; 1855; 1858. No statistics.

1898. Cases, 37; deaths, 4.

1900. No statistics.

1905. Cases, 143; deaths, 7.

NITTA YUMA.

1897. Cases, 27; deaths, 11.

OAK GROVE.

1879. Infected by Memphis.

OCEAN SPRINGS.

1878. Population, 600. Infected by New Orleans.
First case, August 15; last case, December 2; first death,
August 18; last death, December 5. Cases, 175; deaths,
30.

1897. Cases, 23; deaths, 6. New Orleans was in-
fected from this focus and experienced a serious epidemic.

OKOLONA.

1878. First case, August 10. Cases, 3; deaths, 1.

ORWOOD.

1898. First case, August 31; last case, October 27.
Cases, 100; deaths, 5.

OXFORD.

1898. First case, September 21; last case, October 27.
Cases, 86; deaths, 12.

OSYKA.

1878. Population, 925. Infected by New Orleans.
First case, July 27; first death, August 15. Cases, 300;
deaths, 45.

1900. Sporadic cases.

PASCAGOULA.

1847. No statistics.

1875. Deaths, 60.

1878; 1893. No statistics.

1897. Cases, 35; deaths, 2.

PASS CHRISTIAN.

1843; 1847; 1855; 1858. No statistics.

1878. Population, 2,000. Infected by New Orleans.
First case, August 29; last case, December 4; first death,
September 4; last death, November 22. Cases, 199;
deaths, 23.

1879. No statistics.

PEARLINGTON.

1878. Cases, 201; deaths, 24.

1905. Cases, 2; deaths, 0.

PERKINSTON.

1897. Cases, 1; deaths, 0.

1898. First case, June 22; last case, June 22. Cases
1; deaths, 0.

PETIT GULF HILLS.

1853. No statistics.

POPLARVILLE.

1898. First case, October 9; last case, October 23. Cases, 24; deaths, 1.

PORT GIBSON.

1853. Infected by New Orleans. First case, August 15; first death, August 17.

1878. Population, 1,400. First case, August 3; first death, August 8. Cases, 620; deaths, 115.

1898. First case, October 6; last case, October 6. Cases, 1; deaths, 1.

1905. Cases, 63; deaths, 2.

QUARANTINE.

1878. Cases, 5; deaths, 2.

1884. Infected by Colon. Cases, 1; deaths, 0.

1888. Infected by ship Maria, from Havana. Cases, 3; deaths, 0.

1890. Cases, 6; deaths, 2.

1891. Infected by Chandeleur. Cases, 12; deaths, 1.

1892. Cases, 4; deaths, 0.

1893. Cases, 3; deaths, 1.

1895. Cases, 3.

1897; 1898; 1899. Cases from infected vessels.

1903. Cases, 4; deaths, 2.

1905. Cases, 41; deaths, 1.

REFUGE LANDING.

1878. First case, September 9; first death, September 29. Cases, 19; deaths, 11.

QUEEN HILL.

1898. First case, October 15; last case, October 15. Cases, 1; deaths, 1.

RIDGELAND.

1898. First case, October 8; last case, October 17.
Cases, 7; deaths, 0.

ROCKY SPRINGS.

1878. Deaths, 38.

RODNEY.

1829. No statistics.

1843. First case, September 6.

1847. No statistics.

1853. Sporadic cases.

ROSETTA.

1905. Cases, 32; deaths, 7.

ROXIE.

1905. Cases, 16; deaths, 6.

SCOTT'S.

1878. Population, 50.

SCRANTON.

1878. First case, October 5; first death, October 11.
Cases, 60; deaths, 20.

1897. Cases, 363; deaths, 18.

1905. Cases, 17; deaths, 0.

SENATOBIA.

1878. Population, 1,400. Cases, 26; deaths, 7.

SHIELDSBOROUGH.

1820. First case, August 20.

1828. No statistics.

1829. First case, August 5. Cases, 46; deaths, 8.

1839. No statistics.

SMITH'S STATION.

1878. Infected by Vicksburg. Cases, 16.

SORIA.

1905. Cases, 2; deaths, 0.

STARKVILLE.

1898. First case, October 6; last case, October 18.
Cases, 9; deaths, 0.

STONEVILLE.

1878. Population, 50. Infected by New Orleans.
Cases, 23; deaths, 15.

SULPHUR SPRINGS.

1878. Infected by Canton. First case, August 23;
first death, August 28; last death, October 26. Cases, 15;
deaths, 5.

SENATOBIA.

1878. Population, 1,200. Infected by Grenada. First
case, September 1. Cases, 26; deaths, 7.

SUMMIT.

1878. Deaths, 4.

SUMRALL.

1905. Cases, 1; deaths, 0.

SUNFLOWER.

1878. Cases, 48; deaths, 15.

TAYLOR.

1898. First case, August 1; last case, October 21.
Cases, 106; deaths, 14.

TERRENE.

1878. Cases, 12; deaths, 4.

TERRY.

1878. Population, 225. Cases, 10; deaths, 5.

TOUGALOO.

1898. First case, October 16; last case, October 17.
Cases, 2; deaths, 0.

TOULNE.

1878. No statistics.

VICKSBURG.

1839. Infected by New Orleans. Deaths, 50.

1841; 1847. No statistics.

1853. Population, 4,000. Infected by New Orleans.
First case, July —; first death, August 1.

1858; 1871. No statistics.

1878. Infected by New Orleans. First case, July 21;
last case, December; first death, July 24; last death,
November 21. Cases, 5,000; deaths, 872.

1905. Cases, 185; deaths, 28.

WARDVILLE.

1898. Scattered cases.

WASHINGTON.

1825. First case, August; last case, November.
Deaths, 52.

WATERFORD.

1898. First case, September 9; last case, October 6.
Cases, 2; deaths, 0.

WATER VALLEY.

1872. Population, 3,000. First case, August 9; first death, August 30. Cases, 200; deaths, 64.

1898. First case, October 7; last case, October 21. Cases, 12; deaths, 0.

WAVELAND.

1897. Cases, 4; deaths, 0.

1898. First case, October 10; last case, October 18. Cases, 20; deaths, 1.

W. PASCAGOULA.

1897. Cases, 8; no deaths.

WHITZELL'S LANDING.

1877. No statistics.

WINONA.

1878. Population, 1,500. Infected by Grenada. First case, August 9. Deaths, 3.

WINTERVILLE.

1878. Infected by Greenville. First case, August 28; first death, September 15. Cases, 151; deaths, 26.

WOODVILLE.

1844; 1852. No statistics.

1853. First case, August 9; first death, August 13.

1855. First case, August 27; first death, September 2.

1858. No statistics.

1898. First case, October 6; last case, October 6. Cases, 1; deaths, 0.

YAZOO CITY.

1853. Population, 2,000. First case, August 28; first death, September 1.

1878. Population, 2,500. Infected by Vicksburg. First case, September 15; first death, September 21. Cases, 17; deaths, 9.

1898. First case, October 6; last case, November 10. Cases, 26; deaths, 0.

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MISSOURI.

In the summer of 1819, yellow fever made its appearance simultaneously at many places throughout the United States. A bilious remittent fever of a malignant tendency became epidemic both in Missouri territory and in the State of Illinois. Although it generally assumed a milder form than on the seaboard; yet many of the cases reported had the characteristic features of *typhus icterodes* so decidedly marked, that the Surgeon-General entertained no doubt of the identity of the disease. (*Army Med. Stats.*, 1819-1839, p. 8).

There is no record as to what localities in Missouri were affected.

NEW DESIGN.

1797. Population, 200. Deaths, 57. Source of infection obscure.

ST LOUIS.

1854. A few cases were imported to St. Louis in 1854. No statistics.

1855. August 14, an imported case. No developments.

1878.

Many cases of yellow fever were brought here. Among the first fatal cases was Capt. W. O. Nelson, of Port Eads, commander of the Dredge-boat at that place, and member of the firm, Eads & Nelson, wreckers. He died at St. Louis, August 13. Fatal cases among refugees continuing, much excitement arose, and a strict quarantine was established. Total cases, 116; total deaths, 46.

The following resume by Surgeon Walter Wyman, United States Marine Hospital Service, and published in his Annual Report for that year, is of sufficient interest to be reproduced here:

Dr. Wyman observes that the chief point of interest connected with the epidemic of 1878 in St. Louis, is that,

for the first time in th history of the city, yellow fever seized upon inhabitants not previously exposed in more southern latitudes.

During previous epidemics, isolated cases brought from the South have been treated with no thought of possible danger; but the experience of the outbreak under discussion, showed that former immunity from the disease is no guarantee of the city's future safety. There were at least fourteen local cases of yellow fever contracted—three within the city limits, five upon the quarantine transfer boat, and six at quarantine hospital. Ten of the fourteen died, and it is reasonable to suppose that had it not been for the efficient regulations of the Health Department, the scourge would have been felt far more severely.

The first case occurring in St. Louis was that of a steamboat clerk just from New Orleans, who showed the first symptoms upon the 15th of July, and died upon the 19th. Several cases of a like nature soon followed, and the Board of Health becoming concerned by reason of these deaths and the large number of refugees flocking to the city. determined to open the quarantine hospital located ten miles below, upon the western bank of the river.

At first the quarantine restrictions were limited, but as the epidemic increased in severity, more rigid regulations were enforced. All boats were obliged to land and were detained for a thorough inspection. Their holds were disinfected with chlorine, and all sick persons removed to the hospital. Trains entering the city from the South were also boarded, to prevent the admission of yellow fever cases. Within the city limits, all refugees were ferreted out by the police and by health officers appointed for that purpose, and *nolens volens* were taken by ambulance to the steamer *Edwardsville*—a ferry-boat prepared for the reception of such cases—and at once conveyed to quarantine.

Between August 21, the date on which the station was opened, and October 22, the date of the reception of the last case, there were treated at quarantine 129 patients, 88 of whom had yellow fever. Of the 88 yellow fever cases, 42 died.

There was nothing peculiar in the character of these cases, unless it were a marked suppression of the urine, which characterized nearly all of them. The average period of incubation cannot be determined from the records of the hospital.

Of the cases of local origin the majority were contracted or treated at quarantine, but for convenience the following tabulated statement of all local cases is appended:

	SEIZURE.		DEATH OR OTHER RESULT.	
	Date.	Locality.	Date.	Locality. ¹
Nurse in city hospital	Aug. 26 . .	City	Aug. 31 . .	City
Steward at quarantine	Sept. 2 . .	Quarantine . . .	Recovered	Quarantine . .
Night watchman at quarantine	Sept. 13 . .	Quarantine . . .	Recovered	Quarantine . .
Engineer at quarantine	Sept. 20 . .	Quarantine . . .	Recovered	Quarantine . .
Policeman at quarantine	Sept. 21 . .	Quarantine . . .	Recovered	Quarantine . .
Resident physician at quarantine	Oct. 9 . .	Quarantine . . .	Oct. 15 . .	Quarantine . .
Cook of quarantine-boat	Oct. 9 . .	On board of boat	Oct. 10 . .	Quarantine . .
Nurse on quarantine-boat	Oct. 9 . .	On board of boat	Oct. 19 . .	Quarantine . .
Daughter of quarantine-steward	Oct. 11 . .	Quarantine . . .	Oct. 16 . .	Quarantine . .
Wife of the cook of quarantine-boat	Oct. 13 . .	City	Oct. 16 . .	Quarantine . .
Deck-hand on quarantine-boat	Oct. 15 . .	On board of boat	Oct. 18 . .	Quarantine . .
Secoene nurse on quarantine-boat	Unknown	On board of boat	Unknown	City
Boy, George Pilcher	Oct. 18 . .	City	Oct. 22 . .	Quarantine . .
Captain of quarantine-boat . . . . .	. . . . .	On board of boat	Oct. — . .	City

It will be noticed in the above table that five of the employes of the transfer-boat *Edwardsville* contracted yellow fever and died; not one recovered. It

should, in candor, be stated, however, that the disease of which the boat's captain died was returned by the attending physician as typho-malarial fever, but was considered by others, who were probably correct, to have been yellow fever.

The two fatal cases which were taken from the city and died at quarantine possess some interest. One was the wife of the cook of the boat. This man, Nicholas Gaft, was taken ill on the 9th of October, (Wednesday), left the boat and visited his wife in the city. The following day (Thursday) he was removed to quarantine. Upon the following Sunday, (October 13), his wife manifested symptoms of yellow fever, was removed to quarantine, where she died October 16.

The other city case, which died at quarantine, was removed from South St. Louis, commonly called Carondelet. The resident physician pronounced it an undoubted case of yellow fever, stating that the patient had black vomit and other well-marked symptoms.

The boy was removed by order of the health officers, who found him lying by the side of a sister who had expired a short time previous, with apparently the same disease. The physicians in attendance upon the sister, returned as the cause of her death, a disease other than yellow fever, and, upon inquiry, it was found that some nine or ten deaths had occurred in the same general neighborhood, the symptoms of which closely simulated yellow fever; but the diagnosis made, had been typho-malarial fever, malarial hæmorrhagica, &c.

Whether these were cases of yellow fever or not became a subject of warm dispute among the Carondelet physicians, the majority, however, claiming exemption of that portion of the city from the plague.

One other fact concerning the local quarantine cases should not be omitted. When the nurse of the quarantine boat was first taken sick, he was placed in a convalescent ward, his disease being deemed simply malarial.

Two convalescents from other diseases soon after contracted yellow fever, one of whom died. Although no dates have been obtained concerning these two cases they

should properly be added to the list of local cases—making in all sixteen.

By reason of the vigilance of the health authorities, as above described, comparatively few cases of yellow fever were treated in the city. So far as can be ascertained there were about thirty-five refugee cases and sixteen deaths within the city limits, but it is probable that some cases were concealed in order to prevent a forcible transfer to quarantine.

1879.

Two cases, refugees from Memphis. First case, fatal in October; last case also terminating in death, November 15.

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NEW HAMPSHIRE.

PORTSMOUTH.

1793. Infected by a ship from Martinique. Limited outbreak.

1796. First case, August; last case, October. The deaths were about 100. The prevalence of epidemic dysentery at the same time as the fever, served to greatly swell the mortality.

1802. Sporadic cases; deaths, 10.

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NEW JERSEY.

BRIGHTON.

1798. Limited outbreak. No statistics.

BURLINGTON.

1798. Limited outbreaks. No statistics.

CAMDEN.

1853. Infected by Philadelphia. No complete statistics.

GLOUCESTER.

1805. Source of infection obscure. Outbreaks was not general.

1870. A few cases, refugees from New York and Governor's Island. No accurate statistics.

JERSEY CITY.

1878. One case, September 16, a refugee, terminating in death on the 20th.

PERTH AMBOY.

1811. Deaths, 5.

PORT ELIZABETH.

1798. Infected by Philadelphia. First case, August 9; last case in September. Cases, 13; deaths, 6.

WOODBURY.

1798. Probably infected by Philadelphia. No record.

1853. One case, a refugee from Philadelphia. Recovery.

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NEW YORK.

ALBANY.

1746. First case in August. Deaths, 45.
 1798. No statistics.

BAY RIDGE.

1856. Infected by Brooklyn. Only a few cases resulted.

BROOKLYN.

1809. First case in July; last case in September. Deaths, 40. Infected by ship *Concord*, from Havana.
 1823. No statistics.
 1856. Infected by Governor's Island. First case, July 14. Cases, 29.
 1878. At Navy Yard. First case, July 12; last case, July 18. Cases, 8; deaths, 3.
 1879. Population, 565,000. Deaths, 11; all refugees from infected places.
 1888. Population, 805,855. Infected by Spanish bark *Maria Louisa* from Havana and steamship *Cearcuse* from Pernambuco.

CATSKILL.

- 1743; 1794. Sporadic cases.
 1803. First case, August 10; last case, September 23. Deaths, 8.
 1804. No statistics.

GREENFIELD.

1798. Sporadic cases.

GOVERNOR'S ISLAND.

1856. Infected by shipping. On July 26, the first case of yellow fever occurred in a resident of Rotten Row—she died with black vomit, August 2. On August 1, three

other cases occurred, one in Rotten Row and two from 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, 1 in 4.2. Very few cases occurred on other parts of the Island, besides South Battery and Rotten Row, and those that did thus occur were in almost every instance (probably all) in persons who were in the habit of visiting Rotten Row.

In South Battery the disease continued its ravages until early in September, when the occupants were removed to quarters in another portion of the Island, only two cases occurring among them after their removal. In Rotten Row it lingered until checked by cool weather on the 9th of October.

Cases, 159; deaths, 52.

1870. Population, 774. First case, August 13; first death, August 20; last case, October 26; last death, October 29. Cases, 159; deaths, 52.

GOWANUS.

1856. Infected by shipping. Sporadic cases.

HUNTINGTON.

1795; 1798. Limited outbreaks. No authentic statistics.

LOCKPORT.

1878. One fatal case, a refugee from Memphis, September 29.

MONTAUK POINT.

1898. Cases, 4; deaths, 0.

NEW YORK.

1668. First appearance of yellow fever in the United States. No complete statistics.

Yellow fever raged severely in New York, to such a degree that scarcely a patient survived it; and, by some

accounts, it was more fatal than any disease since that period. It was popularly known as "the great sickness." One account states that several hundred died up to September, and 70 more during the succeeding week, in a population of only 6,000 or 7,000. On account of the pestilence, the Assembly was held at Jamaica, Long Island. The disease was said to have been imported from St. Thomas.

Last death, September 30. Deaths, 370.

1719. "In the year 1719, there were a few cases of yellow fever near the Old Slip; but by the vigorous exertions of the Board of Health and the blessing of Divine Providence, it was suppressed before it had attained an alarming height." (*Hardie*, p. 22).

1743. Deaths, 217.

1745; 1747; 1748; 1763. Yellow fever years. No statistics.

1789. Deaths, 76.

1791. First case, August —; last case, October 15. "General Malcolm and some other very respectable citizens fell victims to its fury." (*Hardie*, p. 1).

1792; 1793; 1794. Yellow fever years. No statistics.

1795. First case, July 19. Deaths, 732.

1796; 1797. No statistics.

1798. Great epidemic. Deaths, 2,086.

(From 1799 to date, unless otherwise noted, the figures given in this resume represent occurrences at the Quarantine Hospital).

1799. First case, July —; last case, November. Cases, 163; deaths, 74.

1800. First case, September —; last case, October 14. Cases, 38; deaths, 21.

1801. First case, September —; last case, October —. Cases, 35; deaths, 16.

1802. Cases, 5; deaths, 2.

1803. First case, July 18; last case, October 29. Cases, 1,639; deaths, 606.

Epidemic in the city.

1804. Cases, 8; deaths, 5.

1805. First case June —; last case, October —. Cases, 43; deaths, 25. In the city proper there were 600 cases, of which 262 died.

1806. First case, June; last case, November. Cases, 2; deaths, 0.

1807. Cases, 3; deaths, 3.

1808. Cases, 1; deaths, 1.

1809. Cases, 2; deaths, 2.

1810. Cases, 1; deaths, 1.

1815. Cases, 19; deaths, 7.

1816. Cases, 2; deaths, 0.

1817. Cases, 5; deaths, 4.

1818. Cases, 7; deaths, 4.

1819. First case, August. Cases, 26; deaths, 19.

1820. Cases, 2; deaths, 2.

1821. Cases, 28; deaths, 16.

1822.

At the Marine Hospital the first case erupted July 10 and the last November 6. Cases, 43; deaths, 25.

The city was infected by the Marine Hospital and experienced a limited epidemic. The first cases were discovered July 17, at No. 26 Rector Street. By September, the disease was widespread. On the 28th of that month, the following remarkable document was presented to the common council and ordered promulgated:

“To the Honourable the Mayor, Aldermen and Commonalty of the city of New-York:

The memorial of the undersigned clergymen of different denominations of this city, respectfully suggests to your honourable body, that acknowledging as we do the being and Providence of the “only Lord God our Lord Jesus Christ,” and confessing as we must, a common criminality and demerit in his sight, and visited as we are with one of those desolating scourges, which himself expressly challenges in his word, not only as a judgment, of which he is the righteous disposer; but as one of his “sore judgments,” upon a community of transgressors, and knowing as we may, that his own invisible agency appoints and controls, in sovereign wisdom, all the series of secondary causes,

however, complex and inscrutable to man, it becomes us, every way in our collective character as a city, and after the example of ancient Nineveh to humble ourselves under the mighty hand of God, that he may exalt us in due time.

The reasons and propriety of such a general humillation before God, are sufficiently obvious, we fondly hope, to your honourable body.

Having thus suggested to your Honorable Body a measure which we confide to your wisdom to approve, because it seemed, all things considered, to be expedient and incumbent; a measure, which seems to be demanded, not more by our present circumstances and the aspect of Divine Providence, than by the common consent of the wise and the good and praying, that "the wisdom that is from above," may enlighten all your deliberations and bless your administration, we subscribe ourselves, honourable Sirs, your friends and fellow citizens.

J. B. Romeyn

E. Washburn

N. Bangs

Alexander M'Leod

H. Peneveyre

S. N. Rowan

Samuel Nott, Jun.

Nich. S. Marselus

R. M'Cartee

James G. Ogilvie

S. Martindale

Isaac Chase

William Gray

Samuel H. Cox

Ward Stafford

Peter Ludlow, Jun.

The disease was not very widespread, for there were only 401 cases, of which 230 died.

- 1823. Cases, 8; deaths, 5.
- 1824. Cases, 28; deaths, 8.
- 1825. Cases, 2; deaths, 1.
- 1826. Cases, 2; deaths, 2.
- 1827. Cases, 6; deaths, 4.
- 1828. Cases, 1; deaths, 0.
- 1829. Cases, 4; deaths, 0.
- 1830. Cases, 2; deaths, 1.
- 1831. Deaths, 1.
- 1832. Cases, 1; deaths, 1.
- 1833. Cases, 12; deaths, 2.
- 1834. Cases, 3; deaths, 1.
- 1835. Cases, 2; deaths, 2.
- 1838. Cases, 26; deaths, 8.
- 1839. Cases, 4; deaths, 4.

1843. Cases, 18; deaths, 3.
 1844. First case, August 12. Cases, 9; deaths, 2.
 1846. Cases, 2; deaths, 0.
 1847. Cases, 1; deaths, 0.
 1848. Cases, 26; deaths, 12.
 1852. Cases, 1; deaths, 0.
 1853. Cases, 44; deaths, 15.
 1854. Cases, 45; deaths, 20.
 1855. Cases, 12; deaths, 5.

1856.

After a lapse of thirty-four years (1822 to 1856) yellow fever again made its appearance in New York. Between these years, many cases were brought by vessels from the Spanish Main, but they were all treated at the Marine Hospital, and in no instance was the infection carried ashore. In 1856, however, the population of the metropolis of the world had a narrow escape from the clutches of the Yellow Demon.

The circumstances were as follows:

One case of yellow fever was received from Havana in the month of April; but no other cases were seen until June 18, when the bark *Julia M. Hallock*, from Santiago de Cuba, arrived, with captain, first mate, and a passenger sick with the fever. On the 21st of the same month, the ship *Jane H. Gliddon*, from Havana, arrived, having a passenger and four seamen dangerously ill with the disease; and from the same vessel three other cases were subsequently received. These were all of a strongly-marked character; and some of them occurring many days after the ship's arrival, an infected condition of the vessel was naturally inferred, and the spread of the infection anticipated. From this ship the infection did spread, until at least twenty of the stevedores and lightermen who were engaged in unloading her, contracted the disease.

In the *Annual Report of the Physician in Chief of the Marine Hospital at Quarantine for 1856*, published at Albany in 1857, is presented a chronological summary of

all the cases of yellow fever that occurred during this remarkable outbreak. A record of 538 cases is given, of which more than one-third died.

1870.

In 1870, New York again found the spectre of yellow fever at her doors, and only escaped an invasion of the disease through the inactivities of the *Stegomyia Calopus*, who confined their operations to a circumscribed area.

The following resume is made from the account given by Dr. Moreau Morris, City Sanitary Inspector, in the *Annual Report of the New York Board of Health for 1870*:

On September 13, 1870, information reached the Bureau of Sanitary Inspection that a Mrs. Kelly was lying dead at No. 14 Essex Street, New York. She had been sick for about a week, "with a fever, which did not present the types of the ordinary fevers usually found in the city." An immediate investigation of the history and circumstances attending this case, aroused the suspicion that it might have been yellow fever. The body was, therefore, sent to the morgue at once for a specific investigation. The bed was burned, and the rooms and clothing thoroughly fumigated and disinfected.

It was ascertained that her husband, James Kelly, had been sick also with the same symptoms, and had been removed to Bellevue Hospital, where he had died upon the same day (the 12th) as his wife.

A post-mortem examination was held upon the body of James Kelly, on the 13th of September, by the curator of Bellevue Medical College, which, it was presumed, would reveal the true character of the disease.

The hospital record, as made at the time of the investigation, is as follows:

"James Kelly, admitted September 12, 1870; history, obscure; comatose when admitted; skin, jaundiced; respiration, 30; pulse, 116; temperature, 98 1/2 deg. F.; hepatic tenderness; tongue, dry and coated; died, September 12, 3:30 p. m.

“Autopsy, September 13. Brain and membranes, normal; larynx, normal; œsophagus, mucous membrane eroded in longitudinal patches.” This case received a coroner’s investigation, and the verdict of the jurors was “Death by exhaustion.” The medical certificate attached to the coroner’s return, certifies that the cause of his death was “Coma (cause unknown).”

Signed by

JOHN J. REID, M.D.,

Medical Attendant at Inquest.

No post-mortem examination of the body of Mrs. Kelly was held, but the certificate of death is recorded as follows:

Coroner’s verdict—“Pernicious fever.”

Medical certificate—“Is supposed to be either yellow fever or typhus fever.”

(Signed) WOOSTER BEACH,

Medical Attendant at Inquest.

The records of the examination unfortunately were so meagre, as to afford no clue to the disease, and the doubt still existed as to its true character, until subsequent cases and further investigation pronounced the diagnosis.

In tracing the source of their illness, it was subsequently discovered that both Mr. and Mrs. Kelly had been visiting and attending the “wake” and funeral of a relative on Governor’s Island, on the 2nd and 3rd days of September, remaining thereon over night.

This relative, Wm. Harrington, was a soldier upon the Island, who died on the 1st of September, of what was stated at the time as “typho-malarial or bilious fever.”

It was also ascertained that a Mrs. Ann McCormack, another relative who had attended the same “wake” and funeral, had subsequently sickened and died on the 9th of September, at 49 Oliver Street. The cause of her death was certified by the attending physician as “typhus fever.” By careful inquiries, it was found that these three cases presented almost identical symptoms. Their similarity and obscurity indicated a coincident exposure to the same exciting cause, and incited still further in-

quiry. This resulted (after a delay of four days, caused by false information) in the discovery, as before stated, of their presence at the funeral of Wm. Harrington, on Governor's Island.

Attention being now directed to that island as the source, a Health Inspector, with another medical officer who had been familiar with diseases of tropical climates, was directed to visit it and report upon its character. It was found that a disease of similar character had been prevailing there since the 13th of August (over a month), and which the surgeons in attendance described as a type of malarial fever, accompanied with more than usual fatal results. Many of the residents had suffered, some with a very mild attack, readily yielding to treatment, while others, seized in a more violent form, had succumbed. No suspicion of yellow fever had been entertained by the attending surgeons of the post, neither could they become satisfied of the fact until the pathognomonic symptom of "black vomit" subsequently appeared as the disease progressed.

The report of the two officers, after visiting the cases upon the Island, was that the type of disease was that of the "pernicious remittent fever so frequently seen in the South, and which so generally precedes yellow fever in that locality."

The surgeons of the post had made post-mortem examinations of the dead, and had carefully watched with the microscope for casts or other evidences of yellow fever; no case had presented "black vomit," and, therefore, no correct diagnosis had been made.

The suspicions which had been entertained by the medical officers of the Board of its being yellow fever, were thus, in a measure, quieted, as no positive evidence had yet presented itself.

About this time other cases presenting the same doubtful symptoms occurring in New York City had come to the knowledge of the Board, all of which were traced to Governor's Island as their source; and a fresh, or rather increased outbreak, with more marked symptoms, having occurred upon the Island, the Board, anxious to settle, if

possible, the doubt requested Dr. J. C. Nott, of Mobile, a gentleman who had large experience in this special disease in Southern States, to visit the Island and report his opinion. On the 2nd of September he visited the Island, and the diagnosis was made clear by a post-mortem examination of a recent case of this disease and the presence of "black vomit" in others. His report to the Board on the following day, was that it was undoubtedly yellow fever. A special committee was immediately appointed by the Board, consisting of the Chairman of the Sanitary Committee, Dr. G. Ceccarini, the Health Officer of the Port, Dr. John M. Carnochan, and the City Sanitary Inspector, Dr. Moreau Morris, and it was authorized to take the necessary measures for the removal to quarantine of those sick with yellow fever at Governor's Island, and to protect this city from said disease; and it was further instructed to investigate the origin of the disease and the circumstances of its introduction at Governor's Island.

The Committee, upon the same day, visited the Island, and becoming satisfied of the true nature of the disease, so reported to the Board, and at once conferred with the Commandant of the Post, General Neil, with reference to removing those sick, and placing the Island under quarantine restrictions, etc., etc. It was referred directly to General McDowell, commanding the Department of the East, by whose order alone such measures could be affected. The same night, in consultation with General Cuyler, Medical Director of the same department, General McDowell promptly issued the necessary orders, as had been suggested by the Committee. The following two days were devoted actively to procuring the means of making the transfer of patients, which was accomplished on the morning of October 1. Sixty patients, including many who were in a convalescent stage, were then removed.

Other cases continued to present themselves and it was not until the 26th of October that the last case appeared.

The records of the cases occurring upon Governor's Island will be found in the history of the prevalence of yellow fever at that place in the preceding pages.

From time to time the following cases were discovered in New York City, during the period of its prevalence upon the Island. Each case was closely watched by the medical officers of the Board, and without an exception all were ascertained to have visited the Island either as nurses or friends of the sick, or were soldiers on leave of absence, taken sick at their homes. The record is as follows:

1. Ann McCormack, 49 Oliver Street, died September 9, 1870.
2. James Kelly, 14 Essex Street, died September 12, 1870.
3. Mrs. — Kelly (wife of above), 14 Essex Street, died September 12, 1870.
4. David Straney, 12 Pell Street, died September 15, 1870.
5. Mrs. Mertens, 89 Clinton Street, died September 25, 1870.
6. Peter Becker, 125 Clinton Street, died October 1, 1870.
7. Eliza Mertens, 89 Clinton Street, died October 2, 1870.
8. Eliza Stelche, from Governor's Island, at Bellevue Hospital, died October 4, 1870.
9. William H. Morris, 117 West Twenty-first Street, died October 9, 1870.
10. Charles Haab, 126 East Fourth Street, a soldier on leave, taken sick September 19, recovered.
11. John Haffner, 405 West Forty-first Street, a soldier on leave, taken sick September 25, recovered.

There is no evidence of any other case having occurred in the city.

With reference to these cases, it was ascertained beyond all question as follows:

The first four were persons who visited Governor's Island and attended the funeral of Wm. Harrington, who died on the 1st of September and was buried on the 3rd;

the fifth, sixth and seventh cases were immediate relatives of Sergeant Merten's, who was sick upon the Island, and whom they visited and attended upon as nurses—No. 5 being the mother, No. 6 the brother-in-law and No. 7 the sister.

The eighth case was a soldier's wife residing upon the Island, who was removed therefrom surreptitiously, for fear of being taken to Quarantine Hospital, and taken to Bellevue Hospital, where she died; the disease being unrecognized until after death by the medical attendants. Case nine was a discharged soldier from the Island, sick when he left, ill two weeks before death at his father's house. Cases 10 and 11 were soldiers, at home, on leave of absence, taken sick while at home, and remaining there; finally recovered.

These eleven cases, scattered in different portions of the city, it was feared, might prove centers for infection, and were watched with great care. In each case all the measures of disinfection and sanitary care were applied, which would, if possible, prevent its further spread.

In no instance did any person suffer from its effects, or from the diffusion of any poison therefrom, beyond the case itself, within the city.

1872. No statistics. On vessels in harbor.

1873. First case, May 23; first death, August 1; last case, October 1; last death, September 27. Cases, 62; deaths, 13.

In the city proper, three fatal cases, all refugees from New Orleans.

1875. On vessel in harbor.

1876. Cases, 2; deaths, 2. Refugees from Savannah.

1878.

Population, 1,235,389.

Yellow fever appeared August 16th. Patrick Wm. Riley, a horse-shoer from New Orleans, arriving that day, very sick, was sent to quarantine and soon died. William Schultz died August 22; a week later, Mrs. Joseph Cellers, a Memphis refugee, living in Tenion Court, a

narrow lane near 53 University Place, was taken with fever just after giving birth to a child; she was sent to quarantine, and died September 30. Dr. N. A. Lindley, who felt the symptoms of yellow fever on his way from Memphis, arrived at quarantine September 23, and died there. He was one of the many heroes of the terrible epidemic of 1878, being among the first to respond to the call for aid when the fever broke out in Memphis. Worn out with incessant work, he sought to return to his family, who were in the North. When he reached New York, he proceeded at once to the quarantine hospital, and gave Dr. Vanderpoel an account of his case. He received every attention; Dr. Vanderpoel visiting him three times a day. He rallied on Friday night, but sank rapidly soon after, and died at noon September 30.

Total deaths, 4—all refugees. The disease did not spread to the inhabitants.

1879. First case, June.

1880. Fourteen cases, of which five proved fatal, from vessels in harbor.

1881. Population, 1,206,517. Deaths, 1.

1887. First case, September 7. Cases, 1.

1888. Population, 1,535,538. One case, a refugee from Oak Lawn, Fla., on September 10; death, September 12.

1888. Infected by Port au Prince, Hayti. First case, November 24.

1889. Cases from various vessels arriving from infected ports. First case, June 10; first death, September 15. Cases, 5; deaths, 2.

1890. Cases, 1.

1893. Cases, 1; deaths, 1.

1895. No statistics.

1896. Cases, 1; deaths, 1.

1897. Cases from vessels in harbor.

1898. Cases, 1; deaths, 1.

1901. Cases, 3.

1905. Deaths, 1.

QUEENSBOROUGH.

1801. Scattered cases.

RED HOOK.

1856. Scattered cases.

RONDOUT.

1843. Scattered cases.

STAPLETON.

1848. First case, August 23.

STATEN ISLAND.

1848. Scattered cases.

TOMPKINVILLE.

1848. Scattered cases.

WALLABOUT.

1804. Scattered cases. Infected by vessels from Cape Haytien, Hayti, and Guadeloupe.

WEST NECK.

1795. Scattered cases.

WEST POINT.

1804. No statistics.

YELLOW HOOK.

1856. Infected by Governor's Island. No statistics.

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BEAUFORT.

1854. No accurate statistics.

1864. Infected by Newberne, N. C. First case, September 24; last case, November 17. Deaths, 68.

1871. No statistics.

GOLDSBORO.

1888. One case, a refugee from Florida; recovery.

HATTERAS.

1864. Infected by Newberne. No statistics.

MOORHEAD CITY.

1864. Infected by Newberne. No statistics.

NEWBERNE.

1799. No statistics.

1864. Population, 9,000. First case, September; last case, November. Deaths, 760.

ROANOKE ISLAND.

1864. Infected by Newberne.

SMITHVILLE.

1862. No statistics.

WASHINGTON.

1800. No statistics.

WILMINGTON.

1796; 1800; 1821. Yellow fever years. No statistics.
1862. Infected by Nassau, Bahama Islands. First case, August 6; last case, November 17. Deaths, 446.

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OHIO.

CALEDONIA.

1878. One case, a refugee.

CINCINNATI.

1871; 1873. Cases among refugees.

1878. Population, 280,000. The first case was a young lady living in a house where baggage from New Orleans was stored, and the second case occurred in the same locality. Harris Hackett and Blanche Offner died August 28. A Jewish refugee died on Walnut Hills. The family fled, the alarmed nurse left the body, and no one would enter the house to bury the corpse, until Police Officer Joe Smith bravely led the way.

Total cases, all refugees, 49; total deaths, 19. Date of last death, October 31st.

1879. Refugee from Memphis. No cases among inhabitants.

1897. One case, a refugee.

1905. Three cases—all refugees.

DAYTON.

1878. Population, 38,374. Yellow fever was brought here in September by some refugees from Key West and other infected places. Among the fatal cases was Joseph Lebolt, from Holly Springs, Miss. He was attended by the celebrated Dr. Julius Wise, of Memphis, who only reached his bed-side a few hours before he died. Very few other cases occurred.

1897. Population, 175,000. One case, a refugee.

GALLIPOLIS.

1796.

This is one of the famous epidemics of history, cited by nearly every author on yellow fever. The facts are

obscure, however, and we have grave doubts that this outbreak was yellow fever.

1878.

Population, 3,700. First cases were Chas. Degelman, engineer, and Wm. Koidler, of the steamer *John Gibson*, which landed three miles below the city on August 20. September 11, Joseph Porter, watchman of the *John D. Porter*, died. His body was not permitted to be moved from his house, nor his wife to leave. The schools closed, business suspended and many citizens fled. Mrs. Brown died September 27, below town, where the infected district was located. The disease disappeared October 17. Total cases, 51; total deaths, 31.

MARIETTA.

1832. No statistics.

NEWTON FALLS.

1898. No statistics.

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PENNSYLVANIA.

BALD EAGLE VALLEY.

1799. Sporadic cases.

CHESTER.

1798. Deaths, 50.

CHESTER COUNTY.

1805. Sporadic cases.

KENSINGTON.

1793. Sporadic cases.

LISBURN.

1803. First cases in August. No statistics.

MARCUS HOOK.

1798. First case, August. Cases, 60; deaths, 4.

NYTTANY.

1799. Sporadic cases.

PHILADELPHIA.

1693. First appearance of yellow fever in Philadelphia, according to Webster, La Roche and Berenger-Feraud. No record.

1695. Traditional outbreak.

1699. First outbreak epidemic. Population, 3,800. First cases in June; first death, July 15. Deaths, 220.

1732. Deaths, 250.

1741. First case, May; first death in June; last case in September. Deaths, 240.

1742; 1743; 1744. Yellow fever years. No statistics.

1747. First case in June; last case in October.

1760. Scattered cases.

1762. First case, August 28; last case, November —; last death, October 30. No statistics.

1763; 1789; 1791. Yellow fever years. No statistics.

1793. Great epidemic. Population, 40,144. Number who fled, 17,000. First case, August 18; first death, August 22; last case in December. Deaths, 4,044.

1794; 1795; 1796. Scattered cases.

1797. Severe epidemic. First case, August 1; last case, October 15. Deaths, 1,292.

1798. Another great epidemic. Population, 60,000. First case, August 1; last death in November. Deaths, 3,506.

1799. Severe epidemic. First case, June 28; last case in October; last death, October 18. Deaths, 1,015.

1800. First case in July; last case in September. Deaths, 20.

1801. Scattered cases.

1802. First case in August. Cases, 598; deaths, 307.

1803. First case, July 19; first death, July 25; last case, October 5; last death, October 20. Cases, 3,900; deaths, 195.

1805. First case, July; last case, October.

1806; 1807; 1808; 1809; 1810; 1811; 1812; 1813; 1814; 1815; 1816. Scattered cases. No statistics.

1818. Cases, 2; deaths, 2.

1819. First case, June 23. Cases, 24; deaths, 20.

1820. First case, July 24; last case, November. Cases, 125; deaths, 83.

1826. Scattered cases.

1853. Infected by ship *Mandarin*, from Cuba. First case, July 19; last case, October 7; last death, October 12. Cases, 170; deaths, 128.

1854. Scattered cases.

1870. First case, June 29. Deaths, 18.

1878. Two cases, refugees from Vicksburg, August 24. Cases, 4; deaths, 1.
1879. Cases on brig *Shasta*, from Hayti.
1883. Cases on brig *Julia Blake*, from Havana.
1893. Cases, 3; deaths, 0. In harbor.

PITTSBURG.

1878. One case from the ill-starred *John D. Porter*, died soon after arrival at Pittsburg. No developments.

SOUTHWARK.

1793. A suburb of Philadelphia, which see.

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RHODE ISLAND.

BLOCK ISLAND.

1801. First case in April; first death, August 2; last case in December.

BRISTOL.

1795; 1796; 1797. Yellow fever years. No statistics.

NEWPORT.

1806. Scattered cases.

PROVIDENCE.

1794. Infected by a tramp ship which had communicated with vessels from West Indies. No statistics.

1795. Deaths, 45.

1796; 1797; 1800. Scattered cases.

1802. Infected by ship *Frassana*, from New Orleans.

1805. Scattered cases.

WESTERLY.

1798; 1808. Scattered cases.

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SOUTH CAROLINA.

BEAUFORT.

1817. Infected by Charleston. No record of cases and deaths.
 1871. First case, August 6. Deaths, 7.

CHARLESTON.

1693; 1699; 1700; 1703; 1728; 1732; 1734; 1739; 1745; 1748; 1749; 1753; 1755; 1761; 1762; 1768; 1770; 1792; 1794; 1795; 1796; 1797; 1798. Yellow fever years. No authentic statistics.

1799. No record of cases; deaths, 239.
 1800. No record of cases; deaths, 184.
 1801. Scattered cases.
 1802. No record of cases; deaths, 96.
 1803. Scattered cases.
 1804. No record of cases; deaths, 148.
 1805. Scattered cases.
 1807. No record of cases; total deaths, 162.
 1809; 1812. Scattered cases.
 1817. First case, July; last case, November. No record of cases; total deaths, 272.
 1819. First case, August; last case, October. No record of cases; total deaths, 177.
 1822. First case, June; last case, August. No record of cases, total deaths, 2.
 1824. First case, August; first death, August; last case, November. No record of cases; deaths, 235.
 1825. First case, August; last case, September. No record of cases; deaths, 2.
 1827. First case, August; last case, November. No record of cases; deaths, 64.
 1828. First case, August; last case, September. No record of cases; deaths, 26.
 1830. First case, September; last case, November. No record of cases; deaths, 30.

1834. First case, August; last case, October. No record of cases; deaths, 49.
1835. First case, August; last case, September. No record of cases; deaths, 25.
1838. First case, August; last case, November. No record of cases; deaths, 351.
1839. Infected by Burmah, from Havana. First case, June 7; first death, June, 8; last case, October. No record of cases; deaths, 134.
1840. First case, August; last case, October. No record of cases; deaths, 22.
1843. First case, November; last case, November. No record of cases; deaths, 1.
1849. Infected by ship *Numa*, from Havana. First case, August 6; last case, November. No record of cases; deaths, 125.
1852. First case, August; last case, November. No record of cases; deaths, 310.
1854. Population, 50,000. Infected by Key West. First case, May 14; first death, August 16; last death, November. Cases, 20,000; deaths, 627.
1856. First case, August; last case, November. No record of cases; deaths, 211.
1857. First case, September; last case, November. No record of cases; deaths, 13.
1858. First case, July; last case, December; last death, December 22. No record of cases; deaths, 717.
1862. Scattered cases.
1864. First case, July 27; no record of cases or deaths.
1871. First case, July 19; no record of cases; deaths, 213.
1874. No record of cases; deaths, 37.
1875. One fatal case from Savannah.
1876. No record of cases; deaths, 27.
1898. Charleston Quarantine. One death.

COLUMBIA.

1854. No statistics.

FORT MOULTRIE.

1824. Population, 70 soldiers. Cases, 12; no deaths.
1834. Infected by Charleston. Cases, 5; deaths, 2.
1852. First case, September 7. Cases, 33; deaths, 4.
1858. First case, August 15. No record of cases and deaths.

GEORGETOWN.

1854. First case, August 20; last case, October 28. No record.

HILTON HEAD.

1862. First case, September 8; last case, October, 25. No record.

JAMES ISLAND.

1876. No record of cases; deaths, 2.

MOUNT PLEASANT.

- 1817; 1848; 1852; 1854; 1856; 1857; 1876. Yellow fever years. No statistics.

PORT ROYAL.

1877. No record of cases; deaths, 25.

SULLIVAN'S ISLAND.

1876. No statistics.

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TENNESSEE.

BAILEY STATION.

1879. Infected by Memphis. No records of cases and deaths.

BARTLETT.

1878. First case, August 20; last case, October 29; last death, November 8. Cases, 74; deaths, 9

BEACH GROVE.

1878. One death, a refugee.

BELL'S DEPOT.

1878. Cases, 5; deaths, 3.

BETHEL SPRINGS.

1878. One death, a refugee.

BROWNSVILLE.

1873. Cases, 4; no deaths.

1878. Number who fled, 3,000. Infected by Memphis. First case, August 20; first death, September 1; last case, October 29; last death, November 8. Cases, 747; deaths, 212.

BUNTYN.

1878. Throughout the epidemic of 1878, Buntyn was crowded with Memphis refugees, and the first case of fever occurred October 1st. Among the last cases was that of Jefferson Davis, Jr., son of ex-President Jefferson Davis. He died October 16th.

1879. Infected by Memphis. Cases, 15; deaths, 3.

CHATTANOOGA.

1878. Number who fled, 6,000. First case, August 15; first death, August 21; last death, November 10. Cases, 446; deaths, 135.

COLLIERSVILLE.

1878. Number who fled, 400. Infected by Memphis. First death, August 24. Cases, 135; deaths, 56.

COVINGTON.

1878. Population, 1,200. Almost entire population fled. No record of cases; deaths, 1.

ERIN.

1878. Population, 723. Cases, 38; deaths, 10.

FOREST HILL.

1879. No statistics.

FRAYSER STATION.

1878. No statistics.

GADSDEN.

1878. Population, 530. Cases, 6; deaths, 4.

GALWAY.

1878. Population, 60. Cases, 13; deaths, 8.

GERMANTOWN.

1878. Infected by Memphis. First case, August 20. Cases, 89; deaths, 35.

GILL'S STATION.

1878. No records of cases; deaths, 1.

GRAND JUNCTION.

1873. Cases, 1; deaths, 0.

1878. Number who fled, 100. First case, August 11; first death, August 17. Cases, 185; deaths, 74.

HARRISON STATION.

1879. Population, 100. Infected by Memphis. Cases, 12.

HERNANDO ROAD.

1879. Infected by Memphis. Cases, 4.

HORN LAKE.

1879. First case, September 11; first death, September 14; last case, September —; last death, September 18. Cases, 3; deaths, 1.

HORN LAKE ROAD.

1879. First case, August 20; first death, August 25. Cases, 13; deaths, 5.

HUMBOLDT.

1873. Infected by Memphis. Cases, 3; deaths, 0.

HUNTINGTON.

1873. No record of cases; deaths, 1.

JACKSON.

1878. No record of cases; deaths, 3.

KNOXVILLE.

1878. Cases among refugees, principally from Chattanooga.

LA GRANGE.

1878. First case, September 3; first death, September 6. Cases, 128; deaths, 37.

MARTIN.

1878. Number who fled, 250; first case, August 28. No record of cases; deaths, 40.

MASON.

1878. First case, August 29; first death, September 2. Cases, 61; deaths, 24.

McCALLUM FARM.

1879. No statistics.

McKENZIE.

1878. No record of cases; deaths, 3.

MEMPHIS.

1828; 1853; 1855; 1866. No statistics.

1867. No record of cases; deaths, 231.

1873. Infected by Cochran, Alabama. First case, September 14; last case, November. Cases, 10,000; deaths, 2,000.

1878. Number who fled, 30,000. Infected by New Orleans. First case, August 6; last case, December 12. Cases, 18,500; deaths, 5,000.

1879. Population, 40,000. Number who fled, 23,890. First case, May 23; first death, May 26. Cases, 2,010; deaths, 587.

1897. Cases, 52; deaths, 14.

MILAN.

1878. Number who fled, 1,800. Infected by Memphis. First case, August 26; first death, August 29. Cases, 19; deaths, 12.

MOSCOW.

1878. Number who fled, 70. Infected by Memphis. First case, August 21. Cases, 109; deaths, 35.

MURFREESBORO.

1878. No record of cases; deaths, 2.

NASHVILLE.

1878. Infected by Memphis. First case, August 31. Cases, 27; deaths, 13.

NUBIA.

1878. Cases, 2; deaths, 2.

PARIS AND SUBURBS.

1878. Nearly the whole population fled. Infected by Memphis. First case, August 23; last case, October 4. Cases, 35; deaths, 23.

PIGEON ROOST ROAD.

1879. No record.

RALEIGH.

1878. No record of cases; deaths, 14.

ROSSVILLE.

1878. No record of cases; deaths, 6.

SHELBY DEPOT.

1873. No record of cases; deaths, 3.

SHELBYVILLE.

1879. Infected by Memphis. No record of cases; deaths, 1.

SOMERVILLE.

1878. Number who fled, 650. Infected by Memphis. Cases, 167; deaths, 57.

TULLAHOMA.

1879. One fatal case in August, from Shelbyville.

UNION CITY.

1878. No record of cases; deaths, 1.

VICE-PRESIDENT'S ISLAND.

1879. Infected by Memphis. First and only case, October 8; died October 13.

WHITE HAVEN.

1878. Population, 100. Cases, 4; deaths, 2.

WHITE STATION.

1878. Infected by Memphis. First case, August 25; first death, August 28. Cases, 65; deaths, 50.

1879. Infected by Memphis. First case, October 6. Cases, 1; deaths, 0.

WILLISTON.

1878. Cases, 18; deaths, 11.

WINCHESTER.

1878. Cases, 1; deaths, 1.

WYTHE.

1873. Infected by Memphis. Cases, 6; deaths, 0.

1878. No record of cases; deaths, 1.

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TEXAS.

ALLEYTON.

1867. First case, September 4; last case, December.
No record of cases; deaths, 45.

ANDERSON.

1867. No record.

AUSTIN.

1867. No record.

BASTROP.

1867. No record.

BEAUMONT.

1863. No record.

1897. Cases, 1; deaths, 0.

BELLEVILLE.

1855. No record of cases; deaths, 1.

BRAZORIA.

1859. No record.

BROWNSVILLE.

1853. First case, September 23; last case, December
23. No record of cases; deaths, 50.

1862. No record.

1879. No record.

1882. Population, 4,500. First case, June 24; first
death, —; last case, November 10; last death, November 6.
Cases, 1,072; deaths, 63.

BRENHAM.

1867. First case, August 11; last case, October 31.
No record of cases; deaths, 120.

CALVERT.

1867. First case, October 12; last case, January 10,
1868. No record of cases or deaths.

1873. Population, 1,500. Number who fled, 900. In-
fected by Shreveport, La. First case, September 5; first
death, September 10; last death, December 29. Cases,
450; deaths, 125.

CAMEL.

1903. Cases, 28; deaths, 1.

CINCINNATI.

1853. No record.

CHAPEL HILL.

1867. First case, August 8; last case, December. No
record of cases; deaths, 123.

COLUMBIA.

1833; 1873; 1903. No statistics.

CORPUS CHRISTI.

1853. No record.

1854. Population, 1,000. Infected by New Orleans.
No record of cases; deaths, 30.

1862. No record.

1867. Infected by Indianola, Texas. First case, Au-
gust. No record of cases or deaths.

1873. No record.

1882. (Refuge Camp). First case, August 23; first death, August 25; last case, August 23; last death, August 25. Cases, 4; deaths, 2.

1903. No record.

CORSICANA.

1873. No record.

CASTROVILLE.

1903. Cases, 1.

CYPRESS BAY.

1853; 1859. No statistics.

DANVILLE.

1867. No record.

DE WITT COUNTY.

1903. Cases, 5; deaths, 1.

EDINBURG.

1859. First case, July. No record of cases; deaths, 13.

GALVESTON.

1839. Population, 1,000. First case, September 30; last case, October 11. No record of cases; deaths, 250.

1844. Population, 6,000. First case, July 5. No record of cases; deaths, 400.

1847. Population, 6,000. First case, October 1; last case, November 25. No record of cases; deaths, 200.

1853. Population, 8,000. First case, August 16; last case, November 28. No record of cases; deaths, 536.

1854. First case, August 9; last case, November 5. No record of cases; deaths, 404.

1858. Population, 10,000. First case, August 27; last case, November 14. No record of cases; deaths, 873.

1859. Population, 10,000. First case, September 17; last case, November 30. No record of cases; deaths, 183.

1864. Population, 5,000. First case, September 1; last case, November 20. No record of cases; deaths, 259.

1866. Population, 12,000. No record of cases; deaths, 3.

1867. Population, 22,000. First case, June 26; last case, November. No record of cases; deaths, 1,150.

1870. Population, 22,500. No record of cases; deaths, 16.

1873. Population, 25,000. No record of cases; deaths, 7.

1882. No statistics.

1894. No record. On vessel in harbor.

1895. No record. On vessel in harbor.

1897. Cases, 12; deaths, 0. On vessel.

1905. One case, on vessel in harbor.

GOLIAD.

1867. First case, July 12. No record of cases; deaths, 23.

HARRISBURG JUNCTION.

1867. No record.

HEMPSTEAD.

1867. First case, August 9; last case, November 25. No record of cases; deaths, 151.

HOCKLEY.

1853. No record.

HONDO.

1903. One case, a refugee.

HOUSTON.

1839; 1844; 1847; 1848. No statistics.

1853. Population, 7,000. First case, August 28; first death, September 4. No record of cases and deaths.

1854; 1858; 1859; 1864. No statistics.

1870. No record of cases; deaths, 1.

1897. Cases, 3; deaths, 0. Refugees.

HUNTSVILLE.

1868. First case, August 9; last case, October 19. No record of cases; deaths, 130.

INDEPENDENCE.

1867. No record.

INDIANOLA.

1852. No record.

1853. Population, 1,000. Infected by New Orleans. First case, August 30. No record of cases; deaths, 106.

1858; 1859; 1862. No statistics.

1867. Infected by ship *Margarita* from Vera Cruz. First case, June 20. No record of cases; deaths, 80.

LA GRANGE.

1867. First case, August; last case, December. No record of cases; deaths, 200.

LAREDO.

1903. Cases, 1,008; deaths, 107.

1904. Cases, 10.

LIBERTY.

1867. No record.

LIVERPOOL.

1853. First case, August. No record of cases; deaths, 4.

LYNCHBURG.

1853. Scattered cases. No statistics.

MATAGORDA.

1862. No record of cases; deaths, 120.

1863. No record.

MILLICAN.

1864. No record.

1867. First case, October 15; last case, November 12. No record of cases; deaths, 4.

MINERA.

1903. Cases, 137; deaths, 16.

NAVASOTA.

1867. First case, August 12; last case, December. No record of cases; deaths, 154.

OLDTOWN.

1867. No record.

PALARYANA.

1882. Infected by Point Isabel, Texas. Cases, 18; deaths, 2.

POINT ISABEL.

1853. No record.

1882. First case, August 29. Cases, 208.

PORT LAVACA.

1867. First case, July 3; last case, October 29. No record of cases or deaths.

RICHMOND.

1853; 1859. No record.

RIO GRANDE CITY.

1867. No record.

SABINE CITY.

1853. Population, 200. First case, July; last case, October 1. No record of cases; deaths, 14.

1863. First case, July; last case, October 1. No record of cases; deaths, 14.

SALINA.

1853. No record.

SALUVIA.

1853. No record.

SAN ANTONIO.

1903. Cases, 43; deaths, 16.

SAN JACINTO.

(See Lynchburg).

SANTA MARIA.

1882. First case, October 24; first death, October 29. Cases, 3; deaths, 0.

SUGARLAND.

1859. No record.

VELASCO.

1853. Infected by New Orleans. No record.

VICTORIA.

1867. First case, August 1; last case, December 25. No record of cases; deaths, 200.

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VIRGINIA.

ABINGDON.

1878. First and only case was Judge L. V. Dixon, a refugee from Memphis, who died September 17.

ALEXANDRIA.

1796. No statistics.

BELLONA ARSENAL.

1829. No record of cases; deaths, 1.

BOWER'S HILL.

1855. Infected by steamer *Ben Franklin* from St. Thomas, West Indies. First case, July; first death, August; last case, July; last death, —. Cases, 2; deaths, 2.

CAPE CHARLES QUARANTINE.

1893. Cases, 3.

1894. No record of cases; deaths, 2.

1897. No record.

1898. Cases, 2; deaths, 1.

CAPE HENRY.

1894. Cases, 3.

CITY POINT.

1798. No record.

FORTRESS MONROE.

1888. Infected by Spanish bark, *Buenaventura*, from Havana. One case, October 26, terminating in death on the 27th.

GOSPORT.

1855. No record.

HAMPTON ROADS.

1869. No record.

1883. Infected by vessels. No record of cases or deaths.

1899. At National Soldiers' Home. Source of infection undetermined, but "an old soldier," who had recently arrived from Santiago de Cuba and was taken ill at the Home, thought to have been original focus. First case died July 28. Depopulation resorted to by U. S. Marine Hospital authorities, with such good results, that out of the 3,500 inmates of the Home, only 45 contracted the fever. Mortality 13. Last death, August 7.

Only one case occurred outside of the above limits, namely, in the town of Phœbus, directly "across the creek" from Hampton, the source of infection being plainly traced to the Home.

NORFOLK.

1737; 1741; 1742; 1747; 1789; 1794; 1795; 1796; 1797; 1798; 1799; 1800; 1801; 1802; 1803; 1804; 1805. Yellow fever years. No statistics.

1821. First case, August 1. No record of cases or deaths.

1825; 1826. No statistics.

1848. Infected by *Vandalia*. Cases, 2; deaths, 0.

1852. Cases, 3; deaths, 3.

1854. No statistics.

1855. First case, June 30; last case, October. No record of cases; deaths, 1,807. Infected by *Ben Franklin*, St. Thomas, West Indies.

1878. No record of cases; deaths, 1.

PETERSBURG.

1798. No statistics.

PHOEBUS.

1899. Cases, 1; deaths, 0.

PORTSMOUTH.

1834. One death.

1852. Cases, 4; deaths, 4.

1854. Infected by French ship, *Chimere*, from West Indies. Cases, 7; deaths, 2.

1855. Infected by Norfolk. No complete statistics.

RICHMOND.

1806. No statistics.

1878. One case, a refugee.

SCOTT'S CREEK.

1855. No statistics.

WINCHESTER.

1802; 1803. Scattered cases. No statistics.

1804. First case in July. No record of cases and deaths.

1871. One fatal case.

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VERMONT.

GRAND ISLE.

1789. Condie and Folwell (p. 98), state that yellow fever caused "considerable mortality in Grand Isle in 1798." Source of infection not stated.

ROYALTON.

1798. Epidemic (Condie and Folwell, *loc. cit.*) No statistics.

WINDSOR.

1798. The same authorities state "a similar fever" prevailed at Windsor in 1798. No statistics.

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WASHINGTON.

PORT TOWNSEND QUARANTINE.

1897; 1902. Infected vessels from South American ports. No cases erupted at Quarantine or in the city.

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WEST VIRGINIA.

WHEELING.

1878. One case, a refugee.

PART IV.

YELLOW FEVER

EPIDEMIC

OF

1905.

EXPERIENCES DURING THE YELLOW FEVER EPIDEMIC OF 1905.

BY HENRY DICKSON BRUNS, M. D., NEW ORLEANS, LA.

As "all experience is an arch where thro' gleams the untravell'd world," and as no faithful account of any portion of a great event by an eyewitness can be wholly useless or uninteresting, I have decided to offer you these notes of my experience during the epidemic of 1905—the more as I was engaged not as a practitioner, but as a volunteer sanitary laborer, but seeing and acting always from the viewpoint of the medical man. You all know how the summer of 1905 wore uneventfully along, until the latter part of July, when a sudden "slump" in stocks set all male gossips agog seeking an explanation. You recall how, in casting about to finance the immediately necessary sanitary work, our health officers called together the representatives of the associated banks and made known to them the secret, and how, like all secrets communicated to more than one person, it soon became the common property of the town. On July the 21st the news reached my ears; on Thursday, the 25th, it was unobtrusively published in the newspapers. That night I received a note asking me to meet certain neighbors on the evening of the 26th in the basement of Trinity Church. Those invited all lived in the middle portion of the Tenth Ward, and the meeting, it was well understood, was to devise means to place our immediate surroundings in the best possible sanitary condition with the least possible waste of time. The Tenth Ward of New Orleans, you must know, runs from the river to the swamp, and from Felicity to First Streets. Meetings of citizens had already been called and volunteer work had already begun in several of the other wards.

Reporting at the designated time and place, I found present the Rev. Beverley Warner, the signer of the call; Dr. Joseph Holt, Messrs. Hunt and William Henderson,

Mr. Hewes Gurley, Mr. George Leverich, Capt. Robert Perrin, Messrs. Charles and Arthur Palfrey, Capt. I. L. Lyons, Mr. Robert B. Parker, Dr. G. King Logan, Mr. Harry Charles, Mr. George Allain, Dr. Allan Eustis, Dr. L. G. LeBeuf and Mr. Hoffman.

With little ado the meeting was organized by calling me to the chair. Without debate it was decided that the first thing to be done to combat invasion of our neighborhood by the fever was to make our cisterns impossible to the stegomyia as breeding places. To do this, according to the scientific knowledge of the day, it would be necessary to oil them (pour upon the surface of the water a small quantity of coal oil) and next to cover their tops in such a way that no opening larger than one-sixteenth of inch square should remain unclosed. Secondly, that all premises should be frequently inspected and all standing water poured out, drained away or oiled, and all cess-pools, and privy vaults cleansed and oiled not less than once a week. Primarily our efforts were to be directed to covering ("screening" was the word universally adopted) as rapidly as might be consistent with thoroughness, our employees endeavoring to extend their usefulness by warning and instructing householders as to the need and the mode of cleansing and keeping their premises so as to make them inhospitable to the mosquito. As a matter of course, money would be at once needed, and the chair was authorized to appoint a finance and other necessary committees. He was also asked to become the organizer and director of the work. I accepted on the express condition that I should have absolutely nothing to do with the raising or handling of the funds. The condition being agreed to, having no faith in the performance of large committees—especially where time is a consideration—I appointed Mr. Hunt Henderson chairman of the Finance Committee, with power to appoint other members if he chose, and Dr. Joseph Holt and Dr. G. King Logan as medical advisers and assistants. Dr. Holt continued to act as adviser whenever called upon until our work ended, and Dr. Logan was our active

lieutenant until he was appointed Acting Assistant Surgeon in the Public Health and Marine Hospital Service. It was understood by all that our work would at first be confined to that part of the ward represented by the gentlemen present—a considerable strip lying between Magazine and Baronne Streets. We would do all in our power to put it in such order that the health officials might be relieved of all care about it. Afterwards, if time and means allowed, and it should prove agreeable to the residents of a larger area of the ward, we might gradually extend the limit of our endeavor. For at this time it was the common impression that the State and city health authorities were about to begin a campaign of cleaning, draining, oiling and cistern closing along the river front of each ward, progressing steadily toward the rear or swamp boundary. Evidently, if, upon reaching the middle or wealthier portion of the wards, they could be found already in satisfactory order, not only great expense and labor, but—what then was even more precious—time would be saved. It is needless to say that no adequate idea prevailed of the magnitude or cost of such a task; or of the extent of the infection and the difficulties of sanitation in the original infected district; conditions which at once began to absorb all the efforts and resources of the State and City Health Boards, rendering it impossible for them to throw any force worth speaking of into parts of the city, as yet slightly or totally uninvaded. It was this inadequacy of means to the end which brought about the appeal to the United States for assistance and the supplanting of the local sanitary authorities by the national—the United States Public Health and Marine Hospital Service. Yet, looking back, there is reason to believe that had our Health Boards pursued a course similar to the national organization's, had they appealed at once to the community for a third of a million as sinews of war, had they put every ward in the city in charge of a medical man of sense and character and established a detention hospital or hospitals, under men of experience, they might have done as well. That the money was forthcoming the event showed; that the men were

available was proven by the taking into its service of some two score of our younger physicians by the Public Health and Marine Hospital Service, and the numerous capable volunteer and paid workers who were immediately developed by the citizens' aid associations.

But to return from this digression: Dr. Beverley Warner very kindly placed the basement of his church (Trinity), together with its large yard, at our service as a headquarters. The offer was gratefully accepted, and the meeting adjourned. It may be stated at once that the resolution to keep distinct the financial and executive departments of our work was rigidly adhered to. All contributions to the fund were made to and acknowledged by the chairman of the Finance Committee, or in his absence by Capt. I. L. Lyons. The final statement prepared by him shows that the total amount collected was \$1,486, of which an unexpended balance of \$234 was, by mutual agreement, turned over to the Rev. Beverley Warner, superintendent of volunteer ward organizations, and was by him covered into the general fund raised by the citizens in fulfillment of their promise to the United States Public Health and Marine Hospital Service; so that our work cost us almost \$33 for each of the thirty-eight blocks worked over. Save in emergencies, nearly all supplies were brought through a purchasing agent, a position which Mr. Hewes Gurley kindly volunteered to fill. The approved bills were paid by our treasurer. He also paid the weekly clerical and labor payrolls prepared by our office force, so that every bill passed through at least two hands and no question as to the misapplication of a cent could possibly arise. The final statement already referred to contains many interesting data as to the amount of material consumed in protecting the thirty-eight rather thinly-built-up blocks in the area of work. For instance, we used no less than 290 pounds of bill posters' tacks, 41 hammers, 23 pairs of shears, 58 balls of twine, 3 dozen sacking needles, 6 gross of large safety pins and 17 extension ladders, besides many one and two-gallon oil cans, several large and small tin funnels, barrel faucets, scratch pads and bill files. All these not consumed in service

we turned over to the Public Health and Marine Hospital Service officer in charge of the ward on the completion of our work. Seven barrels of oil were given us by the General Citizens' Committee; of which we used four and returned over three to the Public Health and Marine Hospital Service Acting Assistant Surgeon. Unfortunately no exact idea of the amount of cloth consumed can be arrived at, because a large quantity of cotton cloth of excellent quality was given us by the Maginnis Cotton Mills, and because, until we had finished "screening" and were engaged only in inspecting and repairing, all other cloth was purchased and presented to us by Mr. Robert Parker. That, during the work of inspection and repair alone, we found it necessary to use no less than 1,034 2-3 yards at a cost of \$38.82 faintly indicates the great quantity consumed. Another donation, six barrels of creosote, given us by Mr. Sylvester Labrot, was experimented with in treating gutters, both stagnant and flowing. It was found very useful, for its specific gravity being high it sinks and continues for a long time to produce an oily film upon the surface of the water. On this account, and by reason of its antiseptic and deodorizing properties also, a half and half mixture with coal oil was found to be the best material for treating privy-vaults (Dr. Samuel Logan, Acting Assistant Surgeon, Public Health and Marine Hospital Service) and exposed pools, from the surface of which coal oil scum quickly evaporates.

Our first day, July 27, was mainly occupied in finding proper foremen, but work was begun. From the start we determined to send out no workmen except under trustworthy and intelligent foremen, and we were fortunate in obtaining men. A few were secured on July 27, and the others in the next day or two. They were: L. Mitchell, E. F. Salerno, C. P. May and R. C. Finlay, under-graduates of Tulane Medical Department; C. J. Chapotin, C. Kubel, A. M. Warner, George Upton and the Rev. George Summey, editor of the "Southwestern Presbyterian," a volunteer. The course of Dr. Summey cannot be too highly praised. Quietly, without in any way seeking notoriety, he abandoned his professional and

editorial labors and devoted his whole time to working as an oiling and screening foreman. The wisdom of securing entirely competent foremen before putting any laborers in the field became more and more apparent as we went on. Not only were the men kept steadily at work and all questions of "soldiering" eliminated, but great loss of time in getting to work in the morning, in keeping well provided with material and in deciding promptly upon the correct solution of many difficult little mechanical problems of thorough cistern covering, which frequently arose, were prevented. These foremen rapidly got together a highly efficient body of workmen, as they were given full power to employ and discharge, and the lazy or incompetent were soon weeded out. Indeed, failure to secure the right kind of foremen and to grant them these powers, together with the intrusion of political influences which insisted upon the employment of dwellers in a ward upon work in that ward, regardless of fitness or sobriety, often forcing the retention of men, drunken, inept or incompetent, seemed the chief source of wasteful expenditure and inefficient work which I observed in some parts of the city. Our foremen and clerks (except the volunteers) received two dollars a day, and our laborers one dollar and fifty cents. The largest number of laborers employed was seventy-five and the smallest, six. Our highest weekly payroll was \$502.15, and the lowest, \$66.75. The opportunity to earn this money at the height of the dull summer season and during a time of epidemic was a godsend to a large number of men, some middle-aged with dependent families, but the largest number young and single. The quality of labor we were able to engage was quite extraordinary, consisting of clerks and minor railroad employees of every kind, factory hands, mechanics, etc.—all men of intelligence and energy. Many were young fellows who had come here during the prosperous winter, obtained work, been discharged when quarantine confined the business of the city, and who were thus enabled not only to support themselves, but to lay aside enough to pay for transportation to other, and for the time more favorable, fields of

employment. The same was true, of course, throughout the city, and the money put into circulation in the execution of sanitary work and for material was instrumental in converting what must otherwise have been a season of poverty and privation to the masses into one of comparative prosperity and comfort. What a contrast to the old days, when under a visitation of the yellow plague there was nothing to be done but to sit still, to suffer and to die! How often is wisdom not only justified of her children, but of her collateral descendants!

We began work knowing that wire gauze was unobtainable in the city and that our screening must be done with cloth. We made use of three qualities, being always glad to use what we could get, and generally being unable to choose what we would take. One was a good cheese-cloth heavy enough to be used in single thickness; another, a much more sleazy material, requiring to be doubled to be of sufficient strength, and the third, the material given by the Maginnis Mills, good heavy coarse sheeting and good light duck. This we found far and away the best, and our experience led us to believe it more suited even to permanent work than wire gauze because, being more pliable, it can be more exactly applied to the closing of minute cracks by the average workman, and, if well painted over, it must prove more durable, for every variety, save the very expensive true bronze-wire gauze, rapidly corrodes.

Our first day's experience showed that, besides the obviously necessary barrels of coal oil and the extension ladders, five and two gallon oil cans, tin funnels, barrel spigots, hammers and tacks, shears, sacking needles and twine, and large safety pins were needed for cutting and fastening the cloth. Our men tried, but quickly rejected one after the other, all the suggested oiling devices, from bottles tied to poles to tin cans which opened when pressed upon the cistern rim. Some of these were found difficult and time-consuming to fill, others could not be introduced behind the overhanging eaves of certain types of cisterns, while still others were more likely to shower their contents upon the heads of the users than within

the cisterns to be oiled. They were all superseded by a ladder and a common pint or quart beer or wine bottle. These could be handily carried by a string tied around the neck, rapidly filled by means of a funnel, and easily poked into and emptied through any opening in a covered cistern. After the first day there arose a loud demand from the workmen for carpenters' aprons to hold their tacks and small tools while working on the ladders, and for tacks with heads guarded by pasteboard, as they held the cloth better and could be more rapidly used. To supply these needs we asked the assistance of the ladies of the neighborhood, and in a day or two they furnished us with more than two dozen carpenters' aprons of cheap ticking and no end of pasteboard cut into squares of about one inch. The whole leisure time of our office force and of all our visitors was spent in pushing tacks through these pasteboard squares, but during the height of the work the demand exceeded this supply, and we were obliged to engage two small boys at a quarter of a dollar a day. The speed developed by these little professionals, their rivalry and their devices for facilitating their work afforded us all much amusement.

Early experience showed the best working unit to be a foreman and two laborers for an oiling gang, and three laborers for a screening gang. In the oiling gang this allowed two laborers to carry the extension ladder, their bottles and a two-gallon oil can each, while the foreman usually carried an extra oil can. In the screening gang, two laborers, if the cistern were large, worked on the ladders, while the third and foreman, who directed the work, assisted in moving the ladders, handing up the material, helping to drape the cloth, etc. If the cisterns were small two of the laborers worked at one and the foreman and the remaining man at another. Toward the beginning of the second week many of our foremen were able to work two or even three gangs of three men each upon the cisterns of contiguous properties; but the reiterated instructions to all were thoroughness and diligence, but no more speed than was compatible with efficient work. The route from premise to premise was usually

by means of their ladders over back fences. Thus unoccupied premises were reached as rapidly as occupied ones, and the front streets, as a rule, presented no evidence of the presence of the workers. Occasionally a ladder or a big oil can standing by a front fence, a wagon cloth and ladder laden, its sleepy driver lolled upon the seat, its hang-dog-locking mule somnambulistically stamping flies beneath the torrid sun, would serve to guide the executive who wished to drop in unawares to see how his men were getting on. Two wagons were used during the whole of our work, save for the last few days of reinspection. One was furnished by Mr. Robert Parker, the driver being paid by us; the other, together with its driver, was supplied by the Messrs. Henderson. During the first days they hauled the oil barrels and deposited them in the yards of obliging citizens at convenient points throughout the district; they carried fresh supplies to the oiling gangs as the contents of their cans were used up; and, on mornings when oiling was to be begun at a distance from headquarters, they carried the men, their ladders and their oil to the starting point. After the first five days, when oiling had been completed and the oil barrels had been hauled back to headquarters, they hauled the ladders and material to the starting points every morning, and were fairly busy all day hauling extra material or transporting gangs, which had completed one block, to a new one. When not employed they reported to headquarters and remained in its immediate vicinity ready to be dispatched on any errand.

Our office force, composed of Dr. G. King Logan, Captain Robert Perrin (volunteer), Mr. C. C. Waterman, Mr. George Leverich and Dr. J. D. Weis (volunteer), soon had everything systematized and working with machine-like smoothness. Our day's work began at 7 a. m., and at that hour of each summer's morning I found one or two members of the office force, the foreman and their gangs, and the two wagons assembled before the basement of Trinity Church. The doors were unlocked, the big gates of the yard swung open, and a scene of orderly haste and bustle began. The gangs loaded their

ladders and the day's supplies of cloth upon the wagons, and then each foreman received from one of the office men, stationed at a window opening on the yard, oil cans, funnels and a box containing tacks, carpenters' aprons, hammers, shears and all things needed by his gang for the day. These boxes were also placed in the wagons and away they went to the parts of the district wherein work was to be pushed during the day. At 6 p. m. the wagons loaded with the boxes and ladders returned. The two ladders belonging to each gang, tied together and properly numbered were stored in the yard. Oil cans and work boxes were passed by the foremen through the window to a member of the office force, who looked to see that all tools taken out were returned. Each foreman handed his day's report to another member of the office force, who had charge of that particular, and the day's work was at an end.

Owing to the varying density with which the squares in the territory were built up and the great differences in size of cisterns encountered, to avoid also any stimulus to hasty work by the excitement of rivalry between our foremen, no effort was made to keep account of the number of vaults and cisterns oiled and screened daily. Instead, a large diagrammatic map of the thirty-eight squares, showing their city numbers and the streets bounding them, was prepared and posted upon one wall of our headquarters. As the oiling was completed on a square, a blue circle containing the date was drawn upon the square indicated on the map; when the screening of a square was finished a red cross holding within its arms the date was drawn. Every morning a general order directing each foreman to the square that he and his gang would be employed upon during the day was hung upon a bill-file near the map. If a square had been so far completed during one day it was sure to be finished the next, then the general order would indicate the square to which the gang should next proceed. In this way a glance at the map told not only how the work was proceeding and how long a time had elapsed since a particular square had been oiled or screened, but just where

every foreman and his gang might be found at any particular time if need arose to communicate with him, send additional supplies, etc., as very often happened. Extra material needed through the day was issued upon a written requisition upon headquarters by a foreman. ⁽¹⁾ Material was issued by a member of the office force, one of whom was always present, and the requisition hung on a bill-file kept for that purpose and properly labeled. Foremen were supplied with small scratch pads. On the first leaf, under the date of each day, they copied from the general order their assignment, and on the following leaves kept account, by street and number, of the premises visited, and the number of vaults and cisterns oiled and screened at each. They also jotted down the presence of any nuisance on any premise and anything else noteworthy. The last leaf bore the names of the gang employed under that foreman during the day and was signed by him. From these reports the daily labor roll could be made out without fear of mistake or contradiction. All reports of nuisances, improperly wire-screened cisterns, old wells which should be filled, pools or butts of standing water, were hung upon a file. Every night these were taken up by a special volunteer aid (Dr. Joseph D. Weis), who devoted himself to this task, writing and mailing a courteous note to the property holder asking for a rectification of the condition. The number of concealed cisterns (many in small back rooms), of old unused wells (some under but slightly raised buildings), or partly buried water-butts, shallow ponds, etc., discovered in the comparatively small area under our care, was astonishing. A wall file was also kept for the posting of complaints of property holders, and these you may be sure were numerous and varied. Many seemed unable to realize that damage to a piece of rotten gutter pipe was far more than compensated by the value of the cistern screening being done for them at public expense. However, each complaint was taken up and attended to, and in the end, we believe, to every one satisfactorily. It will be seen that hanging bill-files played a large part in systematizing our work. It was found the least trouble-

some way of keeping all kinds of memoranda and accounts in a business of emergency like this. Indeed, the walls of our headquarters were covered with rows of files, each surmounted by a label indicating its purpose. Only two books were kept, one, the property book, an inventory of our tools and stores entered as they were purchased; the other, the alphabetical payroll made up from the daily reports of the foremen for the laborers and for the office force by our chief clerk. An important file, called the "Skip Book," hung from a nail in the wall. It contained a list of particularly difficult jobs of cistern covering. For it came to pass that, during the first rush of the screening gangs over the district, certain cisterns were left unscreened, either because they were overlooked or were hidden away in houses or sheds, when they were usually reported to us by tenants, or because they were of such size, height or other difficult nature as to be beyond the skill of the first gang which encountered them.

Those unfamiliar with New Orleans must know that the main drinking-water supply is from rain collected from the roofs in wooden containers like railroad tanks, and almost always fitted with covers. Many of these receptacles are arranged one above the other in two or even three tiers or stories, so that the top of the highest may be level with or even a little above the house roof. They are to be seen of every diameter and height. The covers may be of plank, in which case they are often old and rotten or constructed of sheet-iron over wooden frames, conical, dome or minaret shaped, and these often present seam-cracks or rust-holes. Many very wide cisterns, twelve to fifteen feet in diameter, without covers of any sort, were met with. The "skips" were for the most part of this character, and a gang of specially handy-men under a foreman of exceptional intelligence and aptitude was constantly engaged in dealing with them. In this Messrs. Summey and Horton rendered valuable service. In covering large cisterns with very rotten tops or none at all, a ladder had to be passed across the top from one point on the rim to another, and a rude frame of boards or scantling constructed. A large sheet made

by sewing breadths of cloth together, the seams being carefully wrapped in and stitched with twine, was then drawn over the frame and tacked down all around. In screening to cover cracks and holes in sheet iron domes, similar sheets had to be made and wrapped about these cupolas. Sometimes poncha-like discs with a central hole were slipped over the spike, which, like that on a German helmet, often adorns these metallic domes, and were fastened down everywhere to the side of the cistern. In the case of a large cistern encased in cement, into which tacks could not be driven, the cloth cover was allowed to depend far down and then drawn close to the cistern circumference with cord passed around and around it. Many of the ways in which the cloth was fitted close around awkward inlet and outlet pipes did credit to the American reputation for ingenuity. Indeed, these inlet and outlet pipes were a subject of much concern to all engaged in cistern covering. At first we enclosed outlet pipes satisfactorily by putting a square of cloth over the lower end, gathering the edges close about the pipe and securing them in this position by wrapping around and around with twine. But sometimes trash accumulated at the lower end of the pipe, behind the cloth, and caused stoppage. Later a better plan, suggested by one of the Marine Hospital surgeons, of fastening with cord to the lower end of the pipe a sleeve of cotton cloth about eighteen inches long, was adopted. When the cistern overflowed water passed freely through the sleeve at the end of the pipe; when the flow ceased the cloth collapsed and prevented the ingress of mosquitoes. Inlet pipes coming from the roof gutters we at first closed by plugging the opening from the gutter into the pipe with a cone made of wire gauze painted to prevent rusting. The cone, about six inches across the top, could be pushed tightly into the opening of various sized pipes, effectually sealing them against the entrance of anything more than one-sixteenth of an inch in diameter. They could be quickly made by rolling up a square of wire gauze, as a cornucopia is made from a sheet of paper, and fastened by a few turns of wire raveled from the edge of the

gauze. A handy workman was kept making them, and we used up many dozen; sixty-six feet of yard-wide gauze being consumed before we abandoned this method. The cones were given up partly on account of the impossibility of getting fine gauze and partly because householders objected to them, on the ground that trash washed down the roof gutter would dam against the cone edges and cause the roof gutter to overflow. I confess, however, that it seemed to me better that this should occasionally happen than that the trash should find entrance into my cistern, as the cone could easily be pulled out and the gutter cleaned whenever necessary. We substituted the same sleeves that were tied over the ends of outlet pipes. Where the cistern end of the inlet pipe could be readily got at, the sleeve was tied over its open end just as with the outlet pipes. Where the cistern end of the inlet pipe was within the cistern cover and not get-at-able, the sleeve was passed into the inlet pipe at its origin from the roof gutter; then a straight bit of elastic steel about a foot long, and one-sixteenth inch thick, and a half of an inch wide, was curled into a circle and passed just within the mouth of the sleeve. When released it expanded to the circumference of the pipe and held the mouth of the sleeve closely applied to the pipe's inner surface. For these sleeves we were also indebted to the ladies of our neighborhood, who had several hundred made for us at a cost of five dollars.

Our main task was completed at about the time that the Health and Marine Hospital Service office, under Acting Assistant Surgeon Samuel Logan, was established in the ward. For the sake of greater ease of co-operation, our headquarters were, therefore, now moved to the commodious building occupied as headquarters by Dr. Logan. Our force, which had been gradually reduced as the work drew to completion, was cut down to two gangs of a foreman and three men each. These were, naturally, selected from among the most conscientious, experienced and ingenious of all who had been in our employ. On August 9th they began a systematic, minute inspection of all screening work. Their orders were to re-oil any cistern found

defective and to leave all mosquito-tight behind them. One wagon was retained to carry the ladders, cloth and other material to and from work. Following instructions, the foremen themselves mounted the ladders and inspected every foot of screening at close range, examining especially the cistern tops and the inlet and the outlet pipes. If any defect was found the cistern was oiled, the men were instructed how to make it mosquito-tight, and exact completion of these repairs carefully overseen. At the same time an additional lookout for standing water, hidden wells, or other nuisances was kept, and all such were noted in the foreman's daily report. These reports were at once turned in to Acting Assistant Surgeon Logan, who instituted instant and energetic measures for the treatment and abolition of these nuisances. Although we thought our screening had been exceptionally well done, and always under repeated instructions to prefer thoroughness to speed, yet so many were the damages inflicted by wind and weather, and so numerous the other small defects and omissions discovered on critical review that it took twenty days to go over the territory (thirty-eight blocks) and make all perfect. The wire screening at this time being put on by private contractors to replace our cloth proved especially defective and vexatious. Those engaged in wire screening seemed, for the most part, to have failed to grasp its purpose and to be unable to realize that a gap of over one-sixteenth of an inch makes a whole job useless. They seemed to think that anything which would exclude an English sparrow would answer the purpose.

As soon as this first inspection was finished (August 29th) reinspection was begun. Those blocks which had first been given to one inspector were now assigned to the other and vice versa. By Sept. 7th, this second inspection being virtually completed, and the acting assistant surgeon of the Public Health and Marine Hospital Service having the whole sanitary work of the ward well in hand, I could see no reason for the maintenance of an extra cog to the machinery. I therefore closed our office. The ladders and other implements on hand were, after con-

sultation with those interested, turned over to the Public Health and Marine Hospital Service officer; our accounts were balanced by Captain I. L. Lyons, our acting chairman of the Finance Committee, the cash surplus donated through Dr. Warner to the Citizens' Auxiliary Committee, and our work was done.

It is pleasant in looking back to be able to believe that we accomplished what we set out to do: To make a belt across this large and populous ward so thoroughly oiled and screened as to be mosquito-proof, and thus to save to the central authorities care, expense and, above all, time. The area, six by six blocks, was sufficiently large to form an interesting experiment. So far as I know it was the only district in which volunteer sanitary work was carried on from beginning to end under the constant personal supervision of a medical man. By all testimony the stegomyia, though not as extinct as the dodo, became in the center of this tract a curiosity. Around some of its edges, where our neighbors were not so well protected until the Public Health and Marine Hospital Service took hold of the work, I am told that many could be found. The area became infected seventeen times; the first time in the last days of July, but so far as we know the infection never spread but in a single instance—in the square at the corner of Camp and Felicity Streets. Ten times out of the seventeen the infection occurred on the boundaries of the area. It occurred six times on the Camp Street and three times on the Baronne Street boundary; never on the First Street boundary.

One may be sure that the experience of our men was checkered with incidents both pleasant and unpleasant during their forty-five days' campaign. Though for the most part the people acquiesced very good-naturedly in what was being done for the common weal, the belief in the mosquito theory was by no means universal. One hard-headed old Irishwoman obstinately refused to allow her cistern to be oiled. When finally persuaded by one of the most diplomatic of our foremen she exclaimed: "Well, come in and do it, if yez is bound to, but I don't believe yez can keep the Lord from gittin' those He wants

by puttin' a little ile on the cisthorns." The most unpleasant incident had to do with ward politics. After we had been at work about a day and a half, the political leader of the ward called a meeting to "organize the ward." This meeting was attended by nearly all, if not all, the gentlemen who had been present at the Trinity Church meeting and others from the central division. The meeting was organized by the ward leader, and all motions carried and all nominations confirmed were made or suggested by him. The ward was divided into three sections. The middle one, extending from Camp to Baronne Street, was confided to our care. It was resolved that the chairman of the meeting and the executives of the three divisions should meet and appoint a Finance Committee to have charge of collections and disbursements for the whole ward. The gentlemen from the central division, at whose instance I had begun the work, were without confidence in sanitary work conducted under political auspices. I was unwilling to direct such work in co-operation with a Finance Committee for whose appointment I should share responsibility, but in whose selection I should, at best, have but one vote out of three. We therefore left the meeting and determined to continue our work independently. Afterwards a rumor was circulated that the wealthier inhabitants of the central division selfishly subscribed money to protect themselves alone and left their poorer neighbors of the front and rear to meet the cost of sanitary work as best they could. This is untrue. I know that more than a score of the well-to-do living in the middle division contributed to the oiling and screening in all three divisions; many most generously to the ward funds and to the general fund besides. That more whom I do not know did so is highly probable.

The slow progress of our first inspection, which took twenty days, was the subject of some disagreeable criticism. I mention it here to emphasize the difficulty and the time-consuming nature of this work when thoroughly done. It was said that our men were not doing their duty, but were dawdling over their work for the purpose of drawing pay for a longer time. The accusation was

ridiculous. First, the two foremen in charge of inspection and repair were selected from the large number who had been in our employ by reason of their trustworthiness, diligence and skill. Their characters to those who know them are refutation enough. Secondly, their work was not done in secret, but under the eyes of the many Public Health and Marine Hospital Service men who were constantly about the premises where they were employed, of the citizens in whose yards they worked and under my own, for I frequently dropped in upon them at unexpected times. Thirdly, a like opinion has never been heard from any who closely followed this kind of work. On the contrary, that two gangs of four each could have thoroughly covered thirty-eight blocks in twenty days has seemed to them evidence of remarkable industry. A reliable man of experience stated that he had found in one block in another district twenty-six cisterns, supposed to be properly screened, which were lamentable defective and which would have required many days to repair effectually. Such criticism shows ignorance of the practical difficulties to be overcome in so closing the various types of cisterns in any district of New Orleans as to make them absolutely mosquito-tight.

SUGGESTIONS.

The experience of our summer's work resulted in the following reflections:

That the attempt to screen during an epidemic is most unfortunate. During such a time of stress the work is hurriedly and imperfectly done and cisterns which are really open to the mosquito are supposed to be properly closed. Too much attention is concentrated upon this work and the search for other standing water is neglected. These and the cesspools remain unemptied or unoiled and constitute a source of great danger. It would be far better during the actual prevalence of the disease to concentrate all attention and all work upon keeping every cistern properly oiled and reoiled, upon seeking out and emptying or oiling every body of standing water, and upon the thorough fumigation and refumigation of dwellings.

The thorough screening of cisterns so as to leave no opening larger than one-sixteenth of an inch can only be done by skilled workmen. A very common fault in this work is the neglect to carry the wire gauze or other material a foot or two down the sides of the cistern. The staves of many cisterns do not come close together at the top, and, especially in dry spells, there are large cracks between the staves, extending down a foot or more from the top through which any mosquito can readily pass.

Inspection and reinspection of the screening are as important as the work itself, and must be thoroughly, intelligently and conscientiously done to be of value. In practice it was found impossible to do this work with less than two workmen to move about the long extension ladders and a foreman of greater sagacity and fidelity to observe, note and direct the necessary repairs. Inspection done from the ground, done in any way than by going over the whole work minutely from a ladder-top, is worse than useless, in that it establishes a false belief in safety where no safety exists. The work too, if well done, is tediously slow, and many gangs will be required to inspect a whole city within any reasonable time. Unless our health authorities are particularly careful and fortunate in the selection of their employees for this work, the foundation of a calamity will be laid. It is certain that the *average* city employe possesses neither the intelligence nor the fidelity to be a foreman of such work. Reinspection is necessary because most of the material commonly used is very perishable. Only the best quality of bronze wire effectively resists the constant action of air and water. It is a pity that the screening ordinance does not permit the use of a good quality of duck. Our experience led us to the conviction that this material can be more closely and effectively applied by the ordinary workman than wire gauze, and when oil painted it certainly lasts longer. The objection that it prevents adequate aeration of the water is without force. It is practically impossible to close hermetically a wooden cistern. Rain water is charged to saturation as it falls: coolness and darkness are unfavorable to vegetable and

therefore to animal life, and make for purity of the contained water. As it is impossible to know how long defects may have existed before they are found, all cisterns with gaps more than one-sixteenth of an inch should be at once reoled by the inspectors.

There can be but little doubt that the *Stegomyia*, whatever may be her habits now, will, if driven to it, take to depositing her eggs in gutter water and that the larvæ will learn to endure their new environment. Hence it is of the greatest importance not only that underground drainage and sewerage should be pushed to completion as rapidly as possible, but that paving with asphalt, upon which unbroken surfaces must be maintained, should go hand in hand with this work. The asphalt pavement, sloping gradually to the curb, leaves no deep gutter in which stagnant pools can be maintained. Wherever the work has been done in such fashion as to leave these, it should be remodeled without delay, and where the necessities of heavy hauling demand material other than asphalt, it should be so laid as to abolish forever the old-fashioned deep gutter. A comparison of the gutters on Gravier Street from Camp Street to Baronne with those on Howard Avenue from St. Charles to Baronne; of those on Poydras Street from Camp to Baronne with those on Girod between the same streets, and of those on St. Charles Street between Julia and Girod with those on Carondelet between the same streets, will give a striking illustration of the importance of this work and the need for prompt remodeling.

In some cities the tenant is required by law to sweep or cause to be swept down every morning the stretch of gutter before his house. The ordinance is easily enforced by a word from the policeman on the beat to the householder or his servant, and all are easily educated to the advantages of the plan. It appears that such an ordinance would be specially useful in this city.

An experience with even a very limited area showed that this old city is peculiarly rich in hidden wells, cisterns and other containers. I beg to suggest that an

important part of the work of our health officers in preparing for the coming summer should consist in obtaining as complete a knowledge of the location of these containers as possible. This could be done by urging all citizens possessing such knowledge to communicate it at once to the health authorities either directly or through the public press. We found last summer that many tenants were unaware of the presence of such sources of danger on their premises, and we often obtained knowledge of them in an indirect way from former tenants or builders of the houses. The search for all unscreened bodies of standing water on all premises cannot be pushed with too great a vigor if we are to exterminate the *Stegomyia*.

May I be permitted to say that perhaps the health authorities might enlist the services of the physicians of the city as volunteer inspectors of premises, alleys, etc? The general practitioner on his rounds penetrates into every quarter and into almost every dwelling of the city. In furtherance of the general good these gentlemen might be persuaded to note down and report to the health officer every threatening nuisance which comes under their eyes without any uncomfortable use being made of their names.

It seems to me also that it has become eminently a part of our duty to encourage by word and example the sentiment that, its mode of propagation being well understood, yellow fever has been robbed of its terrors and is no more to be regarded with panic-terror by intelligent people than an outbreak of small-pox or diphtheria. As we in small-pox, by the vaccination of all non-immunes, and in diphtheria by the bold use of the serum, both as a prophylactic and a cure, proceed at once to stamp out what were in times past two of the most mortal plagues, so now upon the appearance of yellow fever we can by the prompt report of all suspicious cases, and their proper protection either at home or in detention hospitals, by the thorough fumigation of infected dwellings, and by reducing to the least possible number all breeding places of the *Stegomyia*, cut down to a minimum the mortality, and therefore the dread, of this one-time scourge. This must

follow as the logical result of our newly acquired knowledge; and when it is coupled with a calm appreciation of the utter lack of protection afforded by even the most rigid quarantine, so glaringly illustrated by the epidemic of last summer in this State, yellow fever will take its place in the popular mind along side of small-pox, diphtheria and rabies—as a disease to be avoided, but no longer capable of striking whole communities with senseless fear, canceling their humanity and exalting above manly sentiment the brutish instinct of self-preservation.

Perhaps it is Utopian as yet even to hope, but the day must come when, if we are to be protected in our health and lives by sanitary officials, these, more than any of our public officers, will be chosen by the application of the strictest of civil service laws. We can imagine, if we cannot hope for, boards of health composed of a chief sanitary officer and two or three assistants; subordinate to them a body of inspectors, and clerks of vital statistics, each receiving a salary sufficient to compensate him for devoting his life to this important work. Admission to the lowest grade of this profession—say a clerkship of vital statistics—would be open to young medical men of good character. Upon a vacancy occurring in the next highest grade—let us say that of inspector—a successful competitive re-examination would promote the brightest of the clerks; and so on to assistant to the chief sanitary officer, and finally to that of chief, when that official should be retired after a long, but fixed, period of service. To some such method the inevitable processes of evolution must lead at last.

But, come what may, through the long years that we are developing wisdom enough to choose the protectors of our lives and of lives dearer to us than our own by some better test, some higher qualification, than that of political subservience, we should at least be too proudly manful to fear and falter beneath afflictions that follow as the night the day, the folly of our own acts.

SOME LESSONS TAUGHT BY THE EPIDEMIC OF 1905.

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In this short article, the attempt will be made to call attention to some of the most important practical lessons which may be learned from many things which occurred during the prevalence of yellow fever in Louisiana and Mississippi in 1905.

I shall cull from my personal observation during that time, perhaps from previous experience viewed in a new light, and as well from the work of others. In other words, a few of my deductions may prove to be new to some readers, while others, no doubt, will be recognized as merely new interpretations of old knowledge or explanations of facts previously not understood.

Truth of Mosquito Propagation.

The correctness of the mosquito doctrine was confirmed on a larger scale and at a larger number of places than ever before. That mosquitoes are the sole known practical means of the propagation of yellow fever was demonstrated in the City of New Orleans beyond a reasonable doubt.

When the existence of the scourge became known, it was still early in summer, in July, the same month that it became epidemic in 1853. It was soon discovered that numerous *foci* already existed, located at different parts of the city. The type of fever was recognized to be severe; an old and esteemed practitioner then stated to the author that its virulence reminded him of that of the fever of 1853. The percentage of non-immunes among the inhabitants was large, owing to the large increase in population since the last mild epidemic and to the fact that the last severe pestilence had occurred twenty-seven

years previous. To sum up the situation, all conditions were such as to lead the thoughtful to expect an epidemic of vast proportions, high mortality and long duration.

What actually happened was this: The total number of cases officially reported was 3,384 with a mortality of 451, about 13%. As always, many cases must have failed of report, while deaths were necessarily reported. The fever was over about the first of November, although the first frost occurred only on December 5, and the funds raised for the sanitary campaign were not exhausted.

The only difference in the warfare waged against the pestilence in 1905 and that of previous campaigns was that measures were based solely on the mosquito doctrine: the protection of the sick against the bites of mosquitoes by means of screens, mosquito bars, &c.; the killing of mosquitoes in infected premises, chiefly with sulphur fumes; also the gradual destruction and elimination of all *Stegomyia* by general fumigation, the screening of cisterns and other water containers. The education of the public at meetings and lectures were auxiliary methods of material assistance.

Not only there was no general exodus of non-immunes, but of those who did go away, none took sick who returned after the disease was under control and before the occurrence of frost. Formerly this was a danger against which people had been warned; invariably, a few of those who did not heed the warning fell sick shortly after their return, owing to the lack of destruction of infected mosquitoes.

Why, then, this enormous difference in the prevalence, the mortality and the duration of the epidemic? Why should there have been in 1853, when the fever became epidemic in the same month, a mortality of 7,849; in 1878, when the fever was epidemic a month later, a mortality of 4,056, or respectively about eighteen and nine times greater than in 1905, when the population had largely increased? Why should the epidemic have been arrested before frost for the first time in the history of the disease in New Orleans, although there yet remained a large percentage of non-immunes?

Because the mosquito doctrine was for the first time the basis of the work done for the control of the disease and, notwithstanding the formidable difficulties encountered, it proved eminently successful.

Similar results followed analogous measures at many localities in Louisiana and Mississippi. I shall relate only a striking instance as observed directly by me in Tallulah, in Madison Parish, where I was requested to go by the president of the State Board of Health in the middle of September.

The infection had been brought there on July 21. The first suspicious cases were discovered about August 9. Precautionary measures taken after the confirmation of the diagnosis, gave rise to the hope that there would be no further cases and a greater sense of confidence was engendered by the statement, on August 26, that all cases of illness in the town had been critically examined by a representative of the Public Health and Marine Service who declared that there was not a suspicion of yellow fever in the town.

Owing to this the people threw caution to the winds, screens were torn out because they increased the heat, persons about to flee decided to remain. By the end of the month undoubted and severe cases were recognized, and on September 5 there were at least twenty cases among the comparatively small white population, while fatalities among the best known people gradually wrought the population to a high pitch of excitement and panic. Many fled, including prominent officials, the terror being intensified because practically all were non-immunes, the little town never before having had a visitation of the scourge, and because of the high rate of mortality.

Arriving on September 11, I found that over a dozen deaths had occurred and that of the forty town blocks, all but three or four were infected; in other words, the infection was general. The only water supply was derived from cisterns, tanks, barrels and wells, and the town was swarming with *stegomyia* mosquitoes.

An anti-mosquito campaign was inaugurated at once; all water containers were oiled within twenty-four hours;

the sick were screened or protected by netting; systematic fumigation was carried on vigorously; latrines were treated with crude oil and lime.

Within a week the number of new cases, which had been progressively increasing, were diminishing and by the end of September, long before frost, the epidemic was over, although a census taken at that time showed that there were yet not fewer than 200 non-immunes who had not had the fever.

Confirmatory evidence in a negative sense is not lacking. Referring to only one notable instance, I shall quote from the report of the State Board of Health in regard to Patterson, La., where "conditions were such as to make it practically impossible to control the people, and the fever, although repeatedly checked, ran its course until frost." This and a few analogous experiences of both types showed that there was that year no exceptional tendency in the fever to end early, but that where the mosquito fight was properly carried out the outbreak was stopped before frost, otherwise it continued as usual until frost.

Infection in Proportion to Number of Bites.

A lesson taught also by occurrences in 1905 is that, other things equal, the degree of virulence of the infection is probably due to the number of bites by infected mosquitoes received by the victim. It is natural this should be so as there is no poison known, animal or vegetable, organic or inorganic, the effects of which are not in proportion to the dose. The more bites the larger the dose.

My attention was attracted to this point early during my stay in Tallulah. The houses in which the infection had been most severe, as evidenced by the number both of cases and of fatalities were those where mosquitoes abounded, where water receptacles were most numerous.

An interesting and significant contrast was shown in the history of two practitioners who both did courageous and useful work in the ill-fated village.

One was a young physician employed by the State Board of Health, who thought himself immune as he had

had a slight attack during a previous epidemic, and who labored faithfully without thinking of taking any precautions. More than once during the first days he showed me the bites he had received while on his morning or his evening round, considering them somewhat as a joke and mentioning how he had watched some of the insects at work. In less than ten days after he went on duty he was stricken with a characteristic attack of yellow fever, being apparently overwhelmed by the toxemia and succumbing early, notwithstanding his youth and the devoted care he received.

The other was an older practitioner, a local man, who had never been exposed to the disease and frankly acknowledged his fear of it, notwithstanding which he did his duty as nobly as the other. The difference is that he used all possible precautions, sleeping in a screened house, smearing his face and hands with pennyroyal frequently, using a fan, and otherwise dodging mosquitoes as best he could. This man escaped the fever, or, as I believe, four or five days after receiving the only noticeable bite he suffered, he had the slightest kind of a walking case, well-nigh imperceptible.

The surroundings, the work, the degree of fatigue were the same in both men. The psychic element, the age, the comparative immunity were all in favor of the one who contracted the disease in a virulent and fatal form. The conclusion seems obvious.

In line with the facts just mentioned it must be recalled that it has been asserted previously, especially by the French observers in Brazil, that the number of bites were the bites of one mosquito produced only a mild attack.

Virulence Diminishes "Pari Passu" with the Destruction of Mosquitoes.

For the reasons given above, systematic fumigation, and the destruction of mosquitoes by any other means, first shows its effect by a reduction in the mortality rate, by a decrease in the intensity of the symptoms in those stricken. This can be understood easily. As soon as

the number of infected mosquitoes is materially lessened, it stands to reason that those who are unfortunate enough to be bitten at all are likely to receive fewer bites than those who became victims when there were yet numerous hordes of the dangerous pests. As long as there are any infected mosquitoes at all and also non-immunes exposed to their bites, so long must there break out some cases of fever, hence the length of time that usually elapses before the very last case is observed; in a much shorter time enough mosquitoes are destroyed to cut down the average number of bites received by those who are exposed, consequently the virulence is diminished long before the disease is completely arrested.

This was shown conclusively by the course of events in New Orleans during 1905. For July, before the sanitary campaign was effective, the rate of mortality among the reported cases was 20%; for August it dropped to 13%; while for the other two months of the epidemic it averaged 11.5.

In Tallulah, this was observed also. The fatalities were most numerous just before the inauguration of active warfare against mosquitoes and they diminished steadily thereafter. So much so that no one died of yellow fever who took sick after the work was well started but the much regretted young physician whose case has already been outlined and was exceptional in more ways than one. The mortality was arrested first, then the severity of the cases further decreased noticeably some time before the epidemic was over.

✕ Susceptibility of Negroes.

It was shown conclusively during 1905 that negroes are about as liable to contract the disease as the whites, but that they have it usually in a remarkably mild form. There again a valuable illustration can be obtained from Tallulah and vicinity: of 90 white cases, 18 died, or 20%; of about 950 colored cases, only 5 died, or little over 1/2%. In Lake Providence and vicinity, of 80 whites who were stricken, 15 died, or nearly 20%, while, of 247 colored

patients, 8 died, or a little more than 3%. There were reported from Patterson about 500 cases among the white, with a mortality of 51, yet, of about 200 colored cases only one died.

Several negroes were observed by me in Tallulah, who had symptoms just about sufficient to make a diagnosis possible, yet who were scarcely sick, some not even interrupting their work. At first very few of the darkies reported their sick and it was only when it became bruited about that the sick were supplied with delicacies, especially chicken during convalescence, that we obtained any idea of the large number who were having the disease.

The difference between the morbidity in the two races might be explained by the greater resistance of the blacks to the poison after its entrance in the system, but I am inclined to the belief that it is because, other things equal, the black man receives a smaller dose of the poison owing to the fact that he gets bitten less. This may be due to his tougher skin, or to the strong musky smell coming from his surface which may keep the mosquitoes away in a way analogous to that of pennyroyal and other strong scents which are used with that end in view.

Be that as it may, we all know that mosquitoes are less felt by the colored than by the whites, and 1905 showed that negroes are just as prone to contract yellow fever as their white neighbors, but have it in a very mild form.

This is an exceedingly important lesson for obvious reasons, as it was formerly thought that the negroes were practically immune and cases among them must have been overlooked easily and frequently.

Quarantines Unintelligent.

Numerous occurrences, illustrating different phases of the subject, have shown that the kind of quarantines resorted to up to 1905 were, to say the least, unintelligent because they either were unnecessary, on the one hand, or did not attain their purpose, on the other. Quarantines other than those against persons who might be infected or objects that might carry infected mosquitoes were proved to be unnecessary by the large number of

places which remained free of the disease notwithstanding the fact that ordinary business shipments were received as usual, or at most were fumigated before leaving the infected locality. The United States postal authorities refused to fumigate the mails and no harm came of the omission.

On the other hand, some places became infected which had tried the non-intercourse or shot-gun quarantine born of ignorance and panic. No land quarantine can be absolute; every avenue can not be guarded adequately. The stricter the quarantine the more object there is in evading it and the more apt is the evasion to be successful; also the average quarantine is apt to be put on, in these days of rapid and easy communication only after people have scattered from the point of original infection, some of them perhaps to the quarantining place which is lulled into a sense of false security because it has put up the bars against the rest of the world.

We have learned that the only sensible restrictions are: 1° Detention, for a sufficient time, of persons coming from an infected or suspected point. 2° Fumigation with sulphur of any inanimate objects or packages, coming from such places, which might by any chance contain living mosquitoes, possibly infected. 3° Careful screening of trains, steamboats or other means of transportation between infected and non-infected points.

Prophylaxis in Place.

It was demonstrated during the prevalence of yellow fever in 1905, that a community able and willing to rid itself of stegomyia mosquitoes could look upon the introduction of a case of the disease with equanimity. The means of propagation having been disposed of there can be no danger of a spread of the infection and the presence of the infected person is no longer a menace to the population.

Morgan City, for instance, its health and municipal authorities having been among the early converts to the mosquito doctrine, had its cisterns oiled and screened, its street gutters liberally treated with Beaumont crude oil, and became practically free from the stegomyia. On

an important factor in the degree of infection and that two, if not three, different occasions, patients ill with yellow fever came into the town from near-by infected points and remained during the course of the disease without their presence causing any outbreak of the pestilence.

This and analogous experiences make it clear that any place, by means of a timely expenditure of energy and money, may put into effect prophylactic measures whose efficiency can be counted upon.

Prophylaxis in Person.

In places where general preventive measures have not been attempted or have proved inadequate, individuals may do much in the way of personal prophylaxis.

The screening of buildings or of living rooms and remaining within them from before sunset to after sunrise proved of value during 1905. For those who had to go about, anointing the face, neck and hands with pennyroyal, camphor or other pungent substance; the systematic use of kid gloves and fans; wearing a wide flounce of mosquito netting below the hat brim, in short, the avoidance of mosquito bites by all means possible, apparently proved of value.

Hereafter it should be considered the proper thing for individuals to carry out prophylactic measures in order to re-enforce those instituted by communities or municipalities.

Depopulation of Infected Places.

The exodus from infected places of a more or less large proportion of the population, sometimes by calculation, sometimes merely by impulse, showed in 1905 that this could be a very useful procedure.

The moment yellow fever has gained anything of a foothold in a community, as many of the non-immunes as possible under existing circumstances should be removed until such time as general prophylactic measures shall have become thoroughly effective.

However, this should be done with system although promptly. The refugees should be segregated in a mosquito free camp, train or boat during the period of incubation of the disease. It has invariably followed when people hurriedly left a stricken place that a certain number have fallen sick on the road or in a strange place where people have been afraid of them, where it has been difficult to secure proper attention at the hands of experienced persons, and often where the surroundings have been unfavorable. By means of the plan just mentioned, the few who are unfortunate enough to fall sick are able to get immediate and satisfactory attention, thereby securing the best chance of recovery, while those remaining well are free to start on their journey without a sword of Damocles hanging over them. This can save both physical suffering and mental anguish.

Detention Camps.

What has just been said shows only one of the useful purposes served by detention camps. These have proved to be of the greatest utility in avoiding onerous restrictions upon travel and preventing the paralysis of all business depending upon the going of persons in and out of infected places. All those whose affairs are important enough to warrant their losing a few days during detention are able to continue their peregrinations without additional interference or delay. In the past, a larger number have been kept away from places infected, suspected or susceptible, by the dread of being bottled up indefinitely through quarantine than by the fear of the disease itself. We have learned how to provide against this risk by means of detention camps and how to establish them promptly at a reasonable cost for equipment and maintenance.

The Great Lesson.

The epidemic of 1905, and all it meant of financial loss, suffering, grief and death, could have been avoided by the timely acceptance of the mosquito doctrine and the practical application of its principles. As always, the

ounce of prevention would have been better than the pound of cure. Let us hope that this lesson has been well learned and has sunk deep. The people of New Orleans, of Louisiana, of our Southland, did nobly, as they always do, when confronted by an appalling emergency; but, with their mercurialism, will they give proper heed to future possibilities now that conditions are normal again?

We must persevere in our study of sanitary problems in general and the warfare against mosquitoes in particular. Neither is it too early to give serious attention to the chances of entrance of bubonic plague, nor premature to train our batteries on the rats. A stitch in time saves nine times nine.

THE WORK OF THE MEDICAL PROFESSION OF
NEW ORLEANS DURING THE EPIDEMIC OF
1905.

BY LOUIS G. LEBEUF, M. D., NEW ORLEANS,

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In September, 1897, a special meeting of the Orleans Parish Medical Society was called to discuss the yellow fever situation. This meeting was also convened to instruct the younger members of the profession into the etiology, symptomatology and treatment of the disease. The conference proved very valuable. Profiting by this experience, a similar meeting was called at the outset of the fever in 1905. In calling the meeting to order the Chairman expressed himself in the following words:

"No experience in my eighteen years of practice ever impressed me more forcibly than just such a meeting as this held eight years ago in the room of this society, called by Dr. John Callan, the then efficient President, for the discussion of the same subject. It was also to try and educate the new men of our profession who had never seen this dreaded disease. At that time we had with us men who told us of just such a meeting called nineteen years before, in 1878. We are happy to say that most of these men are still with us. These two previous meetings, epoch-making as they were, undoubtedly also were the saddest occurrences of our corporate existence, and we must hope that this will be the last we ever will hold for this purpose. Let us trust that the work now being done along the line of destruction and protection, following the ascertainment, belief and dogma on the etiology of yellow fever, will mean the turning point of a new era, the regeneration from our former abject, hopeless condition to something definite, something tangible.

"Let us remember how we felt twenty-six years ago. Let us remember how we felt eight years ago with nothing ahead of us, nothing which could be planned, nothing to combat. Prophylaxis in person always failed, prophylaxis in place always futile. No measure ever controlled the situation; no amount of disinfection ever helped, and when the entire truth was told, the only relief which came was when the frost of November appeared as a Heaven-sent Nemesis to our

dreadful scourge. To-day the situation is different, and though we may not succeed entirely in this present campaign, though we may not check the disease at once (for various causes which will have to be told later), we hope to restrict it to some extent, to diminish its too extensive spread, and to instill some hope into our municipal fellow-citizens, a hope which will mean the regeneration and the rehabilitation of our dear city to the standard which she should have amongst the future great cities of our country.

"I want to report, besides, that your Advisory Committee has been continuously and actively at work since last Saturday night. The task has not been the easiest and pleasantest. We will submit a very thorough report later when the work is over, and we hope then to show you that we have endeavored rigidly to conform with the principles which govern the disinterested, and high ethical standard established by this society. We have taken part in every conference, in every meeting called for the organization of the great work which is being tried in this city. One of the members of your society wrote the first instructions which were published last Sunday morning to govern all households regarding the control of the situation. Another member of the committee helped on a committee of three to plan and organize the up-to-date Emergency Screened Hospital, which was placed in operation in thirty-six hours. And though their names do not appear in print, nearly every important article or medical direction in the public press has been furnished or revised by your committee. As we are still actively at work in the campaign undertaken, we wish merely to report this as brief, temporary report until later, when we can give you a fuller and final report."

Though Carlos Finlay had advanced the theory of mosquito dissemination of yellow fever since 1881 at Havana, and though the U. S. Army Yellow Fever Commission, consisting of Reed, Carroll, Agromonte and Lazear, had made their epoch making experiments in 1900, and Lazear had already sealed the truth of the mosquito-infected transmission by his martyrdom as a holocaust to the proof of his belief, and though we had had the report of the Yellow Fever Working Party No. 2, consisting of Drs. Pothier and Parker and Prof. Beyer, with their conclusions from their work at Vera Cruz, still our public was profoundly ignorant of these scientific discoveries. When the first knowledge reached our city of the presence of this dread disease in our midst, there was almost a panic—stocks and bonds went begging, a pall seemed to

be thrown on all things, a general exodus of those who could afford it took place and the commercial interests seemed paralyzed. The experience of former years was staring the initiated public in the face. They remembered the injury to the city commercially, and the thousands of lives lost in the previous epidemics. New Orleans was like a rejuvenated city, with the millions spent here in public improvements, and the great activity in business and in railroad construction, due to the recognition of its wonderful future and prospects from the advantages of proximity to the promised Panama Canal South American trade. Everything showed it to be on the eve of great growth and development, so that when the news came to us of this epidemic, it was a dreadful catastrophe. The public remembered the pitch barrels of 1878, the flags and costumes of gruesome attendants in 1897, and nearly all were in mourning for some dear friend or relative.

Yellow fever itself, when properly treated or better, when properly let alone and nursed, is not such a very fatal disease. In the hands of a competent medical attendant the mortality is not so great as many other diseases, but it was the mystery of its onset and the strange, unaccountable manner of its propagation which chilled the heart and struck terror to the bravest. All mankind has some innate superstition, and any disease which comes in the night, as in this instance stealing from house to house, sometimes taking a whole block without crossing the street, but most times spreading all over like wildfire, without any one being able to explain its exact cause and mode of transmission, naturally appalled every one.

This was the condition of affairs when this campaign opened, and this was the state of things when, on July 22nd, we were told publicly of this trouble. No distressed people ever found its medical profession more united and more willing to help than ours was on that date. There was a tremendous work ahead of us, the work of education, of teaching the new belief and the training in the great campaign of prophylaxis and de-

struction, the thousands of laymen who were willing to make the good fight. Our part was the important one, and the difficult one; it is not very easy to reform the uninitiated to new ideas; ignorance is generally self-satisfied and prejudiced, and the propagandist of the new theory and of the new scientific facts has to prove his contention before it is believed.

It was not all to tell the public of the established facts of Los Animas and Vera Cruz; we were forced to start a campaign of education and forced to labor on the front line to direct the work of destruction and prevention.

The old theory of fomites and infection was over, and the simple fact that, first, a mosquito, and the female *Stegomyia Calopus* at that (*fasciata* as it was called then) was the offender; secondly, it could transmit the disease only if it was allowed to bite a yellow fever patient during the first three days of illness; thirdly, and lastly, that this yellow fever infected mosquito could not reproduce the disease before about twelve days after its inoculation or injection.

So, starting from these three basic fundamental truths, three specific lessons had to be taught, and practiced as the very catechism and Bible of our entire conduct.

(a) Enforce the protection of the yellow fever patients from the bite of all mosquitoes, to exclude the special offender; *i. e.*, provide mosquito bars and screen the room of the patient at once.

(b) This work of screening had to be performed as early as possible to prevent infected mosquitoes from escaping and propagating the disease.

(c) The final destruction of all the mosquitoes which might have perchance bitten a case, before the twelve days of incubation or digestive preparation was completed in the salivary glands or digestive tract of the insect and thus rendered it dangerous to other human beings.

Though these three simple truths were plain and easy, it was only the starting point of the great educational fight the medical profession had ahead of it. To be more certain of our success, it was wiser to destroy all the mos-

quitoes we could, both directly by general fumigation, and also by diminishing the probable sources of their habitat.

Screening, sagging gutters of roofs, barrels, water containers or any stationary vehicle where larvæ might be hatched—this was the dogma and instruction we had to disseminate. If we were successful, though we might not be able to stop the disease, as we had been informed of it too late, and for various inexplicable reasons the fact of the presence here had been unrecognized, or if recognized had been through criminal neglect and blindness allowed to spread beyond control, we would possibly, with a good fight, be able to restrain its too great spread, and prove to the world by this restriction that we could do something that would affect its unlimited spread, and therefore re-establish confidence and build for our future an assurance of action and control which would allow us to throw off our chains and fetters, and forever prove our immunity from what we could henceforth call the Mosquito Fever, instead of the awe-instilling name of Yellow Fever.

As a good deal of the following history which must be related personally refers to the work of the Advisory Committee of the Orleans Parish Medical Society, of which the present writer was Chairman, I will take the liberty, in most of the remainder of this article, to give excerpts of reports written by Drs. Sidney L. Theard, the able Secretary of the City Board of Health; Prof. Rupert Boyce, Dean of the Liverpool School of Tropical Medicine; Reverend Beverly Warner, in charge of the Citizens' Educational Campaign, and the 1905 Annual Report of the Orleans Parish Medical Society:

The First Steps in the Campaign and the Organization of the Resources of the City to Combat the Disease.

On Friday, July 21st, a meeting of the State and City Boards of Health, the representatives of the Public Health and Marine Hospital Service, and Health Officers from surrounding States with Drs. LeBeuf and Magruder, was convened in order to reassure the public and to

check the stringent and onerous quarantine precautions which had, on the rumors of the presence of yellow fever, been promptly taken by the surrounding States against New Orleans, although as yet no official declaration had been made. As an example of this promptitude, it is worthy of note that the State of Mississippi had issued a quarantine ordinance on the day of the meeting. Shortly after the meeting on Friday the first step in general medical organization was taken by the appointment on the following day, July 22nd, of an Advisory Board, consisting of the Chairman, Dr. Louis LeBeuf and three other members of the Orleans Parish Medical Society, viz., Drs. John Callan, Marcus J. Magruder and John F. Oechsner. This Committee was appointed to co-operate with the health authorities and to help to the best of their judgment in the campaign ahead of them. It was now fully recognized by these representative medical men that much valuable time had already been lost, and that the prophylactic measures which had up to this time been adopted by the health authorities were neither sufficiently extensive nor precise. The failure of New Orleans in this respect emphasizes what every International Sanitary Convention had drawn attention to, namely, the necessity of prompt notification of yellow fever. Without this, international and interstate laws of sanitation can not be administered with science, wisely and humanely.

On the evening of July 22nd, the Advisory Committee, the Medical Health Officer and Dr. J. H. White, U. S. Marine Hospital Service, after a protracted consultation, issued the first authoritative and collective pronouncement upon the precautions which were necessary to be adopted. The manifesto reads as follows:

An emergency exists in our city which demands the attention of every individual, with the view to limiting and preventing the spread of epidemic disease. It has been scientifically proved that the mosquito is the only means of the transmission of Yellow Fever. Measures should be especially directed against them. It is especially urged by the undersigned that the following simple directions be followed by the householders of this city during the summer months:

First—Empty all unused receptacles of water. Allow no stagnant water on the premises.

Second—Screen cisterns, after placing a small quantity of insurance oil (a teacupful in each cistern) on the surface of the water.

Third—Place a small quantity of insurance oil in cesspools or privy vaults.

Fourth—Sleep under mosquito nets.

Fifth—Screen doors and windows wherever possible with fine mesh wire.

(Signed)

QUITMAN KOHNKE,

Health Officer.

J. H. WHITE,

Surgeon, U. P. H. and M. H. S.

ADVISORY COMMITTEE,

O. P. M. S.

On the same day (July 22) the authorities, realizing that New Orleans was unprovided with a Fever Isolation Hospital, took steps to acquire an old house in the infected quarter in the Italian district. It seems, of course, very extraordinary that in the twentieth century, and in a port of the great importance and size of New Orleans, that no proper provision should have existed for the isolation of infectious cases. There is no doubt, however, after having paid dearly for their experience, that the Citizens of New Orleans will not in future allow this defect to go unremedied.

The Hospital received its first patients on July 26th, and in spite of the fact that it was placed in the midst of most unsanitary surroundings and overcrowded, it, nevertheless, answered its purpose very well, owing to the very rigid precautions against the possibilities of mosquitoes becoming infected from the patients. It was, indeed, a most striking demonstration of the harmlessness of the disease in the absence of the *Stegomyia*; seven non-immunes, including myself, spent a portion of each day in the wards, but in no instance did infection arise. The entrance to all the wards was barred by double screened doors, so that one set of doors were closed before the second set were opened.

A few weeks after the opening of this Hospital, it became necessary to change into another temporary makeshift.

The new premises were larger, more airy and situated amongst more sanitary surroundings. Owing to the subsidence of the fever, it had, however, far less work to do than the former. There is no doubt that the emergency hospitals did magnificent service, and that the greatest credit was due to Dr. Hamilton P. Jones, Dr. Paul Emile Archinard, Dr. J. Birney Guthrie, and to those who assisted them in the most arduous and difficult task, rendered still more trying owing to the hostile attitude of the poorer classes of Sicilians and Italians.

Simultaneously with the formation of the Medical Advisory Board, a meeting was held in the City Hall, under the auspices of the Mayor, the State and City Health Officers, and a number of citizens prominent in business and professional life, to review the fever situation and to raise money. The outcome of the meeting was the successful launching, under the chairmanship of Mr. Charles Janvier, of a Finance Committee—The Citizens' Yellow Fever Fund Committee—for the purpose of collecting funds to carry on the fight against the fever. On Sunday, July 23rd, the Reverend Dr. Beverly Warner, from his pulpit, took the first step in Anti-Yellow Fever propagandism amongst religious denominations, and on Monday, July 24th, the Fourteenth Ward of the City organized and met for the purpose of cleaning up and screening its own district, and for authority to issue an advertisement "For bids to screen its 250 cisterns with copper gauze or cheese cloth, and for tenders to clean out the drains." All present at this meeting subscribed to the Ward Funds. Its example was immediately followed by the other wards, and thus we started the Ward Organization, which was subsequently placed under the direction of Dr. Warner.

It will now be simple to trace the steps in the campaign if I follow the work of the several organizations:

1. The Local Medical Organization.
2. The Ward Organization.
3. The Public Health and Marine Hospital Service Organization.
4. The Educational and Press Organization.
5. The Financial Organization.

THE LOCAL MEDICAL ORGANIZATION.

Appeal for Civic Co-operation.

On Monday, July 24th, 1905, a proclamation was issued, signed by the Mayor and concurred in by the Medical Authorities, setting forth the situation, and calling upon the citizens to co-operate with the Health Authorities in stamping out the fever. It read as follows:

Mayoralty of New Orleans,
City Hall, July 24th, 1905.

To the People of New Orleans:

The Health situation in this city is serious, but not alarming. Because of this situation, quarantine has been declared against New Orleans by several States and Cities. It is proper that the actual facts be recognized and dealt with resolutely and calmly.

It is authoritatively stated by eminent sanitarians that within recent years visitation of Yellow Fever, more widely spread than that which is in our City, have been successfully met and absolutely suppressed by methods whose potency has been demonstrated by ascertained results, and the application of which is simple. Those methods are now adopted by our own State and City Health Authorities, with the volunteer assistance of the United States Marine Hospital Service, and the Orleans Parish Medical Society of this Parish. To the perfect and speedy success of the measures to be followed, the co-operation of every householder is necessary. That given, the people may confidently expect a speedy release from the trying conditions in which they are now placed, and from the apprehension of its recurrence in the future.

I, therefore, as Mayor, urge all citizens and householders to render cordial and ready obedience to the instructions which may from time to time be given by the Health Authorities, and to render every aid within their power to those Authorities in the earnest efforts which they are now making, and in which they will persist for the absolute stamping out of this infection. These instructions are not difficult of performance; they are easily to be understood, and can be followed with but little expense. Since the consensus of sanitary and medical opinion of to-day is that the infection of Yellow Fever is transmitted, or can be transmitted, only by means of the sting of the insect known as the "cistern mosquito," the following advice recently given by Dr. Kohnke, the City Health Office; by Dr. Souchon, President of the State Board of Health; Dr. White, Surgeon of the United States Marine

Hospital Service, and an Advisory Committee of the Orleans Parish Medical Society, should be willingly and implicitly obeyed by every householder in this city:

First.—To keep empty all unused receptacles of water in every house, and allow no stagnant water on any premises.

Second.—To screen all cisterns after placing a small quantity of insurance oil (a teacupful in each cistern) on the surface of the water.

Third.—To place a small quantity of insurance oil in cesspools or privy vaults.

Fourth.—Sleep under mosquito nets.

Fifth.—Wherever practicable, screen doors and windows with wire screens of close mesh.

The foregoing advice may from time to time be given by the Health Authorities with more particularity. Whatever emanates from them must be accepted as given for the good of the city and the preservation of every individual of its population, and should be respected and followed to the letter.

I repeat, upon the information of those qualified from actual investigation and scientific knowledge to speak upon this subject, that the situation in our city is not alarming, and that if it is treated by our people earnestly and intelligently, that this situation will soon be eliminated and demonstration will be made to the world that for the future the infection of Yellow Fever can have no permanent lodgement within the borders of the city of New Orleans.

MARTIN BEHRMAN, Mayor.

We concur in the above.

QUITMAN KOHNKE,

City Health Officer.

EDMOND SOUCHON, M. D.,

President, L. S. B. H.

J. H. WHITE,

Surgeon, P. H. and Marine Hospital Service.

ADVISORY COMMITTEE,

Representing Orleans Parish Medical Society.

II. APPEAL FOR EARLY NOTIFICATION.

On July 24th, 1905, a most important notice was also issued to the members of the Medical Profession from the Orleans Parish Medical Society, and signed by the Advisory Committee, Dr. White, U. S. P. H. & M. H. S., and the President of the Louisiana State Board of Health urging upon each medical man the absolute necessity of

early notification and of reporting all cases of fever. It is unquestionably an exceptionally wise circular and touches a very weak spot. I reproduce it:

Orleans Parish Medical Society,
New Orleans, La., July 24, 1905.

Dear Doctor:—We want to specially urge you to report all your cases of fever—malarial, typhoid or fever of any kind—during this summer, to the City Board of Health. It is absolutely essential to the checking of the spread of Yellow Fever in our city that all cases of fever should be promptly and conscientiously reported. Our patients, the public and the surrounding communities, will naturally look to our profession in this great emergency, and the responsibility rests in a great measure with us to check this condition, or at least to limit its too extensive spread. It is a well known and scientifically proven dogma that the mosquito theory is to be accepted as a fact; then we must exert ourselves to the utmost to destroy the mosquito, the only host of transmission of Yellow Fever. Let us, then, make a consistent campaign against it, educate our patients regarding this situation and the danger of it, and direct them to place patients immediately under netting pending action of the Board of Health. Neither your patient nor the household will be subjected to the obnoxious house quarantine of several years ago.

Above all things, report your cases promptly, to permit us to check any further foci of infection.

Even if you are not positive that the mosquito is the only source of transmission of Yellow Fever, give your city the benefit of the doubt in this important and vital matter.

Respectfully,

EDMOND SOUCHON, M. D.,
President Louisiana State Board of Health.

QUITMAN KOHNKE, M. D.,
Health Officer of the City of New Orleans.

J. H. WHITE, M. D.,

Surgeon, U. S. Public Health and Marine Hospital Service, in charge
of the Government Measures.

JOHN CALLAN, M. D.,

J. F. OECHSNER, M. D.

M. J. MAGRUDER, M. D.,

L. G. LeBeuf, M. D., Chairman,

Advisory Committee, Orleans Parish Medical Society.

III. APPEAL FOR IMMEDIATE SCREENING OF SUSPECTED CASES AND FUMIGATION.

This circular was immediately followed by another to the medical men, again urging the importance of early notification and careful fumigation. As regards the method of fumigation the circular is not as stringent on this subject as subsequent experience found to be absolutely necessary to ensure safety:

Orleans Parish Medical Society,
New Orleans, La.

Dear Doctor:—In an earnest attempt to work in harmony with the plan of procedure adopted by the Health Authority, and the U. S. Public Health and Marine Hospital Service, now being enforced in a general inspection of our entire city, we want to suggest to you, as your Advisory Committee acting with these bodies, that you report at once any case of fever in your practice remotely suspicious of being Yellow Fever. If you want to do your city the greatest good in this hour of trial, immediately constitute yourself as a Health Officer for the premises of the sick you are called to attend. Even before the regular Sanitary Inspector of the Board reaches the house, place the patient at once under a mosquito bar, pending further proceedings. Also order at once another room fumigated with sulphur—2 pounds to the 1,000 cubic feet—and then thoroughly screen it. If it cannot be done in a perfect manner, at least order all the openings screened with either cheese cloth or other light material, well packed so as to allow no mosquitoes in the room. Keep only one door free, covering all the transoms in the same manner. On entering this door beat the air thoroughly with a cloth before opening. When the room is prepared, remove the patient to it, fumigating the room just vacated in the same manner.

After the first three days of the fever the *Stegomyia fasciata* cannot be infected from that patient, but we must be careful to keep the room well closed until the final fumigation or destruction of any mosquitoes which might have remained in the room. Look to the general hygiene of the house, inquire whether the cisterns or any other open receptacles of standing water about the premises have been properly oiled or screened. Act in this matter regardless of the work which will be done by the constituted authorities, for your own personal good and for the greatest good of your city. In other words, Doctor, take every possible precaution to protect all of your fever cases from being bitten by mosquitoes during the first three days of fever.

Our interest in the entire matter is the same as yours, and we must work for the same purpose. The part to be played by our profession is an extremely important one; the faith and trust of the entire community is placed on our shoulders, and we must fully deserve the confidence reposed in us.

Very sincerely yours,

ADVISORY COMMITTEE, Orleans Parish Medical Society.

IV. APPEAL FOR AN EDUCATIONAL CAMPAIGN.

Another circular was issued on July 24th, 1905, directed to the Board of Health, pointing out the necessity of a Campaign of Education, and urging the importance of asking the Clergy to especially disseminate knowledge from the pulpit in the matter of yellow fever. The circular then proceeds to give useful information in case of infection, and finally appeals for united action in a general warfare against the *Stegomyia*:

Orleans Parish Medical Society,
New Orleans, July 24th, 1905.

Gentlemen:—The condition existing at present is one that calls for the most strenuous, prompt and vigorous measures capable of institution. In view of the absence of the necessity for obnoxious local or house quarantine, the co-operation of physician and householder should be a matter of comparatively easy solution. A campaign of education should be boldly inaugurated. The clergyman, during his rounds and from his pulpit, should be a valuable agent in the dissemination of this knowledge. The Advisory Committee of the Orleans Parish Medical Society begs to recommend that the following measures be instituted at once, with the view of stamping out the few foci of infection of Yellow Fever which now exists in our city:

Cases of fever of any character developing in the infected area may be regarded as suspicious, and the patient immediately protected from mosquitoes. The house, cisterns, yards, drains, gutters, cesspools and vaults should be carefully inspected, and no breeding spots for mosquitoes should be overlooked.

The gutters and streets must be carefully inspected, and no breeding spots for mosquitoes should be overlooked.

The gutters and streets must not be neglected. If the case proves to be one of Yellow Fever, the house must be screened and the rooms in the house other than the one occupied by the patient must be fumigated to destroy all mosquitoes in them. When the case ends, either by recovery or death, the room occupied by the patient must be fumigated, for the same reason.

The success of these procedures will largely depend upon the promptness and earnestness with which mosquitoes are prevented from coming in contact with the patient and the destruction of all mosquitoes in the room after the patient is cured or dies.

The new foci of infection must be diligently sought and drastic measures adopted for stamping them out. It is only through the proper conciliatory education of the physician and the layman, and through their sincere co-operation, that anything can be accomplished.

For the vast portion of the city not infected, we recommend that a sufficiently large force of men be immediately organized to place oil in all unscreened cisterns, or other breeding places of mosquitoes, and distribute circulars among householders enlisting their co-operation. All gutters should either be flushed or oiled.

An active, vigorous and persistent warfare on mosquitoes should, in our opinion, be immediately instituted from one end of the city to the other, as in this way localities now healthy may be kept so, even though foci of infection be introduced. We believed that the sanitary regeneration of this city depends entirely upon prompt and vigorous action upon your part.

With the profoundest assurances of our heartiest co-operation with you in any movement to better the sanitary conditions of the city,

We beg to subscribe ourselves,

ADVISORY COMMITTEE, Orleans Parish Medical Society.

V. A WARNING TO BEWARE OF THE DANGER OF OVERLOOKING THE LESS OBVIOUS BREEDING PLACES OF THE STEGOMYIA.

A very useful and practical notice was also sent out by the Advisory Committee, directing attention to the importance of not overlooking possible receptacles of water in the house, as pitchers, flower-pots, etc. It reads as follows:

Orleans Parish Medical Society,
New Orleans, Louisiana.

We desire to call your attention to the wrigglers seen inside of the residence of people. Probably the public in the fight against the mosquito have directed all their efforts against the cisterns and the barrels or the outside containers, still a source of great danger also exists inside of the bedrooms in the water-pitchers, in the dining-room, or in the conservatory in the water-pots, vases or pots for plants. A frequent error and a great menace is the habit which some householders have of only partly emptying a water-pitcher, and though

it is refilled daily it is never entirely emptied, leading always one-half pint or so for the larvae to develop. Any physician in his daily rounds can see this illustrated by inspecting the various water-pitchers in the bedrooms.

On this same line we beg to again call your attention to the accumulation of water in the urns of the cemeteries, as well as in the sagged gutters of the house drains, which are a great source of mosquito breeding after rain.

VI. APPEAL FOR A MORE SKILLED MEDICAL BODY TO CONDUCT THE CAMPAIGN.

On August the 4th, the fever still making headway in spite of all local efforts, the Advisory Board took very decided action. It candidly expressed the opinion that it had not confidence in the efficacy of the work performed up-to-date; **THAT THIS WORK MUST BE ABSOLUTELY PERFECT IN ITS WORKING TO BE EFFICIENT**, and to accomplish the desired re-organization it was necessary to call in the assistance of the Public Health and Marine Hospital Service of the United States:

Orleans Parish Medical Society,
New Orleans, La., August 4th, 1905.

City Board of Health,

New Orleans:

As there has appeared a new case in the Frye focus, which has been in existence since Monday, while we had been told that the instructions previously agreed upon in the management of all maturing foci had been rigidly carried out, and especially so in this case. As we are not satisfied that the fumigation performed by the City Board of Health has been absolutely effective, we feel, as we have shared some of the responsibility of this work, and that it is a matter of too great importance to be kept on in this unorganized and unsystematic manner. This is the first serious visitation of Yellow Fever in this country since the mosquito has been recognized as the only mode of transmission, and we are unwilling to support the City Board of Health in what we consider an ineffective service.

We regard this as the first crucial test in America, and it must be absolutely perfect in its working to be efficient. We think that the community has lost confidence in this work. We know the profession has lost faith in it. Hence, we cannot keep on upholding a system in which we do not fully concur, so we desire to strongly recommend

that the system be completely reorganized, or that the entire Yellow Fever situation in New Orleans be placed in the absolute control of the United States Public Health and Marine Hospital Service.

Very respectfully yours,

ADVISORY COMMITTEE, Orleans Parish Medical Society.

As a result of this letter and of a telegram despatched to the President of the United States, the Public Health and Marine Hospital Service assumed, in a few days, assumed control of the campaign. The Advisory Committee, however, continued their useful work and cooperated with the new forces under Dr. White, just as they had done with the Local Health Authorities, continuing to issue, with the advice of Dr. White, most useful circulars, and to generally encourage in every way the citizens to keep up the fight with unabated vigor. As the circulars which they issued show a thorough knowledge of the situation and great foresight, I gave them in full.

VII. LETTER WARNING MEDICAL MEN NOT TO OVERLOOK THE MILD TYPE OF YELLOW FEVER WHICH MAY BE FOUND IN THE NATIVE BORN.

Orleans Parish Medical Society,
New Orleans, La., August 17th, 1905.

Dear Doctor:—In the consistent campaign we are now waging throughout the city against the fever we want to enlist your hearty assistance.

We have shown up to now a uniform activity, and if some of the work already accomplished begins to show some little improvement, we feel it is greatly due to your co-operation. This, though, is the crucial moment and you must keep up reporting all your cases with unflinching promptness. THE NATIVE BORN WILL UNDOUBTEDLY BEGIN TO BE AFFECTED, AND WILL SHOW THE LIGHTEST AND MILDEST TYPES OF THE DISEASE; IT IS SPECIALLY WITH REGARD TO THESE THAT WE WISH TO WARN YOU, FOR IT IS AS IMPORTANT TO THE SUCCESS OF THE WORK BEING DONE BY THE U. S. P. H. AND MARINE HOSPITAL SERVICE THAT THE MILD CASES BE REPORTED AS WELL AS THE MARKED CASES. THESE MUST BE SCREENED AS CAREFULLY AS OTHERS.

One stegomyia infected, in the first three days from such a case, can produce a number of serious and even fatal cases. The means employed are being systematized and rendered less objectionable daily by the service, so let us endure a little inconvenience for the welfare of all.

Beware of the so-called immunization or acclimatization fever and report these cases as promptly and rigidly as if they were perfectly characteristic, so that the authorities will be able to give them the same sanitary treatment.

Very earnestly yours,

ADVISORY COMMITTEE, Orleans Parish Medical Society.

VIII. APPEAL TO HOUSEHOLDERS TO DELAY "MOVING DAY" ON ACCOUNT OF DANGER OF SPREADING INFECTION.

In view of the near approach of "Moving Day" (October 1st) the undersigned deem it their duty to direct your attention to the danger likely to attend a general moving of tenants from house to house.

Persons moving from infected localities may later develop the fever in uninfected neighborhoods, thereby developing new foci. Others now residing in uninfected houses may contract the disease by removing into houses where mild cases of fever may have occurred and recovered without medical attention, and consequently escaping fumigation. Non-immunes coming into such houses will almost inevitably contract Yellow Fever, thereby adding to our present troubles.

We do therefore urge the importance of taking such steps as may be necessary to delay the general movement for at least thirty days.

ADVISORY COMMITTEE, Orleans Parish Medical Society.

IX. DANGER OF REMOVAL OF TEMPORARY CISTERN SCREENS.

Orleans Parish Medical Society,
New Orleans, La., September 13, 1905.

There being a pretty general understanding in the community that the cheese-cloth screens over cisterns have to be removed by October 1, and the regular 18-mesh to the inch wire screen substituted by that date, we believe that a number of persons are now having this change done to the great danger of a general liberation of all mosquitoes imprisoned or bred from the pupae in the cisterns. We cannot afford, in the final fight of checking Yellow Fever in our midst, to neglect so important a matter as this, so we strongly urge that the change from

cheese-cloth to wire, if not legally postponed until December 1, shall be by having the wire screen placed over the cheese-cloth without removing the latter.

ADVISORY COMMITTEE, Orleans Parish Medical Society.

Besides all this work, the Orleans Parish Medical Society issued seven thousand pamphlets of directions and instructions to the medical profession and the trained nurses of the entire South. These pamphlets were sent broadcast at the expense of the Treasury Department of the United States. The contents of these pamphlets were carefully written by Dr. Rudolph Matas, and were approved by the Society as an exact clinical and prophylactic treatise of the entire yellow fever treatment.

In conclusion, let me add that the hard-worked profession of New Orleans never demurred when called upon to do its duty in the repression of the epidemic. The following able physicians lectured and demonstrated the propaganda of sanitary and hygienic rules in every corner of the city; from the pulpit of churches and synagogues to the factories on the river front; from the negro meeting houses back of town to the school houses on the front of the city. Yes, and further still, many were called out to speak in country places as far as Opelousas and Mer Rouge, at their own expense, and at great sacrifice to their practice. Amongst a list of volunteers, I wish to name those that come to my mind at this moment:

Dr. Juan Guiteras, from Havana; Sir Rupert Boyce, Dean of the Liverpool School of Tropical Medicine, from England—two experts, as distinguished volunteers in our cause; Dr. Quitman Kohnke, whose Lantern Slide demonstrations were most conclusive and interesting; Dr. Beverly Warner; Dr. O. L. Pothier; Dr. Allan Eustis; Dr. P. E. Archinard; Dr. Chas. Chassaingnac; Dr. J. H. White; Dr. J. A. Storck; Dr. Henry D. Bruns; Dr. H. B. Gessner; Dr. S. L. Theard; Dr. John Callan; Dr. J. B. Guthrie; Dr. E. D. Martin; Dr. M. J. Magruder; Dr. John F. Oechsner; Dr. E. L. McGehee and Dr. Jos. Holt.

STATISTICAL REVIEW OF THE YELLOW FEVER EPIDEMIC OF 1905, NEW ORLEANS.

BY JULES LAZARD, M. D., NEW ORLEANS,

*Statistician of the Yellow Fever Campaign, New Orleans,
1905, U. S. Public Health and Marine Hospital Service.*

GENERAL REMARKS.

In epidemics of all diseases, reference is always made to the previous visit of the disease in a community. During the epidemic of 1905 in New Orleans, the table of the epidemic of 1878 was used in studying the progress of the disease, as this epidemic resembled the one of 1905, only that the latter began earlier in the year and for that reason it was prognosticated that it would be more severe, a prophecy not borne out by later results.

Because of the use made of the figures of 1878, which were inaccurate and fragmentary, it was deemed advisable to place in a compact, intelligent and accurate form, the figures of 1905. The writer is quite aware that figures are very dry and uninteresting, unless some point is to be illustrated or proved.

New Orleans succeeded very well for a number of years in keeping yellow fever out by maintaining a maritime quarantine and an inspection system against the Tropics. This system succeeded very well from 1898 to 1905, but "the best laid schemes of mice an' men," etc. It was in no position, however, to successfully combat the disease once it entered the community, except by some gigantic movement, entailing the labor of many men and the expenditure of much money. Much time is lost in training men, physicians, fumigators and laborers before the force can work intelligently. It was clearly seen in 1905 that the success of a fight against an epidemic depended absolutely upon organization and equipment.

Good and bad are different sides of the same picture. The entry of the disease in 1897, with a slight reappearance the following year, taught New Orleans the ineffici-

ency of her archaic sewerage system and her poor, poor water supply system, though she was on the banks of the world's greatest river, flowing the purest water.

The visitations of yellow fever above noted gave New Orleans suggestion for a change in these important systems of a municipality. In 1897 and 1898, the mosquito doctrine was not fully known, or not known at all, but the helplessness of the city and the fervent prayers for an early frost, clearly indicated that something of a most radical sort must be done, if ever this disease made its entry again. A new drainage and water system was voted and passed upon. This was the good side of the picture of the epidemics of 1897 and 1898. Otherwise there is no telling how long the city would have delayed in instituting these sanitary reforms.

With a free supply of water, cisterns—vats for collecting and retaining rain water from roofs—will soon be torn down by order of the law, unless the "Taxpayers' Association" is stronger in its opposition than it seems to be. This will rid the city of the greatest breeding places of the *Stegomyia fasciata* or *calopus*, or whatever we may presently decide to call the mosquito which has cost the South so many thousands of lives and such vast sums of money.

On July 21, 1905, a quarantine was declared against New Orleans by the neighboring states. There is no way by which it can be definitely stated when the first case appeared in this city. This is always a difficult matter. Below are some deaths taken from all sources—the records of the City Board of Health, Charity Hospital, Touro Infirmary, Hotel Dieu. It is conceded by all who watched the progress of the disease that it began in the "Infected District," an area from the Mississippi River to the wood side of Bourbon Street and the lower side of St. Ann to the upper side of Esplanade Avenue—the "Little Italy" of New Orleans, an area covering twenty-four squares.

Here is the record:

"SUSPICIOUS" DEATHS, 1905, PREVIOUS TO EPIDEMIC PERIOD.

June 19—L. M., Italian, aged 51—Chronic nephritis and aortic aneurism.

June 20—L. K., Austrian, aged 28—Malarial remittent fever.

- June 23—I. B., Italian, aged 28—Malarial fever.
 July 1—A. S., Italian, aged 40—Endocarditis, 1118 Gallatin.
 July 2—J. M., Italian, aged 14—Continued fever. 1118 Gallatin.
 July 3—di V., Italian, aged 2—Typhoid fever. 1118 Gallatin.
 July 9—S. A., Italian, aged 24—Malarial Taxemia, 520 St. Philip.
 July 10—G. V., Italian, aged 65—Gastric Cancer, 528 St. Philip.
 July 12—F. S., Italian, aged 28—Ac. par. Nephritis, 1021 Decatur.
 July 12—A. L., Italian, aged 26—Hemorrhagic fever, 1039 Decatur.
 July 12—F., La., aged 16—Febris Hemorrhagica, 1028 Chartres.
 July 13—G. G., Italian, aged 32—Chr. Par. Nephritis, 528 St. Philip.
 July 17—F. S., Italian, aged 30—Typhoid, 1026 Chartres.
 July 17—L. G., nationality not given, aged 45—Alcoholism, 1105 N. Peters.
 July 17—J. S., Italian, aged 52—Malarial fever, 1107 Decatur.
 July 17—F. S., Italian, aged 45—Pneumonia, 605 St. Philip.
 July 17—G. T., Italian, aged 46—Typhoid, 528 St. Philip.
 July 17—J. E. A., nationality not given, aged 1—Pertussis and Cong. of the brain, 1127 N. Peters.
 July 17—J. M., Italian, aged 14—Continued fever. 528 St. Philip.
 July 17—S. R., Italian, aged 22—Typhoid, 1123 N. Peters.
 July 18—J. G., Italian, aged 47—Typhoid, 1113 Chartres.
 July 18—Di S., aged 30—Typhoid, 514 Ursulines.
 July 19—N. T., Italian, aged 29—Typhoid, 533 St. Philip.
 July 19—V. S., Italian, aged — — Typhoid, 1139 Royal.
 July 19—L. B., Italian, aged 68—Typhoid, 1031 Chartres.
 July 19—R. M., Italian, aged 56—Typhoid, 1117 Decatur.
 July 20—J. L., Italian, aged 53—Malarial fever, 17th St. Canal.
 July 20—L. E., Italian—Typhoid, 1022 Conti.
 July 20—S. V., Norwegian, aged 30—Typhoid and Ac. Nephritis.
 July 20—G. D. A., Italian, aged 51—Typhoid, 528 Ursulines.
 July 20—B., Italian, aged 19—Typhoid, 528 Ursulines.
 July 22—M. C., Italian, aged 38—Typhoid, 624 St. Philip.
 July 22—D. di V., Italian—Malarial fever, 1115 Gallatin.
 July 22—G. R., Italian, aged 38—Typhoid, 524 St. Philip.
 July 24—M. G., Italian, aged 24—Anuria, 530 Ursulines.

The report of these deaths is submitted as "suspicious" for the chief reason that they occurred in the "Infected District," or bore some relation to this locality.

Among other things which New Orleans learned for herself and taught the world is that free publicity should be given to the first case. It does not pay to keep it as a secret, because it is a secret that refuses to be kept, and other reasons. The watchword for all communities when dealing with a contagious disease is PUBLICITY.

The figures below are as the cases appeared, are official, and were compiled by the writer in his daily report to the officer in command during the epidemic. From the inception of the disease to August 5th, the City Board of Health was in charge; after this time until to close of the epidemic in November, the U. S. Public Health and Marine Hospital Service—Dr. J. H. White in command, was in charge of the fight against the disease. The disease was fought on lines laid down by the mosquito doctrine; its success is a part of the history of the city, and a bright example of modern epidemiology.

When quarantine was declared against the city, it was agreed upon that there must have been 100 cases and 20 deaths prior to this date. A figure which is approximately correct as in the beginning of the epidemic and up to August 5, the mortality was about 20 per cent. When the Marine Hospital Service took charge August 8, there were 101 foci, counting the "Infected District" as a single focus. On November 7, there had been 842 foci—meaning that there were 842 squares in which yellow fever had occurred.

A "focus" was arbitrarily fixed and had no practical value in watching the course of the disease; it came about by staining the map of the city in the square in which a case appeared for the first time. A focus when once established was counted throughout the epidemic as a focus, when as a matter of fact it was no longer infectious. It is best in all epidemics to give the public all information desired, but this must be of the character that will be understood. A focus was not understood, and the public assumed very correctly from its limited knowledge that there were 842 points of infection in the city.

DAILY RECORD OF CARES AND DEATHS AND CASES UNDER TREATMENT,
1905 EPIDEMIC.

Date	Cases	Deaths	Under Treatment	Date	Cases	Deaths	Under Treatment
July 20	100	20		July 26	15	6	
21	—	1		27	26	2	
22	20	3		28	21	3	
23	10	2		29	29	7	
24	14	1		30	27	3	221
25	11	4		31	21	5	158

Date	Cases	Deaths	Under Treatment	Date	Cases	Deaths	Under Treatm't
Aug. 1	42	6	177	Sept. 16	42	2	370
2	32	11	190	17	24	2	363
3	54	5	226	18	34	6	351
4	43	5	257	19	34	4	341
5	30	8	270	20	50	6	365
6	28	8	266	21	36	4	359
7	32	8	272	22	37	4	352
8	60	4	306	23	45	6	352
9	63	7	338	24	24	2	331
10	68	5	385	25	37	3	322
11	61	9	401	26	31	5	308
12	105	9	476	27	19	5	300
13	50	12	465	28	23	4	291
14	55	12	470	29	28	2	287
15	62	6	504	30	31	2	272
16	66	4	546	Oct. 1	23	3	260
17	74	4	592	2	19	3	243
18	62	8	590	3	30	2	232
19	58	4	588	4	22	4	228
20	45	4	566	5	28	3	219
21	61	9	566	6	25	4	214
22	57	9	518	7	29	3	226
23	53	5	528	8	19	0	226
24	44	7	522	9	17	1	216
25	65	6	525	10	18	4	201
26	47	10	500	11	16	2	195
27	31	13	448	12	15	2	192
28	45	5	434	13	25	4	185
29	45	7	418	14	19	5	181
30	46	4	419	15	9	3	162
31	41	6	402	16	15	3	155
Sept. 1	39	4	389	17	6	1	144
2	37	3	375	18	5	0	130
3	29	3	364	19	8	0	122
4	55	5	405	20	4	0	112
5	32	2	348	21	7	0	105
6	31	4	357	22	2	0	94
7	35	6	346	23	4	0	77
8	44	4	348	24	4	2	65
9	41	1	346	25	9	2	66
10	27	7	331	26	3	0	57
11	38	0	334	27	2	4	58
12	43	3	340	28	4	0	39
13	43	4	353	29	2	1	32
14	49	6	346	30	4	0	26
15	43	2	357	31	3	2	22

Date	Cases	Deaths	Under Treatment	Date	Cases	Deaths	Under Treatment
Nov. 1	0	2	19	Nov. 10	0	0	
2	1	0	17	11	0	0	
3	1	1	14	12	0	0	
4	0	1		13	0	0	
5	1	1		14	0	0	
6	1	0		15	0	0	
7	1	1		16	1	0	
8	0	0					
9	0	0					
				Total	3,402	452	

The general mortality was 13.11 per cent., though this must be considered as being too low for the general epidemic; but for the want of better figures we may accept this as the mortality for the yellow fever epidemic in New Orleans in 1905. It is easy to understand that many cases were called yellow fever unless they showed very pronounced symptoms of other diseases early in their courses, owing to the importance of screening the cases early.

Up to August 31, the Italians of native birth furnished 51 per cent. of the mortality. After this date the fire having consumed all available material in the "Infected District" slowly became more evident in other residential districts.

DEATHS CLASSIFIED ACCORDING TO AGE.

Deaths from yellow fever up to November 8, 1905:

Ages— 1-2	8
3-5	11
6-10	16
11-15	38
16-20	56
21-25	56
26-30	65
31-35	36
36-40	47
41-45	36
46-50	23
51-60	27
61-70	10
71-75	1

Conceded by Board of Health ..	20
Unclassified	2

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DEATHS BY MONTHS.

July	57
August	220
September	111
October	58
November 8	6

452

Months.	Male.	Female.
July	24	13
August	157	63
September	73	38
October	30	26
November	6	
Males	290	140
Females	140	
Board of Health ..	20	
Unclassified	2	

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DEATHS ACCORDING TO NATIONALITY.

Nationality.	Deaths.
Italy	164
France	39
Germany	18
Austria	6
Mexico	4
Russia	4
China	1
Sweden	1
Switzerland	1
Canada	2
Greece	3
Ireland	3
Australia	3

Scotland	1
Denmark	1
Portugal	1
Norway	1
Spain	1
Holland	1
	<hr/>
	255
United States	197
	<hr/>
	452

Louisiana furnished 137 of 197 deaths; many of which were of Italian parentage.

Six negroes died of yellow fever in this epidemic.

On August 12, there were 105 cases reported. This jump in the number of cases was more apparent than real and requires some explanation. In the interim of the transfer of the charge of the epidemic from the City Board of Health to the U. S. Public Health and Marine Hospital Service, there were a great number of medical inspector's cards which were held over for some days, while the arrangements were being perfected and the force organized. It being the close of the week, Saturday, the cards were counted in as new cases.

On September 16 the Diamond Festival was given, the revenue of which went into the yellow fever campaign fund. On October 26, President Roosevelt paid the city a visit. His visit to the city allayed the scare, the "could get aways" returned, and commerce, which was not hurt as badly as in 1897 and 1898, was resumed.

COMPARATIVE MORTALITY, 1904, 1905, 1906.

Comparative mortality from all diseases for New Orleans:

	1904.		1905.		1906.	
	W.	C.	W.	C.	W.	C.
June	17.15	28.57	19.68	29.72	19.29	35.32
July	16.22	28.43	19.53	22.46	15.82	30.00
August	14.57	24.43	26.01	27.91	17.34	31.36
September	15.19	25.14	18.57	27.77	12.54	24.41
October	15.76	19.11	17.02	31.53	15.70	28.33
November	17.76	30.71	16.72	27.23	17.68	30.82

REQUIREMENTS OF THE MOSQUITO DOCTRINE.*

BY DR. S. L. THEARD.

Secretary to City Board of Health, New Orleans, La.

It was my intention at first to prepare an elaborate article, reviewing and analyzing some of the more important recorded facts and incidents of our immediate sanitary history (and some as yet unrecorded ones), but I soon realized that whatever might be said must finally be made to rest upon certain primary basic principles, a brief consideration of which would be all-sufficient; for upon their intelligent application must eventually depend the success of all sanitary operations directed at the control of yellow fever.

I take for granted that everybody accepts to-day the mosquito doctrine of yellow fever transmission—that no one any longer seriously disputes the fact that the *stegomyia* mosquito, a most common species of the insect in the South and the Tropics, is the natural conveyer of yellow fever; that mosquitoes can suck up infectious germs from the blood-stream of yellow fever patients only during the first four days of the disease; that *stegomyia* mosquitoes become infectious only ten or twelve days after becoming contaminated; that they can transmit in-

* The two articles which follow are from the pen of Dr. Sidney L. Theard, who has been closely associated with the health affairs of New Orleans since the establishment of a municipal board of health for that city in September, 1898, serving that body in the capacity of secretary and sanitary officer. The articles are reproduced from the transactions of the Louisiana State Medical Society for 1906. They are introduced because they contain some important local history not generally known, and also because his conclusions are so different from those generally accepted at the time. In one of the articles Dr. Theard has shown, with the force of mathematic precision, the invaluable services rendered by him in the fever fight of 1905.—G. A.

fection continually thereafter, at intervals of feeding, until death; that stegomyiæ bite preferably in the daytime; that a non-immune inoculated by the bite of an infectious mosquito will show symptoms of yellow fever only three or four days afterwards (exceptionally, five or six).

Rigid tests, both direct and eliminative, have established all of this.

I assume also that the more important characteristics and habits of this species of mosquito are well-known, for instance, that it is a domestic, not a migratory mosquito, flying but short distances and being habitually found within houses.

All of which is sufficient for present purposes. The fact, for instance, that only the female bites and not the male, is a matter of no practical importance here, however entertaining it may be to lay audiences; for sanitary measures directed at mosquito destruction will in all likelihood never include the weeding out of the males from the females. No greater importance attaches to many other details, purposely omitted here for that reason.

To maritime quarantine the application of the mosquito doctrine is most simple, *theoretically*: It calls for disinfection, with an efficient culicide, of all vessels from infectible ports, together with their cargo, before unloading, and the detention for five days, for observation of all persons from such ports. This can never be put into practice, however, because of the exigencies of trade and travel. The disinfection of the cargo of fruit vessels, for instance, most attractive to mosquitoes (as much so almost as sugar), could not be effectively carried out without so injuriously affecting the fruit as to make it unmarketable. Again, I seriously doubt that hindrances thrown in the path of an American citizen because of the mere possibility of his being infected in consequence of his accidental residence in some port classed as "infectible," could stand the test of law.

There is even less probability that measures approximating the extreme requirements of the mosquito doctrine will ever be operated in guarding against the entrance of

infection by way of the back-door—the railroads; for experience has taught us that danger from that source is much less, and restrictive measures will probably always be less stringent in consequence.

The point which I wish to make clear and emphasize, is, that no system of quarantine will ever prove an absolute safeguard against the entrance of pestilence. It will merely reduce the danger to a minimum.

Even if an apparently ideal system could be devised, sober judgment would temper our expectations with the thought that perfection, unfortunately, is of another world only.

Our present system of maritime quarantine could be made the highest expression of what will probably ever be attempted in this direction, at least for many years to come, by reverting to the former practice of disinfecting the empty hold of fruit-vessels from *infectible* as well as from infected ports. This seems to have given us temporary immunity in the past, for a period of years, as was pointed out to this Society at its 1903 meeting.

We cannot brush by lightly the possibility of future infection. Just as long as yellow fever exists, and I am yet to learn of a single disease which has ever been wiped out from the face of the earth (names change, but diseases remain); just as long as there are stegomyiæ flying loose somewhere in this wide world of ours; just so long will we have to reckon with the possibility of the re-introduction of yellow fever infection and be prepared to prevent its spread when it appears.

What, then, should our conduct be when the disease shows in our midst? is the question which naturally suggests itself.

Careful consideration of the mosquito doctrine, in its application to the local control of the spread of yellow fever, forces upon us three conclusions:

First. *We must prevent the access of non-infected mosquitoes to yellow fever cases during the first four days of the disease.* This can only be done by the judicious use of the mosquito-bar, and those various oils so repul-

sive to mosquitoes. Necessarily the results obtained will largely depend upon the active co-operation of the household.

Second. *We must destroy mosquitoes possibly already infected.* This can be accomplished, partly by screening of the infected room or rooms (to prevent the escape of contaminated mosquitoes until they can conveniently be destroyed), and partly by fumigation (more especially of living apartments). In a measure we must again depend upon the co-operation of the household, both active and passive.

Exceptionally another room may be prepared by screening and fumigation, for the reception and further treatment of the case, and all mosquitoes immediately destroyed, by fumigation of the remaining rooms.

Oiling of water containers in the infected and eight adjacent squares will also serve to diminish the number of mosquitoes liable to become infected, either from the actual case if the screening is imperfect or not continuously practiced, or from some other unrecognized or unreported case in the same neighborhood.

Fumigation of contiguous houses might also be practiced, where permitted.

Third. *We must prevent the access of non-immunes to infected localities or infected premises.* This can only be accomplished by the judicious use of the sanitary cordon at the outset, and later of a modified house-quarantine for the prevention of promiscuous visiting and the removal of persons, possibly in the incubative stage of the disease, from infected to non-infected districts.

These are the three basic requirements—the indispensable tripod—in all measures directed at the control of yellow fever. They are the inevitable corollary of the Mosquito Doctrine; they naturally flow from it.

To ignore any of them would be a grave mistake. Such omission could only result from the grossest ignorance of the subject or the poorest judgment. Or else we would have to look for its explanation in the inability to enforce full measures of prevention, because of a half-stand wrongfully taken at the outset, and persistently kept up there-

after for the apparent sake of consistency—the result of a reprehensible and futile effort to practice that abominable policy—concealment. Futile indeed, for truth in the end must inevitably prevail.

The principles themselves are not new.

As for the methods here suggested for their enforcement, they have with me the strength of faith ever since my acceptance of the mosquito doctrine, and are, as succinctly stated, the same views held and the same recommendations made, to the proper health authority, as early as July 13th, 1905.

No one disputes the correctness of the first two propositions: screening of patients and infected premises, and destruction of mosquitoes. Regarding the third there seems to be a divided opinion, (as far as I have been able to ascertain in conversation on the subject). Some favor the sanitary cordon under all circumstances; others are in doubt as to its possible effect for good, save in the first two or three cases. All, however, seem to agree that a modified house-quarantine is most important.

By modified house-quarantine I mean the stationing of guards at the door of infected premises to prevent removals and promiscuous visiting. No further restrictions need be placed on the members of the household, who can not, as we now know, convey infection to others, and who would be at perfect liberty to enter and leave the house as they please. In the light of the mosquito doctrine, the stringent measures of 1897 are no longer permissible.

Guards might, additionally, be stationed at the four corners of badly infected squares. And if the desirability of operating this measure be granted, we have, in essence, the rudiments of a sanitary cordon, which can be made large or small according to the exigencies of the case, and the amount of infection to be contended with. With this important difference, however, that such restrictive measure should be applied at the very outset, on the first intimation of the presence of infection, in an endeavor to strangle the disease outright, and not be gradually evolved as the epidemic progresses.

Against house-quarantine the only argument, with a semblance of force, which can be advanced, is, that rigid measures might tend to discourage the reporting of cases. To begin with, a modified house-quarantine, such as I have suggested, is not a rigid measure. Nevertheless, let us carry the argument to its logical conclusion. There are persons who object to a guard in front of their house in small-pox; others, to sanitary surveillance of convalescent scarlatina cases; still others, to disinfection after diphtheria, or to a card on their door, or to any sanitary care and attention which may be bestowed upon them by boards of health. Shall all of this be abandoned in consequence? The very absurdity of the proposition becomes apparent.

The epidemic of 1905 has frequently been compared with that of 1878, and most laudatory conclusions have been drawn therefrom, from time to time. The truth of the matter is, that, while much was accomplished, a good deal of what might have been done was not even attempted. And here is the result: Though the screening of patients, and the wholesale destruction of mosquitoes, by fumigation and oiling, the number of cases was markedly reduced; it is probable, also, that the character of the epidemic was changed, from what appeared to be at the outset a most virulent type, to a much milder form of the disease; for, remember, the degree of reaction in individual cases depends as much upon the number of bites inflicted by contaminated mosquitoes as upon the degree of infectiousness of the contaminated mosquitoes themselves. But, through failure to regulate the access of non-immunes to infected premises and localities, the disease was permitted to spread rapidly to the four corners of the city; and, appearing in our midst at about the same time that it had shown itself in 1878, it disappeared only when the usual duration of yellow fever epidemics had been spent, some ten days sooner only than in 1878.

These are the bare facts of the subject, presented without any blatant effort at rhetoric.

In concluding, let me say that nothing is further from my mind than the desire to minimize or discredit any

good work which may have been done in the past, or which may now be under way. The wholesale destruction of mosquitoes last summer was a most essential, proper and laudable undertaking, however costly and however much complained of at times; and the measures now operated throughout the city to stay the rapid breeding and multiplication of *stegomyia*, are no less meritorious.

At no time, in fact, should there be a relaxation in all those preventive measures, which alone hold out a promise of relative immunity. At no time should there be a lull, from a false sense of security, in that costly vigilance which is the price of safety.

NEW ORLEANS YELLOW FEVER IN 1905.*

BY DR. S. L. THEARD.

If the history of the yellow fever of last summer is to be written in the annals of this Society, there at least let it be written right.

If what I am about to say has the appearance of an effort at self-praise, I earnestly ask that you pause a while and consider, that whatever may be said by me now, might have been said some eight or nine months ago, that I persistently refrained during all of that time from any public expressions or utterances in the matter, and that I am speaking now under stress of circumstances.

The claim which I, in turn, advance (and it will be made good by dates and by facts), is: That the backbone of yellow fever was broken in this city last summer whilst the lamented Dr. Richardson and myself were in charge of the special sanitary operations of the Board of Health.

As much was done then as could be accomplished at the time within the lines authorized by the Board of Health. Surely the disease could not have been aborted, for at no time was this feasible in the absence of any restrictive measures calculated to prevent the removal of persons, possibly in the incubative stage of the disease, from infected to non-infected districts, or the access of non-immunes to infected premises, and the consequent dissemination of the disease in that way.

Now for the facts.

Knowledge of the presence of yellow fever infection in New Orleans last summer was first had on the afternoon of July 12. On July 22 announcement of the fact was made by the State Board of Health.

From July 13 to July 22 the sanitary measures practiced were instituted, conducted and supervised by the City Health Officer. During that time I was engaged in other work at the office of the Board of Health.

* See foot note to preceding Article.

On July 23, after the announcement of yellow fever, the sanitary operations of the Board were entrusted to my care and supervision. On July 26, Dr. Farrar Richardson, of the Public Health and Marine Hospital Service, became associated with me in that work. The health officer at that time was engaged more especially in the delivery of public addresses calculated to arouse the interest of the masses in the mosquito doctrine of yellow fever transmission.

On the evening of July 26, four days after being placed in charge of the sanitary work of the Board, I announced to the Advisory Committee (a committee of seven composed of two representative business men, two members of the Advisory Committee of the Orleans Parish Medical Society, and two members of the Board of Health, with the City Health Officer, also chairman of the Board of Health, as chairman) that I had completed the arrangement of the sanitary forces of the Board into effective organization.

On August 12, in response to an appeal addressed on August 4 to the President of the United States by influential citizens, members of the medical profession, the Governor, the Mayor, the then President of the Louisiana State Board of Health and the City Health Officer, the Federal authorities assumed entire charge of the sanitary work in progress. *Formal* transfer of the emergency forces had been made on August 8, on paper, in a letter addressed by the Health Officer to Dr. J. H. White, of the Public Health and Marine Hospital Service; but the *actual* transfer occupied several days, being finally effected only on the morning of August 12.

Now as to the deductions to be drawn from these facts.

I have here a chart, originally prepared some three or four months ago, for possible insertion in the biennial report of the Board of Health, then in course of preparation. It shows the rise and fall of yellow fever from July 22 to November 22. (No record was kept of cases reported from July 12 to July 22, and none can be presented).

Dots with a connecting light line show the number of cases reported from day to day; heavy unbroken lines are made to divide the chart into periods of fifteen days ac-

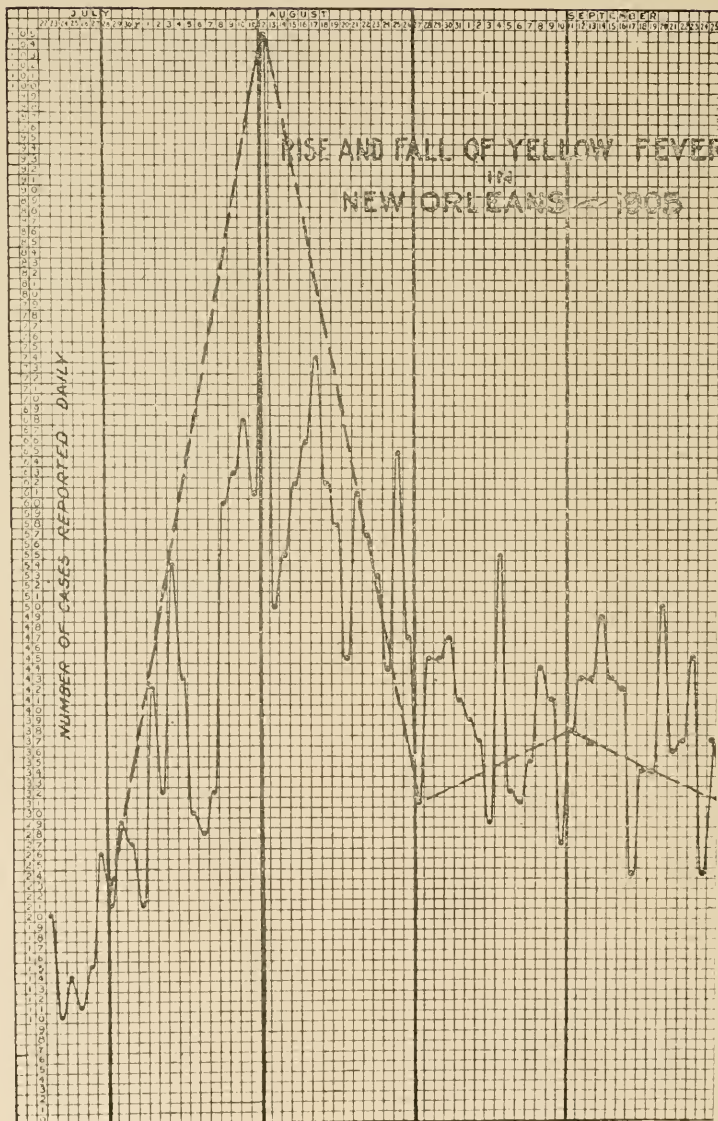
tivity, and the reading of the various periods is facilitated by the introduction of a heavy broken line. The reading of each period is made to include the figures of the first day of the following period for the reason that a large number of the cases reported each day were discovered the day before; and for the additional reason that efforts directed at mosquito destruction were in point of fact begun only on the *evening* of July 13, after the Frey funeral, the sanitary operations of the Board thereafter, throughout the epidemic, being always from 3 P. M. one day to 3 P. M. the next day.

The broken black line shows the "epidemic tendency" of the disease from time to time.

It is not the total number of cases reported in any given period, as compared with the total number of cases in some other period, which enables us to determine the "tendency" of an epidemic to rise or to abate; it is the relation of the daily figures to one another, in either period, which establishes that fact. For example: If in a given period of fifteen days the cases reported show as 2, 4, 6, 8 and so on up to 30, and in the next period as 30, 28, 26, etc., down to 2, the total in either case will be the same—240; but clearly in the first period the disease would be *increasing* and in the second period it would be *decreasing*. Bare figures here mean nothing; it is the fact or incident back of them which counts. To make this still stronger: If the daily rate of report was 2, 4, 6, etc., up to 30 in one period, and 30, 29, 28, etc., down to 16 in the next period, we would, in the first instance, have a total of only 240, as against 345 in the next period; still the disease would be clearly increasing in the first, and decreasing in the latter instance.

There is a great difference between the *number* of people walking in a given place and the *direction* in which they walk. And the numerical strength of a retreating army is a matter of secondary importance when chronicling the fact that it is being routed.

It matters not that the disease was decreasing less rapidly than it had increased; the fact that it was decreasing remains. And clearly, a disease which is decreasing is being controlled and is on the wane.



Result of Work
from July 13 to 27
(as expressed from
July 28 to Aug. 11)

Result of Work
from July 28 to Aug. 11
(as expressed from
Aug. 12 to 25)

Result of Work
from Aug. 12 to 26
(as expressed from
Aug. 27 to Sept. 10)

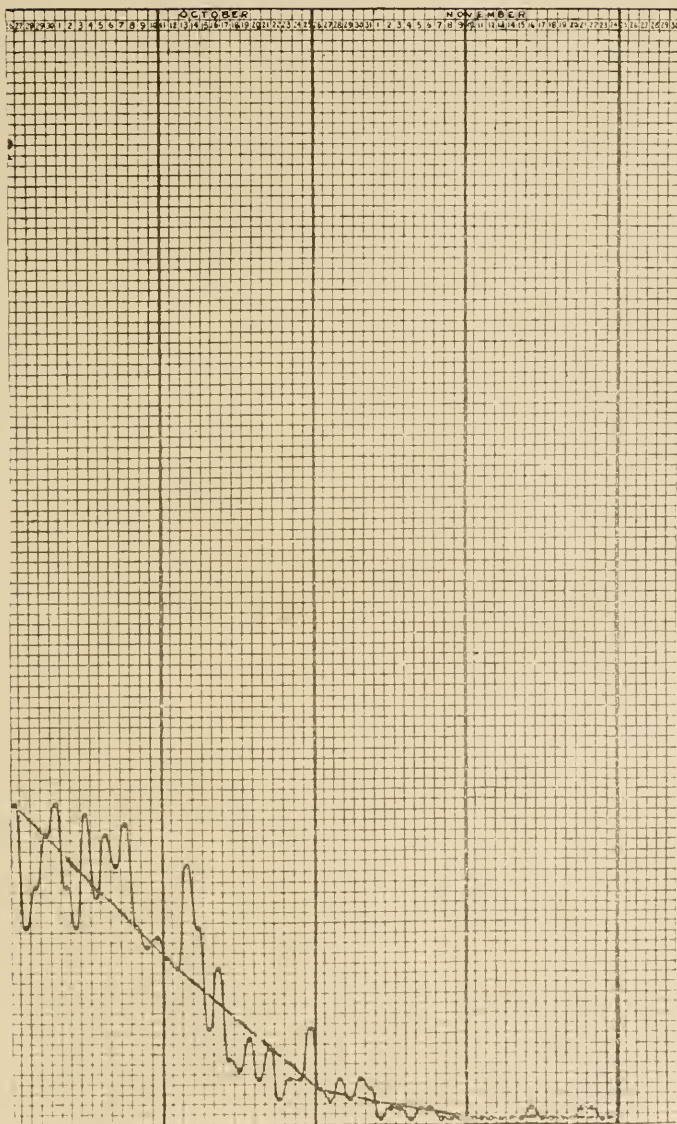
Result of Work
from Aug. 27 to Sept. 10
(as expressed from
Sept. 11 to 25)

Result of Work
from Sept. 11 to 25
(as expressed from
Sept. 26 to Oct. 10)

Result of Work
from Sept. 26 to Oct. 10
(as expressed from
Oct. 11 to 25)

Result of Work
from Oct. 11 to 25
(as expressed from
Oct. 26 to Nov. 5)

Result of Work
from Oct. 26 to Nov. 9
(as expressed from
Nov. 10 to 24)



So much for the value of bare figures unsupported by facts or logical analysis. I now revert to the main proposition.

From a sanitary point of view, the result or effect of efforts directed at mosquito destruction on a certain day, becomes noticeable only fifteen days afterwards. With this important difference between "point of time" and "point of effect" well in mind, it must be apparent, even to the most superficial observer, that the sanitary control of yellow fever was well in hand at the time that the Federal Authorities took charge. Clearly the top was knocked from the epidemic as the result of the sanitary measures operated from July 28 to August 11; and *whoever was then in charge deserves credit for that work.*

The meat and substance of it all—shown graphically on the chart presented—established definitely and absolutely and beyond all cavil, is: that the epidemic was on the ascending scale up to August 12 as the result of the half-measures practiced prior to the announcement of yellow fever and during the few days required after that to bring order out of chaos and arrange the sanitary forces of the Board of Health into effective organization; that it was on the descending scale during the fifteen days which followed, as the result of the work conducted by Dr. Richardson and myself; that the fever showed a tendency to rise during the next fifteen days, probably because of the swapping of horses in mid-stream, the United States Public Health and Marine Hospital Service having taken full charge of the work by that time; that it again abated during the following fifteen days; that the fever was never aborted at any time; that after the main force of the epidemic had been taken away from it (through work performed from July 28 to August 11, as expressed from August 12 to August 26) the fever thereafter ran a mild course under the continuous sanitary measures applied; but that it finally disappeared only after the usual period of duration of yellow fever epidemics had been reached—from three to five months—in this instance, approximately, five months.

DR. THEARD also said:

“I wish to add that the word epidemic has not been used by me in the usual and more commonly accepted sense of the word—that a majority of the people were afflicted with the disease, or that the deaths from the disease were for a time in excess of the total deaths from all other diseases; but merely and only in the sense that it was “on the people,” very much as rain might be, extending as it did from Carrollton to the Barracks, and from the River to the Lake.

“I also wish to say that some may possibly lean to the belief, held by a few, that fifteen days is too short an interval of time to judge of the effect or result of efforts directed at mosquito-destruction—that an interval of eighteen or twenty days is required. If so, it will only strengthen my position, for I would not be called upon, then, to explain the apparent lack of success following the work practiced during the few days which I stated had been required to arrange the forces of the Board into effective organization.”

ANTI-MOSQUITO ORDINANCES.

FULL TEXT OF THE MEASURES ADOPTED BY THE CITY
COUNCIL OF NEW ORLEANS DURING THE
EPIDEMIC OF 1905.

On August 1, 1905, at a time when the yellow fever epidemic was spreading with alarming rapidity, the City Council of New Orleans, adopted the following ordinance:

ORDINANCE NO. 3196. N. C. S.

Section 1. Be it ordained by the Council of the City of New Orleans, that no water liable to breed mosquitoes shall be stored within the limits of the city, except under the following conditions:

Sec. 2. Water kept in cisterns, tanks, barrels, buckets or other containers for a period longer than one week shall be protected from mosquitoes in the following manner: Cisterns shall be covered with oil by the property owner or agent thereof within forty-eight hours after the promulgation of this ordinance and provided with a cover of wood or metal; all openings in the top or within six feet of the top larger than one-sixteenth of an inch to be screened with netting of not less than eighteen mesh, or cheese cloth or other suitable material by the property owner or agent thereof within forty-eight hours after the promulgation of this ordinance; provided, that after the first day of October, 1905, all property owners shall be required to screen cisterns with wire netting of the proper size mesh as required by the Board of Health in such a manner as to prevent the entrance of mosquitoes.

Sec. 3. Tanks or barrels or similar containers to be constructed in the manner provided for cisterns, or in some other manner satisfactory to the Board of Health.

Sec. 4. Buckets containing water for longer than one week (such as fire buckets in cotton presses) and other similar containers of stagnant water, shall be covered in such a manner as to prevent the entrance of mosquitoes.

Sec. 5. Water in ponds, pools or basins, in public or

private parks, places of resort or residences, or in depressions or excavations made for any purpose, shall be stocked with mosquito-destroying fish, or covered with protective netting or shall be drained off at least once every week, or shall be covered with coal oil in a manner satisfactory to the Board of Health by the owner or agent thereof within forty-eight hours after the promulgation of this ordinance.

Sec. 6. The Board of Health may, in its discretion, whenever deemed necessary, treat stagnant water by applying oil to its surface in such a manner as to destroy mosquitoes.

Sec. 7. The object and purpose of this ordinance is declared to be the prevention of the spread of disease by the destruction of mosquitoes.

Sec. 8. The penalty for violation of this ordinance or any section thereof, shall be a fine of not more than twenty-five dollars or imprisonment for not more than thirty days, or both, and failure to comply with any provision shall be considered a separate offense for each day of its continuance after proper notification by the Board of Health.

On September 26th, the following ordinance was passed:

No. 3277, NEW COUNCIL SERIES.

AN ORDINANCE to promote the public health by prescribing the manner in which water liable to breed mosquitoes shall be cared for within the limits of the City of New Orleans.

Be it ordained by the Council of the City of New Orleans:

SECTION 1. That it shall be unlawful to set up, have, keep or maintain on any premises in the City of New Orleans, any cistern, tank or well that is not screened with wire mesh not coarser than eighteen (18) wires to the inch, both ways, provided that the inlets and outlets of such cisterns, tanks or wells may be screened in any manner or with any material approved by the Board of Health of the City of New Orleans, that will thoroughly

prevent the ingress or egress of mosquitoes to and from the water therein contained; provided, however, that no water seal shall be used in screening any such inlets or outlets.

SEC. 2. That it shall be unlawful to have, keep or maintain on any premises in the City of New Orleans, lot or batture, or in any cemetery, park or square, any pond, pool, fountain, trough, urn or water receptacle of any similar character or kind, unless the same is kept constantly covered with kerosene oil from February 1 to December 1 in each year, or be kept constantly stocked with mosquito-destroying fish, or covered with the protective netting specified in Section 1.

SEC. 3. That it shall be unlawful between February 1 and December 1 in each and every year to have or keep on any premises, water in any can, pitcher, bowl, bottle, tub, bucket, barrel, trough or other receptacle, unless the same be thoroughly emptied, dried or cleansed every five (5) days before being refilled; provided, however, that fire barrels may be maintained on premises, provided that they are properly screened with 18x18 wire mesh, but all fire buckets shall be maintained empty.

SEC. 4. That it shall be unlawful to have or maintain on any premises in the City of New Orleans any open well, unless the same be continuously closed or screened as above provided, so as to prevent the ingress or egress of mosquitoes to and from the water therein contained and the drawing of water therefrom be operated by pumps.

SEC. 5. That it shall be unlawful to have or maintain any gutter or drain or roof in or on which water stands after rains, without drawing off thoroughly.

SEC. 6. That it shall be unlawful to have, keep or maintain on any premises in the City of New Orleans, any open cesspool or privy vault, to the liquid contents of which mosquitoes have ingress or egress, unless the same be thoroughly covered with petroleum oil every fifteen (15) days from February 1 to December 1 in each and every year.

SEC. 7. That every lot or square in this city, which, in the judgment of the Board of Health, is near enough

to the house of its inhabitants on which water stands in pools or ponds, or which contains excavations or holes or depressions in which water may stand, is hereby declared a menace to public health, and the owner thereof who shall fail, after notice by the City Board of Health and within the time therein prescribed, to fill or drain the same or keep it covered with petroleum oil, shall be deemed guilty of a violation of this ordinance.

SEC. 8. That it shall be unlawful to set up, have, keep or maintain in any house or hotel, water closets furnished with a tank or basin with water seal, unless such tanks or basins be emptied and the water therein renewed at least once in five (5) days, from February 1 to December 1 in each and every year, or be kept during same period thoroughly covered with kerosene oil.

SEC. 9. That the City Board of Health shall cause this ordinance to be enforced in all its provisions, and to that end said board or persons acting under its authority shall have the right any time from 9 A. M. to 4 P. M. each day to enter upon premises, lots, squares, parks or battures, and any person charged with any of the duties imposed by this ordinance failing, after notice by said Board of Health and within the time prescribed by said notice, to perform said duties, shall be deemed guilty of a violation of this ordinance, and for each day after the expiration of said notice the party notified fails to comply with said notice shall be guilty of a separate violation of this ordinance, and all fines collected for violations of this ordinance shall be paid to the City Board of Health by the Recorder collecting the same; provided, however, that no notice from the Board of Health or its officers shall be required to hold any person liable to penalties for the violations of Sections 1, 2, 3, 4, 6 and 8 of this ordinance, the provisions of which sections are declared to be self-operative and imperative; but in cases under those sections where screening has been improperly done originally, or where the screening has gotten out of order, or has been injured and rendered defective without the knowledge of the owner, or, if absent his agent, then the pen-

alties shall be imposed only on failure, after notice, to make the necessary changes and repairs.

SEC. 10. The owners, and, in their absence, the agents of owners, of all premises, lots, squares, parks or battures in the City of New Orleans, shall be liable for violations of the provisions of Sections 1, 4, 5 and 7 of this ordinance, except in cases where, without the knowledge of such owner or agent, the tenant of or trespasser on any premises, lot, square, park or batture shall violate the provisions of this ordinance, in which event such tenant or trespasser shall be liable for such violation; where the premises are vacant, or are occupied jointly by the owner and his tenant or sub-tenant, the owner, or, in his absence, his agent, shall be liable for violations of Sections 2, 3, 6 and 8 of this ordinance. The tenants or occupiers of all premises, lots, etc., shall be liable for violations of Sections 2, 3, 6 and 8 of this ordinance, and, in the case above provided, for violations of Sections 1, 4, 5 and 7 thereof.

SEC. 11. That any person who shall violate any section of this ordinance, shall be punished by a fine of not more than twenty-five (\$25) dollars, or by imprisonment for not more than thirty (30) days, or both, in the discretion of the court having jurisdiction. Each and every day of failure to comply with any of the provisions of this ordinance shall constitute a separate offense and be punished as such.

SEC. 12. That this ordinance shall be enforced on and after January 1, 1906; until that date Ordinance No. 3196, N. C. S., shall remain in force, except so much thereof as requires wire screening to be completed by October 1, 1905, which part of said ordinance is hereby repealed.

PART V.



THE ACCEPTED
MODERN THEORIES
CONCERNING
YELLOW FEVER.

THE ETIOLOGY OF YELLOW FEVER.

From the Standpoint of 1908 and in Retrospect.

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of Health, 1896-1906.

I.

First Definite Suggestion of the Truth.

Nowhere in the history of scientific research is there a more conspicuous instance of the tenacity with which nature seems to guard her secrets than in the long and deadly struggle it has cost mankind to wrest from her the secret, so priceless and yet so simple when discovered, of the causation of yellow fever. When we think of the countless learned men who, singly and as members of special commissions, have so earnestly and patiently labored, generation after generation, to solve this vital problem, while the insect by which the infection is conveyed mockingly buzzed about their heads, we cannot pay too high a tribute to the acumen of Dr. Carlos J. Finlay of Havana, who as far back as 1881 not only advocated with absolute confidence the doctrine that yellow fever is conveyed by the bite of a mosquito, but correctly designated, as was proved twenty years later by the experiments of the U. S. Army Commission under Surgeon

Walter Reed, the particular mosquito, and the only one, so far as known, by which the disease is transmitted to man.

Unfortunately, Finlay did not at that time have the advantage enjoyed by later investigators of deriving helpful suggestions from the knowledge of the role played by the mosquito in malarial fever, but reasoning on the simple doctrine of direct inoculation, he thought that the proboscis of the mosquito biting a patient ill with yellow fever became contaminated with the virus of the disease, which in turn was directly infused into the blood of other persons subsequently bitten by the same mosquito, thereby conveying the disease to those who were not immune. For reasons now well understood the experiments made by Finlay to prove his theory were uniformly unsuccessful, but he remained unshaken in his belief that the particular house mosquito known to us as the *Stegomyia Calopus*,¹ which he observed to be invariably present in connection with yellow fever, was the active agent for its transmission and, unlike many pioneers who have advocated a truth before the world was ready to receive it, he has lived to see his sublime faith triumphantly vindicated. In one of his able monographs Surgeon H. R. Carter, of the U. S. P. H. & M. H. Service, aptly refers to Finlay's thus singling out the *Stegomyia* mosquito in its causative relation to yellow fever as "a very beautiful piece of inductive reasoning."

If Finlay could have ascertained what Carter later determined, viz.: that a definite period of time must always intervene between infecting and secondary cases, an observation impossible to make in Havana, where the disease was continuous, he would probably not have failed, because he would almost certainly have taken the hint and have kept some of his infected mosquitoes over that period.

It came as a fitting sequel to Finlay's long and undiscouraged advocacy of the transmission of yellow fever

¹ Formerly called *Culex fasciata*, and now named *Stegomyia calopus*.

by mosquitoes that the immortal work of the U. S. Army Commission, consisting of Drs. Walter Reed, James Carroll, Aristides Agramonte and Jesse W. Lazear, by whom in 1900 and 1901 the correctness of this discredited theory was demonstrated to the world, was undertaken and completed at Havana, Finlay's home city, where for twenty years he had been regarded as hopelessly visionary on the subject. Surely, the prophet shall not be without honor, and it takes away nothing from the imperishable fame of Walter Reed and his collaborators, one of whom, Lazear, died a martyr to the cause, while Carroll barely escaped the same fate, for us to give Finlay due credit for abstractly reasoning out a great truth and for so steadfastly upholding his belief despite of his inability to prove it. The substantial vindication of that truth constitutes, in the opinion of the writer, an achievement outranking in value to humanity and to science any single triumph the world has ever known, and has happily settled forever the practical aspect of the etiology of yellow fever.

When we say that the *practical* aspect of this long vexed question is at last settled we speak advisedly, since the "germ" of the disease remains as yet (in 1908) undiscovered and because, after our many tribulations, we have so much reason to be content with our present knowledge that for practical purposes we can afford to rest where we now stand.

The Yellow Fever Germ.

Of course, there is a special pathogenic entity concerned in the causation of yellow fever, since nothing can come into existence without a definite cause, but it would appear that here we have to do with a soluble toxin that is ultra-microscopic and so intangible as to be susceptible of filtration through the very finest grained porcelain without losing any of its virulence, as shown by the fact that the serum of blood taken from a yellow fever patient within the first three days and passed through a Chamberland

filter has communicated the disease by being injected subcutaneously into the system of a non-immune person.

So evanescent is this poison, that after the third day of illness it seems to disappear from the blood of the human subject.

Writers of the present day refer to the germ of yellow fever as a "parasite," following the idea of analogy, much as chemists have classified the hypothetical metal ammonium. In a recent monograph on yellow fever, Dr. Joseph Goldberger,² of the U. S. P. H. & M. H. Service, writes as follows on the subject:

The Parasite.—While the organism of yellow fever has not yet been discovered, we are, nevertheless in possession of some facts which enable us to form some idea of its character. The disease has been found to occur only in man and the mosquito, so that it is inferred that the parasite is one of those that requires for the complete evolution of its life cycle a mammalian and an arthropod host. We have familiar analogies in *Piroplasma bigeminum* of Texas fever and the *Plasmodium* of malaria. Because of these analogies it is inferred that biologically it may be grouped with them as a protozoon. On the basis of these and other analogies, both Schaudinn (1904) and Novy & Knapp (1906) have suggested that it may be a *Spirochaeta*. Stimson's recent discovery of a spirochaete-like organism in the tubules of a yellow fever kidney is therefore exceedingly interesting and suggestive."

It is now historical how enthusiastically the scientific world welcomed the announcement by Sanarelli in 1897, that he had succeeded in isolating the long sought germ of yellow fever, and how great the corresponding disappointment was when his famous *Bacillus Icteroïdes* later proved to be something merely associated with the disease without standing in any causative relation to it. Since that disappointment occurred, certain other tentative an-

² Yellow Fever. Etiology, Symptoms and Diagnosis, by Joseph Goldberger, July, 1907. Yellow Fever Institute Bulletin No. 16, Government Printing Office, Washington.

nouncements of finding the elusive "germ" have been made only to be discredited, with the result that the medical profession, naturally disposed to be skeptical, is likely to accord a very reluctant recognition to the real parasite, should it be found.

While admitting that science owes it to itself to find the "germ" of yellow fever if possible, it may be said that from a purely practical standpoint of etiology it makes comparatively little difference to the world whether this discovery is ever made, since the etiology of the disease, so far as the majority are concerned, seems to be entirely comprehended in our knowledge, severely tried and found reliable, that yellow fever, as we know it, is only conveyed to man by the bite of the female *Stegomyia* mosquito under certain narrowly restricted conditions to be presently named.

This is the whole etiology of the disease in a nutshell.

II.

Views Formerly Held.

In the light of present knowledge it is not without interest to notice briefly the views relative to the etiology of yellow fever formerly held by those in positions of authority as writers and health officials. Prior to the introduction of the germ theory there seems to have prevailed a general belief in a sort of poisonous miasm, either diffused by the body or breath of the patient, or in some other way generated in connection with the case. This miasm was supposed to be highly infectious, clinging tenaciously to textile fabrics and even to the furniture and walls of the sick-room. Woolen articles were supposed to be specially liable to attract and retain the poison. Everything thus presumedly infected was regarded as fomites capable of carrying the disease to another locality where conditions might be favorable for its development.

This belief in the spread of yellow fever by fomites was practically universal, inspiring such abject terror during

certain epidemics that many cities and towns quarantined "against the world," preferring to maintain absolute non-intercourse and to dispense with common necessities of life rather than risk the accidental introduction of anything tainted with infection.

In striking contrast with the teachings of the generation of medical authorities immediately prior to the revelation of the truth about the causation of yellow fever, it is to be noted with all the admiration due to a master mind, that La Roche, whose classic work on the subject appeared in the dark days of 1855, unhesitatingly expressed disbelief in the conveyance of yellow fever by fomites, devoting a large section of one volume to evidence and arguments against that wide-spread delusion.

While there could be no doubt about the general infectiousness of yellow fever, many logical observers doubted its being personally contagious, since so many of those in close contact with cases as nurses and attendants escaped, while hundreds who kept carefully aloof were attacked. It seemed truly paradoxical that the "miasm," which must in some way be associated with the sick, should be thus seemingly inoperative at the bedside, but potent a little distance away.

On this particular point another thinker, Prof. Austin Flint, Sr., of New York, after residing for a time in New Orleans and carefully studying the question with the impartiality of an outsider, judicially summed up³ the evidence as being strongly opposed to the doctrine of personal contagion, declaring that—"That great majority of those who have had an extensive practical acquaintance with the disease believe it to be non-contagious."

Relative to the etiology of the fever, he makes this guarded statement—"Of the nature and source of the special cause of yellow fever we have no positive knowledge beyond the fact that it originates without the body." His reference to the conveyance of the infection by fomites is so conservative as to suggest to one reading between

³ Principles and Practice of Medicine. Fourth Edition, 1873.

the lines the idea that he was not very firmly convinced on this point, as when he says, "may not the special cause be carried from one place to others in clothing, merchandise, etc., and the disease in this way be imported? Facts appear to establish the affirmative to this question."

Quoting Dr. Josiah Nott, of Mobile, Flint further states that—"The special cause is most active near the ground; persons on a ground floor are more likely to be attacked than those in the stories above. The cause is more active at night than in the daytime."

The Dr. Nott in question, a distinguished physician of his day and a thoughtful observer of facts, after ingenious reasoning by exclusion, put himself on record in 1848, as considering it "probable that yellow fever is caused by an insect or animalcule bred on the ground," even naming the mosquito as a possible factor, though not venturing any definite assertion on this point, as did Finlay of Havana.

Another prominent physician of Alabama, Dr. Jerome Cochran, who for years prior to his death, was State Health Officer, commenting on the low lying stratum of infection in yellow fever, is quoted as saying that a wall twenty feet high would check its progress. Some observer with a mathematical turn of mind actually calculated the rate at which the fever appeared to spread from a known focus in a city as being about forty feet a day.

It was a common observation that the fever would hesitate about crossing a street, but readily traversed two back yards to reach a house in the rear.

The strange and unaccountable "smouldering" of the infection between the first and second group of cases had been duly noted from the earliest times, while its rapid spread in hot weather and magical subsidence after the coming of frost caused many to think that some meteorological condition was concerned in its causation.

These and other accurate observation relative to the behavior of yellow fever infection, so easily explained since the habits of the *Stegomyia* mosquito have been carefully studied, show how near to the truth those good people

blundered without guessing it, with the mosquito all the while biting them and singing in their ears.

When the germ theory of the causation of disease began to gain ground an entirely new and alluring turn was given to speculation regarding the special cause of yellow fever. It was at once decided that there must be a tangible microbe, very small perhaps and difficult to isolate, but certainly within reach of the vaunted disinfecting agents of which such great results were expected.

Thus we find Dr. Saml. Choppin, a high authority in New Orleans and President of the State Board of Health, declaring in his report for 1878 (page 10) that the maritime quarantine policy of his Board was "based on the hypothesis that the *materies morbi* of yellow fever consists of living germs, probably animalcular. The object is to attack those germs, wherever existing, by agents destructive to low forms of life without being injurious to their habitat."

The germs were supposed to cling to all sorts of fomites coming from tropical ports and especially to proliferate in the bilge water of wooden ships, it being held by many authorities that decaying wood was the most favorable nidus for their growth and diffusion, which theory easily explained the transportation of the disease by ships and the frequency with which laborers working in the holds of such ships at previously healthy ports were the first persons attacked by fever.

It may be mentioned in passing that the new era of maritime quarantine practice so successfully inaugurated in 1885 by the Louisiana State Board of Health under Dr. Joseph Holt comprised the forcing of sulphur dioxide by a powerful suction blower into every portion of the ship's hold, thereby killing any infected mosquitoes which might have been lurking there when the vessel sailed from a tropical port, while similiar fumigation in detail was performed by burning sulphur in every living space of the vessel, making a clean sweep of all mosquitoes on board. Under the prevailing delusion about "germs" disinfection of all fomites by steam heat was also laboriously per-

formed, this part of the work getting the principal credit for the good accomplished, after which detention sufficient to cover the estimated incubation period of the disease was enforced.

With the further development of the germ theory and with the trend of thought induced by the researches of Koch, Eberth and others, we note a disposition to look for the germ of yellow fever as affecting specially the alimentary canal. Thus, in the section on yellow fever in Loomis & Thompson's American System of Medicine, published in 1897, we read the following by no less an authority than Sternberg:

"Yellow fever is not a contagious disease in the strict sense of the word, i. e., it is not usually contracted by contact with the sick; but, as in cholera and typhoid fever, the infectious element multiplies in the body of the sick, and epidemics usually extend from foci of infection originating from the introduction of cases of the disease into localities previously free from it.

Although not definitely demonstrated, it seems extremely probable that this occurs in the same way as in the diseases mentioned, viz., through the excreta. This is indicated by the fact that while contact with the sick as nurse or physician does not lead to infection, the soiled clothing and bedding of yellow fever patients may induce an attack in those who handle them, and may originate an epidemic when transported without having been disinfected to another locality." * * * * *

"As heretofore suggested, the yellow fever patient, like the patient with cholera or typhoid fever, probably carries "germs" in his intestines which are capable of abundant development outside the body when local conditions are favorable. * * * * *

"In view of the facts heretofore recorded and the conclusions reached as the result of experimental investigation, it is evident that the dejecta of yellow fever patients should be regarded as infectious material and should never be thrown into privy vaults until they have been completely disinfected."

III.

Tyranny of a False Doctrine.

Whatever diversity of views existed as to other points in connection with yellow fever, physicians and laymen of the South were practically united in cherishing a deeply rooted belief in its transmission by fomites. That this conviction prevailed must appear not only natural, but inevitable, in view of the great mass of testimony in support of that belief which has been handed down from the past by perfectly honest witnesses. In fact, some of the reported instances⁴ of the apparent transmission of yellow fever by fomites cannot possibly be reconciled with our present knowledge, compelling the conclusion that something is wanting in the evidence. It was not strange, therefore, that medical men of the South, and especially those officially charged with the responsibility of framing regulations for the protection of the public health, were somewhat slow in accepting the mosquito doctrine in its entirety.

Dr. Edmund Souchon, President of the Louisiana State Board of Health, from February, 1898, to January, 1906, and whose administration was thoroughly progressive, in his Report for 1900-01 (pp. 78-9), correctly defined his own position and that of other Southern Health Officials, as follows:

"While admitting that the mosquito has been shown to be a potent factor in conveying the disease, we Southern Health Officers, charged with the grave duty of protecting our people against this most dreaded of all diseases, are unwilling to accept the dictum of the experimenters that yellow fever can be conveyed by no other agency.

⁴Those interested will find a compilation of twenty-seven authentically reported instances in Dr. Edmond Souchon's paper on the "Treatment of Vessels from Yellow Fever Ports"; N. Y. Medical Record, Feb. 8th, 1902. (Reprinted in the Biennial Report of the Louisiana State Board of Health for 1900-01, pp. 81-102.)

We are willing to be convinced, but are not prepared to abandon established quarantine precautions on the strength of such negative evidence as that afforded by the reported experiments with fomites."

Dr. Souchon, without for a moment questioning that yellow fever is conveyed by the bite of a mosquito, was not willing to admit that fomites or other causes could not also transmit the disease until time and further proofs should demonstrate this beyond all possibility of doubt. He felt that until this was done he would not be justified in altering the quarantine regulations, especially as the people of Louisiana, whose officer he was, still believed firmly in the conveyance of yellow fever by fomites.

In justice to Dr. Souchon and other leading sanitarians of the South, it is to be noted here that they lost no time in profiting by the evidence in support of the mosquito doctrine which continued to accumulate at localities where the occurrence of yellow fever afforded opportunities to verify in actual practice the conclusions relative to fomites previously based only upon experiments, so that long before the outbreak in Texas in 1903 the uselessness of disinfection in yellow fever for any other object than the destruction of mosquitoes had been officially recognized in Louisiana and to a great extent in adjoining States.

IV.

Convincing Object Lessons of 1905.

It is safe to assert that the experience gained during the prevalence of yellow fever in Louisiana and Mississippi in 1905 had the effect of banishing the last lingering belief in the conveyance of the disease by fomites so far as the vast majority of medical men in the South were

concerned.⁵ During that outbreak no attention whatever was paid to the disinfection of the clothing and bedding of patients by the State and Federal authorities who conducted the campaign, the first on record in which the fever was conquered before the coming of frost, all work being planned and carried out in strict accordance with the doctrine of its natural transmission occurring solely by the bite of the *Stegomyia* mosquito.

The magnitude of the demonstration given to the world by that campaign left no ground for any objection that might have applied to experiments on a small scale or under artificial conditions. After that vast and costly object lesson in our own territory, the only "doctors" left unconvinced were (and are) a few old timers who still cling to the traditions of the past, refusing to be persuaded that an insect as feeble and apparently insignificant as the mosquito can be the sole concern in conveying a disease so terrible as yellow fever.

V.

Etiological Role of the Mosquito.

So thorough and complete was the work done by the U. S. Army Commission in Havana, as set forth in their successive reports,⁶ that aside from abundant confirma-

⁵ In New Orleans the great mass of the laity became ready converts to the mosquito doctrine. This result was accomplished largely through good missionary work done in the city and by public meetings and lectures; but the people themselves entered, heart and soul, into the great fight of 1905, and after witnessing the wonderful success of this new method of warfare against their ancient enemy needed no further proof that the doctrine underlying that method must be correct.

⁶ The Etiology of yellow fever. A preliminary note.—Reed, Carroll, Agramonte and Lazear. *Phil. Med. Journal*, Oct. 27, 1900.

The Etiology of yellow fever. An additional note.—Reed, Carroll and Agramonte. *Jour. Amer. Med. Assn.*, Feb. 16th, 1901.

The Prevention of Yellow Fever.—Reed and Carroll. *N. Y. Med. Record*, Oct. 26th, 1901.

The Etiology of yellow fever. A supplemental note.—Reed and Carroll. *American Medicine (Phila.)*, Feb. 22d, 1902.

tion by other trustworthy experimenters and the convincing proof of the correctness of their deductions afforded by the success with which the same have been applied in the practical management of yellow fever, it may be said that nothing essential has been added to our knowledge of the mosquito doctrine since it was formulated by its discoverers. The basic principles of that doctrine in relation to the etiology of yellow fever (without direct reference to quarantine and sanitary work) may be briefly stated, as follows:

1. The only natural agency by which yellow fever is transmitted to human beings is the bite of an infected female *Stegomyia calopus* mosquito. (Until recently known as *Stegomyia fasciata*).

2. Therefore, the disinfection of inanimate objects, as formerly practiced for protection against the disease, is useless.

3. In order to possess the power of transmitting the disease, the mosquito must, at least twelve days previously, have fed upon the blood of a yellow fever patient during the first three days of that patient's illness.

4. After thus becoming able to transmit the disease, the mosquito retains (most probably) that power during the remainder of its life.

5. Neither in the mosquito nor in the human subject does the *Bacillus icteroides* or any other parasite thus far discovered stand in any etiological relation to the disease.

6. After being bitten by a mosquito capable of transmitting the infection, a non-immune person will ordinarily develop yellow fever within five days, the time of incubation varying from two days and one hour in the shortest recorded period, to six days and two hours in the longest.

It is proper to mention here that the French Commission consisting of M. Marchoux, Salimbeni and Simond, by whom the deductions of the U. S. Army Commission were corroborated in a series of experiments undertaken to still further study the etiological aspect of everything connected with yellow fever, reported one instance in which the power of conveying infection appeared to have

been transmitted through the ova of an infected female insect to her progeny. Two of the most expert and reliable experimenters of the U. S. P. H. & M. H. Service, Rosenau and Goldberger, entirely failed to find any confirmation of this hereditary transmission, and in the light of much practical experience the majority of American authorities believe that it cannot take place.

The scope of this article does not warrant an exhaustive review of various related matters of general interest, as for example, the habits and peculiarities of the *Stegomyia* mosquito, its distinctive appearance, mode of attack—the female alone biting—the influence of temperature on its “pernicious activity,” its longevity after becoming infected and ability to hibernate through a mild winter with little or no diminution of pathogenic vigor, as must have occurred in New Orleans following the little epidemic of 1897,—etc., etc.

However, two of the special attributes of the *Stegomyia calopus* are entitled to consideration here as belonging to the chapter of etiology. These are:

A. The power which that mosquito alone appears to possess of transmitting yellow fever; and—

B. The interval of time, usually about twelve days (believed to be influenced by temperature) required by the female insect to develop that power within her system after feeding upon the blood of a yellow fever patient during the first three days of that patient's illness. This interval is the “Extrinsic Incubation” of Carter,⁷ who, in 1898, made a careful clinical study of the subject and, without detecting the agency of the mosquito, correctly determined the period of incubation outside the human body as being “usually in excess of ten days.”

A.

The first of the foregoing points may be regarded as established beyond any reasonable doubt by the negative

⁷ A Note on the Interval Between Infecting and Secondary Cases of Yellow Fever.—H. R. Carter, M. D., Surg. U. S. Marine Hosp. Service, New Orleans Med. & Surg. Journal, May, 1900.

results which have attended all experimental attempts to convey yellow fever through the bites of other mosquitoes, as well as by the fact that however abundant mosquitoes may be at a locality in which a case of imported yellow fever develops, there is no spread of the disease unless the *Stegomyia* is present. This explains why certain interior localities have seemed to enjoy immunity, although in the "yellow fever belt."

As to why this particular mosquito is the only one capable of transmitting yellow fever, we are thus for only in a position to conjecture, but venturing a seemingly plausible supposition covering the whole ground, we come to the second point:

B.

From analogies of susceptibility and natural immunity observed among animals we may appear justified in ascribing to the delicate house-bred female *Stegomyia* hatched from the ovum of a mother fed on human blood, an actual susceptibility to this human disease not possessed by any other mosquito, but with such natural power of resistance as to present an incubation period more than twice as long as in the human subject, and to remain physically uninjured by the attack.

The supposition that the mosquito experiences something corresponding with an attack of yellow fever in the more highly organized human subject is consonant with the scientific dogma that the period of "extrinsic incubation" represents the cycle of development required by a hypothetical parasite within the system of the insect, in accordance with analogous examples in nature, and helps to account for the profound impression evidently made on that system. So deep and lasting is this impression, like that of unchecked syphilis in man, as to produce permanent change of function, the secretion of the salivary glands of the infected mosquito remaining tainted for life.

The period of incubation in the mosquito, averaging about twelve days, added to the three, four or five days of incubation required for the development of the disease in the human subject, made up the interval of "smouldering" between the first case (or group) and the next group of cases so puzzling and deceptive in former times, besides being so disastrous in results.

Surgeon H. R. Carter of the U. S. Marine Hospital Service, who is identified with much of the best yellow fever work done in recent years, realizing the importance of determining, if possible, the exact relationship of this strange phenomenon, took advantage of a series of consecutive cases at a lonely railroad telegraph station near New Orleans, in 1897, to make his first accurate observations. These he was able to verify the next year under singularly favorable conditions at Orwood and Taylor, in north Mississippi, where the appearance of yellow fever among the non-immune population of a sparsely settled district furnished an opportunity to determine with absolute accuracy the interval between certain isolated first cases and the resulting secondary cases, the period of incubation in the human system having already been satisfactorily ascertained. In this way he arrived at the conclusions on which he based his first published statement regarding the "period of extrinsic incubation," the aptness of which designation has been generally recognized.

The significance and scientific value of Dr. Carter's observations were not fully appreciated until the U. S. Army Commission working at Havana took up Finlay's uncompleted studies relating to the mosquito, after having determined that the *Bacillus icteroides* of Sanarelli is not an etiologic factor in yellow fever. This stumbling block having been eliminated, the genius of the united Commission, once started on the true path, with suggestions drawn from the analogy of malarial transmission by mosquitoes and the aid supplied by Carter's practical studies, readily worked out the remaining elements of the problem.

The Commission had no difficulty in securing human subjects for experimentation. At the beginning, a substantial cash bonus was offered, but with characteristic heroism, American soldiers offered themselves as subjects without compensation. There was plenty of yellow fever in Havana and Finlay aided in obtaining the proper mosquitoes for the experiments. A sufficient number of insects were allowed to bite patients on successive days to enable the Commission to study fully all questions of time, with the result that it was found impossible for a mosquito to become infected by biting a patient after about the third day of illness, and also impossible for a mosquito, even when properly infected (i. e., by biting during the first three days of the attack) to transmit the disease to a human subject earlier than about twelve or fourteen days thereafter, thus beautifully demonstrating the rationale of Carter's "extrinsic incubation," of which the Commission had been duly mindful.

A majority of the yellow fever cases experimentally produced, while relatively mild, were distinctly typical, but, as already mentioned, Dr. Lazear of the Commission died of an attack of the disease. Carroll, who allowed himself to be bitten by a stray mosquito, also had an attack so severe as to be nearly fatal.

Among the supposedly non-immune subjects experimented upon some did not develop the disease, showing that they enjoyed a certain measure of natural immunity.

Later, when sufficient proof of the conveyance of infection by the bites of mosquitoes had accumulated to satisfy the most skeptical, experiments on human beings were discontinued as being attended with risk of life even when most carefully conducted.

To test the reputed conveyance of infection by fomites, a quantity of clothing and bedding direct from yellow fever cases and variously soiled with black vomit, feces, etc., was placed in boxes and stored in an isolated house erected for the experiment. This house was carefully screened to exclude mosquitoes, and was kept artificially heated to imitate natural conditions. Seven non-immune

subjects submitting to the experiment occupied a tent near by during the day, being carefully protected from the bites of mosquitoes. Every night a squad would move into the screened house, where they removed the fomites from the boxes, handling each article, putting on the soiled clothing, sleeping on beds made up with the "infected" sheets and blankets, and repacking the whole outfit in the boxes the next morning. Although exposed in this way for three weeks, not one of the seven subjects contracted the fever, but some of them subsequently experienced experimental attacks after being bitten by infected mosquitoes under the proper conditions, showing that they were actually non-immune.

The conclusions of the Commission were promptly put to a practical test by Major W. C. Gorgas, Surg., U. S. Army in charge of the sanitation of Havana, and with such wonderful success, following absolute failure by methods based on former theories, that he succeeded by entirely eradicating yellow fever from that city where the disease had been perennial from time immemorial, thereby carrying conviction to the minds of admiring scientists all over the world.

VI.

The Bacillus Icteroides.

Before dismissing the subject of experimental research to discover the cause of yellow fever, it is not inappropriate to add a final word about the *Bacillus icteroides* of Sanarelli. This parasite, while not the actual "germ" of the disease, is undeniably very interesting in certain respects. It is found in little groups in the capillaries of the liver and kidneys of yellow fever subjects, organs strikingly affected by the disease, and its behavior in the laboratory, especially as regards agglutination tests^s and

^s Archinard of New Orleans found in 1897 that among twenty cultures of known parasites the only one showing agglutination with yellow fever blood was the *Bacillus Icteroides*.

the causation in certain animals of pathologic conditions typical of the disease in man, certainly justified sanguine belief in its being the long sought germ. Among animals experimented upon the dog proved especially susceptible, promptly developing characteristic symptoms of yellow fever, viz.: violent gastric disturbance, intestinal hemorrhages, albuminuria, suppression of urine and death in convulsions, with post-mortem findings of degenerative changes in the liver and kidneys corresponding with those present in human beings who die of yellow fever.

Sanarelli reported five cases produced in human subjects by inoculation with filtered toxin from cultures of the *Bacillus icteroides*, all presenting clinical pictures of yellow fever.

Altogether, it seemed conclusive that this *must be* the specific parasite of the disease, but the impartial investigations of the U. S. Army Commission at Havana, besides determining the absence of the *Bacillus icteroides* in the blood of a number of undoubted cases of yellow fever, further showed that blood serum from a fatal case, though absolutely sterile to culture media favorable to the growth of that parasite, produced an attack of yellow fever in a non-immune subject when subcutaneously injected. A similar sample of serum from the case thus experimentally produced likewise proved sterile, but also caused an attack resembling yellow fever when injected into the circulation of a non-immune person.

From these observations, showing that the *Bacillus icteroides* is absent from the blood of yellow fever patients at times when the serum of that blood, even after being filtered through close grained porcelain, is fully capable of causing yellow fever if introduced into the system of non-immunes, it is self evident that we must look elsewhere for the specific cause of the disease, however interesting from a laboratory standpoint that remarkable parasite may be. Here, it is evident that we still have something to learn.

VII.

Dengue and Yellow Fever.

In conclusion, there seems to be another and really important field for study as regards the frequent and hitherto confusing association of yellow fever and dengue. Both diseases being transmitted by the bites of mosquitoes and often occurring simultaneously, as it were, in localities where yellow fever almost immediately afterwards becomes epidemic, there would appear to be some grounds for suspecting a modified evolution of toxin in the system of the transmitting mosquito, either the *Stegomyia calopus* itself or of some other member of the same group, whereby the original poison thus modified instead of causing undoubted cases of yellow fever produces the sort of atypical fever which in the past has proved so confusing and disastrous.

It is, of course, very easy to explain matters by simply assuming that the two diseases happen to be present at the same time, but to those who have personally observed these puzzling twofold outbreaks some other explanation seems necessary, and it is not expecting too much of science, which has laid the world under so many obligations, to express the hope that in the near future the solution of this long standing problem will be forthcoming.

THE SANITARY PREVENTION OF YELLOW FEVER.

BY QUITMAN KOHNKE, M. D.,

Health Officer of the City of New Orleans, September 1898 to September 1906.

I.



The Yellow Fever Mosquito.

There can be no yellow fever as a communicable disease in the absence of its transmitting agent, the *Stegomyia* mosquito, first classified, entomologically, as *Culex fasciata*, then as *Stegomyia fasciata*, and later as *Stegomyia calopus*.

The female only is a blood feeder and disease conveyer, the male on account of the peculiar construction of its feeding organ being unable to pierce the skin to obtain blood.

The female deposits her eggs on the surface of still water, and under favorable conditions, the adult insects are developed therefrom in about one week.

The mosquito may be seen at all hours, but is oftenest observed in the morning and the afternoon. It selects shady places and avoids sunlight. It is said to be a day feeder during the first four days of its existence after which time it feeds at any hour of the day or night. It may live for several months, and once infected with yellow fever, remains infectious during the rest of its life. It is a house mosquito and does not migrate. The possibility of infectiousness, transmitted to the off-spring through the egg, is not yet established.

Hibernation of the adult mosquito is supposed by some authorities to occur, but has not been actually observed. Hibernation of the egg and the larva is also believed to happen. My observations incline me to the view that hibernation is likely in the egg, possibly occurs in the larva, but does not take place in the pupa or adult.

If hibernation of adults does occur in New Orleans, I am of the opinion that infectiousness does not resist the changes incident thereto.

Recrudescence of yellow fever due to the persistence of infectiousness in the mosquito through the period of hibernation is held by some observers to account for the reappearance of the disease in the summer following an epidemic year. The recurrence of yellow fever is more likely due to its reintroduction through imperfectly guarded channels of entrance or, rarely, to the continuance of the chain of cases through the winter and their increase in number as the warm season favors mosquito development.

Much has yet to be learned of the habits and character of the *Stegomyia* mosquito, and the field of observation and research is broad and comparatively new in this direction.

We are in possession, however, of the essential facts of its connection with yellow fever, and new discoveries will be the elaboration of details, corroborating the main truth and regulating its precise application in sanitary practice.

II.

Moral Responsibility for Epidemics.

Since the discovery of its mosquito transmission, the prevention of yellow fever is a much simpler problem than in the days of our ignorance of the mode in which the disease invariably spreads from person to person. While we have not yet discovered the germ of yellow fever or its primal origin, our knowledge of the manner and

character of its movement places a formidable weapon in our hands against its progress, and it may be said in reason and with fairness, that a community suffering a yellow fever epidemic is lacking as a whole in the essential characteristics of intelligent manhood.

Yellow fever in the ignorant past was a misfortune; in the enlightened present it is a fault—in the moral future it may be a crime.

III.

The Sanitary Creed.

The doctrine of the mosquito conveyance of yellow fever, for the practical application of preventive measures based thereon, may be expressed thus:

The immediate causative factor, the germ of the disease, is accessible to the only natural vehicle of transmission, the mosquito, during the first three days of the fever, and the germ after entering the mosquito's stomach requires twelve days to migrate to one of the salivary glands, from which the insect, while feeding, may inject it into the blood stream of its victim, in whose system the period of incubation is usually from three to five days, rarely six.

The human subject of the disease may be considered infectious, therefore, to the mosquito during the first three days of the fever, *and not thereafter*; the mosquito being infectious after the twelfth day from the date of inoculation, *and not before*. Its victim shows the first symptom of disease usually in less than five days after infection by the insect.

The exceptions to this rule are not sufficient to suggest its modification, but in actual practice the patient is considered possibly infectious during four days, and the mosquito possibly dangerous on the tenth day.

A case of yellow fever cannot occasion another case in less time than the period of germ emigration in the mos-

quito, which is twelve days, added to the period of incubation in the human victim, which is seldom less than three; fifteen days completing the minimum cycle of infection. We may say approximately that explosions of infection should be expected, and are observable semi-monthly, and the preventive effect, therefore, of disinfection cannot be determined earlier than fifteen days thereafter. We can not say how many cases may result from one case untreated sanitarily, but we can say positively that no case will result if there are no mosquitoes present of the *Stegomyia* variety. Conversely we may rightly apprehend a great infection in the presence of great numbers of mosquitoes.

The application of the mosquito doctrine to the prevention of yellow fever is all that need be done in any emergency; but to accomplish this, is a problem not to be solved by any set formula. It is an easy matter to set down on paper and in an office a lot of rules in the abstract to be carried out in the field, but it is a different matter to apply these rules concretely to actual cases to obtain results.

Circumstances and conditions met with in actual practice may radically change the relative value of details, esteemed of paramount importance theoretically.

As applicable to a locality or community, there may be considered three propositions, upon the first two of which is based the third, which is offered in the nature of a conclusion.

1. Quarantine against yellow fever cannot be made absolute in its protective value.
2. Early recognition of the presence of yellow fever infection is difficult always, and at times impossible.
3. The most dependable measure of prevention of yellow fever is destruction of the *Stegomyia* mosquitoes before the possibility of infection.

Quarantine.—In quarantine against yellow fever, two essentials are to be considered, *and nothing else*. Detention of persons exposed to infection for not less than the period of incubation of the disease, and the prevention of entrance of infected mosquitoes.

The increasing facility of rapid travel makes quarantine more difficult and less reliable. However, near to perfection may become our maritime quarantine system, we shall always be exposed to infection by rapid land transportation from ports not themselves infectible, or which are less careful for other reasons. Quarantine, though important and necessary, cannot ever be all-sufficient.

Early Recognition.—Early recognition of yellow fever infection, so essential to the prompt application of sanitary remedial measures, is rarely to be expected. The history in this respect of 1897-8 and 1899, as well as that of 1905, exemplifies this, not only in New Orleans, but elsewhere, even in Havana, where better preparation is made and better opportunities offer for the prompt discovery of early cases.

We should not relax our constant watchfulness during the season of danger, but we must realize that knowledge of the existence of first cases requires a combination of factors not always obtainable and not within our practical control.

IV.

Mortality Statistics.

Three charts of mortality are shown for three separate years, one of which, 1905, is a yellow fever year. All the charts apply to New Orleans.

The causes of death are those under which yellow fever may be concealed, intentionally or not.

A careful analysis of these records does not bear out the notion, expressed by some, that the presence of yellow fever may be discovered early through an inspection of the mortality records. In 1905, the presence of yellow fever was suspected by the report on the afternoon of July 12th, of cases of illness for official investigation. Subsequent discovery was made of its probable presence as early as the middle of May. If mortality records had the value, in this respect, that is claimed for them, then those for 1905 would have furnished the warning of danger.

No system of investigation which will seem to discover yellow fever in the records of 1905, prior to July 12th, will fail to indicate yellow fever also for 1903 and 1904, years when yellow fever was not present.

The value of mortality charts may be historic and corroborative, but it is certainly not prophetic, in respect to yellow fever. Investigations of individual cases, whose circumstances, together with the given cause of death, may excite suspicion, is more reliable than an observance of increased mortality from certain diseases, and is earlier available. But this also is not dependable to discover early cases, for it was our routine practice during the danger period, and was done during the summer of 1905, as late as the early part of July, with negative results.

1905.

	Malaria	Acute Nephritis.	Bright's Disease	Enteritis Under Two Years	Deaths Typhoid	Cases Typhoid
January	0	6	60	11	11	32
February	4	3	51	10	2	7
March	2	7	42	7	8	16
April	3	3	35	25	6	26
May	5	8	48	116	6	19
June	5	4	44	91	11	24
July	1	6	32	38	28	114
August	6	5	43	18	13	31
September	2	4	27	24	5	26
October	2	5	34	11	3	12
November	5	8	44	14	6	16
December	2	5	46	24	3	11

1904.

	Malaria.	Acute Nephritis	Bright's Disease.	Enteritis Under Two Years	Deaths Typhoid	Cases Typhoid.
January	4	5	38	9	9	16
February	3	5	40	3	7	15
March	5	8	41	16	2	8
April	4	7	37	80	6	18
May	6	3	32	70	10	28
June	5	4	42	50	13	28
July	4	5	42	40	11	45
August	6	6	25	22	14	58
September	13	5	32	19	12	37
October	9	10	47	17	10	26
November	6	8	42	16	10	26
December	3	5	56	12	7	31

1903.

	Malaria.	Acute Nephritis	Bright's Disease	Enteritis Under Two Years	Deaths Typhoid.	Cases Typhoid.
January	3	4	53	13	5	16
February	1	7	53	12	4	8
March	4	2	53	10	6	13
April	2	5	39	20	6	13
May	9	5	41	82	8	28
June	11	5	30	73	18	55
July	10	3	39	56	16	59
August	9	3	51	26	21	79
September	8	3	54	11	14	66
October	11	7	51	17	8	25
November	10	6	49	18	2	24
December	3	5	50	17	11	26

V.

Destruction of Stegomyia.

Finally, we must, I think, conclude that the destruction of the only transmitting medium is the surest preventive of yellow fever. This measure also is subject, of course, to imperfect application in practice, and incomplete results. It is, for this reason, not sufficient, alone, to guarantee against infection, but it offers the important element of time during which to arrange for and encourage its thorough application; and in the event of the failure of quarantine and of the prompt recognition of infection, the spread of the disease is modified by even a partial destruction of the conveying medium, and this gives opportunity for perfecting organization against the infected insects.

The health authorities of New Orleans were convinced of the truth and importance of the mosquito doctrine of yellow fever conveyance, in 1901, and of the importance of mosquito destruction. Twice a law such as is now operative was proposed to and rejected, by the city council, and my belief is now, as it was then, that the destruction of *Stegomyia* mosquitoes prior to the introduc-

tion of yellow fever is the ounce of prevention that is better than the pound of cure.

VI.

Conditions Obtaining in New Orleans in 1905.

The explosion of infection in New Orleans in 1905, was due to an unfortunate combination of unfavorable conditions, to which was applied the spark of introduced infection. How the fever entered the city is not the official concern of the health officer, who is specially denied by law any function or authority in maritime or inland quarantine. When the fever got here, however, it found ideal factors for its development and spread. The section of the city first infected is the most densely populated. The people are for the most part ignorant of our language and illiterate in their own. Their habits are unsanitary and their customs such as tend to secretiveness and improvidence. They are not, as a rule, vicious, but fearful of police authority, and exceedingly clannish; as is not unnatural for foreigners in a strange country.

It is currently believed, and I think correctly so, that among them are criminals escaped or deported from their own country; and that the "dago vote," as it is called, is a political factor of considerable importance in that section of the city.

Medical attention in case of illness is usually delayed until the severity of symptoms demands it, and any but severe ailments are likely to be followed by recovery without medical interference. They are attended when ill, mainly by physicians of their own nationality, not all of whom speak our language and some of whom are unfamiliar with yellow fever. They are apt to resent the reporting of any case of communicable disease to the authorities, and are likely to dismiss the attending physician for this reason. Imagine a crowded population of this kind whose water supply consists in large part of turbid river water, kept for settling purposes in numerous

open barrels, each one an ideal breeding place for the *Stegomyia* mosquito.

For more than four years the health officer, encouraged and supported by the board of health, had pointed out the danger; had explained, urged, begged and prophesied, but other considerations were deemed of greater importance than the destruction of mosquitoes. In plain English, the politicians thwarted the designs of the health officer while the general public was indifferent.

When the disaster came, however, the people of New Orleans, awakened from a lethargic sense of security, rose to the situation and demonstrated their willingness and ability to fight the greatest battle that was ever waged against yellow fever; and they conquered. The united forces of the combined authorities of the City, State and Nation and the whole people of New Orleans, men and, notably, women succeeded in turning a great calamity into the most glorious victory of modern times. For the first time in New Orleans an epidemic of yellow fever was fought with the weapons suggested by the doctrine of mosquito conveyance of the disease, and for the first time extensive yellow fever infection was controlled as early as August.

The successful efforts of the local authority were disturbed by internal bickerings, jealousies and political intrigues which endangered the final outcome, and the Federal government was appealed to and invited to assume charge of the situation. This was done through the Marine Hospital Service by the enabling authority of the health officer and the victory was continued to completion.

The first victory over yellow fever was in Havana, the greatest in New Orleans.

The character of the neighborhood first infected, its nearness to the landing place of the Havana steamers, the intimate connection of the people with the tropical fruit trade, and the facility with which infection could have gotten, and probably did get, to the luggers, the landing place for which is in close proximity, these luggers being connecting links with the gulf coast of Louisiana, are

suggestive; and give occasion for various speculations, with regard to the mode of origin and source of infection, not likely at this time to reach the domain of ascertained facts.

Suspicion was specially directed to this neighborhood of the city about the middle of July, but subsequent knowledge indicated the real beginning of yellow fever infection to have been probably six or eight weeks earlier; thus allowing infection to reach other sections of the State before the suspicion of its presence was excited in New Orleans.

Never before was an epidemic of yellow fever in New Orleans fought in the same way, and the most skeptical of reasonable persons must conclude that the control of what would have been one of the greatest of yellow fever epidemics was due solely to the prevention and destruction of mosquitoes.

VII.

Conclusions.

Since the *Stegomyia* mosquito alone transmits yellow fever, preventive measures need be directed only against this insect, and since the adult mosquito of this variety issues in about one week after the egg is deposited upon the surface of still water, the following rule should be enforced to render a locality immune to the disease.

Once a week pour upon the the surface of all still water, not removable by drainage or otherwise, or stocked with fish, or screened from mosquitoes, a quantity of refined kerosene equivalent to one ounce for each ten square feet of surface.

This, if begun before their flight, will prevent the breeding of *Stegomyia* mosquitoes, and thereby remove the possibility of spreading infection which they alone can spread.

A locality so protected against yellow fever need not quarantine against the disease, but protection so obtained

can not be more complete than the work is thorough, and the work will not be more thorough than the people are informed.

If quarantine be advisable, because of infectibility, this measure of protection need only include persons exposed to infection, (and these should be detained only during the period of incubation of the disease); and need not include any article, incapable of transporting mosquitoes.

An infectible locality is one containing adult *Stegomyia* mosquitoes, and, should the disease be introduced, fumigation to kill possibly infected mosquitoes must be practiced in infected domiciles, and for this the location of early cases is necessary.

It is my experience that early cases, not imported, are not recognized in time to prevent infection, and it is my belief that they never will be. Diagnosticians who can at all times differentiate between the very mild cases of yellow fever and diseases resembling it exist mainly in the imagination of the laity.

Ignorance and improvidence have permitted variola to exist more than a hundred years after the discovery of its prevention. Ignorance, improvidence and commercial greed may permit yellow fever to be occasionally epidemic in our country for an equal period.

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PATHOLOGY OF YELLOW FEVER.

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Difficulty of Pathological Diagnosis.

The pathology of yellow fever, like the clinical aspect of the disease, is dependent upon a number of factors which must be taken collectively, to establish the lesions of the infection. It could be embodied in a very few words by describing it as a general steatosis. No other infection produces such intense and widespread fatty degeneration as yellow fever. The sudden and general hemorrhages appearing during its course are due to the fatty degeneration of the endothelium. Yet there is not a single lesion of any organ which can be considered pathognomonic of yellow fever. It is the collective lesions and general pathological picture presented during the course of the infection and at the autopsy, which characterizes the disease.

We do not find, as in typhoid fever, typhus and other infectious diseases, characteristic lesions localized in special organs. The lesions of yellow fever are disseminated throughout the body, and it is the peculiar general picture presented by the lesions of the different organs, associated with the history of the case, which makes up the basis of a pathological diagnosis. The lesions are characteristic in that they affect certain organs, while others remain apparently free.

Yellow Color.

To one familiar with yellow fever, the appearance of the body brings to his mind a number of features, which, though not absolutely characteristic, present an *ensemble* on which at times a diagnosis may be based. The body presents a yellow color, not the light or lemon color of ordinary jaundice, but a decided uniform deep orange yellow, which with the peculiar lividity generally exhib-

ited by the bodies, gives them a rather striking appearance. On the chest, neck, genitals, and, at times, other parts of the body, not necessarily the dependent parts, are found number of small or large hemorrhagic areas, which appear to be cutaneous and subcutaneous hemorrhages. The dependent parts show as a rule marked post-mortem hypostasis. The sclera are markedly yellow and frequently show hemorrhagic points; the pupils are usually dilated.

Hemorrhagic Spots.

In a number of places the subcutaneous tissue show hemorrhagic areas, due to overdistention of the capillaries of the part, with rupture resulting from the fatty degeneration of the endothelium. In some cases these hemorrhages are numerous and quite extensive. The skeletal muscles do not present any marked changes, though, at times, areas of fatty degeneration are found. This, however, is unusual.

The Lungs.

The lungs do not present any special lesions. They generally appear normal. The microscopical picture may show slight engorgement, but nothing else of note. In their report on yellow fever Marchoux and Simond state that the oedema frequently existing in autopsies of yellow fever, is possibly due to post-mortem changes. I must say that my experience with yellow fever, prompts me to agree with their statements, and that I have generally observed that the lungs show very few, if any, changes.

The Heart.

The heart and large vessels at its base show frequently hemorrhagic spots over their surfaces. The heart is usually flabby, and of a yellowish-red color. The endocardium frequently shows hemorrhagic spots also. The organ may present all of these lesions in a marked degree,

or one lesion may be more pronounced, while the others do not show. Again the organ may not show any lesions. It is rare, however, that one or the other lesions are not apparent. The microscopical examination may reveal at times marked fatty degeneration, while at others the muscle is normal.

The Liver.

The lesions of the liver are more frequently met with and are more characteristic, the organ presenting in typical cases a marked fatty degeneration. It has a yellow cast, though I cannot say that it is always boxwood in color. At times it may exhibit that appearance, but in the majority of instances the organ is simply yellowish. The microscopical appearance in cases that die early show fatty degeneration of the middle part of the lobule, or in what is known as the hepatic artery zone. This appearance does not show, however, in cases that die after the fifth or sixth day of the disease, as the fatty degeneration has involved all of the lobule. In these cases the organ is transformed into a mass of fatty degenerated cells, little if any of the protoplasm of the cells remaining, while the blood capillaries and spaces are filled with blood.

The early fatty degeneration as described above, limited to the middle zone of the lobule, is considered by some as characteristic of yellow fever; but it is found in other infectious diseases, and is rather a characteristic of the fatty degeneration of acute hepatitis of infectious diseases.

The Spleen.

The spleen does not show anything of note, and is generally normal in size. This is a differential point between yellow and malarial fevers. The spleen in the latter always presenting the characteristic appearance of malaria. The microscopical examination fails to show anything, but at times one may find a large quantity of blood in the blood spaces, with fatty degeneration of endothelium.

The Intestines.

The small and large intestines, if we except the beginning of the duodenum, do not present very much of note microscopically. Under the microscope we may find in the small intestines a swollen mucosa, the cells of which are desquamating and, occasionally, a few fatty cells; but these lesions are not constant. At the beginning of the duodenum, the first two inches present very much the same lesions as those of the stomach.

The Blood.

The blood of yellow fever does not present much of note. The repeated examination of this tissue has failed to reveal anything definite. Some cases present apparently an increase of the platelets, but this is not a constant condition and cannot be considered typical of the disease. Again certain bodies have been reported as occurring in the plasma, but it is very probable that they are due to fragmented corpuscles or some artefact, and are not constant. The blood count is practically normal and there does not seem to be any constant variation in the amount of hemoglobin, though at times a series of cases may show a slight diminution. Taken as a whole in a large number of cases the blood alterations are practically nil. The leucocytic count is also normal, and there does not seem to be a preponderance of either class of leucocytes. In the microscopical examination of organs, one is at times struck with the number of leucocytes carrying fat globules, or it may be undergoing fatty degeneration.

The Nervous System.

The central nervous system shows lesions which are practically the same as that of the other organs. Fatty degeneration, may be present, though probably not as extensive nor as intense. The surface of the organ is generally congested and the centrum ovale shows a number of punctiform red areas, showing dilation and congestion of

The Kidneys.

The kidneys are usually of a reddish-yellow color, and appear congested. On section the organ presents a marked yellow color, mixed with red and frequently small hemorrhagic areas are disseminated through the substance of the organ. In some cases, however, this organ may not show any apparent lesions. The microscopical appearance is generally that of an acute parenchymatous nephritis, with extensive fatty degenerations, the cells of the tubules appearing as granular masses lining the tubules and filled with fat droplets. The cells or what remains of them are desquamating and in many areas casts are found plugging the lumen of the tubules. The capillaries are filled with blood and in places blood is found in the connective tissue and at times in the tubules. In some cases, hardly any lesions can be demonstrated, with the exception of a few fatty cells.

The Adrenals, Thyroids and Pancreas.

The adrenals, thyroids and pancreas all present fatty degeneration of their respective epithelium. The degeneration in the adrenals seem to be more marked in the *zona fasciculata*. All of the different organs present fatty degeneration, which seems to be the main lesion of yellow fever.

The Stomach.

The stomach mucous membrane presents hemorrhagic spots, more especially near the cardiac extremity. The contents are of a semi-fluid or fluid dark-grumous color, or the viscus may be empty. The microscopical examination reveals a swollen mucosa; the cells are desquamating and fatty, the fatty degeneration extending to the glandular cells even in the fundus of the glands.

the blood vessels. The surface and even the white substance of the brain may show numerous small hemorrhages. These are the most apparent gross lesions of the nervous system; though at times they are not noticeable. The microscopical examination of the different ganglionic areas of the organ shows fatty degeneration of the nerve cells, all of which seem to be susceptible to the toxic influence of the infection. The cells of Purkinje, according to Marchou and Simond, are less vulnerable.

The spinal cord present the same general lesions found in the brain.

Adults More Susceptible.

We must not forget that the majority of fatal cases of yellow fever occurs in adults, and that these may show lesions of previous diseases, and these lesions must not be looked upon as forming part of the pathology of yellow fever. Frequently the spleen of yellow fever cases is found enlarged and shows evidence of malarial infection previous to the yellow fever which caused the death of the case. Cirrhotic conditions of the liver are also frequently found, as well as the small granular kidney of chronic interstitial nephritis.

In fact all of the organs may present lesions which antedated the attack of yellow fever. It is a question whether we would have as many deaths from yellow fever, if the patient's organs were healthy previous to the occurrence of yellow fever. For it is remarkable how rarely children or young children die of yellow fever. In fact in them the disease is so mild as to pass unnoticed by the best experts on yellow fever; a fact noted by all who have seen yellow fever and who have written on the subject. It is possible, however, that children are less susceptible to the poison.

General Steatosis the only Special Characteristic Lesion

Before concluding this subject I wish again to impress that there is no special characteristic lesion of any organ

upon which we can base our diagnosis at autopsy. The general steatosis of practically all the organs, more or less marked in all of them, is the only constant lesion, and that it is the general picture presented by this characteristic associated with the clinical history of the case which enables us to make a positive diagnosis of yellow fever.

DIAGNOSIS OF YELLOW FEVER.

BY HAMILTON P. JONES, M. D., NEW ORLEANS.

Resident Physician Isolation Hospital, New Orleans, 1897;
Chief Surgeon Jones (Yellow Fever Hospital, Santi-
ago de Cuba, 1898, U. S. A.); Physician-in-Chief
Emergency Hospital, New Orleans, 1905.

The diagnosis of yellow fever is perhaps one of the most difficult of all to make with certainty in the early stages of the disease, and there are probably many light cases of this disease not recognized at all, and during epidemics a great many diagnosed as such that are not.

Most careful study, scientific observation and post-mortem of all of the cases in the Isolation Hospital (New Orleans, 1897), in the Jones Yellow Fever Hospital (Santiago de Cuba, 1898), and the Emergency Hospital (New Orleans, 1905), all of which I had charge, and in which over a total of a thousand cases were treated, convinced me that not less than ten per cent. of the cases sent into these yellow fever hospitals did not have the disease. These institutions were all established with the primary end in view of protecting the communities from the infection, and for the treatment of yellow fever only, and in many instances police power had to be exercised to force indigent or unruly patients into them. It is natural to suppose that no such extreme steps would be taken until the physicians had convinced themselves of the truth of their diagnosis. If ten per cent. are sent into hospitals wrongly diagnosed, it is reasonable to suppose that at least ten per cent. escape diagnosis at all. This, it will be seen, still leaves the number of reported cases in any given outbreak approximately the correct number.

It, therefore, becomes imperative that the physician take every precaution for the community, by not being too sure of himself, but very sure of his screens for the first four days of any fever that might be confounded with this disease. While there is no doubt in my mind that the mosquito is the medium of conveyance of yellow fever

from man to man, and that the infected mosquito may possibly be carried greater or less distances to accomplish this, yet the history of all outbreaks are traced to the importation of some human being sick of the disease, upon whom the local mosquitoes feed and become infected.

With this important fact in mind, it, therefore, becomes imperative to get an absolutely correct history of the patient's movements for at least ten days prior to being stricken down, and equally important to determine his haunts, the localities whence his associates have come, and whether or not there has been sickness among them. Equal in importance with the above as an aid to diagnosis, is a careful medical history of not only the present attack but the medical history of his whole life, personal habits and environment, all of which if known might help to clear up an awkward situation; for instance, history of gall stones, cirrhosis of the liver, with repeated attacks of albuminuria and jaundice, etc.

Unfortunately there is no cardinal symptom of yellow fever, nor any two or three symptoms that may be taken as pathognomic at any one stage of the disease. The picture is a complex one, gradually unfolding itself. In mild cases all symptoms may be so light as to escape all but the most careful scrutiny, while in severe cases so pronounced as to almost stamp the diagnosis on the body and face of your patient. Persons ill with yellow fever always say that they are very sick and always, no matter how light the case may be, give the attending physician that impression.

Yellow fever, in common with such contagious diseases as smallpox, measles and scarlet fever, occurs as a general rule, but once during life, differing from them, however, in that it has never been known to propagate beyond 48° north and 38° south latitude, nor below a temperature of 65° fahrenheit, corresponding to the possible geographical distribution of the *stegomyia calopus* and its temperature of activity; the disease sparing neither age nor sex, only those being exempt from its influence who have at some former time had it. Its attacks are confined neither to the night nor day, nor to any state of the system,

whether of fasting or feasting, of plethora or anaemia, of robust health or chronic disease.

First Stage.

Yellow fever presents two well defined stages:

First stage.—This is characterized by severe pains in the head, confined chiefly to the eyes and forehead, back, lower extremities and epigastric region, with increase of pain and tenderness over the liver on pressure, a peculiar shining or drunken appearance in the eyes, rapid circulation, and marked peripheral venous stasis and elevated temperature. It more often attacks those who are apparently in perfect health; they are seized with intense headache, chill, shivering pain in the limbs and back, followed by rapid elevation of temperature, increased action of the heart, animated congested countenance, red, glistening, suffused eyes, congestion of gums, as a rule, but not always; intense thirst, anorexia, uneasiness of the epigastrium, nausea and vomiting. This stage may extend from 36 to 150 hours without any distinct remissions, according to the severity of the disease.

Second Stage.

Second stage.—This is characterized by depression of the nervous and muscular systems, and of the general and capillary circulation; capillary congestion more marked; slow and intermittent pulse; jaundice, albuminous urine loaded with granular casts and debris—always bile-stained. In more marked cases some, or all of these additional symptoms may appear: A purplish and yellowish mottled appearance of the surface, urinary suppression, passive hemorrhages from the ears, stomach and bowels, gums, nose, tongue, uterus, vagina, gall bladder and anus; black vomit, interstitial hemorrhages, delirium, convulsions and coma.

The Blood.

The blood in yellow fever has not shown any characteristic of the disease, except that it seems to be more concentrated than normal, all the various cells being found, in uncomplicated cases, in otherwise healthy individuals, in slightly greater numbers than in health, but in proper ratio with probably more platelets than normal. Hemoglobin percentage is always high in simple uncomplicated cases of yellow fever, 100 per cent. and over.

Urine.

Albumin is an invariable constituent of the urine at one time or another during the course of yellow fever, ranging from a trace to 80 per cent. moist. Casts, renal epithelium, and debris, always bile-stained, and other evidences of an acute inflammation of the kidneys present in a great majority of all cases. In several instances the finding of casts and debris not bile-stained led me to suspect that the patient was not suffering from yellow fever, but from some other disease associated with kidney troubles, and subsequent developments confirmed the suspicion. One would naturally expect in the early stages of yellow fever, in a person already suffering from a cast producing disease of the kidneys, to find casts not bile-stained, but they would as the disease progressed become so stained. In any other condition of the system associated with casts and bile pigments in the urine, we would expect to, and have found, the casts and debris bile-stained.

I consider this observation of the greatest importance in the differential diagnosis of yellow fever.

Facial Expression.

There is a peculiar facial expression in yellow fever, brought about by the combination of the flushed and congested face and eyes and the underlying tinge of yellow that is quite characteristic of the disease.

Jaundice.

Early in the onset, while congestion is still active, blanching the lips or skin will reveal jaundice of the skin and mucous membranes. Jaundice usually develops rapidly and is well marked by the time the congestive stage has subsided.

Circulation.

The venous stasis is an important sign, and while not peculiar to this disease, is more or less well marked in all cases, the mark left by pressing with the finger on the cheek taking an appreciable time to return to the color of the surrounding tissues, from a few seconds to a minute or more, depending on the stage of the case and its severity.

Temperature.

The temperature in yellow fever is continuous, lasting from 24 to 150 hours. There may be a period of calm lasting a few hours, followed by a secondary rise; this is a septic fever, of colon bacillus origin. Yellow fever itself is a fever of one paroxysm only, but opens the way for many secondary infections, evidenced by furunculosis, parotiditis, carbuncles, etc. Cases having a temperature above $102\frac{1}{2}$ degrees fahrenheit, are severe, and on the approach of death the temperature may go to 106 or 107, continuing to rise after death for hours, sometimes reaching the extraordinary height of 112 or 114, a condition not often noted in other diseases, except sometimes in sun-stroke and injuries or diseases, affecting seriously the central nervous system, as abscess of the brain, apoplexy, etc.

Pulse.

The pulse during the onset of the attack is rapid as a rule and fairly full and strong, the rapidity, however, rarely corresponding to that found in other diseases with

an equal temperature. It frequently happens, however, that the pulse may never go above 100, no matter how high the temperature goes. Cases vary in this respect very much. As a general rule there is lack of correlation between the pulse and temperature, frequently the pulse becoming slower while the temperature continues to rise. Even where there is correlation between pulse and temperature in yellow fever, the pulse and temperature going up and down together, the pulse is usually from fifteen to thirty beats per minute less than would be found in other diseases.

As the pulse in yellow fever falls, it becomes weaker, softer and more or less irregular as to time and strength of beat, and often intermittent. In fact so true is this that the attention of the attending physician may be drawn to the possibility of the presence of yellow fever by the character of the pulse of other members of the household who give a recent history of some undetermined sickness. This is particularly valuable in the lighter cases of children. This slowness and irregularity of the pulse may last from a day or two to several weeks.

Respiration.

Respiration in yellow fever is rarely affected unless there is some intercurrent disturbing factor.

Blood Pressure.

Blood pressure is almost uniformly low in yellow fever. At the onset of the disease it may be higher than normal, but as the disease progresses, usually by the end of the second day it has fallen below 120 m.m. of mercury, with a Riva Rochi Sphygmanometer 16 c.m. bag, and may go below 70 m.m. This low blood pressure is a valuable sign of this disease and seems almost to be a conservative protective step taken on the part of nature, and the blood pressure observations made at the Emergency Hospital, New Orleans, 1905, threw important and interesting light on certain phases of the disease not before understood.

In order to bring my ideas out more clearly on this phase of the disease, it will become necessary for me to digress from the diagnosis for a moment.

One of the most pronounced effects of the yellow fever toxin is the profound fatty degeneration of every organ and structure of the body produced. Even the epithelial cells and muscles of the deep urethra are affected. The effect of this fatty degeneration on the heart muscle is to weaken its action. The effect of this fatty degeneration on the blood vessels and capillaries is to impair their strength, and render stasis and hemorrhages, particularly capillary, more easy to produce. When a patient becomes frightened, delirious, unruly or through ignorance gets up and exerts himself, the disastrous and oftentimes fatal consequences are brought about by the increased heart action, and consequent increased blood pressure, causing rupture of the weakened and degenerated smaller blood vessels, producing hemorrhages into the meninges and gastro intestinal mucous membrane, causing delirium, convulsions, black vomit, hemorrhages from the bowels, uremia and frequently death. The fatal effects of over-eating are due to the increased blood pressure, produced by the meal. A rapid pulse and high blood pressure, either singly or together, are of the gravest import in yellow fever. From my observations it would appear that the crossing of blood pressure and pulse lines does not have the same sinister significance that the crossing of the temperature and pulse lines has in the chart; however, it is not altogether favorable for it to do so.

In reference to the degeneration of the blood vessels, I have noted that yellow fever patients are more easily bruised, and that hypodermics are more liable to produce subcutaneous abscesses and sloughs than in most other diseases.

Differential Diagnosis.

The following diseases may cause difficulty in making a differential diagnosis:

Malaria. Yellow fever may be mistaken for certain unusual forms of malarial fever. Microscopical examination of the blood, and the use of quinine will usually clear

EMERGENCY HOSPITAL

CLINICAL CHART

Case No. 206

Bed No. 5

Ward D

Name Antonina Searan

Doctor in Charge H. P. Jones

Date Admission Sept. 2nd 1905



Diagnosis Yellow fever (mild) Chart kept by _____ NURSE

EMERGENCY HOSPITAL CLINICAL CHART

Case No. 302

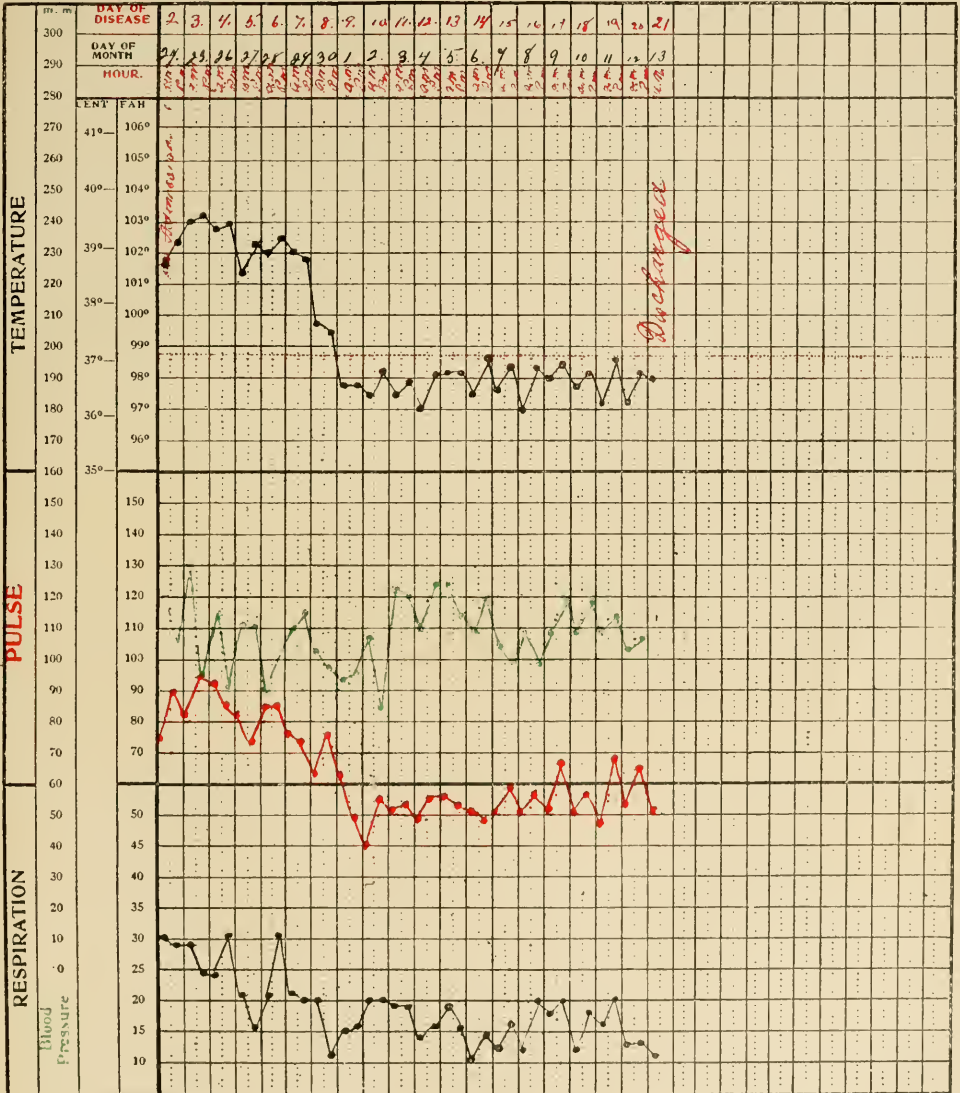
Bed No. 6

Ward 5

Name Chas. Lewis

Doctor in Charge H. P. Jones

Date Admission Sept. 24th. '05



Diagnosis Yellow Fever (Serici) Chart kept by _____

NURSE

EMERGENCY HOSPITAL CLINICAL CHART

Case No. 294

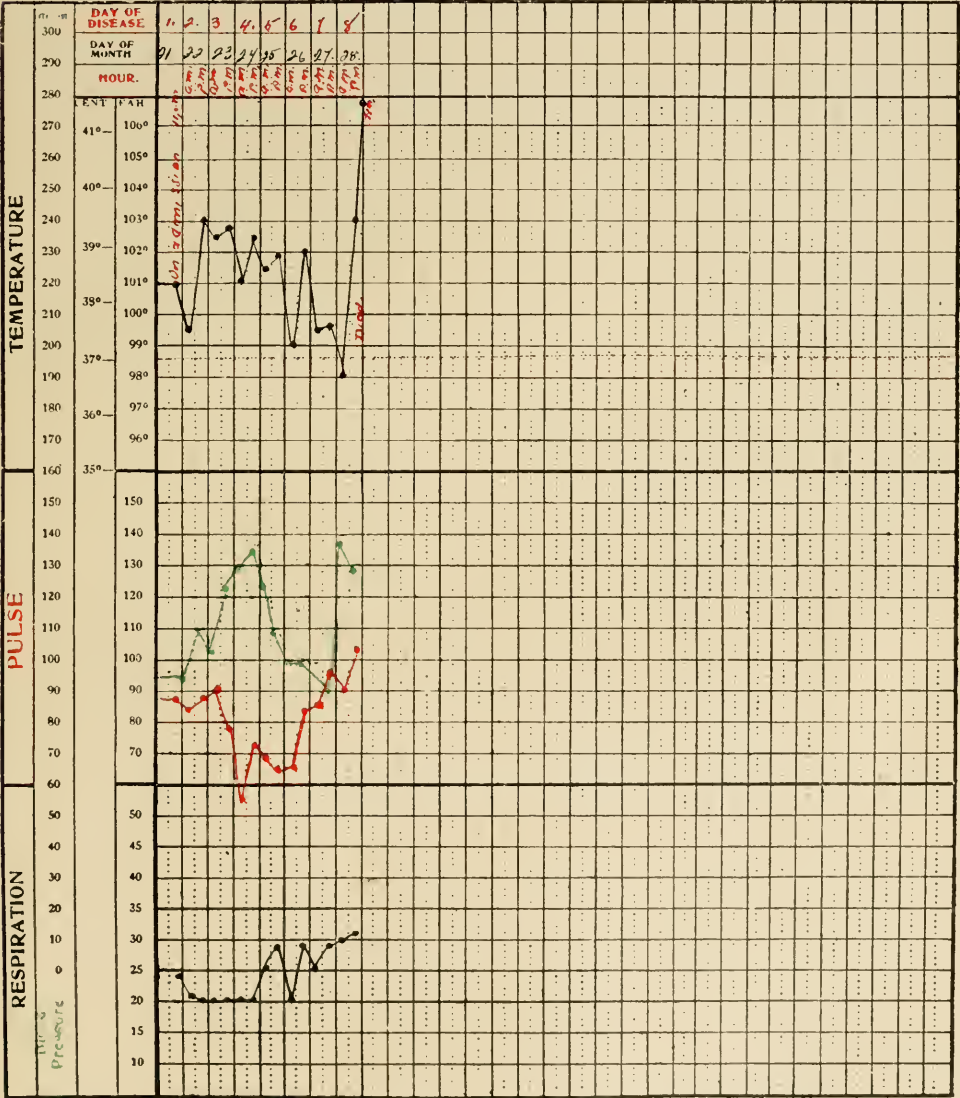
Bed No. 2

Ward A.

Name William Kelly

Doctor in Charge D. Jones

Date Admission Sept 21st / 05



Diagnosis Yellow Fever (Fatal) Chart kept by C. H. Holmes

NURSE

up this diagnosis, however, it is perfectly possible to have yellow fever and malarial fever also. In this case the greatest care will be necessary, and difficulty will be experienced in making the differentiation.

Hemoglobinuric Fever. This gravest form of malaria resembles yellow fever somewhat in its onset and symptoms—jaundice and albuminuria—but is characteristically different in that you have evidence of the destructive influences in the reduced number of red blood corpuscles and low hemoglobin percentage in malaria and absence of hemoglobin in the urine, of uncomplicated yellow fever.

Dengue. It is not difficult to differentiate between marked types of yellow fever and dengue after the first two or three days. The principal points of difference are the almost universal presence of an eruption in dengue and the absence of an eruption in yellow fever; the presence of jaundice in yellow and the almost universal absence of jaundice in dengue. Albuminuria is almost universally absent in dengue. It is possible for dengue and yellow fever to exist by side, but in that event it would be necessary to carefully and closely observe a good number of cases before a positive differentiation could be made. It is not probable that a large number of cases of dengue and mild yellow fever could be observed without some of these cases showing the characteristic lesions of the particular disease more pronouncedly than the other, thereby relieving the doubt.

La Grippe and acute lobar-pneumonia, particularly of apex, may possibly be confounded with yellow fever, but a careful study of the case will reveal catarrhal symptoms, and the absence of bile-stained casts and debris in the urine, and ought not to be confounded with yellow fever. In yellow fever, the lungs are normal.

Typhoid Fever in the early stages may possibly be taken for yellow fever, but the history of the case and the finding

of the Eberth bacillus, the Widal reaction, and the correlation of pulse to temperature will help to clear up the diagnosis. Yellow fever may engraft itself upon any disease, and I have held post-mortems in Cuba, showing the characteristic lesions of yellow fever and of typhoid fever, in cases in which malarial plasmodia were found in the blood during life.

Acute Yellow Atrophy of the Liver is a very rare disease, accompanied with a rapid reduction of the size of the liver, whereas in yellow fever the size of the liver is normal or is slightly enlarged.

Weil's Disease simulates yellow fever closely, the symptoms being fever, jaundice, diarrhea and nephritis. The marked enlargement of the spleen and diarrhea will tend to differentiate this disease. The spleen in yellow fever is not enlarged or tender.

Catarrhal Jaundice. In this disease we have little or no fever and none of the evidences of pain and violent acute toxemia found in yellow fever.

It may at times become exceedingly difficult to differentiate between a case of gastroduodinitis in a chronic alcoholic suffering from exacerbation of his chronic nephritis. Careful investigation of the history of a case of this sort and examination of the stools will throw light on the case.

Acute Peritonitis associated with black vomit, may be mistaken for yellow fever, but here again the absence of bile-staining of the urinary debris will eliminate yellow fever.*

General Summary.

No reasonable person will, of course, discredit the value of clinical experience as an aid in diagnosis, and when the clinically experienced practitioner avails himself of the clinical laboratory aids, there is small likelihood of error.

* Goldberger, Bulletin No. 16, U. S. P. H. & M. H. Service.

For the purpose of aiding those who may never have seen a case of yellow fever before, the following symptoms in the light of our present knowledge justify a diagnosis of yellow fever, *after all other diseases have been considered and excluded*, where possible, bearing in mind, however, that in a small percentage of cases, yellow fever may be associated with any chronic disease, and some of the acute, as malaria and typhoid:

1. A continuous fever of one paroxysm lasting more than twenty-four hours, with sudden onset, associated with violent pain in head, back or epigastrium, or any one of these localities—anorexia, nausea and vomiting.

2. Pulse rapid at onset, but steadily becoming slower in many instances, while the temperature continues to rise; even, if rising and falling with temperature synchronously, being from 15 to 30 beats less than the usual ratio between pulse and temperature found to exist in most other diseases, often becoming very slow, 60 or below, soft and at times intermittent, and very irregular.

3. Low blood pressure, 10 to 65 m.m. of mercury below normal.

4. High blood count 4,000,000 and over, with other elements in proportion, showing a concentrated blood.

5. High percentage of hemoglobin in the blood, often 100 per cent. and over.

6. Venous congestion, followed by stasis and jaundice in from one to several days, tending to bruise easily, and to hemorrhages of gums, bowels, etc., but never of kidneys or bladder, sometimes, of urethra.

7. Albuminous urine, containing bile-stained casts and debris from the urinary tract; and often bile, and bile pigments.

PROGNOSIS OF YELLOW FEVER.

BY CHARLES CHASSAIGNAC, M. D.

*Dean New Orleans Polyclinic; Editor New Orleans
"Medical and Surgical Journal," etc.*

The prognosis of yellow fever may be studied both from the general standpoint and that of the individual patient.

To-day the relative virulence of an outbreak or epidemic can be estimated fairly well in advance. Such estimate should be based on three factors especially: 1° The data of the inception or the introduction of the disease in a given locality; 2° the interval elapsing before the existence of yellow fever is discovered or acknowledged; 3° the degree of ability or desire on the part of the community in which the disease prevails to carry out the proper sanitary measures.

1° The earlier in the season the first case occurs the more, everything else equal, is there likelihood of an epidemic and of the prevalence of a severe type of the disease. Statistics show that in the past all the bad epidemics occurring in the City of New Orleans began early, notably that of 1853, the worst in its history; that year the first case was reported as early as May. All the other great epidemics started in either May, June or July. On the other hand, outbreaks beginning as late as August or September have invariably been of a comparatively mild type.

2° The longer the period between the outset of the disease in a given place and the discovery of its existence, the greater the severity both as to the extent of its prevalence and its virulence.

3° When the authorities of an infected locality recognize the importance of intelligent sanitary work, where the inhabitants co-operate earnestly with them, and if sufficient means are available to institute promptly all measures necessary for the protection of the sick against the bites of *stegomyia* mosquitoes, the destruction of in-

fecting mosquitoes, and finally the annihilation of all mosquitoes of the dangerous kind, either there is little danger of an epidemic if the early cases have neither been overlooked nor concealed, or at the worst the epidemic will be of a comparatively mild type and of short duration.

It is unnecessary to go into details concerning the points outlined above in reference to prognosis in general, as they are readily supplied and explained by the mosquito doctrine of yellow fever which is adequately treated in other sections of this work.

The prognosis in individual cases is not so easily made because numerous conditions and circumstances must be taken into account and carefully weighed before anything like a safe estimate can be made of the patient's chances of recovery.

There is no doubt that the average case of yellow fever in an individual blessed with healthy organs is far from being the terrible thing that it is usually pictured. That it is a disease, nevertheless, which at times puts the ineffaceable stamp of death on its victims at the outset can not be denied. At the present time, the knowledge we possess concerning the propagation of yellow fever and its practical application to a modification of the type of the disease, justifies the prediction that the latter will become less and less to be feared.

Apart from the general tendency of yellow fever in any given outbreak, as already considered, the points chiefly to be taken into account in weighing the chances of any particular patient are as follows: 1° age; 2° condition of the vital organs; 3° habits; 4° probable relative amount of poison introduced into the system; 5° surroundings of patient; 6° race; 7° treatment.

We shall review these points *seriatim*, leaving for subsequent consideration the diagnostic significance of some of the important symptoms of the disease.

Age. The younger the patient, the better his chance of recovery. In infants and small children the disease is so mild as to have led to the belief that natives of New Orleans and other points formerly subject to frequent

outbreaks of yellow fever were immune to the disease. Natives usually had during childhood an attack so mild as to be unrecognized yet sufficient to produce immunity. The risk increases as the age advances, except in females at about the age of puberty, in whom the mortality appears to be higher than in those a little older.

Condition of the Vital Organs. When the organs are sound the patient, of course, has a better chance; especially is this true as far as the kidneys, the liver and the heart are concerned, in the order named. The nearer normal is the individual, the less likelihood is there that some important organ will succumb either from toxemia or secondary septicemia, for the better can elimination progress and the more pronounced the resistance of the organism as a whole.

Habits. The patient's former habits should be taken into account in attempting to prognosticate the outcome of an attack of yellow fever. The alcoholic, those guilty of other excesses, the overworked—all make poor subjects and are apt to offer less resistance to the inroads of the disease, one of the organs bearing the brunt of the attack is much more apt to be weakened already. Temperate, steady, sanely and not too strenuously occupied individuals stand the disease better and, other things reasonably favorable, are very likely to recover.

Amount of Poison. There is no doubt in the writer's mind that the comparative amount of poison injected into the system of the victim by infected mosquitoes, plays an important part in determining the virulency of a given attack, as well as does the rapidity with which that poison is introduced. If and when that degree of infection may be ascertained a prognostic element of value will have been secured. An individual who, through ignorance of danger or through apathy, recklessness, or the necessity of circumstances, receives numerous bites within a short period stands a good chance of having a dangerous attack and perhaps succumbing if some other unfavorable feature is present in his case. On the other hand, one who, despite his understanding of the consequences and all care possible, still gets a bite or two

will probably have only a mild attack. The French observers in Brazil have stated as one of the conclusions of their experiments that a single bite from an infected mosquito never proved fatal.

Surroundings. It stands to reason that well nourished people in comfortable and sanitary habitations, invalided in cheerful and well ventilated apartments do better than those who live in dark, dingy, close and unsanitary tenements. The mortality is always higher among the alien poor who live more or less crowded together in unsanitary tenements.

Race. The prognosis is better by far among the blacks and colored than among the whites, even when the former are otherwise in less favorable condition or surroundings. Whether this is because the darkies merely possess a higher degree of resistance to this particular poison, or because their skin being tougher and their odor more repellent to the mosquito, they are less frequently bitten, we are not prepared to say. The fact remains that the majority have the disease in a mild form and that the mortality among them is almost nil, so much so that they, like white children, had been supposed to be immune until comparatively recently.

Treatment. The medical treatment and the nursing the patient receives figure largely in the result and a knowledge of what it is to be in any given case may be of material assistance in our prognostications. The sufferer who is fortunate enough to have an intelligent and experienced medical attendant of the "let well enough alone" type, and to be nursed by a quiet, careful nurse of judgment stands the best chance of getting well. The one who is treated by an inexperienced physician who is guided by the advice set down in the book of some noted therapeutic authority who has never seen a case of yellow fever is very apt to die.

By weighing the elements tending for or against the patient according to the points considered under the seven heads above, one possessed of a fair amount of judgment can make a pretty fair prediction as to the outcome

of any particular case, if at the same time, proper consideration is given to the prevalent type of the disease.

In addition to what has just been said, it is proper to call attention to the relative prognostic value of some of the symptoms of the disease. These are mainly: the temperature, icterus, the urine, and hemorrhage, including black vomit.

Temperature. If at the outset the temperature is only of moderate intensity, ranging not above $103\frac{1}{2}^{\circ}$ to 104° in adults, and especially if defervescence is prompt and rapid, the prognosis is good as far as this point alone can be a guide. With the same degree of elevation in the beginning, if the temperature remains stationary or, particularly, if it rises at all the next day, the prognosis is grave. Should the fever reach or surpass the 105 degree point during the first twenty-four hours the prognosis is bad; the patient has a very slim chance of recovery and that only if all other indications are favorable.

Icterus. The more intense the icterus and the earlier it shows itself the graver the prognosis. When there is a very marked jaundice by the third day or earlier, it is an evidence of profound toxemia and there is good ground for serious anxiety as to the outcome of the case.

Urine. The condition of the urine furnishes valuable indications as to the prospect of recovery. Its quantity is of greater comparative significance even than its condition. As long as the patient can urinate abundantly the prospects are good, even if the percentage of albumen is fairly large. In fact, I have seen patients recover whose urine was highly albuminous and loaded with casts but continued copious; the laboratory prognosis differed from the clinical and the clinical proved correct.

Whenever the urinary secretion becomes scanty, danger must be apprehended and suppression of urine means death, the exception being that which proves the rule. The patient is overwhelmed by toxemia, uremia and sometimes septicemia combined, coma or convulsions supervene and the patient's sufferings are ended.

Even retention of urine is a bad omen as it is frequently a forerunner of anuria. This is probably because the

impairment of function leads to a very slow and gradual filling of the bladder, the call for urination being slight in consequence and not becoming insistent before the secretion ceases; when the catheter is introduced the first time a fair amount of urine may be withdrawn while at its second introduction, several hours subsequently, scarcely any may be found—there is no longer retention but suppression.

Notwithstanding what has just been written about the greater importance of the abundance of urine, it must not be concluded that the urinary findings are of no prognostic value. A very large proportion of albumin is of serious import, more so if present early and especially as early as the second day of the disease. The more casts are found, the more danger of serious damage to the kidneys. When the urine is highly albuminous, loaded with casts, and at the same time scanty, the prognosis is most gloomy.

Hemorrhage. From the injection of the conjunctiva, the flushing of the face, epistaxis and, later, other hemorrhages, there is evidence throughout of the decided effect of the disease on the circulation. The degree of this effect and the time at which its phenomena appear are of prognostic import.

Epistaxis and moderate menorrhagia or metrorrhagia, at the outset, produce relief often and are not a bad sign, except during pregnancy. It must be remembered, however, that the bleeding at the nose may give rise to unnecessary alarm when the blood is swallowed and then is vomited after being in the stomach for a while. This is taken by the inexperienced for black vomit, but may be differentiated chiefly by the fact that it can be ascertained there has been nose bleeding and that this occurrence comes early, generally some time on the second day, a period too early for the true and much dreaded black vomit.

Bleeding from the gums is a grave symptom and the earlier it appears the more significance must be attached to it. Coming as early as the third or fourth day, it indicates a very serious condition. Danger need be

apprehended less if the sponginess and bleeding of the gums is present only after the fourth day.

Hemorrhage from the intestines is always a dangerous indication and death is very apt to follow when there occur bloody stools of a gangrenous odor.

Like other hemorrhagic symptoms, bleeding from the stomach, which produces what is usually termed black vomit, is of the gravest import when it occurs as early as the third day; on the fourth day it is still a very bad sign and means almost sure death if the gums also are bleeding; if only on the fifth or sixth day and, particularly if at that time the gums are still firm and do not bleed, the prognosis is not so gloomy. The quantity of vomit also counts, the more of it and the more often it happens, the worse the indication.

It has been outlined, then, that by the aid of some definite propositions it is possible to prophesy about the type or degree of virulence of the disease which is to be characteristic of a given outbreak. It has been shown next that the past history and the actual condition of the patient can furnish valuable prognostic data. Finally, we have determined that a proper study of some of the important symptoms will yield important information as to the outcome of an attack of yellow fever. It must be added that, after all is said, the experience and judgment of the observer must remain important factors in determining the accuracy of his prognosis. Neither must it be forgotten that "yellow fever is a disease of surprises." Some patients have died whose recovery had been confidently expected, while we have known others who recovered after their death certificates had actually been written out.

As Touatre has said, "a patient must never be given up!"

THE TREATMENT OF YELLOW FEVER.

BY LUCIEN F. SALOMON, M. D.

Secretary Louisiana State Board of Health, 1886-1893.

In preparing this article upon the treatment of yellow fever, it has been my effort to avoid technical terms and phrases, and so express myself as to make the subject plain to the lay mind so that in the event of a physician not being obtainable any person of intelligence will be able to manage a case, until the patient can be seen by one. On the other hand, the treatment here given is recommended to practitioners of medicine as the result of a very large and successful experience in yellow fever.

Many years ago, in the early days of my practice, I found that potassium nitrate was almost as efficient, if not as sure an antidote to the malarial poison, as quinine; and long before the microbiological investigations which have since been made, demonstrated that Yellow Fever was not caused by a microbe, the peculiar hemorrhagic tendency of the disease, resembling so closely the hemorrhagic form of malarial fever, led me to use potassium nitrate in the treatment of Yellow Fever. As a result, I am prepared to state, and also confidently assert, that in a majority of instances, a case, if seen within the first twenty-four hours and treated according to the method which I shall give, is converted into a simple pyrexia, with rapidly declining temperature, terminating at the end of the third day, and not followed by the secondary rise so often seen.

Of course, the mere administration of drugs does not constitute the entire treatment of any disease, but, having in the first instance administered what I consider an antidote to the poison, then it becomes our duty to so manage the case as to conduct our patient to the safe harbor of recovery.

With these preliminary remarks, I shall now proceed to describe how to treat Yellow Fever. The first step

necessary is the administration of a large saline purgative, preferably sodium sulphate. This will thoroughly cleanse the entire intestinal tract. It is not necessary to give calomel or any other purgative, because the sodium sulphate, in addition to its flushing power, also acts as a cholagogue. It will often be found that when the patient is seized with the attack there is undigested food in the stomach. If such should occur within a short time after eating, he will vomit and empty the stomach of the food. If the seizure should come on three or four hours after a meal, and there is still some undigested food in the stomach, there will be nausea. In such cases it is well to give minute doses of calomel, for the purposes of quieting the stomach, so that the sodium sulphate will not be rejected. For this purpose, the following combination is best adapted to the purpose: A powder consisting of one-quarter grain of calomel with one grain of ingluvin. This to be repeated every twenty minutes until four are taken, and then followed, in one-half an hour, with one-half or one ounce of sodium sulphate dissolved in a glassful of water. It will be found very frequently that the intense headache accompanying the onset of the attack will be relieved after the administration of the saline. If not, relief can be obtained by the old-time hot foot-bath, which, by the way, I never use except for the relief of said condition. One hour after the administration of the purgative, and without necessarily waiting for its action, begin the administration of the following prescription:

Potassi nitratis	1	dram
Liq. ammoniac acetatis	3½	ounces
Syr. aurant flor	½	ounce

The adult dose of this mixture is one-half ounce, repeated every two hours during the continuance of the fever. The liquor ammoniac acetatis is administered in conjunction with the potassium salt for its action on the skin, as it causes free diaphoresis, thus favoring elimination. The potassium nitrate, in addition to what I con-

sider its specific effect as an anti-toxin, also plays a very important part by acting as a prophylactic diuretic.

It will be found, as a rule, within a few hours after beginning the administration of the above mixture, that the temperature, no matter how high at the onset, will begin to decline, and will decline progressively until the end of the third day, when convalescence will begin.

In addition to the remedies above mentioned, there are several cardinal points in the management of a case of Yellow Fever which should be borne in mind. The first is absolute rest in the recumbent posture, not allowing the patient even to raise his head for any purpose whatever. Second—Absolute abstinence from food of any description, liquid or otherwise, until the complete subsidence of the fever. Third—Careful attention to the thorough emptying and cleansing of the lower bowel by large enemata administered at least once daily, using for this purpose at least two quarts of normal salt solution. Water and ice should be allowed *ad libitum*, preferably carbonated water, such as Apollinaris, carbonated lithia water or seltzer water. If the patient is averse to the carbonated water, plain vichy may be given.

After the fever has subsided, the temperature often becomes sub-normal. The patient is now in what is called the algid stage. Very often the extremities will be cold; sometimes the entire body is cold and clammy to the touch. For this condition there is nothing better to restore the patient to a normal condition than a small glass of ale administered every two hours, in conjunction with nux vomica and caffeine. I usually administer one-eighth of a grain of extract of nux vomica with one or two grains of caffeine citrate every two or three hours, as the case may require.

In beginning to feed the patient, which may be done on the fourth or fifth day of the disease, great care is necessary. For the first day, give two ounces of weak chicken broth, to be repeated at intervals, and nothing else. The next best step in the feeding of the patient is the administration of butter milk. Butter milk is easily retained

and digested, besides being grateful to the patient. From this, go to sweet milk, beef or chicken soup thickened with rice or barley, and after a few days, gradually to the normal diet.

I have outlined above the treatment of a simple, uncomplicated case of Yellow Fever, but one will often be confronted with cases that will tax one's ability and ingenuity to the utmost.

We will begin with the most ordinary complication, the one most often met with—that is nausea. This can generally be relieved with milk of magnesia. This failing, there may be added to it one or two minims of creosote.

You will occasionally find that, in spite of above treatment, the temperature continues high. In efforts to reduce high temperature beware of the use of so-called antipyretics; such drugs as phenacetin and its congeners are positively vicious in their effects. The disease itself is sufficiently depressing without adding to the depression. I believe firmly that many a life has been lost in Yellow Fever by the administration of these preparations. Water externally, either by sponging or the application of the wet towel, will almost invariably reduce the temperature. Never use ice water. My method is to use tepid water always. Frequent sponging will generally reduce the temperature. If not, the application of the wet towel will accomplish the desired result, particularly if it is carried out the following plan which I have often adopted: The patient is covered from chin to feet with a large bath towel saturated with tepid water, and then the nurse or attendant is made to fan the patient, thus creating a current of air and causing rapid evaporation, and equally rapid reduction of temperature. I have many times in this manner brought a temperature of $104\frac{1}{2}$ or 105 below 103 in half an hour.

The next step to be considered is black vomit. I pause here to state that in 1878, at the outbreak of Yellow Fever in New Orleans, I gave the result of my experience (in a discussion before the New Orleans Medical and Surgical Association) with ergot in controlling black vomit. The

suggestions then thrown out based upon past experience, were adopted by a number of physicians during that epidemic, and Dr. S. S. Herrick published the result of his experience in the use of ergot in Yellow Fever. I have frequently, and almost invariably, controlled black vomit with hypodermics of ergot, administration by the stomach of creosote, either with chalk mixture or milk of magnesia, and the application of the ice bag to the epigastrium.

Now we come to the most dangerous condition that may arise in Yellow Fever, and one of the most difficult to overcome—that is the suppression of urine. As a rule, under the treatment above suggested, this condition is very rare, owing, as stated in the beginning, to the prophylactic diuretic effect of the potassium nitrate. Should, however, the urine become scanty, or altogether cease, the remedy is ergot. Ergot administered hypodermatically will almost always relieve this condition, especially if combined with the administration of caffeine.

Of course, the above briefly outlined treatment of Yellow Fever, it is not claimed will cure all cases. That is something beyond human ability, but from an experience of over two hundred and thirty cases without a death, I am led to believe that by the method given and the proper care of each individual case the mortality will be exceedingly small, and I put it forth in the sincere hope that it will be to some extent helpful in saving human life.

THE LOUISIANA SYSTEM OF HYGIENIC EDUCATION.

BY FRED J. MAYER, M. D.

Secretary Louisiana State Sanitary Association.

"Every mind was made for growth, for knowledge, and in its nature is sinned against, when it is doomed to ignorance."—Channing.

"A knowledge of the laws of life is more important than any other knowledge whatever. * * * A knowledge which subserves direct selfpreservation, by preventing loss of health, is of primary importance."—Spencer.

At the beginning of the great yellow fever epidemic of 1878, a medical student, from one of the interior towns of Louisiana, who had been studying the symptomology of the disease in New Orleans, fell sick, and profoundly impressed with the non-contagiousness of the disease, returned to his home and was received at point of pike and gun, and for a period of nearly forty days subjected to a brutal and inhuman quarantine. After recovery from the attack, supposed to be yellow fever, for which the quarantine was imposed, and from the first wild outburst of passion against those in authority responsible for the inhuman restrictions, leveled against the victim, his mother an immune who nursed him and his brother who met him on his arrival, his thoughts naturally reverted to the cause of the wild, panicky and insensate fears that would drive a community to treat the victims of a contagious or infectious disease as though they were criminals, nay worse, for even with barbaric tribes the condemned criminal is afforded food and shelter until such time when he must pay the penalty for his infraction of the tribal law, while in civilized communities the poor unfortunate victim of a disease, for which he is in no wise responsible, is not only frequently denied these, but at the point of a shot gun is prohibited from securing the necessities of life, which he may have the ability and desire to pay for.

This train of thought could lead to but one conclusion: That ignorance of the cause of the disease, its manner of propagation and its prevention, was at the bottom of the trouble; another thought occurred: that this magnificent State, with its wonderful resources of field, farm and mine, reticulated with 4000 miles of navigable waterways, with a balmy climate and a soil rioting in profusion of raw materials and fuel to convert them into those products upon which empires are built, with a hospitable people in whom the American instinct of fair play was strong, whose qualities of physical courage had been tested in the crucible of Civil War and Reconstruction, should be absolutely inhibited in its growth and evolutionary development by the fear of an ultra-microscopic germ, periodically sown by the bronzed harvester of Death.

The strange immunity of those communities in the infected areas, off the lines of travel, or which had instituted rigid quarantine, plainly pointed to some vehicle of transmission of the yellow fever germ at that time supposed to be fomites, and suggested that the only sensible way to deal with the problem was to institute a sane and scientific quarantine, with the minimum of hardship inflicted on the commercial interests, and that until the masses of the people were sufficiently instructed to apply the fundamental principles of hygiene to the suppression of disease, this panicky feeling would continue and periodical exhibitions of shot gun quarantine barbarities would recur—the remedy was apparent: Educate the masses—not only the children in the schools, but the grown folks—many of whom had successfully crossed the pons asinorum, and could most learnedly discourse with the muses, but who were profoundly ignorant of the rudimentary rules of life.

Of a verity the paraphrased caustic lines from Hudibras fitly apply:

“Full many a youth returns from school
 A Latin, Greek and Hebrew Fool.
 Full many a man returns from college
 With a head choke full of useless knowledge
 In sanitary science still a block
 Tho’ deeply skilled in hic haec hoc.”

In 1882, Koch having pointed out: "the constant presence in tuberculous tissue or matter of a well defined micro-organism, capable of reproducing tuberculosis when isolated and injected into healthy animals," it was evident: that the theory of heredity was no longer tenable, and that this dreadful disease, which since the dawn of history, "arose and o'ershadowed the earth with its name," could only be stayed in its triumphant march by a study of its cause, nature and prevention; and that this knowledge should not be confined to the family physician, but should be made common property, so that the simplest mind could realize the dangers of tuberculous sputum, of meat and milk from dairy herds that had not been subjected to the tuberculin test, and the role that the common house fly and bed bug plays in the transmission of the bacillus tuberculosis.

The extreme conservatism of the medical profession, which seemed to regard as unethical any discussion of medical subjects with the laity, stood as a bar to any acquiescence in or ready acceptance of the principle of public instruction in the cause, nature and prevention of communicable diseases, the writer, while never accepting the correctness of this ultra-conservatism, holding it a colossal mistake to permit lay writers to trench upon ground, which should have been traversed by medical men alone, yet not wishing to appear unethical, pushed the plea for public instruction before the old Attakapas Medical Society, before the Orleans Parish Medical and Surgical Society, and before the Louisiana State Medical Society, until it won their approval as evidenced by the formal resolutions adopted. The State Agricultural Association endorsed this plan of hygienic education, twice by formal resolution: the State Pharmaceutical and Dental Associations and the Mobile Quarantine Convention endorsed the principle unanimously.

Armed with this medical endorsement, the fight for the principle was carried before the American Public Health Association at the Mexico meeting in 1893. Later, at the annual convention of the same body in New Orleans, and at the 1906 meeting in the City of Mexico; under the

rules of this Association, all resolutions are referred to the executive committee which failed to report back the resolutions, there is no question that in an open field, on the floor of the House, it would have won recognition, since the principle underlies the objects and purposes of the organization, as set forth in Article 2 of the Constitution, viz.: "the advancement of sanitary science and the promotion of organizations, and the measures for the practical application of public hygiene," the Louisiana system simply goes a step further in carrying hygienic instruction to the masses of the people in the homes and by their firesides, by Chataouquan methods.

At the New Orleans meeting of the American Medical Association, a resolution offered by Dr. Sanders, State Health Officer of Alabama, endorsing the principle of this system was unanimously adopted by the section on hygiene, referred under the rules to the general Committee on Resolutions and never reported back, so evidently the medical mind is not yet fully converted to the idea that the highest duty of the physician is prevention and not cure.*

*Since this was written, the American Medical Association has had Dr. McCormack visiting the entire country, advocating Public Education in Hygiene, and at the Chicago Meeting of the Association, June 2-5, 1908, Dr. Burrell of Boston, its President, devoted his Presidential address to the "New Duty of the Medical Profession, the Education of the Public in Scientific Medicine. Vide Journal A. M. A., Vol. No. 23, p. 1873. At the same meeting Dr. Harrington, of Boston, in his address on "States Rights and the National Health," among other things said:

"In arousing the public to a proper appreciation of the importance of public hygiene, we have far more to fear from professional than from lay ignorance." * * *

The creation of educated public interest in the National health is a duty which happily does not belong to any one class or calling, each in his way can do his part by precept and example, of great value as shown in the agitation for the law relative to foods, and here, there and everywhere for the establishment of Sanatoria, for ordinances against the spitting habit, are popular lectures, magazine articles, and the sympathy of the press.

In the winter of 1882, with the memory of the yellow fever epidemic of 1878-1879, still fresh, and the mortuary statistics of tuberculosis bristling with its annual holocaust, a scheme of Public Instruction in Hygiene was evolved, which should start in at the Kindergarten, continue through the primary and academic grades, to the college and university, and university extension with some great Central Institute of Hygiene as a focal point from whose portals could be issued a journal, bulletins and leaflets in all the tongues spoken in the State, and a corps of trained Lecturers organized for the instruction of the masses.

The scheme was considered a Utopian dream by most medical men, who held that the Medical Colleges had Chairs of Hygiene, and that the rudiments of that science could be taught in the public school, unmindful of the fact that even in Medical Colleges Hygiene was usually an unimportant adjunct to the Chair of Materia-Medica, and that the teachers in the public schools themselves needed instruction, and so the plan for want of means to carry it into execution failed to materialize.

"Two years ago there was inaugurated at the Harvard Medical School a series of free public lectures, given on Saturday evenings and Sunday afternoons for four months, mainly on Preventive Medicine. The first series was a most gratifying success; the second so largely attended that at times more people were turned away than succeeded in securing places. The chief result is a widespread interest in public hygiene, and marked strengthening of the cordial relations which ought to exist everywhere between the profession and public." (Journal A. M. A., Vol. No. 24, p. 1959.)

On July 18, 1908, the editor of the Journal A. M. A., in an article entitled "Relation of Education to Preventive Medicine," in commenting on Dr. Ditman's monograph on "Education and its Economic Value in the Field of Preventive Medicine," says: "Effective measures for removing the causes of disease can be carried out only with the support of an enlightened public opinion, and this must be formed by education." (Vide Journal A. M. A., Vol. 2, No. 3, p. 227).

In volume 51, No. 4, p. 323, in commenting on "The Louisiana System of Hygienic Education," the editor says: "On

One of the distinctive features of the system, and the one from which it was expected to get the best results, was a series of popular lectures illustrated with lantern slides, breaking the continuity of the strain on the lay mind by appropriate musical and recitative numbers, between each lecture and discussion. In 1885, as an experiment to test the correctness of the theory, this idea was carried into execution and the most gruesome subject purposely selected for a popular lecture, viz.: "The Sanitary disposition of the dead." The kindly manner in which this dismal topic was received, confirmed the correctness of the theory; the only thing that remained to be proven, was: whether public interest could be kept up for any length of time, and the opportunity for proving this did not present itself until 1897, when the first popular Institute of Hygiene ever held was convened in the town of Opelousas, in this State. The session opened in the morning, lasted all day and all night. At mid-night an adjournment was taken to enable the ladies to retire, and

the intelligent co-operation of the public the ultimate success of Sanitary legislation must largely depend. A useful auxiliary in this direction already exists in what has been called 'The Louisiana System of Hygienic Education,' the essential feature of this movement, according to Dr. F. J. Mayer (Rept. of Spec. Med. Insp. La. State Board of Health, 1908), consists in the holding of Institutes of Hygiene before Colleges, High Schools and Special Institutes. By this means not only is a considerable portion of the populace instructed in the nature and prophylaxis of transmissible diseases, but the movement is further extended by the 'perfect correlation of the clergy of all denominations, educators, scientists and the press with the health service of the State in its educational efforts.' * * *

"The further extension of this movement is much to be desired. It seems desirable, however, as Dr. Mayer suggests, that the educators should be independent officials, not engaged also in field work; not only because there is work enough of that kind alone to engage their attention, but also because their teaching is apt to be looked on with suspicion by the ignorant if it emanates from one charged with executing the ordinances of the Board." (V. J. A. M. A., Vol. 2, No. 4, page 323).

the Institute reassembled at 12:30 P. M., when a lecture was delivered for men only; it was 2 o'clock A. M. before the successful experiment adjourned sine die. Many of the leading Sanitaricians of the State participated; including Drs. Dalrymple, Metz, Dyer, Chassaingnac, Formento, E. D. Martin and others. Those who have had experience with agricultural and pedagogical institute work will recognize the success of holding the wrapt attention of an audience for such a lengthy period. Water, Hygiene of the skin, Sexual Hygiene, Cremation, Anthrax (Charbon), Variola and Vaccination, Yellow Fever, Typhoid and Consumption were lectured on and discussed before a packed house.

The practical benefits of this institute were felt the next day in an overhauling and cleaning of cisterns, the chief source of drinking water in the town. Some of these tanks had not been cleaned since the war, and contained two feet of black pultaceous mud reeking with organic filth. Attention was directed to the dangers of polluted milk supply, and people boiled milk who formerly had consumed it raw, although the cows supplying it drank from the town creeks polluted with sewage.**

The next year another institute was held in Baton Rouge, through the exertions of Dr. Dalrymple, Professor of Comparative Anatomy in the L. S. U. & A. M. College, and recently elected President of the American Veterinary Medical Association.

These two institutes, while demonstrating the feasibility of the plan, made manifest the fact, that the expense was

**The unbroken continuity of interest manifested at this Institute was due to the fact: that under the guidance of an eminent musician the physiological effect of music on the nervous system was taken full advantage of in lessening the strain on the lay mind, which otherwise would have been unbearable in a mixed audience. The use of music is an important adjunct of the Louisiana System of Hygienic Education, and applies with equal force to all institute work; like all nerve stimuli, it must be used with discriminatory judgment, hence the very best musicians should be consulted in arranging the musical part of the program; it would never do to follow a discourse on death in its protean forms, with an aria, one might say mal-aria, the lugubrious strains of which

too heavy for the individual, and that it was the duty of the State to furnish this instruction. These institutes were held under the auspices of the "Louisiana State Sanitary Association." The purposes and objects of this corporation as set forth in Article II of its constitution adopted November 22nd, 1897, are declared to be:

"The advancement of sanitary science,

"First. By the organization of a central body with auxiliary circles in every parish in the State and its extension, until it embraces all the Southern, and particularly the Gulf and the South Atlantic States.

Second. The founding of a school of Hygiene and Quarantine on the Chatauquan plan of correspondence, Lectures and Summer Institutes.

Third. The publication of a monthly Journal devoted to the objects of the Associations.

Fourth. To secure through an educated public opinion the enactment of adequate health laws; laws on vital statistics on food adulteration and water pollution, on meat and dairy inspection, on vaccination and their enforcement; and the founding of hospitals for contagious diseases.

Fifth. To systematically educate the people of the State to the necessity of substituting rational, scientific, uniform, maritime and inland quarantines during periods of epidemic danger or invasion for the barbarous shot-gun quarantines, which while crippling commerce, afford at best a doubtful and insecure protection.

Sixth. The restriction and prevention of tuberculosis and the founding of sanitarium for its Hygienic-Dietetic treatment."

following closely after the dreary dissertation might pile Pelion on Ossa; nor would it serve the purpose to follow the discourse with some excruciating rag-time that would rudely check the rising tide of sympathy and deflect its current into a channel of levity, the sympathetic interest and attention of the audience would be balked. Rostand elaborated the idea in "Cyrano de Bergerac," when the thoughts of the starving Cadets of Gascony were turned and raised to higher levels by music that appealed to loftier instincts.

The charter provides for representation of all interests concerned particularly to that mighty agent of reform, the Press and declares: "That its Advisory Council shall consist of delegates from each Sanitary Circle in the State, from each Town Council and Police Jury of the State, from the Commercial Exchanges and Boards of Trade, from the Boards of Health, from the Medical, Pharmaceutical and Dental Societies, from the Colleges, from the Louisiana Chatauqua and other educational and scientific bodies, from the Press Association of the State, and the Press Club of New Orleans, and the Commercial Travelers' Association; the basis of representation from each to be fixed by the Executive Committee."

These two committees shall, in joint session, "Serve as a nominating committee of officers and committeemen, for the ensuing year and make such recommendations to the Association as shall best secure the objects of its creation."

The membership is composed of active, associate, honorary and non-resident corresponding members, the Executive Committee determining for which class a proposed member shall belong; there is no initiation fee and the annual dues are fixed at \$1.00, and the liabilities of members limited to the amount of their annual dues, and "this society may incorporate with similar or other sanitary associations in the other Southern States in such manner as its Executive Committee may determine."

The Secretary is ex-officio State organizer.

Copies of this Charter were sent to the Exchanges and Transportation Companies, but failed to attract attention, although as per reference to Section 5, of the Charter, it will be seen they would have been the chief beneficiaries. The business mind had no patience with any system that required time for a proper evolutionary development; what it desired was a speedy estoppel to shot gun embargoes on commerce, and vainly imagined, as many of them still do, that all that was necessary was the exhibition of physical force on the part of the State or National government.

Here it is where a great divergence of opinion exists, those who have more closely studied the question, recognize that the average American is imbued with the old Anglo-Saxon idea, that every man's house is his castle, and that he has an inherent and inalienable right to defend it from invasion, whether the invader comes in the form of a burglar or a foreign disease germ, and that, whether he has a legal right or not, he is going to take it; now when whole communities become obsessed with this view, and, in the furtherance of their belief in the right of self-preservation, commit excesses not warranted by science, it is apparent that the only permanent relief to be obtained is from a better enlightened public opinion. In the reign of Elizabeth, a gibbet was set up at every mile post, from Lands End to New Castle, in the hope of stopping smuggling, and failed, and our own well appointed revenue service cannot wholly prevent infraction of the law; the whole army of the United States if impressed into service as a quarantine guard might for a time enforce the passage of trains through territory quarantined against infected areas, but it could not prevent the torch from being applied to a railroad bridge, nor the raising of a rail by the mid-night prowler, and this would for a time put a stop to commerce. Nor could all the powers of the United States force a community to carry on business relations with centers of infection if they felt indisposed so to do; so in the last analysis any system of inter or intra-State quarantine, whether under the control of the Federal or State authorities, to be effective must have an enlightened public opinion back of it so that its provisions may be enforced. For as Lincoln said: "With public sentiment nothing can fail, without public sentiment nothing can succeed, consequently he who moulds public sentiment goes deeper than he who enacts statutes, or pronounces decisions, he makes statutes and decisions possible to be executed."

In 1898, and for four years thereafter, through the courtesy of the State Department of Agriculture, it was made possible to carry on a series of Lectures on Hygiene of the Home and Farm, including Lectures on Consump-

tion, Small-pox, Typhoid, Fever, Anthrax, Water and Insects in their relation to public health, drainage, etc. At these lectures it was noticeable that the farmers took as much interest in Hygiene as they did in the agricultural discussions, their questions showing that they realized that ill-health in man and beast was the most serious economic leak on the farm.

In 1900, a bill was drafted and presented to the General Assembly by the late Ex-Speaker Henry, of Cameron, to create a Commissioner of Hygiene whose function would have been purely educational and whose principal duty would have been to lecture before the Agricultural and Pedagogical Institutes, the Colleges and High Schools, and before Special Institutes of Hygiene at the County Seat of every Parish.

Under the political conditions existing at that time, it was considered a hopeless task to attempt to pass any measure opposed by the Chief Executive, for the appointive power placed in the Governor's hand, a sword with which he could slash right and left and whip recalcitrants into line with the flat side. Nevertheless, before this able body, with the Governor violently opposed to its passage, the Hygiene Bill won recognition by a vote of 63 to 27 in the Lower House, and 26 to 6 in the Senate, solely on the strength of its merit. The Governor vetoed the measure on the ground that the State was not able to stand the expense of \$4000 per annum asked for. Two years later the Bill was reintroduced by Hon. W. W. Ventress, a distinguished Sugar Planter of Iberville, passed the Lower House by 63 to 17, with 18 of its avowed protagonists unavoidably absent, passed the Senate unanimously in despite of the unprecedented and unseemly opposition of the Governor, and was again vetoed by him on the grounds set forth in his original veto message, that it was "a meritorious measure regretfully refused" for want of funds, and this in the face of his own message setting forth the fine financial condition of the State, and so for a season, a plan of public instruction in hygiene, upon which the leg-

islative will had been twice affirmatively expressed, fell, through the petty opposition of a politician—

“Drest in a little brief authority
Most ignorant of what he's most assured,
His glassy essence like an angry ape,
Plays such fantastic tricks before high heaven
As make the Angels weep.”

The passage of this Bill, and the efficient execution of its provisions, would have saved the State the epidemic of 1905, and the incidental loss of two hundred millions of dollars to her commerce; this bold assertion is based on the fact, that after the epidemic had started and was under full headway, a campaign of Sanitary Education along the lines proposed by the vetoed measure, succeeded in the brief period of sixty days in converting the people to the mosquito doctrine who for over a hundred years had been wedded to the fomites theory; even the ignorant colored population being converted and co-operating with the magnificent work of the medicos and sanitarians of New Orleans; and for the first time in sanitary history an epidemic of yellow fever was practically stamped out of a great center of population before the advent of frost; and the commercial conscience awakened to a realization that “Honesty is the best policy,” and that the frank admission of the existence of a contagious or infectious disease, together with tangible evidence that prompt and scientific methods for its extinguishment are being pursued, is better than a policy of concealment, which always leaves in the public mind a belief that the evils hidden are infinitely worse than they really are; it is the mysterious and unknown that has always carried terror to the human heart, full many a warrior who has hacked and hewn his way through aisles of bristling steel to fame, who on a hundred battle fields has proudly carried his escutcheon untarnished by a stain, has forgotten the obligations of Christian chivalry and sullied his knighthood with a craven and dastardly fear in the presence of unknown danger, or supernatural terrors, especially when clothed in the garb of pestilential disease.

In 1906, when Dr. C. H. Irion became president of the Louisiana State Board of Health, one of his first acts was to carry into execution some of the measures of this scheme of public education, and over one hundred institutes of hygiene were held throughout the infected area of the year before; where the mosquito doctrine was expounded in a series of illustrated lectures in English, French, German and Italian. At these institutes the co-operation of the priesthood and clergy was earnestly sought and secured, and by their influence aided materially in securing attentive audiences. The good results were soon apparent in the passage of screening ordinances in most of the towns of the State, by post-epidemic fumigation, and other sanitary steps, with the result that there was no recrudescence of yellow fever for the first time in sanitary history, in a year following an epidemic year, the single exception occurring in a town that had persistently neglected screening and other sanitary precautions, and made no effort to secure the educational advantages of an institute.

This correlated educational sanitary work was followed by a remarkable exemption later from the incursions of mosquitoes, and better health conditions generally than had ever been observed before, during the summer and autumn following prevailed indeed, the improved conditions incident to the sanitary precautions taken in 1906, bore fruit as well in 1907, after they had ceased operations, and this improvement continued until the people had lapsed back into the usual callous indifference that requires rude awakening by epidemic danger and constant preaching on sanitation.

This institute work was supplemented by an annual Conference of the Sanitary Officers of the State, Parishes and Municipalities wherein representation was accorded to all educational, medical, sanitary, commercial and transportation bodies, and sanitary measures were exhaustively discussed. At the last Conference held in Opelousas, the State Press Association, sitting in annual Convention in Lafayette, realizing the educational advantage adjourned as a body and joined the Sanitary Confer-

ence on invitation of President Irion. The Rt. Rev. James Blenk, Archbishop of the Diocese of New Orleans, sent his personal representative to this Conference, the Rev. Father Kavanaugh, Catholic Superintendent of Education; the minutes of every meeting were published by the daily press, so the educational propaganda was carried to the farthest limits of the State.***

During the early months of the year an Anti-Tuberculosis league was organized, which has already succeeded in establishing a consumptive sanitarium in the ozone belt of the State, besides carrying on its educational work by the Louisiana method. The earnest and noble women who took the initiative in this matter are very much handicapped by want of means.

Among the unique results of this hygienic educational work was an institute, held by an attache of the Board of Health, for the exclusive benefit of the nuns, nearly four hundred in number, under the auspices of the Superintendent of Catholic Education. The good results of which cannot be doubted, when it is remembered that most of these noble women are teachers, with a wide circle of influence outside the school room, and that sixty per cent. of their number throughout the world die of tuberculosis, most frequently contracted in the rounds of their daily charity labors.

The State Board of Health has endeavored to give an institute wherever one was desired, and is now planning an extensive programme commencing with a score of county fairs to be held throughout the State. The principle of this system has received recognition in other

***Since this article was written, another sanitary convention under the auspices of the Louisiana State Board of Health was held in the spring of 1908, at Alexandria, which traversed the field of preventive medicine and was attended by Dr. McCormack, Secretary Kentucky Board of Health; Dr. Brumby, Chief Executive of the Health Department of Texas; Prof. Aswell, State Superintendent of Public Education; Dr. Caldwell, of the State Normal; Bishop Vander Ven, of the Catholic Diocese of Natchitoches; Dr. Kramer, Grand Master of the Masonic Order in Louisiana, who all delivered addresses.

States, notably in Indiana, where under the able administration of Dr. Hurty, the politicians have been whipped into line by the farmers who recognized the value of hygienic lectures at their Agricultural Institutes. In New York last year a start was made, indeed the Health Commissioner in his report claims the honor of priority of a plan tentively tested in this State in 1885, where it passed the experimental stage in 1897, and received a magnificent accentuation by the Legislative Assembly of 1900 and 1902, and by the Anti-mosquito Campaign of 1905 and 1906, and is now the fixed policy of the State Board of Health, being the first practical answer to Bowditch's plea in 1876, before the National Medical Congress in Philadelphia, when he said: "Our present duty is organization, National, State, Municipal and Village, from the highest place in the National Council down to the smallest village Board of Health, we need organization, *with these organizations we can study and often prevent disease.*"

The principle underlying the Louisiana system: Education, hand in hand with prevention, has reached France, and is protagonized by no lesser personage than ex-President Loubet in his "Pueri-Culture,"—Child Cultivation, who has brought together the National Union of Presidents of Mutual Benefit Societies and the Medical and Pharmaceutical Union in an educational campaign on the plan of the Mutualists Anti-Tuberculosis Dispensary of the 13th Ward of Paris, and a campaign has been started against food adulteration, foul air, dirt, polluted milk, want and sanitary ignorance.

The results obtained by the Schneiders at Cruzot, whose sanitary surveillance of the milk supply has reduced the infant mortality during the first year of life (the most dangerous period) from eighteen per cent, the average for all France, to nine per cent, for the past year, proves that no greater philanthropy or more patriotic duty confronts the people of our sister republic, than that now engaging the thoughts of ex-President Loubet.****

****The establishment of Infant Milk Depots, Milk Dispensaries, or "Goutte de Haut," in different parts of the world, have invariably lessened infant mortality. The first institution of the kind was established in Stamberg in 1889, followed

The purveyor of depraved milk, the "great liquid food" upon which so many innocents depend for sustenance and life, is the most contemptible and sordid criminal that lives "unwhipped of justice," beside whom the sneak thief, the burglar and the murderer stand in relative respectability, for he steals without the excuse of hunger or other pressing want, and murders helpless innocents by inanition and deadly disease germs, one of which alone: Tuberculosis, (frequently transmitted by milk) carries off fifty per cent. of the children of Christendom.

Under these institutes, it was intended that lectures would be delivered on Hygiene, Quarantine, Maritime and Inland, Miasmatic and Acute Contagious Diseases, Pathology of Miasmatic, Contagious and Malarial Diseases, Bacteriology, Serum-Therapy, Physiology, Malarial Diseases, Contagious and Infectious Diseases of Children, Hygiene of Surgery, of the Eye, Ear, Nose and Throat, of the Skin, of the Mouth, Sexual Hygiene, Leprosy, Dietetics, Influence of Alcohol and Narcotics in their relation to Public Health, Toxicology, School Hygiene, Agriculture and Manufactories in their relation to Hygiene, Contagious and Infectious Diseases of Animals, Sanitary Engineering, Sanitary Transportation and Disposition of the dead. Insane Asylums, Meteorology and Climatology, Municipal Sanitation, Railroad Car Sanitation, Construction and Management of Detention and Observation Camps during Epidemics. Insects in their relation to public health, Tuberculosis restriction and prevention, Tuberculosis Hygienic, Dietetic treatment. The Louisiana system has always emphasized the necessity of co-operation on the part of school authorities and teachers with the health authorities in securing better school hygiene, recognizing that "as the twig is bent, the tree's inclined." and that among the children attending public

by one at the Belleville Dispensary, Paris, in 1892; the first in this country was founded in New York City, by the philanthropist, Nathan Straus, who is indefatigable in his exertions to improve the milk supply furnished infants; aside from the immediate good results that found their establishment, they are valuable object lessons in pointing out the evils of impure milk and educating the masses to the danger.

schools there were thousands who were suffering from preventable diseases, the direct result of ignorance both on the part of parents and of the children themselves; that the preaching they most needed was the gospel of soap, and that a vast stride in the right direction would be made, if all the children attending the public schools were examined by physicians, free of cost, with special reference to vaccination, tuberculosis, trachoma, decayed teeth, personal hygiene and malnutrition. The institute conductor of the Louisiana Board of Health addressed thousands of children in their schools during the educational campaign of 1906, on personal and school hygiene, and on the subject of mosquitoes and flies as transmitters of disease.

It is pleasing to note that New York is also taking up the question of more hygiene and less physical culture in the schools, a committee headed by an ex-Superintendent of Education, Mr. Burlingham, recently discovered an appalling condition of affairs, reporting that out of 600,000 school children, 46,500 are physically defective; that among the cases of malnutrition, the greatest number were found in families having an income of over \$20.00 a week; that 72.4 per cent. had defective teeth, and that soap was an unknown quantity to thousands.

The Louisiana system recognizes that sporadic efforts at teaching hygiene will not alone suffice, that the work must be kept up day by day, year in and year out, with the same ardor that fills the teachers of religion; if the latter were to stop preaching for only one year and the churches remained closed, how many lapses from grace would follow? The more true is this of the tenets of a doctrine, the truth of which is only beginning to break upon the world,* and of a system which seeks to correlate all the

* At the recent Anti-Tuberculosis Congress held in Washington, D. C., universal opinion favored public education in the cause and prevention of the disease as the keynote of the fight against its ravages and there is no doubt that had the Committee on Resolutions submitted to the Congress a resolution, sent up by Section VII, declaring it to be the duty of the State to furnish this instruction, it would have been unanimously adopted.

educational factors of the State in a comprehensive effort to remove those ills which are the direct result of "ignorance deep seated, far reaching, profound and appalling; an ignorance not confined to the lower strata of society, but permeating all classes; an ignorance which in its blind but gigantic strength is bracing its mighty shoulders against the pillars of the temple of Hygiea, and threatening to engulf us in ruins darker than a buried Babylon."

THE ENORMOUS ECONOMIC LOSS INCIDENT TO EPIDEMICS.

If one-half of the money most properly spent for the suppression of disease in hogs and potatoes by a paternal government, was only devoted to educating the rising generation in the value of prevention of disease, the good results following would show the wisdom of the expenditure.

Millions are spent for the encouragement of unassimilable immigrants, ignorant in many instances of our customs, habits, speech, institutions and religion, but not one cent for the conservation of the lives of our people, 200,000 of whom annually go down to a consumptive grave, the majority at the age of greatest productivity. The economic loss has been conservatively set at three hundred millions annually, aside from the humanitarian aspect, and taking a cold blooded, business view, it would pay to educate the masses to a proper appreciation of the dangers that hourly confront them.

The American Public Health Association and the Sanitary Institute of Great Britain for over a quarter of a century have carried on their educational work among sanitarians; the Louisiana system goes a step farther and carries this instruction to the masses of the people, teaching them not alone the aphorism of the Latin poet Martial: "Life is not mere living but the enjoyment of health," and the maxim of the Roman law giver: "The sanitary safety of the Republic is the supreme law," but that the economic loss in the untimely removal of millions of human feet tons, at the period of their greatest produc-

tivity, from communicable, preventable diseases is due to ignorance, which it is the highest duty of the State to enlighten. The system appeals not alone to the humanity but to the common sense of the American people, points out that the victim of a contagious or infectious disease is not a criminal to be hounded to earth, but the victim of the sanitary laches of a community, it reiterates the averment of Dr. Benj. Rush: "City authorities were justly chargeable with the lives of all who die of preventable diseases within their jurisdiction, and that they should be made responsible before the Courts of Justice." It fulfills a high civic duty in correlating all educational factors in the State, and focusing them on the all important moral, economic and political necessity of preserving the public health by reaching the masses and teaching the individual the value of a sound mind in a sound body, that to attain this it will not do to violate the sanitary law, and in our daily lives act—

"As if this flesh which walls about our life
Were brass impregnable."

The annual address before the Orleans Parish Medical Society in January, 1898, was devoted to this topic, and an elaborate plan for a State Institute of Hygiene proposed which has never been carried into complete execution for want of means, the economic value of such a system is beginning to be appreciated, and the day is not far distant when every civilized State will have an Institute of Hygiene on the Louisiana plan, with a National Institute to supplement the work of the States, and an International Institute to focus a world wide movement in public instruction in hygiene, when the world will awaken to a realizing sense that an epidemic is the remorse of a guilty community, guilty of sanitary laches, guilty of pollutions and desecrations of the Sacred Altar of Hygiea, in the words of Aristotle:

"Of all these things the judge 's time."



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