James Law

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IN THE YEAR

1873

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HISTORY AND COURSE OF THE EPIZOÖTIC AMONG HORSES UPON THE NORTH AMERICAN CONTINENT IN 1872–73.

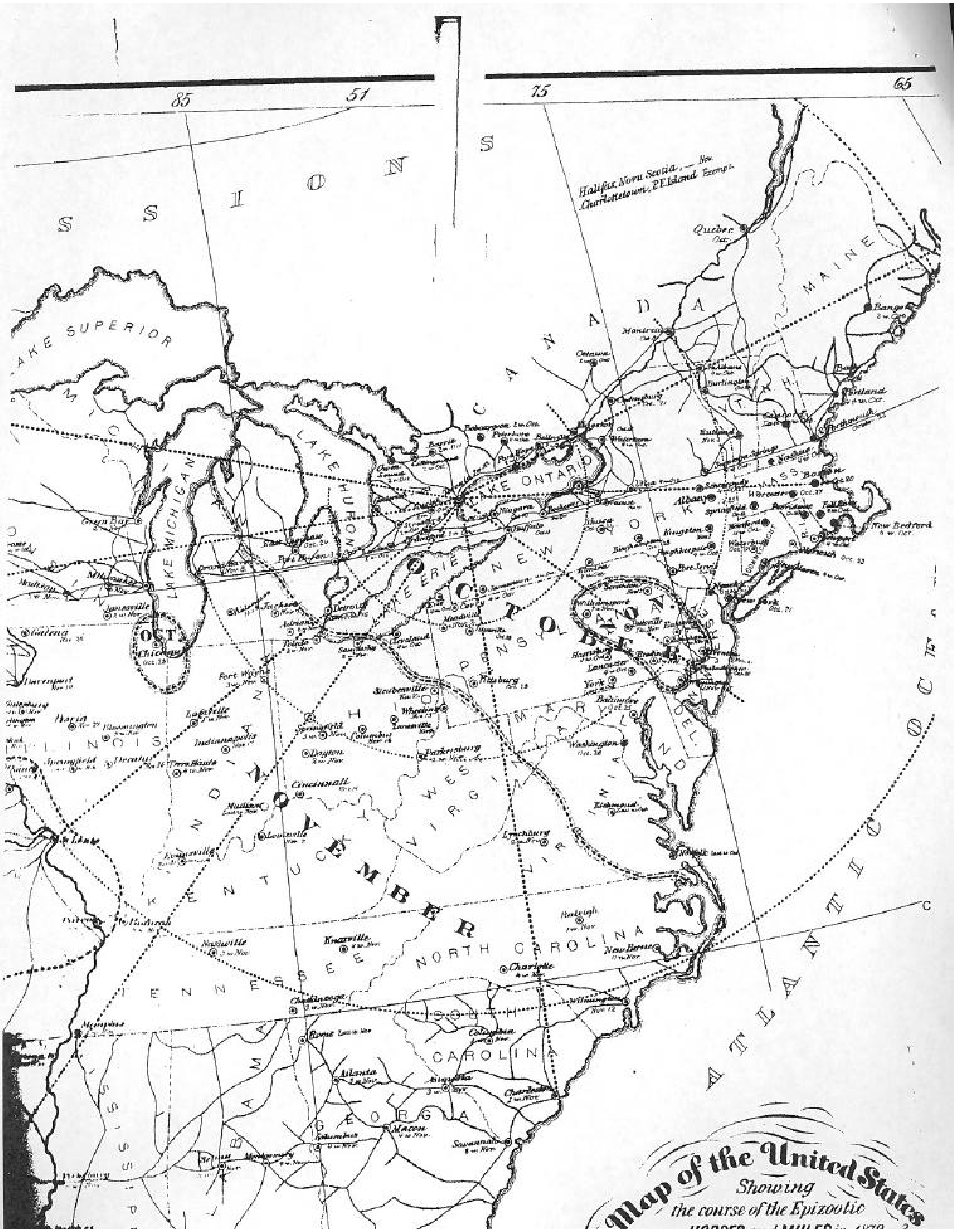
By ADONIRAM B. JUDSON, M. D.,
Of New York.

It is probable that Influenza has occasionally appeared as an epizoötic among horses from early times. Passages in the writings of the fourth century are supposed to refer to this disease, and the literature of the thirteenth and seventeenth centuries contains words which indicate the repeated occurrence of this plague. During the eighteenth century, and in the first part of the present century, it made its appearance several times among the horses of Great Britain and the European Continent The descriptions of the latter visitations leave no room for doubt that the disease was the same as that now under consideration.

The ancient accounts of this disease fail entirely to describe its invasive or spreading quality. The more recent accounts give some hint of this interesting feature of the disease. For instance, in 1727, it appeared in England in November and in Ireland in December; in 1750 it did not reach the horses of Ireland till its decline in England, and in 1760 it raged in London and other parts of England in January, February, and March, and seized the horses of Dublin at the end of March. In the present paper it is my purpose to bring into prominence the facts which illustrate the invasive character of this affection, with the hope of throwing light on the method of its progress and thus making a contribution to the study of the laws of epidemics.

Professor Andrew Smith, Surgeon of the Ontario Veterinary College, Toronto, Canada, states [1] that the first cases occurred in the townships of York, Scarborough, and Markham, about fifteen miles north of Toronto, Canada, among the last days of September, 1872. In a letter written by Professor Smith, December 7, 1872, he says: "As far as I can ascertain, the disease originated in this district and generally extended in every direction. It appeared in the neighborhood of Barrie, Collingwood, and Owen Sound . . . . in from eight to fourteen days after the malady broke out here. . . . . In conclusion, I may again state that from recent inquiries, I am convinced the disease first appeared in this neighborhood." Professor Law has studied the meteorological conditions which prevailed at Toronto, and states

[1] *Influenza in Horses*, by James Law, Professor of Veterinary Sciences, Cornell University, Ithaca, N. Y., in the Report of the Commissioner of Agriculture. Washington, D. C., 1872, pp. 206.



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S S I O N S
Halifax, Nova Scotia, — Nov.
Charlottetown, P.E.Island Exempt.
Quebec
CANADA
MAINE
Bangor
Montreal
Ottawa
Burlington
Portland
Portsmouth
Boston
New Bedford
LAKE SUPERIOR
LAKE MICHIGAN
LAKE HURON
LAKE ONTARIO
LAKE ERIE
Green Bay
Milwaukee
Janesville
Galena
Chicago
OCT.
Detroit
Toledo
Cleveland
Niagara
Buffalo
Albany
Springfield
Hartford
New York
NEW YORK
OCTOBER
NOV.
PENNSYLVANIA
Pittsburg
Lancaster
York
Baltimore
Washington
MARYLAND
DEL.
Davenport
ILLINOIS
Springfield
Indianapolis
INDIANA
Fort Wayne
Lafayette
Terre Haute
OHIO
Columbus
Dayton
Cincinnati
Steubenville
Wheeling
Parkersburg
WEST VIRGINIA
VIRGINIA
Richmond
Lynchburg
Norfolk
NOVEMBER
Louisville
Evansville
KENTUCKY
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NORTH CAROLINA
New Berne
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Chattanooga
Memphis
SOUTH CAROLINA
Columbia
Rome
Atlanta
Augusta
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Macon
Savannah
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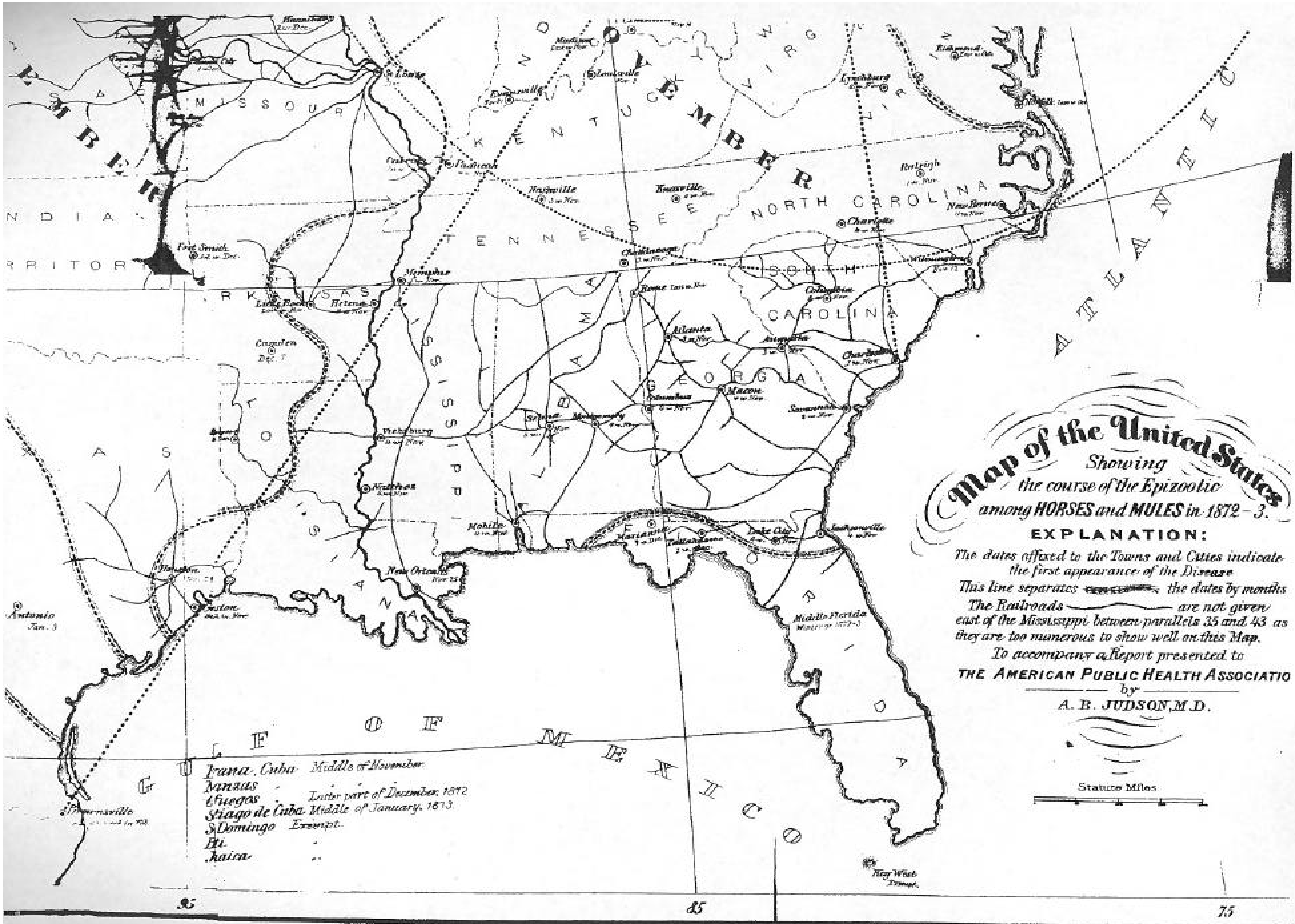
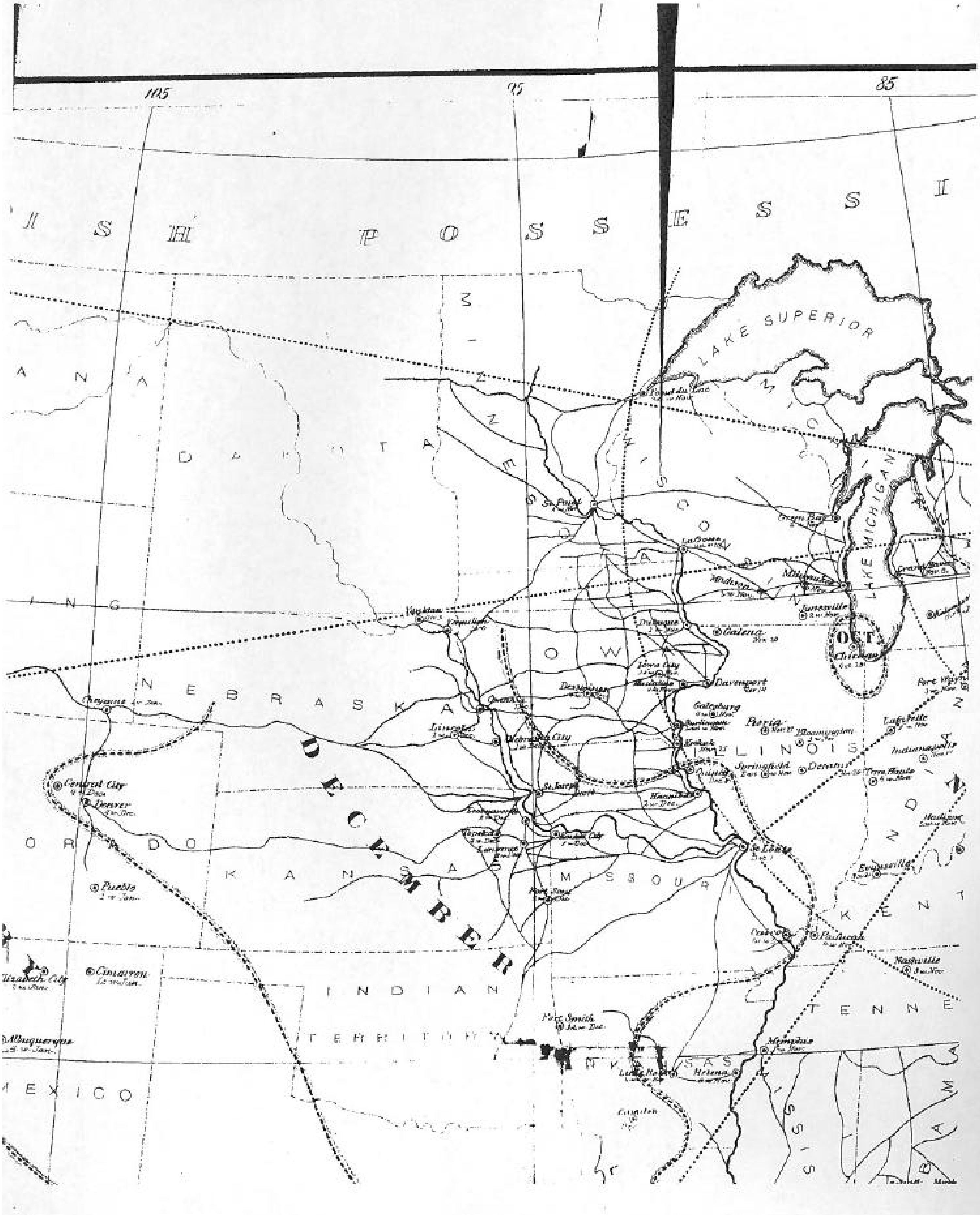
ALABAMA
ATLANTIC OCEAN
Map of the United States
Showing
the course of the Epizootic


Map of the United States
Showing
the course of the Epizoolic
among HORSES and MULES in 1872-3.
EXPLANATION:
The dates affixed to the Towns and Cities indicate the first appearance of the Disease
This line separates the dates by months
The Railroads are not given east of the Mississippi between parallels 35 and 43 as they are too numerous to show well on this Map.
To accompany a Report presented to
THE AMERICAN PUBLIC HEALTH ASSOCIATIO
by
A. B. JUDSON, M.D.
Statute Miles
Irana, Cuba Middle of November
Latter part of December, 1872
Stiago de Cuba Middle of January, 1873
S. Domingo Exempt
MISSOURI
KENTUCKY
TENNESSEE
NORTH CAROLINA
SOUTH CAROLINA
GEORGIA
ALABAMA
MISSISSIPPI
LOUISIANA
FLORIDA
ATLANTIC
GULF OF MEXICO
St. Louis
Nashville
Knoxville
Memphis
Chattanooga
Rome
Atlanta
Macon
Columbus
Augusta
Columbia
Charleston
Savannah
Raleigh
Charlotte
Lynchburg
Wilmington
New Berne
Vicksburg
Natchez
New Orleans
Mobile
Montgomery
Marianna
Tallahassee
Jacksonville
Middle Florida
Key West
Fort Smith
Little Rock
Helena
Camden
Galveston
Houston
Antonio
Brownsville
95
85
75



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OCT.
Chicago
St. Paul
La Crosse
Milwaukee
Green Bay
Madison
Janesville
Galena
Dubuque
Davenport
Iowa City
Des Moines
Galesburg
Peoria
Burlington
Keokuk
Quincy
Springfield
Decatur
Terre Haute
Indianapolis
Lafayette
Fort Wayne
Hannibal
St. Louis
Evansville
Paducah
Nashville
Memphis
Helena
Little Rock
Fort Smith
Yankton
Omaha
Lincoln
Nebraska City
St. Joseph
Leavenworth
Topeka
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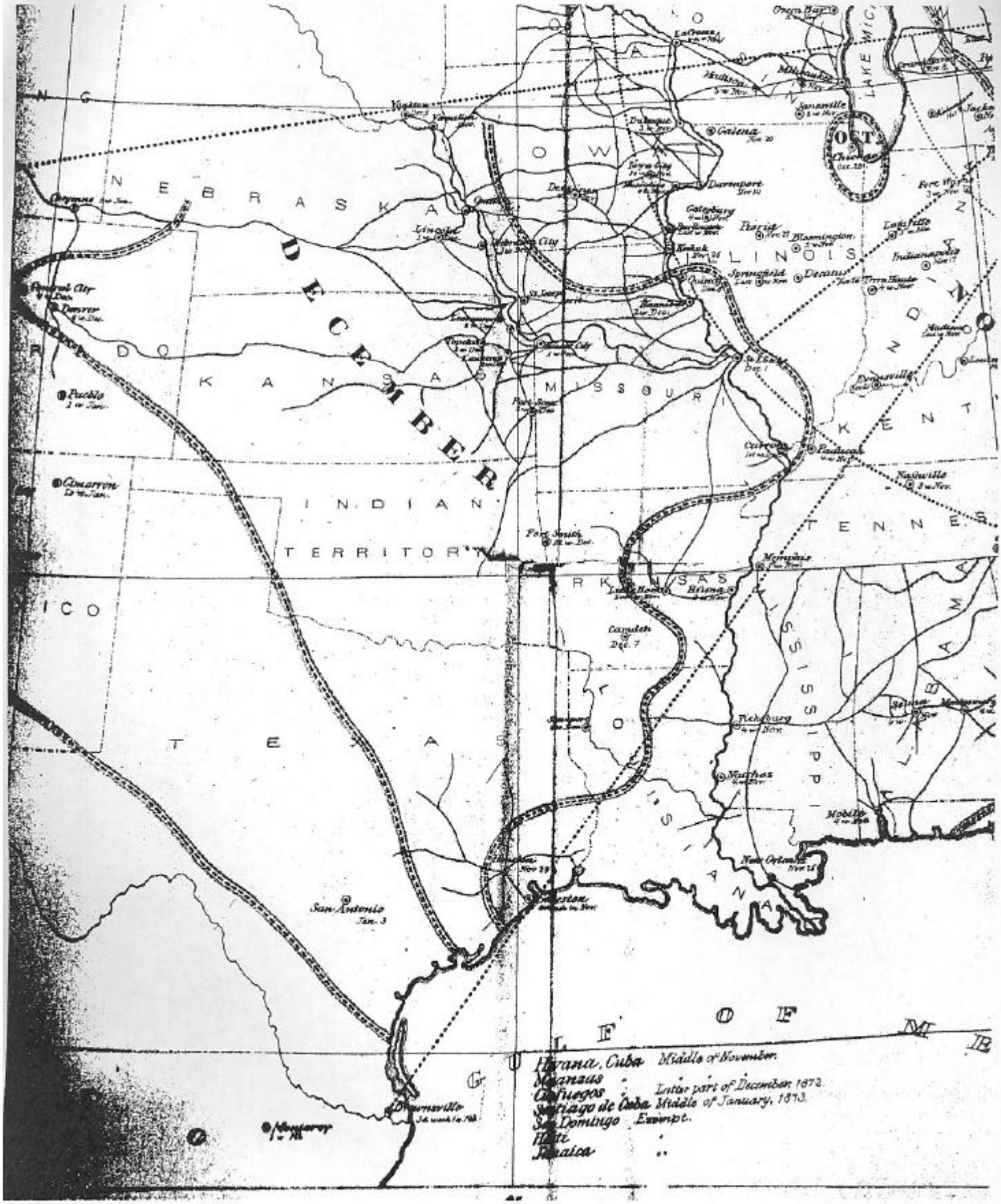
Kansas City
Fort Scott
Cheyenne
Central City
Denver
Pueblo
Cimarron
Albuquerque


DECEMBER
NEBRASKA
KANSAS
INDIAN TERRITORY
TEXAS
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ILLINOIS
KENTUCKY
TENNESSEE
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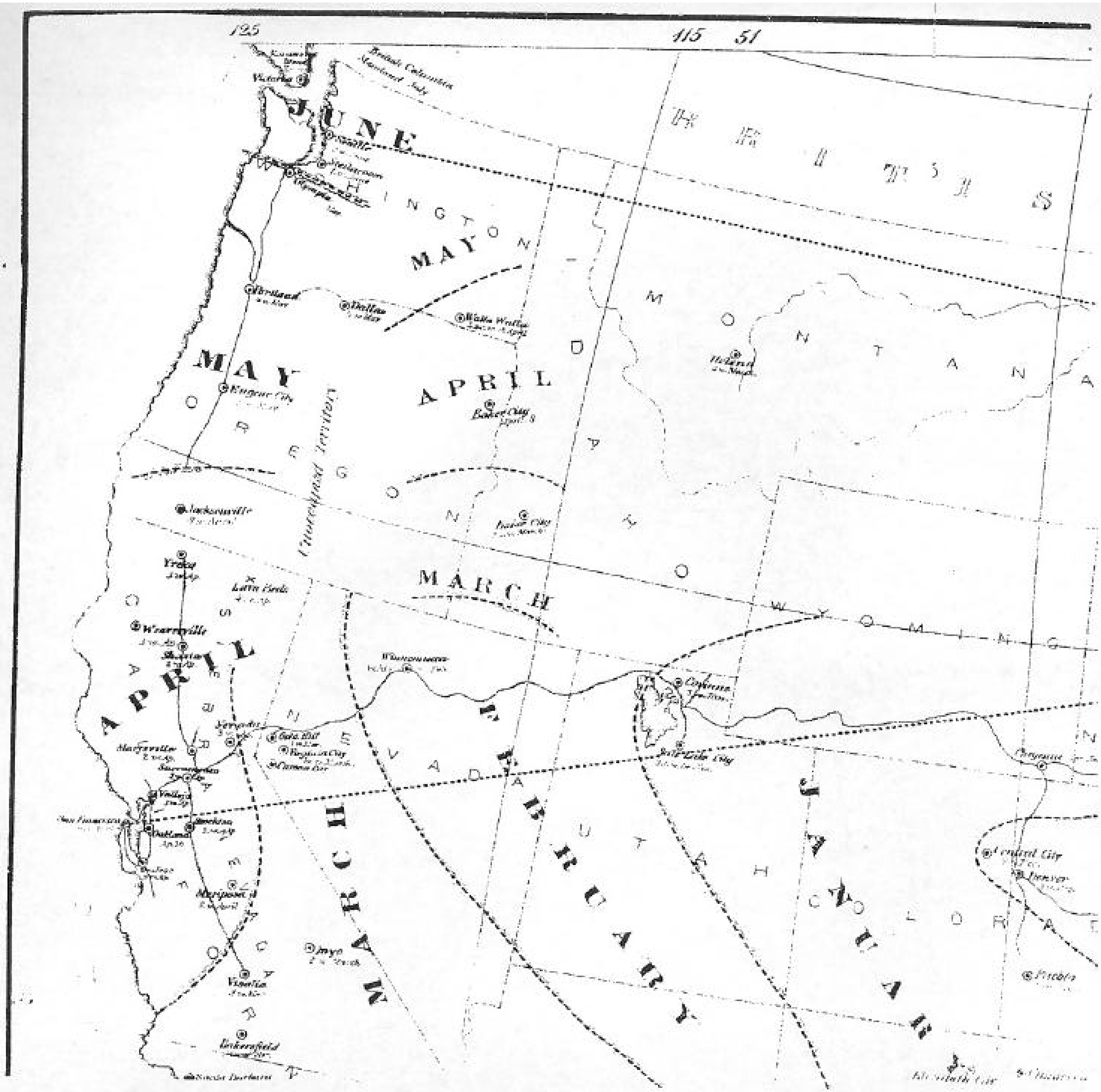
LOUISIANA
Havana, Cuba Middle of November.
Manzanas " Latter part of December 1872.
Cienfuegos "
Santiago de Cuba Middle of January, 1873.
San Domingo Exempt.
Haiti "
Jamaica "


125
115
51
JUNE
MAY
APRIL
MARCH
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JANUARY
MARCH
MAY
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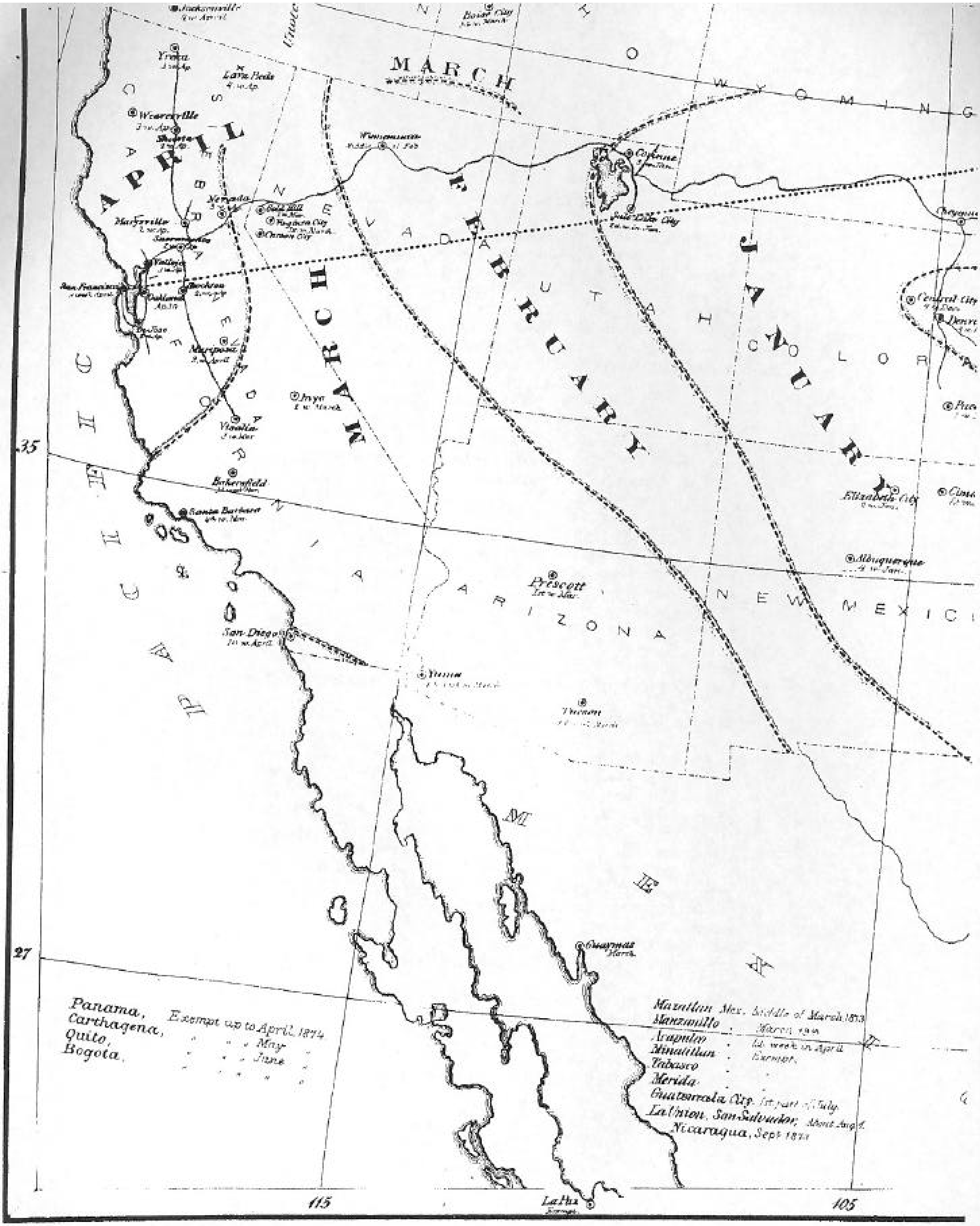
O R E G O N
MONTANA
WYOMING
NEVADA
UTAH
COLORADO
CALIFORNIA
Unsurveyed Territory
Victoria
Portland
Dalles
Walla Walla
Eugene City
Baker City
Boise City
Helena
Jacksonville
Yreka
Weaverville
Shasta
Marysville
Sacramento
Vallejo
San Francisco
Oakland
Stockton
Mariposa
Inyo
Visalia
Bakersfield
Gold Hill
Virginia City
Carson City
Salt Lake City
Corinne
Cheyenne
Central City
Denver
Pueblo



MARCH
APRIL
MARCH
FEBRUARY
JANUARY
WYOMING
NEVADA
UTAH
COLORADO
ARIZONA
NEW MEXICO
Yreka
Nevada
Marysville
San Francisco
Oakland
Mariposa
Visalia
Bakersfield
Santa Barbara
San Diego
Inyo
Prescott
Salt Lake City
Corinne
Albuquerque
Elizabeth City
Guaymas
La Paz
35
27
115
105
Panama,
Carthagena,
Quito,
Bogota,
Exempt up to April, 1874
May
June
Mazatlan Mex. Middle of March 1873
Manzanillo
Acapulco
Minatitlan
Tabasco
Merida
Guatemala City. 1st part of July.
La Union, San Salvador, About Aug. 1
Nicaragua, Sept. 1873

that "there was no extraordinary state, or extreme changes in the weather during the whole month the last days of which witnessed the outbreak." The darkness which surrounds the origin of this epizoötic is impenetrable in the present state of our knowledge of the preservation and revitalization of disease germs.

The following verbatim quotations from newspapers, and from the correspondence with which I have been favored, truthfully and graphically describe the salient features of this epizoötic. The following extracts show that all, or nearly all, horses and mules were affected: —

"There are not fifty horses in the city free from the disease." — *Ottawa, Canada.*

"We had very few horses unaffected." — *Montreal.*

"At least seven eighths of the entire number of animals in this city were suffering from the disease." — *Boston, Mass.*

"More than three fourths of all the horses in the city are affected." — *Providence, R. I.*

"The horses not affected by it are the exceptions." — *New Bedford, Mass.*

"There is scarcely a horse left that is not affected." — *Newport, R. I.*

"The actual number of horses affected is only equaled by the number in the city." — *Wilmington, Del.*

"The disease has reached nearly every horse in the city." — *Corry, Penn.*

"The malady is absolutely universal among our equines." — *Pittsburg, Penn.*

"Scarcely a horse in the city is free from it." — *Bloomington, Ill.*

"Three fourths of the horses in the city are stricken with the disease." — *Knoxville, Tenn.*

"The epizoötic has attacked nearly every horse in this city." — *St. Joseph, Mo.*

"Few horses in this city are exempt from it." — *Lake City, Fla.*

"Nearly every horse in the city is more or less affected by it." — *Camden, Ark.*

"The great majority of the horses are more or less affected." — *Selma, Ala.*

"Nearly every horse or mule is more or less affected." — *Natchez, Miss.*

"Almost every horse in our city has it." — *Dallas, Oregon.*

"Nearly all the horses in the town have it." — *Walla Walla, Wash. Terr.*

"A great number of horses and mules were attacked." — *British Columbia.*

"The disease was very general, very few horses, mules, or asses, escaped it." — *Manzanillo, Mexico.*

"They all had it." — *Acapulco, Mexico.*

"Probably very few horses or mules entirely escaped." — *Corinto, Nicaragua.*

"In every stable where there are horses and mules together, both are affected alike." — *Norfolk, Va.*

"A majority of the work horses and mules of the city are more or less affected." — *Charleston, S. C.*

"Many horses and mules have died from the effects of the epizoötic." *Marianna, Fla.*

"About twenty deaths were reported last night among the mules in the Louisville (Ky.) City Railway Stables."

"It attacked horses, mules, and jacks." — *Mazatlan, Mex.*

The presence of the epizoötic in a city produced a great change in the appearance of the business thoroughfares, as is shown by the following extracts: —

"The streets yesterday were almost deserted by teams of every description." — *Bangor, Me.*

"There has been a marked absence of horses from the streets to-day." — *Nashua, N. H.*

"The streets are almost deserted." — *Washington, D. C.*

"A Sunday quiet prevails upon the streets." — *Springfield, O.*

"The epizoötic made Market Street more quiet than it usually is on Sunday." — *Chattanooga, Tenn.*

"The withdrawal of horses from the streets is almost universal. — *Denver, Colorado.*

"The streets of this city presented a most deserted appearance yesterday, so far as teams and vehicles were concerned." — *Virginia City, Nevada.*

"The streets yesterday looked deserted." — *San Francisco, Cal.*

"The city passenger cars will partially cease running for a few days." — *Montreal, Canada.*

"The street cars have stopped." — *Erie, Penn.*

"The cars of the West Ward Passenger Company were taken off last evening." — *Easton, Penn.*

"The absence of cars from the streets was the subject of general comment." — *Norfolk, Va.*

"Yesterday at noon the street cars on the main line were withdrawn." — *Wheeling, West Va.*

"The cars of the Adams Street railway stopped running this morning." — *Toledo, O.*

"The running of the cars on the High Street railroad was entirely suspended yesterday." — *Columbus, O.*

"Our street railroad was compelled to suspend operations yesterday." — *Evansville, Ind.*

"On account of the epizoötic the street cars will cease running regularly until further notice." — *Salt Lake City, Utah Terr.*

"On every line a number of cars have been drawn off." — *San Francisco, Cal.*

"Ox-teams are being used wherever they can be obtained." — *Fall River, Mass.*

"Very few horses are to be seen, oxen supply their places." — *Parkersburg, West Va.*

"Oxen are now employed by several of our merchants in draying." — *Columbus, Ga.*

"The horse has almost entirely disappeared from the street, the ox becoming more and more the chief reliance for transportation." — *Cincinnati, O.*

"Many of our merchants have resorted to ox-teams." — *Milwaukee, Wis.*

"The stage has come in for the last two or three days drawn by oxen." — *Vermillion, Dak. Terr.*

"An extra number of ox-teams were brought into service yesterday by butchers and teamsters." — *San Francisco, Cal.*

The damaging effects of the epizoötic on business interests are set forth in the following extracts: —

"Expressmen are unable to fill their orders, and the warehouses were yesterday filled with goods awaiting shipment." — *Boston, Mass.*

"At the various railroad depots and piers freight is rapidly accumulating." — *Philadelphia, Penn.*

"Our grocery men, provision dealers, etc., are delivering their goods by means of hand-carts, wheelbarrows, and wagons drawn by man-power." — *Pottsville, Penn.*

"On the wharves scarcely a horse is to be seen, and business has consequently received a sudden and severe check." — *Wilmington N. C.*

"Impossible to get transportation for the ordinary wants of trade." — *Baltimore, Md.*

"Many of the farmers are greatly retarded in bringing their fall crops into the market on account of the malady." — *Jacksonville, Fla.*

"There is complete stagnation of freight for lack of drayage." — *Houston, Tex.*

"What shall we do without mails? is the question asked on every hand. All the coaches have been withdrawn." — *San Antonio, Texas.*

"Yesterday business began to feel its effects. Drayage which usually costs two dollars and a half, doubled its price." — *Cairo, Ill.*

"It is difficult to procure carriages, or even a hearse for a funeral." — *St. Louis, Mo.*

"From that day to this (one week) not a single letter has left for the East, or arrived at our town from thence." — *Cimarron, New Mex.*

"Vegetable, milk, bread, and ice teams fail to make regular calls on their customers, and many are entirely neglected. There has been considerable inconvenience the past few days, and a great deal of freight in consequence still remains in the business houses. The illness of nearly 3,000 horses has caused between 5,000 and 10,000 men to be idle." — *San Francisco, Cal.*

"Great inconvenience is suffered on account of the epizoötic, which has dismounted the cavalry." — *The Lava Beds, seat of the Modoc Indian War.*

"It prevailed to such an extent as to seriously interfere with all business." — *Havana, Cuba.*

The following extracts present the popular view of the symptoms and nature of the disease: —

"There was scarcely a horse to be seen on the streets that did not show signs of the distemper by coughing and a discharge from the nostrils." — *St. John, N. B.*

"Every one of the sixty horses in the barn was affected, and such a coughing, wheezing, and blowing of noses no horseman ever heard before." — *Springfield, Mass.*

"The lungs were found in a high state of congestion, and the throat and all the respiratory organs much diseased." — *Lynchburg, Va.*

"The horses are seized with coughing, followed by a running at the nose and chilliness." — *Charlotte, N. C.*

"The symptoms were the oft-described ones of wheezing, sneezing, and running at the nose." — *Mobile, Ala.*

All the animals attacked have a cough, sore throat and fever, with generally a running at the nose." — *Kansas City, Mo.*

"The horses seem to be suffering from a severe cold, with running at the nostrils." — *Elizabeth City, New Mexico.*

"At and near Fort Whipple all the animals are coughing, sneezing, and pining away." — *Prescott, Arizona.*

"A drooping languor seemed to pervade the entire stable. Their eyes were more or less dim, and the heavy cough could be heard in all directions." — *San Francisco, Cal.*

"The horses affected manifest the usual symptoms of a cough, and profuse mucous discharge from the nose." — *Marysville, Cal.*

"They are all attacked in the usual manner, slight shivering at first, then running at the nose." — *Oakland, Cal.*

Horses were seized with hard, dry cough, sneezing, glanders, followed by extreme exhaustion." — *Cienfuegos, Cuba.*

"The animal has no appetite, and a continual coughing follows." — *Guatemala City.*

"Symptoms, loss of appetite, fever in about ten days, continued from three to sixteen days, followed by cough; some had a discharge of yellow mucus from the nose, others not; duration variable from two to eight weeks; great loss of flesh." — *La Union, San Salvador.*

The symptoms and complications are described by Professor Liautard, of the New York College of Veterinary Surgeons, in the following words:[1] —

"The symptoms presented by the cases of simple influenza in the city of New York, have been, with few exceptional cases, rigors, febrile action, impaired appetite, sneezing, cough, nasal discharge, accelerated respiration, weak and compressible pulse, dry fæces. The attack was very sudden; the animal would be apparently well in the evening, and sick the next morning. The chills were generally followed by profuse perspiration. There was repeated sneezing. The cough was hard, difficult, dry, and spasmodic, even to such an extent as to threaten suffocation. In the majority of cases there was an abundant discharge from one or both nostrils, — first mucous, afterward muco-purulent in character. This flow was rendered more profuse by an excessive flexion of the head. Sometimes this discharge appeared entirely purulent, and was often expelled after a paroxysm of coughing and sneezing, in large cheesy masses. In these cases the frontal and maxillary sinuses were principally affected. These symptoms were usually attended with more or less febrile action, though in some cases this was absent.

[1] *Report on the Epizoötic as it appeared in New York*, by A. F. Liautard, M. D., V. S., Consulting Veterinary Surgeon to the Board of Health, in the Appendix to the Annual Report of the Board of Health, New York, for 1872. New York, 1873, pp. 276.

The larynx and intermaxillary organs were painful, and pressure upon them was followed by a spell of painful coughing. Respiration was more or less accelerated and difficult, depending in the first stage of the disease on the diseased condition of the anterior air-passages. The pulse was peculiar, sometimes 40 to 50 per minute, seldom more than 70. In all cases it was very weak and compressible. The temperature of the rectum varied from 101° to 105° Fahr. In exceptional cases it was as high as 106° or 107.° Thermometric observations indicated that the temperature varied very much in the different stages of the disease. From 101° it would increase in a few hours to 104° or 105°, and then decrease to 103°, these oscillations being noticed as long as the disease lasted. In some cases the temperature remained above 100° for some time after the animal had recovered. Loss of appetite was often the first symptom, and loss or impairment of the appetite occurred in every case, with very few exceptions. In many cases where dry food was refused, the appetite could be excited by providing fresh carrots, turnips, apples, or potatoes, raw or boiled. The ocular mucous membranes varied in appearance, in some cases being normal, in others slightly congested, and in many cases showing a well marked yellowish hue. The mouth was sometimes very warm and dry, but in many cases it was quite normal, with the exception of an abundant flow of thick saliva. The submaxillary lymphatic glands were slightly enlarged and painful; but I saw only one case in which these glands suppurated. The thyroid bodies were more or less enlarged. The fæces were usually hard, dry, and passed with difficulty; occasionally they were soft. The urine was sometimes voided in great quantity, and toward the end of the disease it was often slightly bloody, thick, and turbid. The movements of the animal were feeble and staggering (the *titubante* walk of the French). The skin was dry, and the hairs dull and staring.

The duration of the mild catarrhal form is from two to three weeks, after which the animal can resume his work. In a few cases the symptoms disappeared altogether in eight or ten days, while in others more than a month elapsed before the nasal discharge had entirely ceased.

The most common complications were thoracic. Pleurisy and pneumonia destroyed a large number of animals. A few cases of tympanitis and of colic, from impacted food, or from indigestion, were also observed, but none proved fatal. The nervous system was affected in a few cases in the form of cerebral or spinal meningitis. In these the result proved quite satisfactory. Many of the hard-worked animals were attacked with purpura hæmorrhagica (the *mal de tête de contagion*, or *anasarque*, of the French), and a large number of these cases terminated fatally. In these cases the dropsy was general and excessive. The mucous membrane of the nasal passages and of the eyes was marked with petechiæ. The nasal discharge became bloody. As the œdema of the extremities increased, the skin cracked and permitted the blood to ooze through it. Locomotion became difficult and mastication impossible. The temperature was high, and the pulse weak, compressible, small, and soft, numbering from fifty to seventy-five per minute. The respiration was accelerated and short, and an offen-

sive odor was exhaled from the nostrils. Many animals were destroyed, under the impression that they were affected with glanders or farcy. This complication usually terminated in death after a period varying from a few hours to four or five days. Hæmaturia often existed, either as a primary symptom or as a complication, but never assumed a serious nature. Severe attacks of laminitis of two or four extremities were often seen. Another complication, of frequent occurrence, not serious in character, and confined to horses reduced by hard work, poor food, and bad stabling, was œdema of the extremities, extending from the knee or hock down to the hoof. This œdema, which was often mistaken for the dropsical swelling of purpura hæmorrhagica, disappeared with a little exercise, and reappeared as soon as the animal was returned to the stable. This complication permanently disappeared as soon as the animal regained his appetite and strength."

Professor Liautard's views concerning the treatment are contained in the following words:[1] —

"The treatment of influenza must be in accordance with the symptoms. During the simple catarrhal form of the disease the diet should consist of dry or boiled oats, mashes, oat, rye, or corn-meal gruels, roots, and fruits. These articles should be varied and given in small quantities. The temperature should be regulated by blanketing, bandaging of the extremities, and general or local friction. Good ventilation should be secured, and disinfectants used in moderation. In the majority of cases the hygienic measures above mentioned, together with rest, will prove entirely sufficient to effect a cure. Rest is of the utmost importance. Without it the animal will scarcely escape some of the sequelæ of the disease. Experience has taught me that rest is of paramount importance, for all those animals whose labors were suspended as soon as they were taken sick, escaped complications, and resumed work in a few days. On the other hand, a large mortality occurred among railroad and stage horses. Many of these animals, being kept constantly at work, were attacked by serious complications, purpura hæmorrhagica being the most frequent, and perhaps the most fatal. If the throat is swollen and painful, stimulating liniments, mustard applications, or blisters, must be used. Steaming with boiling water and with decoctions of poppy-heads or marsh-mallow leaves, with the administration of electuaries of belladonna, renders the cough less painful, and if mixed with some preparation of antimony, such as kermes mineral, facilitates expectoration. A tendency to constipation may require injections containing soap or sulphate of soda.

Bleeding, sedatives, purgatives, and setons, must be entirely laid aside, or, when resorted to, it should be with great discretion. The practitioner should ever bear in mind that this affection is essentially of an asthenic character. As there is debility almost at the very outset, the disease requires not antiphlogistic measures, but supporting treatment almost from the beginning. This is especially the case if the appetite is impaired, the pulse weak and small, and the walk staggering. Under these conditions, diffusible stimulants, such as preparations of ammonia, or camphor, com-

[1] Op. cit., p. 278.

bined with vegetable tonics, such as gentian or cinchona, are indicated. Drenches of ale or of brandy have been successfully administered, but they must be used with care on account of the laryngitis which sometimes exists.

The complications must be met with such treatment as each case may require. The treatment adopted by me in purpura hæmorrhagica included stimulating frictions to the swellings, fomentations of decoctions of aromatic plants, drenches of bitter and aromatic tonics, such as chamomile or elder-flower tea, and scarifications when necessary. Peruvian bark or gentian was used in combination with mineral tonics, especially the sulphate, phosphate, or iodide of iron, or in some cases with the bisulphite of soda, or a few drops of carbolic acid. These combinations were given in powders or pills, or in drenches, according to the appetite and the facility of deglutition. The hypodermic injection of quinine and citrate of iron has been successfully employed. Diuretics may also be administered. Of these, oleum terebinthinæ, in ounce doses, is perhaps the best. In larger doses it is liable to give rise to abdominal troubles. If diuretics are used, the urinary secretion is to be carefully watched, so as to avoid hæmaturia, which very often appears. Where the purulent collection in the sinuses is very abundant and the frontal bone displaced by the pressure of the pus, and where respiration is thus impeded, I would recommend trephining, a simple operation affording immediate relief, not attended with danger, and leaving no disfigurement after cicatrization."

The mortality caused by the epizoötic was estimated for the city of New York by the following method: During the six weeks following the appearance of the disease in New York, there were, according to police returns from the rendering dock, 1,946 deaths among horses, a weekly average of 324. As the normal weekly average was 89, it follows that 235 (324 — 89) represents the weekly mortality caused by the epizoötic, and that 1,412 (235×6) represents the mortality caused by the epizoötic during the six weeks in which it affected the rate of mortality. As all, or very nearly all, the horses were affected, it may be said that the epizoötic was the first cause of death in 1,410 cases, and the second cause in 536 (1,946 — 1,410) cases. A census taken by the Health Department in 1870 makes the number of horses 38,272. A calculation based on these figures shows that 3.7 per cent. of the horses in New York were destroyed by the epizoötic.

The following is an abstract of the results of post-mortem examinations made by officers of the Board of Health of New York: —

Case I. October 31, 1872. Bay horse. Sick about ten days with cough, loss of appetite and weakness. Pulse 74, respiration 30, temperature 102°; muco-purulent nasal discharge, extremities œdematous, staggering gait, eye dull. Killed by a blow on the head. Mucous membrane of maxillary sinuses and nasal passages inflamed and covered with semi-fluid, muco-purulent matter. Pharynx, larynx, and trachea, normal; both lungs moderately congested. Other viscera normal.

Case II. November 2, 1872. Black horse, pulse 108, respiration 28,

temperature 102°. No œdema; dark-brown fluid discharged from nostrils. Nasal passages congested, especially the covering of the turbinated bones; larynx and anterior portion of trachea normal; posterior portion of trachea and bronchi and bronchial tubes congested; superior portion of lungs actively congested; inferior portion in advanced stage of pneumonia. Respiratory passages and bronchial tubes contained dark-brown matter similar in color to the pneumonic lung tissue. Other viscera normal.

Case III. November 4, 1872. Similar to Case II.

Case IV. November 5, 1872. Sorrel horse. No œdema; actions quick and intelligent; a copious white frothy discharge from the nostrils was scattered about by the forcible expirations of the animal; pulse 60, temperature 100½°. The lining membrane of the nasal passages, trachea, and bronchial tubes, as far as they could be distinguished, healthy. The air-passages contained several ounces of a milky fluid. Section of the inferior portion of the lungs showed a dark-red congested condition, section of the anterior portion was at first normal, but almost instantly changed to a vivid scarlet. Pressure on the latter sections forced from the finer tubes a frothy milk-white liquid resembling that found in the trachea and discharged from the nose. Liver congested. Other viscera normal.

Case V. November 7, 1872. Section of œdematous parts was of a very dark-red color.

Case VI. showed a remarkable contrast between the normal condition of the pharynx and base of the tongue, and the intense congestion of the superior surface of the soft palate and the lining membrane of the larynx.

Cases VII. and VIII., November 16 and 27, 1872, were well-marked cases of purpura hæmorrhagica, and strikingly illustrated the dyspnœa and extravasation into the muscular tissues.

The accompanying maps have been prepared to show the rate of progress made, and the direction taken by the epizoötic from its starting point until all the horses within reach had been affected, when it ceased to act, apparently for the want of susceptible animals on which to exert its power. The facts on which these maps are based have been taken from the letters of correspondents, who have most kindly placed the results of their observation at my disposal, and from the newspapers. Early in the progress of the epizoötic it was seen that the journalists were actively interested in recording the remarkable features of this visitation. The extracts already given show how widely this interest was felt. As the disease passed from city to city, its progress was anxiously watched and recorded. The local reporters in those places which were yet free from the disease were on the alert to detect and publish the occurrence of the first cases. It repeatedly happened that the epizoötic was announced in certain cities before it had actually appeared, and the mistake was duly corrected in subsequent issues of the newspapers making the mistake. But when a city was really attacked, the local papers at once began to publish column after column concerning the epizoötic. Their daily and weekly readers were supplied with descriptions of symptoms and advice in regard to prevention and treatment, with ac-

counts of its disastrous effects on business and items of news concerning its appearance, progress, and decline in other places. It thus happened that the popular demand for information on this subject produced, in the newspapers, a current and accurate history of the progress of the disease. Access to this history was obtained through the kindness of Mr. George P. Rowell, of the Advertising Agency, at No. 41 Park Row, New York, where the successive numbers of all the daily and weekly papers printed in the United States are systematically filed and preserved for six months after their issue.

The result of a careful review of the newspapers and of the correspondence above mentioned has been the following table of dates. In many cases the dates are fixed with exactness by the statements of those who were anxiously expecting the appearance of the disease; in other cases they have been determined approximatively, in the absence of the definite statements of observers. In all cases, however, there is good reason to believe that the date of the serious manifestations of the disease is fixed within a week or two weeks of the actual time of their occurrence. In certain cases, as will be seen, it has been deemed important to indicate briefly the authority on which the dates have been determined.

TABLE OF DATES OF THE APPEARANCE OF THE EPIZOÖTIC OF 1872–3.

CANADA.

Toronto: Letter from Andrew Smith, Surgeon of the Ontario Veterinary College, Toronto, November 20, 1872: "The disease first appeared in this district in an epizoötic form about the end of September, although possibly a few isolated cases may have existed a short time previous. On Monday, the 30th of September, I found fourteen horses affected in one stable." Barrie, Collingwood, and Owen Sound: second week in October. See Andrew Smith's letter of December 7, 1872 (p. 88). Peterborough, Port Hope, Bobcaygeon, Belleville, and Ottawa: second week in October. Kingston, "The Daily News," October 18, 1872: "As yet we have not heard of its visitation to Kingston." October 19: "The contagion has at length reached Kingston." Goderich: third week in October. Montreal: October 8th. Letter from D. McEachran, M. R. C. V. S.: "Referring to my case book, I find the record of the first case under date October 8." Quebec: October. St. John N. B.: second week in October. Halifax, Nova Scotia: November. Prince Edward Island: exempt. Letter from David Laird, editor of "The Patriot," Charlottetown, P. E. I.: "It did not reach Prince Edward Island. At the time the disease was raging in the other provinces, the navigation was closed, and our island entirely cut off, in the way of export or import, from the main land, which fact must have been the reason it did not cross to our shores."

NEW YORK.

Niagara Falls: October 10. Buffalo: October 13. Letter from William Somerville to a Buffalo newspaper of October 15, 1872: "On Friday last (October 11) I was called by telegraph to the Falls to see several sick horses. . . . . And now the disease has got among our horses in Buffalo."

Rochester: third week in October. Syracuse, "Daily Journal," October 22, 1872: "On Saturday of last week (October 19) the disease made its appearance in this city." Utica, Oswego, Watertown, Schenectady, Saratoga Springs, Elmira, Jamestown, and Poughkeepsie: fourth week in October. Ogdensburg, Letter from M. E. Thomas, V. S.: "The epidemic of influenza first made its appearance here . . . . on Monday, October 21." Albany, "Evening Journal": "The first case was reported on Wednesday" (October 23). New York City: October 20. Report of Professor Liautard:[1] "On the evening of October 21st, only a few animals were affected, but on the morning of the 22d I doubt if there was a single animal of the equine species which was not attacked. Horses, mules, and even a zebra belonging to a menagerie, were affected almost simultaneously." Kingston, November 1; Nyack, October 30; and Ithaca, October 31. Report of Professor Law:[2] "On October 30 it was reported for the first time in Peekskill and Nyack, N. Y. On the 31st it appeared . . . . in Ithaca, N. Y., having existed since the 25th in Trumansburgh, ten miles to the northwest of the place last named, and slowly reached Varna, three miles to the east of Ithaca, on November 6."

CONNECTICUT.

Waterbury, "Daily American": "It first appeared . . . . Sunday morning, October 27." Norwich, "Daily Advertiser": "The first case was discovered . . . . Wednesday morning" (October 23). Hartford and New Haven: fourth week in October.

RHODE ISLAND.

Providence: October 23. Newport: fourth week in October.

MASSACHUSETTS.

Boston, "Daily Advertiser": "The first case reported was . . . . on Sunday afternoon" (October 20). Springfield, "Daily Republican": "It broke out . . . . Tuesday afternoon (October 22). Worcester: October 27. Fall River and New Bedford: fourth week in October.

VERMONT.

Burlington, "Free Press and Times": "The epizoötic made its first appearance in this city on Saturday" (October 26). Rutland, "Daily Herald": "Sunday morning (November 3) suddenly, without any premonitory symptoms, the disease broke out." St. Albans: fourth week in October.

NEW HAMPSHIRE.

Concord: last week in October. Nashua: fourth week in October. Portsmouth: October 23.

MAINE.

Bangor: third week in October. Bath: October 28. Portland: fourth week in October.

PENNSYLVANIA.

Philadelphia, "Press": "The Canadian horse disease reached Philadelphia on Saturday morning" (October 26). Harrisburg, Lancaster, York,

[1] Op. cit., p. 276. [2] Op. cit., p. 210.

Erie, and Corry: fourth week in October. Pittsburg, "Commercial": "The disease first appeared on Tuesday evening" (October 29). Meadville, "Evening Republican": "The first evidence of the disease in this city was noticed . . . . Saturday" (November 2). Titusville: October 28. Bethlehem, Easton, Reading, Williamsport, and Pottsville: first week in November. Scranton, Professor Law: "November 13 reached Scranton."

NEW JERSEY.

Trenton, "Daily State Gazette," October 29, 1872: "There is no case in the city." November 4: "Yesterday the disease spread with great rapidity; some seventy-five animals having taken the disease since Saturday" (November 2).

DELAWARE.

Wilmington, "Daily Commercial," November 6: "It has been a matter of much comment that Wilmington has so long escaped. . . . . Thirteen cases are reported."

MARYLAND.

Baltimore, "American": "Only made its appearance on Friday or Saturday" (October 25 or 26). Washington, D. C.: October 28.

VIRGINIA.

Norfolk and Richmond: last week in October. Lynchburg: second week in November.

WEST VIRGINIA.

Wheeling, "Intelligencer": "Yesterday (November 13) some twelve or fifteen horses showed symptoms of it in the first stage." Parkersburg: second week in November.

OHIO.

Steubenville, "Daily Herald": "The disease made its appearance in this city on Friday evening" (November 15). Cincinnati, "Commercial": "The first appearance was . . . . on Friday night" (November 8). Columbus, "State Journal": "The first symptoms were observed on Saturday morning" (November 16). Zanesville, "Daily Courier": "The first cases of the disease . . . . were developed . . . . on Saturday last" (November 16). Dayton, Sandusky, and Toledo: second week in November. Springfield: third week in November. Cleveland: fourth week in November.

INDIANA.

Indianapolis, "Journal": "The first authentic case was attacked Sunday night" (November 17). Evansville: November 21. Fort Wayne and Lafayette: third week in November. Terre Haute and Madison, fourth week in November.

MICHIGAN.

Detroit: About October 16. Port Huron: third week in October. East Saginaw, "Daily Courier": "Attention was first drawn to the horses first seized on the morning of Thursday" (October 24). Jackson, "Daily Patriot": "The first symptoms appeared on Thursday" (November 7).

Grand Haven, "Daily Herald": "This unaccountable disease broke out in Grand Haven this morning" (November 8). Kalamazoo, "Daily Telegraph": "Last Saturday afternoon (November 9) the first case occurred here." Adrian: second week in November.

ILLINOIS.

Chicago, October 29, "Daily Tribune": "On the 20th instant there were brought to this city from Canada ten horses. The animals were stabled at No. 612 West Jackson Street. Four or five days after their arrival eight of them were taken sick; to save the other two, they were removed to No. 609 West Madison Street. At the time of their transfer these two horses were perfectly well to all appearances; but on Saturday or Sunday last (October 26 and 27), they showed symptoms of the 'Canada disease,' and with them twenty other horses." The disease proved to be the epizoötic. Cairo: first week in December. Quincy, "Daily Herald": "It arrived Sunday" (December 8). Peoria, "Daily Transcript": "It seems to have made its appearance no longer ago than last Wednesday" (November 27). Bloomington: third week in November. Galesburg: fourth week in November. Galena, "Evening Gazette": "Yesterday morning there was not a case of the new horse disease in Galena; last evening (November 20), a few cases came to light."

IOWA.

Davenport: November 14. Keokuk, "Daily Constitution": "Yesterday (November 25) this disease made its appearance." Dubuque and Iowa City: third week in November. Muscatine and Des Moines: fourth week in November. Burlington: last week in November.

NEBRASKA.

Omaha: December 1. Lincoln and Nebraska City: first week in December.

WISCONSIN.

Milwaukee: first week in November. Janesville and Green Bay: second week in November. Madison and Fond du Lac: third week in November. La Crosse: fourth week in November.

MINNESOTA.

St. Paul: third week in November.

DAKOTA TERRITORY.

Yankton, "Press": "The disease first made its appearance here last Thursday" (December 5). Vermilion: first part of December.

KENTUCKY.

Louisville, "Courier-Journal": "On Saturday night (November 9) a number of horses . . . . were observed to be ailing." Paducah: fourth week in November.

TENNESSEE.

Memphis, Nashville, and Chattanooga: third week in November.

NORTH CAROLINA.

Raleigh: first week in November. Charlotte and Newbern: fourth week in November. Wilmington, "Journal": "It first made its appearance here on Tuesday" (November 12).

SOUTH CAROLINA.

Charleston, first week, and Columbia, second week in November.

GEORGIA.

Savannah: second week in November. Augusta and Atlanta: third week in November. Macon, Rome, and Columbus: fourth week in November.

FLORIDA.

Jacksonville and Lake City: fourth week in November. Marianna and Tallahassee: first week in December. Middle Florida: winter of 1872–3. Key West, exempt. "Weekly Dispatch," May 24, 1873: "Key West has been singularly exempt from this disease."

ALABAMA.

Mobile, Montgomery, and Selma: fourth week in November.

MISSISSIPPI.

Natchez and Vicksburg: fourth week in November.

LOUISIANA.

New Orleans, Report of S. S. Herrick, M. D., Sanitary Inspector, in Annual Report of Board of Health for 1872: "The earliest access of the distemper learned was November 21; but of this there may be some doubt, as no other cases occurred until the 25th." Shreveport: second week in December.

TEXAS.

Galveston: fourth week in November. Houston, "Daily Telegraph": "Yesterday (November 29) there were thirteen cases of a serious disease among the horses of this city." San Antonio: January 3, 1873. Brownsville: third week in February.

ARKANSAS.

Helena: third week, and Little Rock, last week in November. Camden, "Weekly Journal": "Several horses on Saturday and Sunday last (December 7 and 8) developed unmistakable symptoms." Fort Smith: third week in December.

MISSOURI.

St. Louis, "Missouri Democrat": "Saturday there was not a single case in St. Louis; but by Monday (December 2), over twenty were reported." Kansas City, first week, and Hannibal, second week in December. St. Joseph, "Daily Gazette": "On Saturday last (December 14) the first symptoms were discovered."

KANSAS.

Fort Scott, Lawrence, Leavenworth, and Topeka: second week in December.

COLORADO TERRITORY.

Denver and Central City: fourth week in December. Pueblo: first week in January, 1873.

WYOMING TERRITORY.

Cheyenne: second week in January, 1873.

NEW MEXICO.

Cimarron, first week, Elizabeth City, second week, and Albuquerque, fourth week in January, 1873.

ARIZONA TERRITORY.

Prescott: first week in March, 1873. Tucson: second week in March. "Weekly Citizen," March 15, 1873: "The stage animals westward are attacked. Eastward all seems right again." Yuma: fourth week in March.

UTAH TERRITORY.

Salt Lake City, second week, and Corinne, third week in January, 1873.

IDAHO TERRITORY.

Boise City: third week in March. "Tri-weekly Statesman": "The epizootic has reached this place through the overland stage company's horses from the East."

MONTANA TERTITORY.

Helena: fourth week in March.

NEVADA.

Winnemucca: middle of February. Gold Hill and Virginia City: first week in March.

CALIFORNIA.

Inyo, "Southern Californian," March 13, 1873: "The epizoötic has broken out in Inyo with great fury. . . . Inyo caught it from Carson City." Bakersfield: third week in March. Santa Barbara: fourth week in March. Visalia: third week in March. San Diego: first week in April. Oakland: April 10. Mariposa, Stockton, San José, Sacramento, Marysville, and Shasta: second week in April. San Francisco, "Bulletin," April 15, 1873: "The horses here have not yet been affected." "Alta California," April 19: "The epizoötic has reached our city." Vallejo, Nevada City, Weaverville, Yreka: third week in April. Lava Beds, seat of Modoc Indian War: fourth week in April.

OREGON.

Jacksonville: fourth week in April. Baker City, "Democrat": "It made its first appearance . . . . in this city yesterday morning (April 8). Eugene City: third week in May. Portland and Dallas: fourth week in May.

WASHINGTON TERRITORY.

Walla Walla: last week in April. Olympia: May. Steilacoom: first week in June. Seattle: third week in June.

BRITISH COLUMBIA.

Letter from David Eckstein, Esq., U. S. Consul at Victoria, B. C.: "On the main-land the disease broke out, I believe, in July. . . . . Victoria City, and in fact all of Vancouver's Island, remained unscathed by what is known as the epizoötic. Not a single case is known to have occurred here up to the present (November 15, 1873). For several months no horses or mules were allowed to be landed at the ports of Victoria, Burrard Inlet, or Nanaimo."

CUBA.

Havana, letter from Henry C. Hall, Esq., Vice-consul-general: "The disease did not become epidemic here until about the 20th of November." "Horses from the United States and Canada were imported into this island during the month of September, 1872." Letter from A. T. A. Torbert, Esq., Consul-general: "The disease was said to have been introduced by a span of American horses imported for the governor." Cienfuegos, letter from John Sullivan, M. D.: "In Cienfuegos, about the end of December, a few isolated cases appeared." Santiago de Cuba, letter from A. N. Young, Esq., U. S. Consul: "The disease first made its appearance about the 15th of January (1873), was at its height during February, and disappeared early in April. . . . . There were about one hundred deaths among horses in the city. . . . . I witnessed the advent of the disease in Cincinnati in the early part of November last (1872), and also here during the above mentioned period. I do not think the horses suffered as much here during the attack as in Cincinnati, probably on account of the milder temperature here."

HAYTI.

Letter from Ebenezer Bassett, Esq., Port au Prince, July 8, 1873: "The epizoötic has never yet made its appearance in this republic." Louis Sanne, Esq., Acting U. S. Consul, Aux Cayes, June 26, 1873: "The disease in question has not appeared yet here." Stanislaus Goutier, Esq., U. S. Consul, Cape Haytien, June 26, 1873: "This disease has never made its appearance in Hayti."

SAN DOMINGO.

Letter from J. Ginebre, Esq., Puerto Plata, July 21, 1873: "The epizoötic has hitherto not appeared among the horses or mules of this island." Fisher W. Ames, Esq., Santo Domingo City, June 13, 1873: "I have not seen a single case of any disease that even simulates it."

JAMAICA.

Thomas H. Pearne, Esq., U. S. Consul, Kingston, July 15, 1873: "The disease has not to my knowledge ever appeared here."

MEXICO.

Monterey, letter from J. Ulrich, Esq., U. S. Consul: "The epizoötic made its appearance here between the 1st and 10th of February last (1873). . . . . At Saltillo, seventy miles west of Monterey, the disease prevailed

also in a mild form. Saltillo has an altitude of over 5,000 feet above sea-level." Guaymas: A. Willard, Esq., U. S. Consul: "The epizoötic appeared at this place last March (1873), its entrance to our place being distinctly marked in its march from Arizona." Mazatlan, Isaac Sisson, Esq., U. S. Consul: "The epizoötic made its appearance in this city and neighboring towns in March last (1873), say about the middle." Manzanillo, A. Morrill, Esq., U. S. Consul: "The first case of the real disease appeared on the 19th of March (1873)." Acapulco, John A. Sutter, Esq., U. S. Consul: "The epizoötic made its appearance in the vicinity of the port of Acapulco during the first week of April" (1873). La Paz, David Turner, Esq., U. S. Consul, June 20, 1873: "No signs of the epizoötic have been noticed in this territory." Minatitlan, John A. Wolf, Esq., U. S. Consul, July 2, 1872: "The epizoötic has really not appeared here." Tabasco, Aug. J. Cassard, Esq., U. S. Consul, July 5, 1873: "In this consular district that epidemic has never arrived, and is totally unknown." Merida, Marlin F. Hatch, Esq., U. S. Consul, October 16, 1873: "The epizoötic has not appeared in the state of Yucatan."

GUATEMALA.

Guatemala City, Henry Houben, Esq., U. S. Consul, July 15, 1873: "The aforesaid disease made its appearance in this city a few days ago."

SAN SALVADOR.

La Union, J. F. Flint, Esq., U. S. Consul: "An epidemic disease commenced amongst the horses and mules in this department about the 1st of August" (1873).

NICARAGUA.

Corinto, Rufus Mead, Esq., late U. S. Consul: "It made its appearance in this State sometime in September (1873). . . . . The symptoms were as you describe them, and in some cases there was swelling under the belly."

UNITED STATES OF COLUMBIA.

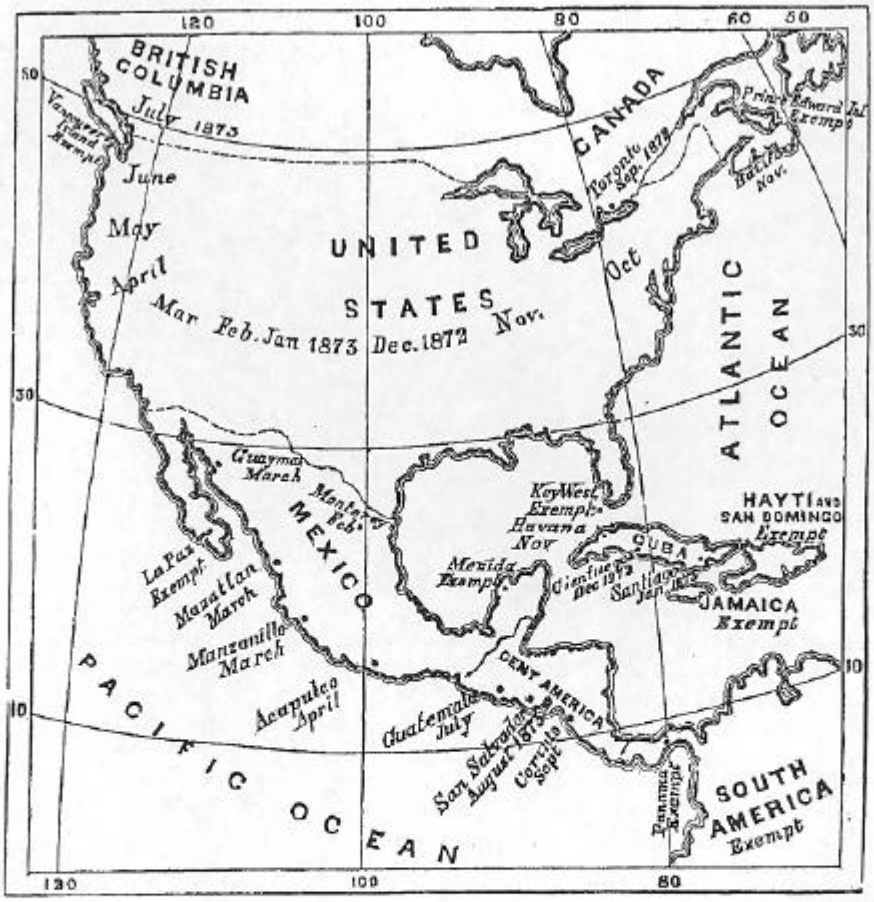
Panama, Owen M. Long, M. D., U. S. Consul, April 23, 1874: "Up to this present writing I have not heard of a single case of epizoötic. I hardly think it will ever reach this part of the world, as we have but few horses and not a great many mules . . . . There is very little travel in this country in consequence of the entire absence of good roads. We can drive out of Panama in a carriage only about a mile and a half." Carthagena, Augustus S. Hanabergh, Esq., U. S. Consul, May 23, 1874: "There has been no distemper of any kind among the horses of this place for several years past, neither have I heard of the existence of any disease among those animals in any part of this country, with such symptoms as you describe." Bogota, William L. Scruggs, Esq., U. S. Minister Resident, June 5, 1874: "I am somewhat familiar with the disease, having had considerable experience with it among my own horses, and those of my neighbors and friends, in Georgia, before leaving for my post of duty in Columbia; and I am safe in saying that none of the symptoms have, up to this time, appeared among the horses here, or in the immediate vicinity. Indeed, I am not aware that

the epizoötic, or anything like, has made its appearance in any part of Columbia."

ECUADOR.

Quito, Rumsey Wing, Esq., U. S. Minister Resident, June 1, 1874: "Up to this date there has been no appearance of the epizoötic in this city, and so far as I am aware, in this country."

Up to this date (Oct. 3, 1874), there has been no mention of the recent appearance of this epizoötic among the horses of Europe, in the Veterinary Journals of London, Paris, or Brussels.



MAP OF NORTH AMERICA, SHOWING THE COURSE OF THE EPIZOÖTIC OF 1872–73.

The propositions and conclusions derived from the preceding facts are presented below in words taken from my report on this subject, prepared

by the direction of the Sanitary Committee of the Health Department of New York City, and printed in the Appendix to the Annual Report of the Board of Health of New York City for 1872.

Proposition No. 1. — Epizoötic influenza does not spread by virtue of any of the recognized atmospheric conditions of cold, heat, humidity, season, climate, or altitude.

The proof of this proposition amounts to a demonstration, as will be seen by a reference to the maps. The disease prevailed and was propagated in the cold of a northern winter, and in the summer heat of Central America; in the dry air of Minnesota, and in the moist air of the sea-board; at an altitude of 5,000 feet above the sea, at Saltillo, Mexico, and on the low levels of New Orleans, La. (ten feet above sea-level), and Galveston, Texas (five feet above sea-level).

Proposition No. 2. — Epizoötic influenza does not spread solely by virtue of unrecognized atmospheric conditions.

During the prevalence of the disease, the opinion was expressed, by many thoughtful observers, that it was spreading through the air, or by virtue of some unknown atmospheric condition. In no other way did it seem possible to explain the sudden prostration of all, or nearly all, of the horses in a city or limited district. Subsequent investigation has not proved that the disease is *not* communicable through the air at short distances, and over limited areas. They have proved, however, that the spread of the disease over the country is not solely, or chiefly, by virtue of unrecognized atmospheric conditions.

The irregularities in time and place, in the appearance of this disease, are so numerous and surprising that they cannot be classified or brought into harmony with any system of laws that bears any resemblance to the laws which govern the phenomena of any of the recognized atmospheric conditions. Some of the irregularities may be appreciated by examining the larger of the accompanying maps with the assistance of the arcs and radii that have been drawn from Toronto, where the disease first appeared, as a centre. It will be seen that the disease appeared at places equally remote from its starting point, at widely different dates; for instance, at Montreal, Canada, Oct. 8; Burlington, Vt., Oct. 26; Rutland, Vt., Nov. 3; New York, Oct. 21; Trenton, N. J., Nov. 2; Columbus, O., Nov. 16; and Grand Haven, Mich., Nov. 8. It will also be seen that the disease appeared simultaneously at St. Louis, Mo., and Galveston, Tex., the latter place being twice as far, in the same direction, from Toronto as the former. These are but instances taken from a countless number of similar facts to be found all over the map.

By these considerations proposition number two is logically proved, unless we are willing to believe in the existence of an unrecognized atmospheric condition whose phenomena are governed by laws which bear no relation of resemblance or analogy to the laws which govern the phenomena of the recognized atmospheric condition.

Proposition No. 3. — Epizoötic influenza spreads by virtue of its communicability.

Experiments for the *demonstration* of this proposition have been wanting. The incidents attending the appearance of the disease at Chicago, Ill., as recorded on page 100, approach closely to a satisfactory demonstration. If the statements in regard to the appearance of the disease at Chicago had been the result of scientific observation, they would have demonstrated our proposition.

Admitting the present impossibility of demonstration, we have abundant and convincing *logical proof*, as follows: —

1. It is logical proof that epizoötic influenza spreads by virtue of its communicability, that no place was exempt from the disease which was known to have been in communication, by means of horses or mules, with places in which the disease existed.

On the main-land of this continent every place which is known to have had communication, by means of horses or mules, with places where the disease existed, suffered from the disease. In regard to the West India Islands, we have letters from two correspondents (p. 103), which mention the importation of American horses into Havana, and Cuba was overrun by the disease.

2. It is logical proof that epizoötic influenza spreads by virtue of its communicability, that the places that were exempt from the disease were so situated that the importation of horses or mules was in some of them impossible, and in others of them improbable. The following places were exempt: Prince Edward Island, Vancouver's Island, Key West, the Islands of Hayti and San Domingo, the Island of Jamaica, La Paz, and that portion of Mexico containing Minititlan, Tabasco, and Merida.

Prince Edward Island and Vancouver's Island were sequestered, the former by the severity of a Canadian winter, and the latter by a quarantine against horses and mules. The Islands of Key West, Hayti and San Domingo, and Jamaica, have limited commercial intercourse with the ports of this country or with Cuba, and the importation of horses or mules is probably a very rare occurrence. La Paz, near the extremity of the peninsula of lower California, is so situated that, in all probability, there is no unbroken communication by horses and mules with those portions of Mexico in which the disease prevailed. The same statement can be made concerning Minititlan, Tabasco, and Merida, as the region in which they are situated is separated from the states of Vera Cruz and Mexico, in which the disease prevailed, by difficult and thinly settled lowlands.

[It is further logical proof, recently come to hand, that epizoötic influenza spreads by virtue of its communicability, that the disease ceased to spread only when it had affected all the susceptible animals within reach. The last point at which its presence is reported is Corinto, Nicaragua, where it appeared in September, 1873, just a year after it took up its line of march from Toronto, Canada. The question whether it would pass into South America was answered in the negative by the letters already quoted from Panama, Carthagena, and Bogota. I am informed by Lieutenant-commander G. C. Schulze, U. S. Navy, a veteran explorer of the Isthmus, that overland communication, by means of horses or mules, between North and

South America is an impossibility. From Panama to the Atrato river, a distance of two hundred and fifty miles, the country is an almost impassable swamp intersected by rough and difficult mountain ranges. The only inhabitants are a small number of half-civilized negroes and savage Indians.]

3. It is logical proof of this proposition that the disease passed rapidly over those regions in which the towns and cities are numerous and in frequent communication with each other, and with comparative slowness over those regions in which the towns are less numerous and in less frequent communication with each other.

An examination of the maps will show that the disease spread rapidly over the States east of the Mississippi and Missouri rivers, where cities and towns are numerous, and where communication is rapid and easy; and that the rate of its progress was greatly reduced as it passed over the thinly settled States and Territories of the western half of the country where communication is slow and difficult.

There are many minor points which illustrate the fact that the rate of progress made by the disease depended on the amount and facility of commercial intercourse. Some of these points are, in brief, as follows: The early appearance of the disease at New York, Philadelphia, Baltimore, and Washington, places situated on a crowded line of travel, and its late appearance in a large region lying between these cities and the starting point of the disease, as well as in certain important cities and towns lying near, but not on this great line of travel; the rapid progress of the disease along the line of the Pacific Railway; the arrest of the disease by the Sierra Nevada mountains, impassable by horses and mules at the season of the approach of the disease, and its invasion of California after flanking the mountains by way of the succession of mining districts between Carson City, Nevada, and Inyo, California; and the division of the current of the disease by the Sierra Nevada mountains and the unoccupied territory in Northern California and Oregon, one division moving more rapidly than the other by reason of passing over a more thickly settled region. The early appearance of the disease at New Orleans, La., and Galveston, Tex., has caused the surmise that infected horses were landed at those ports by some of the numerous coasting steamers from New York and Philadelphia.

Conclusions. — One of the results of the investigations detailed in the preceding pages is the confirmation of the opinion commonly held by medical authorities, that epizoötic influenza is the counterpart of epidemic influenza. They are both specific febrile diseases, in which the specific poison produces disordered function of the chief nervous centres, and acts on the mucous membrane of the eyes, of the nose, and of the bronchi.

The definition of influenza given in Aitken's "Practice of Medicine," applies with exactness to epizoötic influenza, if a few unessential words are omitted. Leaving out the subjective symptoms, and substituting *epizoötic* for *epidemic*, this definition reads as follows: "A specific febrile disease, invariable in its essential characteristics, frequently prevailing as an epizoötic, attended with lassitude and prostration to an extreme degree; chills, the eyes injected and tending to fill with tears, the nostrils discharging an

acrid fluid; cough prevails, with yellow expectoration. Fever attends the disorder, sometimes slight and sometimes severe, and of a type varying in different epizoötics and localities."

Epizoötic influenza is the counterpart of epidemic influenza, not only in its pathology and definition, but also in certain other important features which are common to both diseases, among which are the following: 1. It has at intervals overrun portions of the globe from early times; 2. It attacks all, or nearly all, individuals; 3. The rate of mortality is low, the prognosis depending on the condition in which the disease finds its victim, and on his ability to secure rest and supporting treatment, rather than on the intensity of the specific poison.

As the effects of the prevalence of epizoötic influenza on commerce, and on the general welfare of the community, are extremely injurious, inquiries in regard to its method of propagation, and in regard to practicable measures of prevention, are very important, the more so as the facts obtained will probably apply to its counterpart, — epidemic influenza. The result of the preceding inquiries into the methods of propagation of epizoötic influenza is the presentation of abundant and convincing proof that it spreads from city to city, and from country to country, by virtue of its communicability, and regardless of atmospheric conditions. This proposition should be qualified by the statement that the apparently sudden seizure of all the horses in a city, or limited neighborhood, renders it possible that within narrow limits it infects through the atmosphere.

From the views of this subject presented above, it is evident that the introduction of epizoötic influenza can be prevented by arresting communication through horses and mules, with those localities in which the disease prevails. Its importation by sea can be prevented by quarantine regulations. Its transportation overland can be prevented by the establishment of a *cordon sanitaire;* but this means would, from the nature of the case, be successful only under exceptionally favorable circumstances.

In regard to epidemic influenza, the same rules probably hold good; but their application is impracticable. The arrest of intercourse between two adjacent countries or sections, or the enforcement of quarantine regulations with the necessary stringency, would probably be considered more disastrous than an epidemic of influenza.