et al.

REPORT

OF THE

TREASURY CATTLE COMMISSION

1882

U. S. Treasury dept.
Cattle Com

Letter transmitting
report on Lung
Plague of cattle

1852

47TH CONGRESS, 1st Session. } SENATE. { Ex. Doc. No. 106.

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LETTER

FROM

THE SECRETARY OF THE TREASURY,

TRANSMITTING

In response to Senate resolution of February 10, 1882, *the report of the Treasury cattle commission on the lung plague of cattle, or contagious pleuro-pneumonia.*

FEBRUARY 15, 1882.—Referred to the Committee on Agriculture and ordered to be printed.

TREASURY DEPARTMENT,
February 13, 1882.

SIR: I have the honor to acknowledge the receipt of a copy of a resolution of the Senate, adopted on the 10th instant, and attested by its acting Secretary, directing me to communicate to the Senate the report of the Treasury cattle commission on the lung plague of cattle, or contagious pleuro-pneumonia.

In compliance with such direction, the report in question is herewith transmitted.

Very respectfully,

CHAS. J. FOLGER,
Secretary.

Hon. DAVID DAVIS,
President of the Senate.

REPORT

OF

THE TREASURY CATTLE COMMISSION

ON

THE LUNG PLAGUE OF CATTLE, OR CONTAGIOUS PLEURO-PNEUMONIA.

The Hon. CHAS. J. FOLGER,
Secretary of the Treasury:

SIR: In presenting a report which we hope may not be altogether fruitless in securing or shaping legislation, we cannot close our eyes to the fact that many legislators are entirely ignorant of the plague of which we are treating, while others who have heard something of its prevalence are still in some doubt as to its contagious properties. We have therefore judged it desirable to enter somewhat fully into the history of the disease in the Old World and the New, and in the Northern and Southern Hemispheres, so as to illustrate its purely contagious nature, its insidious progress, its destructive tendency, and the circumstances in which it has been respectively possible and impossible to extirpate it from an infected land. This was the more necessary in order to connect the disease as now existing in the United States with that imported in 1848, and to show the reasons for our comparative immunity from great extensions and losses in the past, and the increasing dangers of such diffusion and loss in the future.

We have kept steadily in view the main object of our appointment, and have fully established the claim that the Western and Southern States, as well as the whole of New England, are free from this disease, and have set forth the conditions under which we believe that the cattle of these States could be shipped to Europe with a perfect guarantee of soundness as regards this plague. Finally, convinced that any permanent guarantee of continued immunity for our as yet uninfected States, and our export cattle, can only be secured by the extirpation of this disease from the continent, we have set forth those measures which, in the light of history and science, are the best calculated to secure its speedy and thorough extinction.

NOMENCLATURE.

It would be useless to furnish a long list of synonyms, yet it is well to note that in all lands this disease has been known by designations such as *plague*, *epizootic*, *distemper*, &c., which showed that it was recognized as something more than a simple inflammation of the lungs, and

owed its origin and diffusion to a specific-disease poison. We much prefer, and throughout this report have freely used, the appropriate term, *lung plague*, rather than *pleuro-pneumonia*, mainly because the latter is already applied to a simple inflammatory affection of the lungs and their covering, without a suspicion of that contagion which is the essential element of this disease. The effect of the term *pleuro-pneumonia* on the average medical mind may be inferred from the fact that in the New York legislature a bill providing for the extinction of the lung plague was defeated through the confident assertions of a medical member of the house that there was not, and could not be, such a thing as a *contagious pleuro-pneumonia*. No one thinks of calling *small-pox ringworn*, or *scabies inflammation of the skin*, *typhoid fever inflammation of the bowels*, *hydrophobia inflammation of the brain*, *scarlet fever inflammation of the throat*, nor *pulmonary consumption inflammation of the lungs*. Yet, it would be no more absurd and misleading to call these simple inflammations of the organs named than to call the contagious lung disease of cattle *pleuro-pneumonia*. Not being a simple inflammation, but really a specific fever, it ought to be known by a specific name, and we have adopted the term *lung plague*, already in use, as one well calculated to set forth its essentially pestilential character.

HISTORY OF LUNG PLAGUE, AS SHOWING ITS PROPAGATION BY CONTAGION ONLY.

The same excuse advanced in extenuation of the above reference to historic names will apply to the following presentation of important facts in the history of this affection. The ultimate source of the contagion of lung plague we do not know. Up to the present time this has successfully eluded all investigation. Like small-pox, measles, the plague, &c., this affection is only known as it is transmitted by its own contagious products. If the sanitarian of to-day meets with a case of small-pox, or of lung plague, he at once inquires after some pre-existing case of the same kind, from which this has been derived, and with the same confidence with which he would, on finding a young animal, inquire after its sire or dam. All historic records of lung plague betray its continuous existence in different parts of Europe, where it has prevailed from time immemorial, and show further that the invasion of a new country by the pestilence has ever been but the sequel of the transit of cattle from an infected region, either in the commissariat parks of a belligerent army or in the channels of an opening commerce. Whatever, therefore, may have been the conditions of the original generation of the lung plague virus, whether it was a primary creation at the foundation of the world, or whether it has been the product of an evolution under peculiar modifying circumstances, this much can be confidently affirmed, that in Western Europe and in the Western and Southern Hemispheres its appearance can be traced in every case to the introduction of diseased cattle or their products.

ANCIENT HISTORY OF LUNG PLAGUE.

The early history of the lung plague of cattle cannot be followed with that certainty which characterizes the records of Russian cattle plague, foot and mouth disease, sheep-pox, &c., which develop sooner after the system has taken in the infection. The average period of incubation or latency of the poison is, for foot and mouth disease two days, for

Russian cattle plague four days, for sheep-pox seven days, but for lung plague thirty days. As the exigencies of war or commerce usually led to the introduction into a new country of two or more of these plagues simultaneously, it is the exception rather than the rule to find any clear distinction drawn between them in these early days of medicine. Thus the Russian cattle plague, which developed most speedily and proved the most deadly, naturally came in for the greatest share of attention, while the lung plague, which appeared a month later and proved more slowly though not less surely and ruinously destructive, was looked upon as the dregs of the same disease, and thus we have usually a most confusing medley of the two. Youatt, whose works have been extensively read in America, gives a striking illustration of this, confounding as he does under the one name of "*malignant epidemic murrain*" at least four diseases, namely, malignant catarrh, rinderpest, malignant anthrax, and lung plague. By exercising special care one can disentangle these records and show with reasonable certainty the existence of this malady in early times.

Aristotle, writing three hundred and fifty years before Christ, says: "The cattle *which live in herds* are subject to a malady during which the breathing becomes hot and frequent, the ears droop, and they refuse to eat. They die speedily, and the lungs are found destroyed." Here the restriction of the disease to cattle which lived in large herds, where there was ample opportunity for a continuous succession of cases by the infection of new and susceptible subjects, the confinement of the morbid lesions to the lungs, and the high mortality, all strongly suggest the lung plague. Tacitus and Columella refer to an extended outbreak of lung disease in cattle in the middle of the first Christian century. The latter describes it as a "heavy mortality, with ulceration of the lungs, cough, emaciation, and finally phthisis." As serving to identify this with lung plague we have the facts that cattle only are named as its victims, and that the epizootic attended and followed the great wars for the extension of the Roman Republic and Empire. The lung plague is confined to cattle, and the great means of its propagation in all ages have been the infected cattle in the commissariat parks, which moved from place to place with the advancing or retreating armies.

LUNG PLAGUE IN THE SEVENTEENTH AND EIGHTEENTH CENTURIES.

A pulmonary affection of cattle which prevailed in Hesse in 1695 is thus described by Valentini:

> The preceding winter being wet, but in the end very frosty, was followed in early spring by an unusual heat, which continued throughout the whole summer, which sudden change brought about an unequal and unnatural motion of the humors and breath, resulting in death to man and brute. Oxen and cows perished in great numbers. From the observation of those who opened the bodies it appeared that they died of pulmonary phthisis, to which, doubtless, the severe cold and the succeeding intense heat largely contributed. In man, also, it caused dysentery and malignant fever; toward the end of June and the beginning of August this fever in places becoming intermittent and mainly tertian.

This was doubtless the genuine lung plague, for its extensive prevalence, its high mortality, and the fact that cattle only among domestic animals are mentioned as the sufferers, forbids the conclusion that it was due to the weather vicissitudes alone. The fact that the mortality supervened in the hot weather is exactly in keeping with the habits of the lung plague, the deadly effects of which are always greatly enhanced by a hot season or climate. Had it been true pulmonary phthisis (tuberculosis), it would have been ameliorated, in place of aggravated, by the

warm season and the open-air life in the fields. That it had no connection with the contemporaneous sickness in man is shown by Valentini himself, who shows the latter to have been of a malarious origin.

In estimating the true nature and cause of the cattle disease, it must not be forgotten that Europe was about that time engaged in general warfare, an occurrence which has never failed to induce a universal extension of the animal plagues. Thus the Poles were waging a war with the Turks, the Swedes with the Russians, French, and Savoyards, and the French with the Dutch; and Hesse, where the plague was especially noted by the historian, was directly in the midst of the contending nationalities.

That Valentini attributed the outbreak to the weather is not surprising, since physicians can still be found so antiquated as to attribute this and other animal plagues to the peculiarities of the seasons. But Valentini inadvertently furnishes further evidence of the justice of our position in reporting in the same year the prevalence of the aphthous fever (foot and mouth disease) in animals and men. "In the autumnal equinox from the last of August inflammation of the gums, tongue, and mouth in men; in animals, inflammation of the feet was also observed" (Sydenham, Opp., I, p. 283). Both plagues were introduced by contagion by means of cattle driven with the armies. Equally careful historians would doubtless have noted these in most of the other countries of Europe as well.

Wirth records the prevalence of lung plague in Switzerland and adjacent countries in 1726 and 1727, and that it continued its ravages in different localities until 1739. This was also a period in which the ravages of rinderpest were most extensive, both plagues having been manifestly propagated by the wars of Charles XII and of the Spanish succession.

From this time the records are more definite. In 1743 the disease is reported as ravaging Suabia (Wirth), but immediately afterward its extensive prevalence is noted coincidentally with the war of the Austrian succession. Thus in 1764 Trumpy reports its presence in Pomerania; in 1769–'70 Bourgelat records its continuous existence in Franche-Compté; in 1769 Wirth notices its ravages in Fulda, Germany; from 1772 to 1830 its existence was virtually uninterrupted in Nassau (Franque); in 1774–'76 it ravaged Istria and Dalmatia (Fanti), and was still prevailing in the former in 1790 (Orus, Bottani); from 1778–'90 it devastated Würtemberg and Silésia (Kausch, Wirth); from 1786–'91 Bavaria (Plank, Laubender), and in 1892 Franconia (Hensinger); these latter extensions were favored by the military movements in connection with the partition of Poland in 1772, and by the collection of troops in connection with the disputed succession in Bavaria in 1777 and 1785.

LUNG PLAGUE PERMANENT IN THE MOUNTAINS OF CENTRAL EUROPE.

Bourgelat's statement that this plague prevailed continuously in Franche-Compté about 1770 is only a solitary illustration of its perennial presence in the unfenced mountainous regions of Central and Eastern Europe. In these, herd was continually mingling with herd, so that fresh subjects were always presented for infection, and the contagion had every opportunity for its perpetuation. In the well-cultivated plains, where the separate holdings were inclosed, a natural limit was set to the life of the plague germ, since, after a time, in the smaller herds, all the susceptible animals had fallen victims to the pestilence, and if several months elapsed before the birth or introduction of new

and susceptible stock, disinfection often ensued. Hence it was that whereas in the intervals between extensive wars the arable lands were to a large extent freed from this pestilence, the unfenced and uncultivated mountains, and the open commons, the property of the different towns and cities, remained the centers of infection. This digression seems necessary to explain what remains of this history, and to account for the persistence of the disease in certain localities in the United States.

Franche-Comté, which was at this time the constant home of the plague, was situated between the Jura and Vosges mountains, and partook of both, so that it was constantly liable to infection from these contaminated regions. Lafosse asserts that from 1769 to 1789 lung plague was almost exclusively confined to the mountains of Switzerland, of Jura, of Dauphiny, of Vosges, of Piedmont, and of Upper Silesia; but that it spread widely on the plains of the different countries in connection with the wars of the French Revolution. Delafond adds Hesse and Swabia, and Zundel the mountains of Auvergne and the Tyrol, to the countries where the plague habitually prevailed prior to this date. Swabia was specially favorable to such unbroken infection, because of the unfenced territory of the Swabian Alps, while Hesse was exposed through the Vogel Mountains and extensive forests like the Thuringer Wald. We have the further testimony of Huzard, Chabert, and Vicq d'Azyr that the disease ravaged Paris and neighborhood from 1772 to 1794. Here the constant influx of strange cattle to supply the food of a large city, the endless changes in city dairy herds, and the presence of large parks and commons, sufficiently account for its perpetuation. This prevalence of the pestilence in the genial atmosphere of Paris sufficiently disproves the idea that the affection was kept up by the inclemency of the hills. This conclusion becomes absolute, however, when we add that this plague has never penetrated to the coldest and most exposed of the European mountains, which are, however, protected by situation alike from becoming the theater of great wars and the channels of cattle traffic. Among those which maintain this enviable immunity are the Pyrenees, the mountains of Norway and Sweden, and the Highlands of Scotland.

EXTENSION DUE TO THE WARS OF THE FRENCH REVOLUTION AND EMPIRE.

The above-mentioned statement of Lafosse relative to the general infection of Europe in connection with the French Revolution is fully indorsed by other writers. Zundel says:

> Under the republic and the first empire, *peri-pneumonia* is to be counted among the miseries entailed by the war, and we find it not only in Switzerland, but in the different departments of France, Italy, and Germany. We may name particularly the years 1812–'15, when the affection was very prevalent in these countries; 1816–'18, when it attained an extraordinary intensity in the Tyrol, Bavaria, Bohemia, Austria, and Styria; and 1820–'22, when it ravaged severely Switzerland, Piedmont, Franche-Comté, Lyonnais, and Auvergne.

The culmination of the ravages of the plague in 1812–'15 is fully explained by the considerations that for a quarter of a century, dating from the French Revolution in 1789, Europe had been the theater of an almost uninterrupted warfare, which led to the movements of infected cattle in every direction in the train of the different armies, and to the infection of the countries in which the latter operated. Finally, this reached its acme in 1812, in connection with Napoleon's ill-fated expe-

dition to Moscow with half a million men, and still more in the succeeding three years, when all Europe was literally in arms, arrayed for or against the French cause. The exhaustion of the different states by the constant wars, and the decay of agriculture in consequence of the heavy conscriptions, the burdensome taxation, and the devastations incident to the presence of armies in the field, lessened the available supply of cattle; and this, together with the greatly increased demand for the provisioning of the armies, necessitated the drawing of live stock from more distant points. Thus the commissariat drew not only on the infected herds of the mountains and forests of Central Europe, but also on the steppes of Russia and Asia; and with the steppe cattle Europe imported the lung plague and all those Oriental bovine pestilences which find a perennial home on these great and fenceless plains.

Since this general invasion most of the countries of Central and Western Europe have remained under the sway of this baneful plague. It is reported as prevailing in Prussia in 1802 (Sick), and at intervals up to the present time (Dieterichs, Laubender, Wagenfield, Gielen, Sauberg, Seir, Keurs, Hering, Verheyen, Gerlach, &c.). In Hanover it has prevailed extensively since 1807. (Haussmann, Gerlach, &c.). In Belgium and Holland, it was reported as all but universal from 1830 to 1876, causing an average mortality of 10, 15, or 25 per cent. of the entire bovine population (Loiset), while in the greater part of France it has been widely prevalent since the days of the first Napoleon.

RECENT INVASIONS IN THE CHANNELS OF COMMERCE.

During the last half century the increasing activity of the cattle trade has taken the place of wars in the general diffusion of this plague. All through Western Europe have started up immense distilleries, sugar factories, &c., where the refuse products are devoted to the fattening of stalled cattle. These distillery and sugar-factory stables of to-day have taken the place of the army commissariat parks of the past in drawing upon all available regions for supplies of cattle; so that oxen from Eastern and Central Europe are fattened in the great commercial and manufacturing centers of the West. The rapid extension of railroads has lent its aid to the traffic, until to-day a lucrative and peaceful commerce has become no less effective in the propagation of animal plagues than the desolating wars of former ages.

Thus the northern department of France is said to have received the lung-plague infection in 1822 through cattle brought from Franche-Comté for the purpose of fattening (Delflache). Belgium and Holland were similarly infected by Flemish cattle in 1830. Holland (Gelderland) was again invaded through the introduction of infected Prussian cattle by Vanderbosch, a distiller, in 1833 (Verheyen), and from 1840 onward, when the pemands increased for the large factory stables, the plague advanced with strides unprecedented for a period of peace. Zundel says:

> In 1840 and the succeeding years, the malady made all at once an extraordinary extension, invading Switzerland, Southern Germany, Alsace, and Franche-Comté, and ravaging in the most destructive manner more than forty departments of France.

A remarkable point in this history is the confinement of the disease to Central and Western Europe, where the general wars were mostly carried on, and to which cattle from the open infected forests and steppes were naturally drawn; also, where later in more peaceful times we find the routes of cattle traffic from the infected districts to the great western centers of commerce. Sweden was constantly at war during the reign of Charles XII, but this never led to the appearance of lung plague,

simply because the germ had not been introduced; and in its absence no movement nor privation of cattle generated the disease in the Scandinavian peninsula. So, later, no cattle traffic set in from the infected portions of the continent, and in its absence no climatic vicissitudes served to generate the plague. Later still, when infected Ayrshire cattle were introduced from Scotland, the result showed clearly that the imported plague found in Sweden a not uncongenial home (see below). Similarly, in the war of the Spanish succession, in the end of the seventeenth century, though this plague was spread over the whole of Central Europe, yet Spain escaped, for the simple reason that no cattle were drawn from beyond the Pyrenees. Equally harmless in this respect have been the extensive military operations by the French and English in Spain from 1808 to 1813, and finally the frequent civil wars which have disturbed that country since the accession of Isabella II in 1833. It need only be added that Spain is not a mercantile country, requires to import no cattle from abroad, is effectually barred from inroads of infection by the Pyrenees, and is far removed from the busy cattle traffic now maintained between the infected regions and the marts of Western Europe, and especially of Great Britain; and Spain has accordingly been spared the devastations of the lung plague and other animal pestilences. Thus every additional page of history serves to confirm the truth that this plague is to-day propagated by contagion, and contagion alone.

INFECTION OF THE BRITISH ISLES.

Though the invasion of Great Britain was effected through the medium of commerce, yet it is here placed under a separate heading as the first of a series of extensions of this plague over watery barriers that had long placed a limit to its progress. The British Isles were infected through imported Dutch cattle. The infection, which reached Holland from Flanders in 1830, and from Prussia in 1833, had in 1835 extended to Utrecht and South Holland. At first it ravaged the vicinity of the great cattle marts of Rotterdam and Schiedam, from which it extended over the whole of the Netherlands, including Friesland on the north and the islands of Zealand on the south. In the interval between 1839 and 1841 the British consul at the Hague at different times sent Dutch cattle to a friend near Cork, Ireland, with the view of improving the native breed. With one of these importations the lung plague was introduced; and meeting with conditions favorable to its diffusion, it spread in a few years over the entire island; which, from that time to this, has continued to send regular installments of the infection to Great Britain.

In 1842, under the pressure of the chartist agitation, the British Parliament reduced the duties on foreign cattle to 20*s.* a head on oxen and bulls and 15*s.* on cows, and in that year 4,264 head of cattle were imported. But the price of beef still remained high, and in 1846 the duty on lean cattle was entirely abolished, with the result of increasing the importations for that year to 45,043 head, and inducing a steady increase till, in 1853, no less than 125,253 were imported. This enormous drain upon Western Europe proved injurious to both buyer and seller. By increasing the demand for stock and drawing upon more distant countries to supply this, it drew a great influx of disease on Western Europe, and produced that extraordinary diffusion of the lung plague which has already been noticed. The effect on England was, if possible, still worse. The Dutch and Belgian owner of infected stock, with ruin staring him in the face, was easily persuaded to sell his cattle at a low price for exportation; and many of these, with their fatal freight of contagion, were

thrown on the British market and sold to the unsuspecting British farmer.

In 1842, the year of the reduction of the import duty, the lung disease was first recognized in England in the vicinity of London, and it gradually spread from market to market and from county to county, until the greater portion of the island was ravaged by the pestilence. From this time onward Great Britain was placed between two fires—one reaching her through her Irish trade and the other through her continental one.

Mr. Robert Herbert, writing in 1860 in the Royal Agricultural Society's Journal, in speaking of the continental trade, gives illustrative examples, in which, out of large purchases of hundreds of animals by single feeders, one-fourth and upward perished of lung plague, and significantly adds "that very few graziers are to be met with who, from past experience, would run the risk of endeavoring to fatten foreign stock upon any description of land." The lung plague reached Edinburgh, Scotland, in November, 1843, on the occasion of the great autumn market, *All Hallow Fair*. It was not until 1844, 1845, and 1846 that the infection reached many of the agricultural counties distant from large markets, such as Norfolk, Lincolnshire, Derbyshire, Lancashire, Yorkshire, and Northumberland, and above all the breeding counties of Gloucester, Hereford, and Devon. Some counties in the highlands of Scotland, and some districts in the Cheviots, which breed their own stock, and never introduce strange cattle, have escaped the infection up to the present day. In other words, the great centers of cattle traffic—London, Manchester, Birmingham, Liverpool, Leeds, Sheffield, Newcastle, Edinburgh, Glasgow, Perth, Aberdeen, and Inverness—were early infected, because to these diseased animals gravitated. The outlying country districts were visited later; and as cattle from the great markets were introduced, while those districts which bred their own stock, and sold, but never bought, in most cases escaped, and still maintain their immunity after a period of forty years. This speaks with trumpet tongue for the introduction of the germ as an essential prerequisite to the disease.

WHY THE LUNG PLAGUE HAS NOT DIED OUT IN IRELAND.

In England the persistence of the plague for these forty years was a foregone conclusion, because at all the great centers of population were extensive cattle markets open to all alike—fat and lean, home and foreign—and as these were receiving daily accessions of infection from Ireland or the continent, or both, this infection was constantly being carried out from these marts by the store cattle purchased there, and served to form new plague centers in all parts of the country. So unerringly did this operate that the widest extension of the plague always followed on the great markets for store cattle. Thus, there was invariably the greatest extension of the disease in the autumn after the farmers had laid in their store cattle for winter feeding.

But in Ireland the case was different. There being there no great manufacturing centers, no great concentration of population, there was no demand for beef more than could be easily supplied by the home herds; there was accordingly no importation of foreign stock; the only exception to this rule being in the case of a few high-classed animals introduced for the improvement of the native herds. Ireland, like the United States, is essentially a beef-exporting country, and it was to have been presumed that this plague introduced into one corner of her

territory should have died out, as it had so often done in the farming districts of Europe, unless there was here some special cause for its maintenance and diffusion. To this cause it is well here to advert, as it serves to point out the reality of our own dangers in the United States, and the true course of safety.

The grand cause of the continuance of the lung plague in Ireland is to be found in the habit of constant trading and turning the cattle into large common pasturages at so much per head. To illustrate this we shall quote freely from the report for 1878 of Professor Hugh Ferguson, director of the Irish privy council, veterinary department. In describing the methods in vogue in managing cattle he says:

Animals exported from Ireland are very seldom bred by their exporters, and often before exportation pass through several hands, from, those of the breeders to those of their final purchasers, for exportation to Great Britain.

The changes of ownership are more frequent with regard to cattle than with regard to sheep and swine.

With each change of ownership there is generally a change of locality, and the movement entailed thereby, as well as the exposure in public fairs and markets, and on lands or premises used for temporary resting places for animals in transit, subject them more or less to the influence of diseases of a contagious or infectious nature, particularly foot-and-mouth distemper, when that malady is prevalent.

In Ireland weanling and more advanced calves are purchased throughout the country from their rearers, who are not always their breeders, by persons who either deal in or prepare store stock, and when a sufficient number is collected are kept by them frequently on different pastures hired for the grazing season, changing the locality as emergencies require, either from termination of tenancy, inclemency of season, deficiency of food, for the sake of convenience, or from other causes.

Such pastures, many of which are mountainous and occupy large tracts, are in many cases grazed by cattle which belong to many different persons who pay by the head for the summer's grazing of their animals. The owners of these cattle, who often reside in a different part of the country, or out of it, or are engaged elsewhere in another branch of the cattle trade, or are traveling about, frequently do not see them or have them visited, until the termination of the grazing season, when the animals are removed to localities more favorable to the time of the year, there, perhaps, to herd with other lots belonging to the same or different owners which have been brought from different parts of the country for the same reasons.

These animals, in due time, are brought in assorted lots to public fairs and markets, where they are generally sold for the purpose of being further matured; and when so matured they are again brought into the market and resold as early stores.

After another season, and having been sorted and culled, they are sold for the purpose of being further grazed, or, if sufficiently matured, for stall-feeding. It is at this period that they are generally purchased as stores for the English markets.

If not sold for that purpose they are purchased by the Irish finishing feeders, either for grazing or stall-feeding, and when in sufficient condition are sold as fat cattle, either for exportation to Great Britain or for home consumption.

When sold in Ireland for either purpose, it is generally publicly, and when other animals are collected for sale.

But there are some Irish graziers and stall-feeders who, instead of sending their fat cattle to a market in Ireland, export them directly to the English markets for sale, consigning them for that purpose to their agents.

Some extensive landholders in Ireland carry on a very large and lucrative trade by collecting from different fairs or markets or other places, selected young animals of size and promise, keeping them for a sufficient time, then sorting them into even "lots" and disposing of them at fairs, either for export, as advanced stores, for stall-feeding or other finishing, or to home buyers for the same purpose.

At a particular season of the year there is a large trade carried on in the exportation from Ireland to Great Britain of *springers* or animals in calf for dairy purposes. They are generally purchased at fairs in different parts of Ireland, and when a sufficient number is collected near the port of shipment they are embarked.

They travel slowly and generally by road, the persons who deal in them finding that the concussion and undue compression to which they are exposed while in railway transit are very injurious and sometimes cause abortion.

Many of the Dublin dairy proprietors are extensive cattle dealers, particularly for exportation. In the season they trade largely in *springers*. When the cows in their dairies cease to yield milk they fatten them and sell them for slaughter, or, if they happen to be in calf, for dairy purposes as soon as they can. When young, there is always a ready sale for them in the English and Scotch markets, and consequently there are great numbers of them exported.

If we except unfenced countries, like the steppes of Eastern Europe, where the herds of different owners mingle freely and succeed each other on the same pasturage, we cannot conceive of a condition of things better calculated to disseminate contagion than that represented to exist in Ireland. To comprehend its full bearing we must take into account the average small holdings of the Irish tenant, who in many districts owns no more than a single cow, and has therefore but one calf to sell. The dealer therefore who buys twenty calves has in so doing often to run the risk of twenty chances of infection from as many different places, to say nothing of the almost certain exposure to contagion on the premises where they may have been kept over night on the way to market, or in the public market itself. Having run the guantlet of these perils, his twenty calves are sent off to a distant pasture, and on the way are once more subjected to the risk of infection by resting over nights in premises habitually let for such purposes, and therefore presumably infected. When they reach the pasture they mingle with one or two hundred more cattle, most of them picked up as these have been and subjected to the same numberless chances of contagion. Such a pasturage thus represents the contagion existing in one or two hundred different places spread over a wide area, plus the contagion introduced by the countless numbers of other cattle sent to the great fairs where they were purchased, plus the contagion laid up in the premises habitually let for the temporary accommodation of cattle going to and from the fairs. When we consider that this change of ownership, this assorting into lots of equally promising animals, this sending to market, and this remingling with fresh cattle from different quarters both there and in the next pasturages, is repeated several times every year, it certainly seems as if no enemy could have devised a method better calculated to spread the contagion. But this is not all. This habit of incessant marketing is stimulated by the introduction of lung plague into a herd or pasturage. On being apprized of such an occurrence, the owner often picks out those of his stock which are still apparently healthy, and hurries them off to the first available market, that by their sale he may secure what salvage he can. The unwitting purchaser, congratulating himself perhaps on an unusually promising bargain, turns them out in another large pasturage with scores of others, where in a month or two later the disease will certainly develop, and the same process of the sale and scattering of infected cattle is repeated. The healthy animals by this system of constant marketing are exposed to a maximum risk of infection, and as the infection of a herd becomes a stimulus to its repeated sale, the public markets are necessarily the very hot-beds of the poison.

Apropos of the remark that Dublin dairymen were often cattle dealers as well, may be quoted from Gamgee's report to the privy council in 1862, that in the dairies of Dublin 51 per cent. of the cows were sold yearly because affected with the lung plague.

In every country into which the lung plague has been introduced its ravages have always borne a direct ratio to the movement of cattle; and in Ireland, though the necessity for such movement was at its least, yet a strange artificial activity, even in the absence of all new importations of the disease, has kept the unfortunate island in the rank of the most plague-stricken countries of the world. For centuries this fair land, thanks to its insular position, had remained a stranger to animal plagues; then one unlucky importation, backed by a most pernicious system of cattle traffic, has entailed upon her over forty years of pestilential desolation.

INFECTION OF SWEDEN.

Sweden, long protected by the Baltic and by her independence of external supplies from the animal plagues of Central Europe, was infected by lung plague in 1847 by means of English cattle imported for the improvement of the native stock. It spread over three provinces, and the following year was conveyed to Denmark, but in both countries most stringent measures were adopted for its suppression (including the slaughter of the infected, with indemnity), and these were speedily followed by success.

INFECTIONS OF DENMARK.

Besides the invasion through Sweden in 1848, this country has been repeatedly invaded by the lung plague, to which it was especially exposed because of its immense dairying interests. By virtue of its peculiar peninsular position, however, it was spared those wholesale invasions which came upon Holland, Belgium, and France through their being in the direct track of the cattle trade to England, and through their home demands for their large distillery stables. Denmark, accordingly, suffered only on rare occasions, when infected cattle were imported to replenish the dairy herds, and through a well devised and faithfully executed system of extinction they have always succeeded in stamping out each outbreak in its incipient stage. Professor Fenger, in 1862, wrote:

> As to the appearance of the disease in the Kingdom of Denmark, it is an established fact that it has taken place only three times upon three different farms where cattle had been introduced from abroad. No other cattle were affected than those in the three herds alluded to, and for three years no disease has appeared in Denmark. As to the spontaneous origin of pleuro-pneumonia, I wish to draw your attention to the fact that it is never seen in the town of Copenhagen, notwithstanding that in this place large dairies are kept where the cows are fed on draff from the distilleries, and are kept in a state very contrary to any which sanitary rules might suggest. In the dukedom of Schleswig the disease has been imported several times (last from England) and occasionally has spread rather widely. This autumn the cattle of 30 different places in Schleswig have been kept in a kind of quarantine.

A more recent infection is that of the island of Funen, the nearest point to Germany, in 1880. The lung plague infected a herd of sixty cattle at Dalumgaard, near Odense, but was stamped out by the slaughter of the whole herd, the stopping of all cattle markets, and of all exportation of cattle from the island for eleven weeks.

INFECTION OF NORWAY.

Norway imported lung plague in a cargo of Ayrshire cattle, introduced into the herd of the Agricultural College at Aas. The disease broke out three months after their arrival, and was stamped out by the slaughter of all the native cattle with which the Ayrshires had come in contact, and by a prolonged quarantine of the Ayrshires themselves.

INFECTION OF SCHLESWIG-HOLSTEIN.

Schleswig-Holstein, formerly under Danish rule, but more exposed to infection by its proximity to Germany and Holland, has been more frequently infected than Denmark, but has never failed in promptly extinguishing the contagion. One infection was through Ayrshire cattle brought from Scotland in 1859, and was suppressed by the slaughter of the infected animals and the prolonged quarantine of the district, as

stated above by Fenger. Several later invasions from Germany and Holland, and notably a very extended one on the occasion of the Prusso-Danish war, were promptly stamped out by the same summary measures. Though the duchy is to-day a part of the German Empire, yet, by its energetic measures against lung plague, it maintains an immunity to which Germany proper is a stranger.

INFECTION OF SOUTH AFRICA.

South Africa was infected with lung plague in 1854, by means of a bull imported from Holland by a gentleman of Cape Town, for the purpose of improving his stock. This animal had been two months at sea and six weeks at the cape before he was noticed to be amiss. The desire to avail of the coveted Dutch blood sufficed to insure a wide diffusion of the infection before the bull sickened and died. The colonists, too, ignorant at first of the terrible peril which threatened them, took no pains to destroy or segregate the animals which had run the risk of infection, and before they became alive to their danger the plague had spread beyond all human control. This result was speedy on account of the peculiar nature of the country and its inland trade. Being unfenced, South Africa presents on a still larger scale a method like that which has been followed in Texas and our Western States and Territories, of herds branded with their owners' marks running free from year to year and subject to no control, except at the yearly *round-ups*. We have seen that in all countries where such mingling is permitted—in the Steppes, hills, and forests of Europe and in the large boarding-pastures of Ireland—the lung plague has spread rapidly and defied all sanitary control; but in South Africa there is this further unfavorable condition, that all commerce is carried on by ox-wagons, and the work oxen become an additional and most effetive means of spreading the contagion.

On this subject the Rev. Daniel Lindley, a missionary, who appeared before the Massachusetts legislative committee in 1860, makes the following statement, which is as interesting as it is instructive:

> This disease * * * was introduced from Holland, imported in the body of a bull. A gentleman in Cape Town, wishing to improve his stock, made that importation and with it that disease which has been to South Africa the severest scourge which has ever fallen on its property interest. It was about six weeks after the animal landed —he having been on board the vessel on the passage about two months—before any sign of sickness appeared in him. At the time it was not suspected that the disease was a lung contagion, so long known in Holland. However, he died. He communicated that disease to a great number of cattle, and before they became aware of the evil that threatened them, it had been scattered about extensively. The question may arise in the minds of the committee, Why was it not at once exterminated there as you propose to have it here? The answer to this question will be found in this statement that I must make, in order that you may understand the circumstances of that country. If you will imagine New England and a great part of the United States, divested of its woods, its forests, leaving here and there thickets and jungles, and a grass country, that is without fences, without any inclosures, and all this country spread over with cattle by the thousand—for the property of the inhabitants of the country consists in cattle and in sheep—and over all the country cattle are grazing by the thousand. I have seen 1,600 in one herd, but generally the herds are from one to five hundred. In those parts of the country where lions and tigers have been exterminated, these cattle are allowed to roam night and day where they please, and they wander considerable distances, sometimes miles around. In addition to that all the produce of the country which is brought to maket, whether to supply the city of Cape Town or Fort Elizabeth, or other towns lying along the coast, is brought down from the interior in large wagons drawn by oxen. All the goods imported into the country and taken inland are conveyed on these wagons, drawn by oxen; and to each wagon the custom of the country gives six pairs of oxen.
>
> The country is large, it being from Cape Town to the extremity of any civilization

in the interior 1,200 miles, and across the plains to where I live, 1,200 miles more. Well, this country is passed through up and down, crosswise, and backward and forward, by hundreds of wagons and thousands of cattle every day. They have no railroads, no rivers, no other way of transporting goods from one point to another but this ox wagon. Well, they are great sheep raisers in this country—having four to ten thousand sheep in a flock—and I have seen as many as fourteen thousand in one flock. Their clips of wool are all sent down in these wagons to the coast.

In a country of this kind, where there are so many cattle, and where everything is done by means of cattle, and they are traveling night and day, there is no possibility of killing out this disease by extirpation. The seed had been so widely disseminated before the people knew what the matter was that such a system was looked upon as hopeless, and the government adopted no measure to stay it, and every man was left to look out for his own interests. I will say that after it had got fairly spread abroad to a considerable extent, the inhabitants very generally resorted to inoculation. And I will say in passing that we are indebted to that for about all the cattle we have left. We should have been flat on the ground and no man could have got to the coast with his products or returned with his merchandise. Inoculation has saved us what we have after six years. The disease was still at work when I came away, about a year ago, but was much more under subjection. *It has killed hundreds and thousands of cattle, and I can assure you, gentlemen, that where it has come into a flock it has not left more than five out of a hundred.* I was happily surprised when I heard Dr. Loring state that in the past year, in this State, not more than 20 per cent. had died.

With us, when an animal is known to have the disease, we look upon it as already dead. I can affirm, without hesitation, that where it has got into a herd of cattle not more than five out of a hundred have been spared. Occasionally one has passed through and has not had the disease at all; and a few, on the other hand—two or three in a hundred—have recovered, and no more. I know of one man who had five hundred head of cattle, and that disease got in and he had not five left. If I speak with emphasis, it is because I have had sad experience; and I have been afraid that the good citizens of Massachusetts might not be aware of the evil which I most firmly believe threatens their property interest more than anything that ever threatened it yet.

* * * * * * *

I will tell you how the disease came to my particular neighborhood: A native went out as a peddler over the Cathumba Mountains into the interior, nearly 300 miles. There he took cattle in payment for goods. He brought down a herd of oxen to the eastern coast; while on the way down some of his oxen became sick and he quietly put them out of the way, for he could travel two or three days perhaps and not see a single person, and the dead cattle were not likely to attract attention. He had that failing which we can pardon in others, as we see it in ourselves, that he cared a little more for himself than he did for his neighbors. He put the sick oxen out of the way, and brought down the rest and sold them. They were bought by a gentleman who had about 120 oxen. The peddler's cattle, looking apparently well, were put into that herd. Well, presently the disease broke out. It was in that instance that this doctor had the influence to prevent the slaughter of the herd, because he said the disease was not contagious. Well, these cattle were running about in the neighborhood—out on the plain, 20 miles square, without fence and without tree, save here and there a bush—where were grazing thousands of cattle, and they ran just where they pleased. From this flock the contagion was communicated to all the cattle in the region. Oxen were traveling through the country every day, at least a hundred passing a day, and in that way it was carried widely through the country. Until it was brought from a contaminated region in the interior by these oxen, the disease had never been within 300 miles of us. I might give a thousand facts just equal to this, but I am mentioning what occurred in my neighborhood.

The disease had not crossed to the northward to the Umgani River until this happened. A man wished to convey a boat from Natal to a place about 60 miles to the northward. He put the boat on a wagon and took his six yoke of oxen to draw it. He traveled one day and camped just outside of a village through which he had passed. In the morning he found one of his oxen sick. He had camped on a piece of ground where oxen grazed every day, and in a place where people thought themselves safe. Finding his ox sick, he quietly took him and his mate out of the wagon, and leaving them there, started on. These oxen remained through the day and mixed with the many cattle owned in that village. The second day after they had been there it was discovered that there was a sick ox in the field. The inhabitants were all out at once; they killed the ox, and from the description they saw that he had the disease they had dreaded. They immediately inoculated their cattle and saved a goodly number of them. Now, in regard to that, I wish to make this statement: I made a statement which was honestly reported, I suppose, but mistakenly as a statement, that they had saved 90 per cent.: in some cases not more than 30 per cent. Between this and 90 is probably the average per cent. saved. In that case I mentioned that there was a

clear, distinct instance where the sickness had been brought from the interior, three hundred miles, and in the last case it was carried twenty miles.

Another instance: *Two natives were trading, and brought the disease from the country where they went, two hundred miles, and set it down in a perfectly healthy region, in a herd of about eighty cattle, and there it spread, and they were every one carried off.*

Another fact, one with which I had to do myself: A native, a stupid heathen native was working for an Englishman in an infected region; he took his pay in cattle, two calves, I think, a year or a year and a half old. He carried them into a healthy district, where the disease had been kept out, and within twenty miles of which it was not known Presently these calves fell sick and died, and the cattle with which they were placed began to be sick. I had in my service a young man belonging to that village, that was twelve miles from where I lived; a messenger came to this young man to say, *your cattle are sick.* When I heard that I inquired if any cattle had been brought from the infected region to his kraal. He said such a one, naming the native before mentioned, had been working with a man and had taken two head of cattle for his pay; he came back a little over two months ago with these cattle, and they took sick and died, and now our other cattle are sick. I saw at once what the matter was, for I knew that the region where these two cattle were taken from was wholly contaminated. I said, *your cattle will all die; you ought to tell your neighbors to keep their cattle away from you.* I asked him if his cattle had mixed with other cattle, and he said, *there are three kraals that have mixed with ours. So it was too late, and the result was they all died.* I suppose that in these four herds there were from one hundred to one hundred and thirty head of cattle, and *they every one died.* Well, I told the young man whom I sent to go and warn his neighbors; he did so, and they took their cattle in an opposite direction to grass, and, for two years before I came away, not a single head of the cattle around there had taken the disease. *Just those that were exposed to the contagion, and no others, died.* The neighbors' cattle continued in a state of perfect health for two years after those four herds, one hundred or one hundred and thirty head, had died right out there in the heart of a healthy region, a region as large as a county. I cannot doubt that the disease was communicated by contagion, and if the animals can be cut off the disease will be kept off. It was kept off in the region in which I lived in this way. The chief with whom I lived occupies a considerable extent of territory, and he is fortunately fortified on one side by a range of mountains, and on the other by a precipice some hundred feet in height. He had assembled his tribe for another purpose, and wanting my advice in reference to some political difficulties, he sent a messenger to tell me of his trouble. I went to him, and after that matter was settled I took occasion to tell him that the sickness was within some forty miles of us. I told him what the disease had done and would do, and I said to him, *there is just one thing to do, and that is, to keep your cattle where they are and not allow any to go out or come in.* Well, the people there love their cattle, as they say, better than they love their lives. They took the alarm, and every effort that was made on the part of any one to bring cattle into the country was immediately and stoutly resisted. The intruder was met with spear and shield and threatened with death and destruction to himself and his cattle if he came a step farther, and so was made to go back. Only half a mile off, within sight of these cattle, dead animals were lying unburied that had been exposed to this contagion. The disease was brought there by the oxen of an individual who had been into the interior, and when he came home his oxen died. They communicated the disease to all the cattle in that neighborhood, and I never saw more complete destruction. *There was not a single head left in all those kraals.* Those cattle came up to within half a mile of our boundary, and you could look down and see herds of them lying dead. That was three years ago, and yet when I came away the disease had not got one inch over that line.

These are facts that I have seen and know, and in that country, if you should ask us, *is the disease communicated by contagion?* we would say *yes, and we would just as soon doubt that the sun made daylight.* There are thousands upon thousands of facts to prove it. We have no more questions to ask on that subject. You will see how widely the disease might spread in a country like that, where cattle are so abundant, where the travel is continued day and night, and where thousands of oxen are on the road every twenty-four hours. It has been to that country a great scourage. Thousands and hundreds of thousands of cattle have died, and many of the people have been made poor by the ravages of the disease, and the only hope they have of securing a comfortable subsistence, and recovering a comfortable position in respect to property, is through sheep. *They have given up all idea of grazing cattle, and are now turning their attention to sheep; for the disease is so widely spread that they have no hope that it will ever be exterminated.*

The especial value of this narrative lies in its testimony to the identity of this disease in the northern and southern hemispheres; to its terrible fatality in a warm climate, a matter full of dread significance to us; to its rapid diffusion where circumstances favor contact of the sick and

healthy; to its propagation by contagion only and to its exclusion from all herds from which strange cattle are debarred. This last point is one which should be especially dwelt upon. In that torrid country where the lung plague has so far shown the greatest power of speedy diffusion, and where the mortality has risen higher than in any other land, where, in other words, the climatic conditions appear to be the most favorable to its existence, it had failed to appear spontaneously among the native cattle during the ages preceding its colonization by the Dutch, and for two centuries after this settlement; and even after the contagion had been introduced and had spread generally over the land, it needed only the resolute will of a native chieftain, in the exclusion of strange stock, to shut out the contagion and preserve any given district sound.

A striking instance of the same kind is narrated by the missionary, Mr. R. Moffatt, father-in-law of the lamented Livingston, in a letter to Sir George Gray, governor of the Cape of Good Hope, dated Kuruman, October 2, 1859. He states:

That he was not allowed by Moselekatse, the chief of the Matabele country, South Africa, to approach nearer than his most southerly cattle outpost, about six days' journey from headquarters, for fear of introducing the lung sickness among his cattle. Men were therefore sent to bring Moffatt's wagons to where the chief lived, which was a laborious task, while to every available part about the wagons the spears and shields of the warriors, now performing the labor of oxen, were fastened. Every man in Matabele is a warrior, and is never seen removing, even to the shortest distance, without his weapons. Moselekatse possesses enormous herds of cattle, these and ivory constituting his wealth. (See also letter of Mr. Corbet under the head of Mortality.)

Thus the uncivilized African teaches this great and enlightened nation a lesson in sanitation which she can only neglect at an unspeakable sacrifice.

The growing importance of the wool-growing interest in South Africa may be inferred from the facts that in 1875 Cape Colony had 11,500,000 sheep and 3,300,000 goats, as against 1,300,000 cattle, and that of the $25,000,000 of exports nearly $15,000,000 was in wool. Cattle are evidently no longer the "chief wealth of the people."

INFECTION OF AUSTRALIA.

This took place in October, 1858, through an English cow imported by Mr. Boadle, of Melbourne. The malady ravaged his herd for nearly a year before it drew the earnest attention of the colonists. From the Melbourne Argus of September 17, 1859, we learn that a meeting of stockowners had just received the report of a committee, and decided to slaughter the infected herd, and reimburse the owner by public subscription. Mr. Boadle said:

The first case occurred in an *imported* cow, landed in good condition and giving milk. She was attacked and died in November last, *six weeks after arrival.* Two others died in the latter end of December and beginning of January, and from that to the present time, with only one slight intermission of a month, the ravages of the disease have been incessant.

The committee report:

That of five animals imported by Mr. Boadle two have died, a third is at present recovering from the attack, a fourth has seemingly recovered, and the fifth has hitherto escaped the distemper. The total number of deaths have been twenty-three; five beasts have recovered, but are evidently unsound, and on the occasion of our inspection ten were ill, of which four were slaughtered, at our request, for dissection.

As showing the animus of the meeting it applauded the proposal to destroy every herd in which the infection should appear; to interdict

"all shifting of cattle without a clean bill of health for some months, and to subject to professional examination all imported cattle, which should not be landed unless a certificate of health were given, and also one presented to the officer, certifying that they had not been diseased for six months before embarkation."

Mr. Boadle's entire herd of cattle (51 head) on his home farm was slaughtered and paid for, and the farm itself quarantined. No legislation was effected, the public apprehension subsided, and the disease was allowed to gain new headway. The effect of this neglect was so disastrous that we must go into the matter somewhat more in detail.

The Melbourne Argus of December 24, 1860, has the following:

As to whence we received it, and how it has been spread here, there can be no doubt. An imported short-horn cow brought it from England, although she was to all appearance sound when put on board ship and during the whole of the passage. On inquiry, however, after the mischief was done, it turned out that *this cow had had a slight attack some two years previously, of which she was declared, at the time, to be perfectly cured;* but the cure was but temporary and apparent, and the disease broke out here in a more virulent form, quickly spreading to the other cattle on the same farm. Had an act been then passed by the legislature to authorize the inspection of all suspected cattle, the care of a few weeks or months, and the expenditure of a small sum of money, would have eradicated the disease for the time, and a strict examination of all such as were imported, and the requirement of proof that they had never been affected, would have kept the country free from it; but our legislators were not alive to the danger; and when the act is passed, which will be we presume, immediately after the meeting of Parliament, the task of eradication will be a difficult and most expensive one.

Among the cattle lately destroyed in a diseased state have been several working bullocks, belonging to carriers engaged in carting supplies up the country, and bringing down wool and other produce as return loading, and in no other way could the contagion have been more quickly disseminated, mixing, as such teams do, at every stopping place with other bullocks similarly employed, and frequently with the cattle belonging to the different localities through which they pass. Scarcely is one small herd destroyed now before fresh cases are reported, each one showing but too plainly the wide spread of the disease, and giving more reason to fear the announcement at any moment of its having broken out in one or more of the large herds, when good-bye to the hope of eradicating pleuro-pneumonia.

It is further alleged that McKinnon's working oxen above alluded to had been surreptitiously turned into Mr. Boadle's sequestered pastures under the shadow of night, and had thus contracted the contagion. Thus the petty cupidity of the teamsters brought a terrible and endless disaster on that vast island, the infected oxen repeating in Australia the earlier and no less disastrous experience of South Africa.

An act of the Victorian legislature passed March 19, 1861, provided for an inspection of all cattle in suspected districts, the slaughter of the sick, and the interdiction of movement; and as the disease had now appeared at the Ovens, on the borders of New South Wales, the legislature of that colony passed a similar act April 11, 1861. An attempt was made by the latter colony to keep the disease south of Murray River, but the golden opportunity had been neglected; the disease carried by working and stray cattle had been introduced into many of the large herds roaming the open country, and throughout 1861 the commissioners found the malady wherever they went in both colonies. The first cases observed in New South Wales were in a large herd at Yarra Yarra, which had been moved by its owners, Messrs. M'Laurin, from Mitta Mitta, Victoria, in August, 1861. Yet in January, 1862, the New South Wales commissioners report that they had examined 100,000, and in every herd, with one or two exceptions, they had found the disease. In Victoria matters were worse if possible, and by midsummer, 1862, it is reported that in that colony "whole hecatombs of infected and suspected cattle have been burned and destroyed." It is estimated that up to 1873, 1,404,097, or 40 per cent. of the cattle of the island, perished,

amounting, at $30 per head, to a total value of $43,500,000. And still it prevails with unabated fury, standing with the infected unfenced ranges of South Africa, Europe and Asia as a solemn warning of our own impending fate should we, too, delay till the infection shall reach our western plains and Territories.

LUNG PLAGUE IN TASMANIA AND NEW ZEALAND.

As might be expected from the position of Tasmania, on the coast of Victoria, it was early infected by cattle brought from the latter, and by 1864 the disease was universally prevalent in the island.

New Zealand was not infected till 1864, when contaminated cattle were introduced. Here and in Tasmania there was but a repetition of the experience of Australia. Thorough sanitary measures were delayed until the disease had gained the open ranges, when it spread from herd to herd and bade defiance to all human control.

INFECTION OF MASSACHUSETTS.

The importation of lung plague into Massachusetts, though not the first introduction of that disease into America, may be mentioned first, because its history is complete from its inception to its final extinction in 1865. Mr. Winthrop W. Chenery, of Belmont, near Boston, who had repeatedly imported Dutch cattle with the best results, had four more sent him in the spring of 1859. They were procured in Purmerend and the Boemster, and were shipped in April from Rotterdam, an infected town, where they had been kept a few days in stables prior to shipment. These cows were forty-seven days at sea, and arrived at Boston on the 23d May. All were at once taken to Belmont, though two were so ill that they had to be conveyed in wagons, one of the two having been unable to stand for the last twenty days at sea. This cow was killed as hopeless on the 31st of May, and the second died on the 2d June. A third cow of this importation sickened June 20, and died in ten days. The fourth showed no sign of illness at any time. The next victim was a cow imported in 1852, which sickened August 20, and died before the end of the month. Others now followed in rapid succession, and in the first week of September Mr. Chenery, for the first time suspicious of the true nature of the disease, isolated his herd and refused to sell on any account. From that time to January 8, 1860, twenty-six more died.

Unfortunately, on June 23, he had sold three calves to Curtis Stoddard, of North Brookfield, Worcester County, one of which was noticed to be ailing on the way home. Several days later Leonard Stoddard took this calf to his farm to cure it, and kept it in his barn with forty-eight other cattle for four days, when he returned it to his son's place, where it died August 20. Curtis Stoddard lost no more till November 1, when he sold eleven young cattle to as many different persons, and wherever these went the disease appeared. In one instance more than 200 cattle were infected from one of those Stoddard heifers. Of the nine cattle which Stoddard retained seven were killed and found to be badly diseased.

An ox of L. Stoddard's sickened two weeks after he had returned the sick calf to his son, and fourteen more cases followed in the course of a few weeks. He kept eight oxen for teaming, and one team staying over night at Mr. Needham's infected his oxen, of which eight died, and the remainder were slaughtered by the State authorities.

Mr. Woodis, of New Braintree, purchased a cow of L. Stoddard, which infected and led to the destruction of his herd of twenty-three cows.

Mr. Olmstead bought a yoke of oxen of Mr. Stoddard and kept them five days, with the result of infecting his herd so that one-third died, and a second third were condemned by the commissioners.

Mr. Olmstead sold the Stoddard yoke of oxen to a Mr. Doane, who put them to assist, with twenty-three other yokes, in removing a building in North Brookfield. They were engaged in this for a day and a half, and all had to be destroyed by order of the commissioners.

Mr. C. P. Huntingdon purchased a cow from L. Stoddard and lost seven.

Silas H. Bigelow lost his entire stock of ten animals infected from Doane's in the big team. So with M. W. Deland, Jonathan Pellet, George Harwood, and others.

These may serve to illustrate how the disease spread. For a length of time every case could be traced directly to the Stoddard and Chenery herds.

In the course of the next four years the disease was discovered in herds in the following towns: Milton, Dorchester, Quincy, Lincoln, Ashby, Boxborough, Lexington, Waltham, Hingham, East Marshfield, Sherborn, Dover, Holliston, Ashland, Natick, Northborough, Chelmsford, Dedham, and Nahant, and on Deer Island.

Further, a herd of one hundred and thirty heifers from Lexington and Concord were sent to different pastures in the mountains of New Hampshire, in the towns of Hillsborough, Washington, Sempster, Stoddard, Hancock, Peterborough, and Windsor, and several of these heifers, killed about the 1st of June, were found badly diseased.*

By the spring of 1860 the State of Massachusetts was aroused to the danger, and in April an act was passed to provide for the extirpation of the disease called pleuro-pneumonia among cattle, under which three commissioners were appointed with power to slaughter and pay for all cattle in herds where the disease was known or suspected to exist. With various intervals these and succeeding commissioners were kept in office for six years, and in their final report Mr. Preston and Dr. Thayer congratulate the State on the "eradication of one of the worst forms of contagious disease which has been found among cattle."

The records show that, besides the animals which died of the disease and those disposed of by the selectmen of the different infected towns in 1863, when the commission was temporarily suspended, there were 1,164 cattle condemned by the commissioners. The cost to the State was $77,511.07, including $10,000 laid out by the towns during the suspension of the commission.†

The record is one of which Massachusetts may well be proud as the first instance in America in which a State has had the fortitude to maintain a consistent system of suppression until the last disease germ has been extinguished. The fact that Massachusetts was specially favored does not detract from her merit, which lay in seizing her opportunity and making the most of it. Had she been destitute of railways, so that her inland commerce had been carried, like that of Australia and South Africa, by bullock teams; had the disease found her herds pasturing in one great open country, entirely devoid of fences; or, finally, had the

* This sending of cattle to New Hampshire was finally stopped by a proclamation of the New Hampshire commissioners that if any more animals infected with pleuro-pneumonia were sent to the Granite State they would be slaughtered without indemnity.

† The total loss to the farmers of the State is estimated by Dr. Thayer at $250,000.

plague reached her at the starting point of a great distributing cattle traffic instead of at its terminus, as it did, the nine months' delay would have rendered her efforts fruitless, and the plague would have been perpetuated on her soil. The contrast between the splendid success of Massachusetts on her inclosed farms and the failure of Australia on her open pastures, though the latter was no less energetic and far more prodigal of her money, is a lesson of the gravest import to the United States. To-day we have it in our power to stamp out this pestilence, but if we criminally delay until it shall have reached our open pasture lands we shall but repeat the experience of Australia, and must resign ourselves to the permanent incubus of the pestilence circulating from the sources of our cattle traffic, through its various channels, into every State in the Union.

INFECTION OF NEW YORK, NEW JERSEY, AND ADJACENT STATES.

The statement has been generally accepted that a Mr. Thomas Richardson, of New Jersey, introduced lung plague from England in a shipment of shorthorns; and discovering the true nature of the disease, nobly *stamped it out* by the slaughter of his whole herd, valued at $10,000. A sequel to the story is that some of the neighbors had their stock infected by using the hay taken from a barn where the diseased cattle had been. Strangely enough, the place where the meritorious act took place seems to have been withheld from the public, so that no more accurate information can be obtained.

The importation which first fixed the lung plague in the port of New York was that of a single cow bought by Peter Dunn, milkman, Brooklyn, from the captain of the English ship Washington, in 1848, and placed in his own herd in a stable near South Ferry. This cow, at first famed for the abundance of her milk, soon sickened and died, and conveyed the infection to the other occupants of the building. From there it spread to other stables in the vicinity, and soon the whole of Brooklyn was involved. Among other places infected in this way were large distillery stables in Skillman street, and there the disease was seen and identified by the Massachusetts commissioners in 1863, having continued uninterruptedly from the primary infection.

The same conditions favored the survival and propagation of the disease then that obtain still in the same locality. Brooklyn suburbs were much more open and extended than they are to-day; and on the open, unbuilt lands the cattle from infected herds, turned out to pasture, mingled freely with those from healthy herds and infected them. Then the cattle from infected herds could be bought at reduced rates, of which the dealers naturally availed, so that the panic among the owners of infected stock operated with the cupidity of the dealers in securing a speedy extension of the disease; dealers, too, soon discovered that the farther they sent the infected animals from the vicinity of diseased herds they could be sold with the less suspicion, and a premium was thus placed upon its diffusion. Then, it is not to be forgotten that around all the adjacent cities, New York, Jersey City, Newark, &c., there were the same common pasture grounds, which in summer became mere infection-traps; that dealers' stables entertaining sick and healthy, in turn became hot-beds of infection; that the habit of the cow dealer, of sending out cows on trial and taking back the sick or ill-doing animal, or sending it on to a new place on further trial, all contributed largely to the dissemination of the plague. In short, these large cities around the port of New York presented, and still present, on

a smaller scale, those inimical conditions which served to perpetuate the plague in South Africa and Australia. Fortunately for America, this is but on a small scale, and as we recede from the city limits we come on all sides upon inclosed farms, which form a natural barrier to animal infection, and serve to make it controllable by sanitary means.

At a very early date the infection had seized on the city dairy-herds of New York, Brooklyn, Jersey City, Newark, Elizabeth, New Brunswick, Trenton, and even Germantown, Philadelphia, and Baltimore, in each of which it found the same favoring conditions, and therefore in each it made a permanent home. Several extensions into Connecticut have been recognized and stamped out by the ever-watchful cattle commissioners.

WHY THE LUNG PLAGUE HAS EXTENDED SOUTH ONLY.

The fact that lung plague has confined its ravages to the seaboard between Long Island and Virginia, while it has made no serious extension to the North nor West, demands some explanation. This explanation is easy and satisfactory, and attention to it is of no small consequence in connection with the proposed extinction of the contagion.

From New York southward to Virginia is a stretch of flat fertile land hemmed in by the Alleghany Mountains on the one side and the ocean on the other. This plain is not only well cultivated and well stocked with domestic animals, but it is the seat of very varied and extensive manufacturing interests. The demands of these latter have led to the formation of a number of growing cities and villages, around which is much land held by speculators and laid out for building, but still unused, and which remains uninclosed, being practically a common pasture land for the cows of the city or village. On these commons, or unfenced pastures, meet daily in summer the cows of the poor, the herds of the small milkman, and the cattle of dealers and drovers; and thus during the entire summer any infection that may be present has free scope to extend from cow to cow and from herd to herd. As all these places from New York to Baltimore were within easy reach of New York by rail, dealers naturally supplied them by cattle from the New York and Jersey City markets whenever the prices promised a profit on the transaction. There was the further temptation to the New York dealer to send infected herds to such places, since there would be less risk of exposure of the nefarious nature of the transaction; and, the sale once affected, there would be less danger of after complaints or actions for damages. In this way the plague was steadily spread for 250 miles south of New York, concentrating itself around such cities as Newark, Elizabeth, New Brunswick, Trenton, Easton, Reading, Burlington, Camden, Germantown, Philadelphia, Wilmington, Dover, Baltimore, Annapolis, Georgetown, Washington, and Alexandria. Almost every step in advance was a permanent gain, for each city presented on a small scale, in its common-pasturages and its frequent changes of cattle, rendered necessary to keep up a uniform supply of milk and fill up the ranks of the dying cattle, the counterpart of the unfenced cattle-ranges of the Old World and of the southern hemisphere, where the plague has gained a permanent establishment. Thus each newly-infected city became in its turn a fresh and permanent center of infection, from which the disease spread outward over new fields on every favorable opportunity. In such places it was next to impossible for the plague to die out of its own accord, for there was a constant and increasing influx of fresh and susceptible subjects to supply the growing losses, and this new ma-

terial was but added fuel to the flame. On a confined and well-fenced farm, where the stock belonged to a single owner, the expediency of avoiding new purchases until the disease had literally burnt itself out was usually appreciated, and thus a limit was set to its ravages; but on the open commons of the cities and villages everything conspired to keep up the infection. With many the loss of a few cows was but viewed as *a run of ill luck*, and the more intelligent soon came to realize that those animals which recovered had a special value, being safe from all future attack. The high prices of milk made cow-keeping remunerative in spite of the losses, and thus the numerous deaths but served to increase the purchases of fresh and susceptible animals, and these in their turn falling victims to the disease served to maintain the affection in an unending series of cases. To those unacquainted with the cash returns from city cows it may seem absurd to offset the losses by the prices obtained for milk. Yet, a good cow yielding 15 quarts of milk daily, at 10 cents a quart, draws $1.50 per day. In summer, when the cows get most of their food on the common-pasturage, nearly all of this is clear profit, so that that cow will have paid her full price of $63 in six weeks. Two months of good milking may yield $90 worth of milk, or a half more than the original value of the cow. One New York dairyman (Joseph Hyde, Seventieth street) lost 20 cows in four months of 1879, more than the full number of stock he kept at any one time, and though entirely dependent on stall-feeding, he confessed that he had made money in this year. With such a result upon purchased feed, it is small marvel that the milkman who had a free pasturage could afford to face the mortality and steadily fill up the ranks with fresh subjects.

As illustrating the baleful influence of these common-pasturages, it may be noted that around such towns and villages the lung plague has always been more extensively prevalent at the end of autumn, after the commingling of herds for a season, than in spring, after a winter of comparative seclusion in the stables. This serves to place in the strongest light the one known cause of the disease—contagion—and to emphasize the necessity for the most stringent rules for controlling the movement of cattle in infected districts.

But the dangers of the cow trade in our large eastern cities do not end here. In each of the larger cities are one or two dozen persons engaged more or less extensively in the cow trade, and if possible each of them keeps a private stable for the accommodation of cows held for sale. But these stables receive not only the fresh and healthy cows direct from the country, but also the sick and unsuitable ones which have been sent out to dairymen on trial and returned to the dealer as coming short of the yield of milk guaranteed. It follows that cows that sicken in the dairies in great part find their way back to the dealers' stable, so that that becomes early infected and afterward remains as a permanent center of infection. The other fresh cattle coming into this stable are almost without exception susceptible to the plague, so that the chances are in favor of the majority leaving this stable in an infected condition. Thus the trade works incessantly in a vicious circle; the fresh cow, if it escapes infection, on first reaching the city probably enters an infected stable, and when the plague begins to tell on its health it is returned to the dealers' stable to infect the cattle standing there; also the stable, if that has not been done previously, and a new town-herd into which it is sent later on trial, only to be returned again and again until it perishes or makes a tardy recovery.

Another practice of these city dealers is to send out cows on trial to different milkmen, and if they prove unsatisfactory to move them on to

a second and a third stable so long as they can find some one willing to take them. It follows that those in the early stage of the disease or in process of recovery, being short in their yield of milk, are rapidly passed on from herd to herd, passing a few days in each and leaving the seeds of disease at every stopping place.

Finally, the city cow-dealer is often the real owner of a milkman's cows. He furnishes a dairy with cows, taking a chattel mortgage on them for an amount often approaching to double their real value, and thus obliges the milkman to pay interest on far more than his real stock in trade. If disease appears among the cows, the dead animals are replaced by others at the same ruinous rates, and the unfortunate milkman dare not buy from another source lest the first dealer should foreclose his mortgage and ruin him by the simultaneous loss of his stock and his milk route. It is manifestly to the interest of an unscrupulous dealer to carry this oppression just as far as the subject can be made to bear, and there are some men in the business just rapacious enough to avail of their opportunity to the utmost. The lung plague increases the deaths, the deaths increase the demand for fresh cows, and the introduction of fresh cows means the investment of their spare cash at double the legal rate of interest.

Such is the state of things in our large eastern cities, which has served to spread and perpetuate the lung plague. And unless these are temporarily put a stop to, it will be a most difficult and expensive matter to stamp out this disease when already well established in such a city.

Restrictions on the westward progress of the plague.—The state of things along the Erie Railway is the exact opposite of that on the south of New York. From the New Jersey State line westward there is no large city for the distance of about 200 miles, and consequently no combination of a large and poor population and a free pasturage on open unfenced grounds on which the herds of different owners could mingle. The valuable arable land is all fenced in, so that if by accident the germ of the plague were introduced it would be quite likely to remain confined to the one herd until all the susceptible animals had passed through it, when, in the absence of new purchases or births, it would expire for lack of fresh subjects. Again, if the owner decided to sell such an infected herd, he would naturally send it to the stock-yards in New York or Jersey City, where, passing into an already infected region, they would fail to give the disease a new extension. If by any chance a poor man who could pasture his one cow on a wild and unfenced mountain side had obtained an infected animal from the east, it was so far removed from others that the extension of the infection was next to an impossibility, and the contagion was soon extinguished in death or recovery. Thus the rugged mountain chain of the Alleghanies in preventing the formation of large cities likewise forbade the gradual extension of this pestilence to Western New York and Ohio, as would otherwise have been all but inevitable.

More potent still in its protective influence has been the relatively small value of cattle on the west of the Alleghanies to the prices they brought on the seaboard, in the vicinity of large cities. No one, therefore, along the line of the Erie Railway went to New York to buy common cattle, all demands being so much more cheaply supplied from the West. It was high-bred cattle only that were conveyed from New York and the seaboard to replenish the inland herds, but these were placed on the farms of wealthy owners, which were carefully fenced, and where every precaution was taken to prevent intermingling with adjacent stock. Such stock could not be so summarily disposed of as common

cattle, and the sale of high-priced Short-horns or Jerseys in an infected condition would have entailed careful inquiries and possibly ruinous lawsuits. It will be seen, therefore, that even in the event of infection having been carried westward in high-bred stock, there would have been a much stronger probability of its dying out in the secluded herd which was first infected than there was in the cattle around our Eastern cities. Had the infection at any time been conveyed into the herds of poor milkmen who pastured their cows on the commons around Chicago, Indianapolis, or other western cities, it would have been as certainly perpetuated as it has been in the East.

Obstacles to the progress of lung plague northward.—Along the line of the New York Central Railroad the obstacles placed in the way of the plague were of a somewhat different kind. North of Yonkers, where the open commons virtually end, the land is well fenced, so that even if infection were introduced it had every opportunity to die out in the first herd infected, and but few chances for its preservation. Here, too, in case of a herd becoming infected and its being found desirable to clear it out, the most available means would be through the New York stock-yards. Thus every tendency of the disease was to gravitate toward the points where the plague already prevailed, and the danger of its slow and gradual extension along this line was reduced to the minimum.

Protection along the line of the Harlem Railroad has been secured by the comparative absence of large cities and of open and common pasture grounds. Up to Mount Vernon open commons are found, and as far as this the lung plague has been a frequent visitor, if not indeed a permanent resident, but north of this the land is well inclosed, and along the whole road there is only one village of more than 1,000 inhabitants. White Plains alone has 4,000. In cases, therefore, of the introduction of the lung plague into Westchester and Putnam Counties, it was usually easily traceable to cattle from New York City or farther south, and the farms being fenced it could be isolated and extirpated without difficulty.

Along the New York and New Haven Railroad the land is still well fenced, but the villages and cities are numerous, and as might be expected the lung plague has frequently extended in this direction, but has been as often stamped out by the watchful care of Connecticut. A second reason for the infection of Connecticut is to be found in the fact that having the New York market between herself and the sources of the cattle traffic, she naturally drew upon that market for store as well as fat cattle. But for the vigilance of the Connecticut cattle commissioners, the boasted immunity of Massachusetts could not have been maintained for these sixteen years, and the whole of New England owes a deep debt of gratitude to that body for their faithful guardiancy of their cattle industry.

CONTINUITY OF THE IMPORTED DISEASE AND THAT OF TO-DAY IN NEW YORK.

A few words may be requisite to establish the fact that the lung plague of to-day in New York is the direct descendant of the case imported in 1848.

1st. Many are still living who can remember when the dairy herds of New York City and Brooklyn were free from all contagious lung disease, and who can testify that since the unfortunate arrival of Peter Dunn's English cow the malady has constantly prevailed.

2d. The readers of periodical literature will recall the fact that there have been in New York during this time frequent outcries against "swill milk," and these, together with the more formal reports of Dr. Percy and Mr. Bergh, while mistaken in ascribing the disease in the cows to swill-feeding, yet furnish valuable testimony as to the continued existence of the malady. The cuts in Frank Leslie's paper representing the *swill-fed cow* as *stump-tailed* supplies further indubitable evidence, as the shortness of the tail was caused here, as elsewhere, by the practice of inoculation with the lung plague matter. This process often gives rise to so much inflammation in the tail that that member either separates spontaneously or has to be cut off to prevent such extension of the disease as would destroy life. Yet, to add proof to proof the following two cases are named, out of many, to show the unbroken continuity of cases from the year of the importation of the plague-germ to the present.

3d. In 1849 William Meakim, Bushwick, L. I., kept a large dairy, and employed a man, with a yoke of oxen, in drawing grains from the New York and Brooklyn distilleries. A milkman on the way, who had lung plague in his herd, persuaded this man to use his oxen in drawing a dead cow out of his stable. Soon after, the oxen sickened and died, and the disease extending to his dairy herd Mr. Meakim lost 40 head in the short space of three months. From this time onward Mr. Meakim lost from six to ten head yearly for twenty years, when he left the dairy business. This brings the record down to 1869, covering the period of 1863, when Dr. E. F. Thayer, with the other members of the Massachusetts commission, saw and identified the disease in the Skillman-street stables. From 1869 Professor Law can testify to its continuous existence, having been consulted at intervals concerning valuable herds into which the disease had reached from the generally infected stock of the region.

4th. Dr. Bathgate, of Fordham avenue and One hundred and seventy-first street, New York, says that twenty-three years ago (1858) his father kept a herd of Jersey cattle, which became infected by contact with adjacent infected herds, and that the malady continued to prevail in his herd for years in spite of all his efforts to check it. From that date to this he affirms it has never been absent from the district.

IMMUNITY OF AMERICA APART FROM DISEASED IMPORTS.

In the above connection it is not to be forgotten that for two centuries and a half after the settlement of America the cattle of the settlers remained free from any such contagious disease; and it was only when the infected English cow was landed in Brooklyn in 1848 that the pestilence began which has since extended some three hundred miles due south. More than this, for the immemorial ages during which the buffalo has roamed the American plains, no such disease has appeared among the herds. For, be it noted, the buffalo belongs to the bovine family, and here, as in Europe, is susceptible to this infection; and had this pestilence once been introduced among them, it would have been preserved forever by the constant mixing of herds and the birth of new and susceptible animals, as it has been on the unfenced plains of Asia, Europe, Africa, and Australia.

INCLEMENT WEATHER HAS NOT GENERATED LUNG PLAGUE.

It has often been charged that the plague has been generated by inclement weather, but the experience of both America and Europe meets

this with a positive disproof. In Europe, the bleak and stormy mountains of Scandinavia in the latitude of Greenland, and the Scottish Highlands in the latitude of Labrador, have maintained a permanent immunity, while the plague was remorselessly ravaging the sunny fields of England, France, and Italy. In America the plague has prevailed for thirty-three years on the genial sea-coast of the Middle States, while it has spared the whole interior of the continent, where the temperature descends so much lower. Nor is it the raw sea-winds that generate it, since from Connecticut north to Labrador no such disease has ever appeared apart from its one importation into Massachusetts.

HIGH TEMPERATURE HAS NOT GENERATED LUNG PLAGUE.

It is worthy of note that the European countries ravaged by this plague have been especially those of Central Europe, where the greatest traffic in cattle and the most extensive wars have ever taken place, while Spain, Portugal, and the Channel Islands, which have no such traffic with the rest of Europe, have throughout escaped infection. The same immunity has been preserved in the whole of Africa—(excepting its southern extremity, since the importation of the Dutch bull); in other words, through the whole tropical part of the continent—in all of our Southern States, in Mexico, in the West Indian Islands, and in the whole of Central and South America. However much the disease may be aggravated by a hot climate, as witnessed in South Africa and Australia, and in our own semi-tropical summers, there is not a shadow of support for the idea that it is generated by a high temperature.

LUNG PLAGUE NOT GENERATED BY A TEMPERATE CLIMATE.

In this connection, we need only instance the cases of Spain and Portugal, of the Channel Islands, of Canada, of our own Western States, of the Pacific States, and of the great stock-raising plains of the La Plata, also of the British Isles before 1840, of South Africa before 1854, of South Australia and Tasmania before 1859, and of New Zealand before 1864. We may also adduce such States, as Massachusetts and Connecticut, Norway, Sweden, Denmark, Schleswig-Holstein, Oldenburg, Wurtemberg, and Switzerland, as have stamped out the imported disease, and preserved sound herds until in some cases reinfected by the occurrence of a new importation.

LUNG PLAGUE NOT GENERATED DE NOVO BY THE PRIVATIONS OF TRAVEL.

We have already seen that until the great advances of agriculture and commerce in the present century the lung plague was mainly propagated by the wars of Central Europe. But that the mere privations of cattle in the army herds did not generate the poison *de novo* is shown by the harmlessness of the frequent wars of Sweden in the eighteenth century and early part of the nineteenth; by the continued immunity of Spain throughout her desperate wars of the seventeenth, eighteenth, and nineteenth centuries; by the absence of the plague during and after the wars of independence of the South American republics; by the same absence of any such disease during and after the war of independence of the United States; during the war in Texas in 1836; during the wars in Mexico in 1845 to 1848 and 1861 to 1867; and, finally, during our civil war, 1861 to 1865. In reference to these North American wars it should

be added that a disease was certainly propagated in the army herds operating in the States near the Gulf of Mexico, but it was the Texas fever only, in which the lungs are unaffected, and from this there is left no infection which has hitherto survived the frosts of a Northern winter.

No one will deny that in the late civil war there was as great an array of fighting men as in the most extensive wars of Europe; that the armies required as great a supply of beef as the armies of Europe; that they operated over as wide a country, and that in the general absence of the macadamized roads of Europe the herds of supply were subjected to as great privations as those of the European armies; and yet we have before us the undeniable fact that the States which formed the main theater of the war came out unaffected by the lung plague which has so often proved a disastrous sequel to the wars of Europe.

Then, as regards the ordinary cattle trade, it must be borne in mind that except during the exigencies of war no cattle are allowed to pass from Russia into Prussia or Austria without detention and quarantine. Counting, then, from Kamienietz, the eastern point of Austria, to Rotterdam, or from Memel, the eastern point of Prussia, to the Hague, we have in neither case over 1,000 miles, while from the plains of Nebraska or Kansas to Boston is 1,500 miles, and from Texas or Montana 2,000 miles. Surely, if the fatigues and privations of travel can develop this disease *de novo*, it is in the United States that it ought to appear, and not in Europe. But we find, on the contrary, that though our Texas and Montana cattle often die in great numbers during the journey, they never develope a virus which propagates a contagious disease of the lungs in the herds among which they come. Thus Chicago, which received consignments of 1,382,477 head of cattle in 1880, where the local herds come up to the stockyards and occasionally mix with cattle in transit, and where consignments to the stockyards are fed in city distillery stables and pastured on the open prairie in company with the city dairy herds, presented not a single case of lung plague in the city dairies nor in the distillery stables, though both were subjected to repeated examination. The city of Buffalo, receiving yearly over 700,000 head of cattle, presents no case of lung plague in the dairy or distillery herds, which are constantly recruited from the public stockyards and come in contact with the cattle passing from these yards to slaughter. The same is true of all the great centers of cattle traffic in the West, as also of the country grazing districts supplied with Western cattle west of the Alleghanies, and finally of the whole of New England, including the city of Boston, which receives yearly consignments of about 200,000 head of cattle from the West. The fact that a single importation of four Dutch cows into Massachusetts implanted a plague which it cost six years and over $77,000 to eradicate, while this State yearly receives about 200,000 head of Western cattle without the evidence of a single case of lung plague, speaks volumes for the soundness of the stock and the harmlessness of the journey.

LUNG PLAGUE NOT GENERATED DE NOVO BY IMPURE AIR.

Many believe that this plague is but the result of impure air in the small, confined, and filthy cow-houses too often found in the large cities. This appears to gain some color of support from the constant prevalence of the affection around certain large cities in both the Old World and the New. But these great cities are also the great centers of cattle traffic, and are besides subjected to all those inimical causes in connection

with the cow-trade to which we have above adverted. That it is not caused by the impure air in the stables is sufficiently proved by the fact of its less extended prevalence in spring, after a winter of seclusion in these filthy hovels, than in autumn, after a summer's pasturage in the open air. The same truth is seen in the entire absence of the lung plague from our Western city stables, though these are in no respect better than those on the Eastern seaboard. In the distillery stables in the West 270 or 300 cubic feet per head is a fair average. In one case, indeed, Woolner's distillery, at Peoria, two stories of the same building were devoted to cattle, those in the lower story standing 45 in a row, with an area of about 220 cubic feet for each and ventilation only by the doors at the ends of the rows. The air was constantly saturated with the emanations from the swill as well as from the lungs, skin, and excretions of the animals, which were kept in this condition from four to six months, yet not a symptom of lung plague was to be found among them.

In some city dairies matters were even worse. The cows of one dairy in Milwaukee were found in a hovel the ceiling of which was only 5½ feet high, and which allowed less than 150 cubic feet per each animal, while drainage had been entirely neglected, and the building was surrounded by a most filthy and malodorous puddle. Yet, these cows showed no sign of lung plague nor of any specific disease of the lungs.

These are by no means isolated cases. Analogous ones can be found all over the West. Yet, the West knows nothing of the lung plague, and in this respect reproduces the condition of Great Britain prior to 1841. The cow-sheds of that period were far more confined, close, filthy, and unsanitary than those of to-day, yet in not one of them was the lung plague generated until the importation of the germ from Ireland and the Continent. So we need not fear the development of this plague from these impure buildings until we allow the introduction of the virus from the East, when these distillery stables and filthy city dairies will become so many plague centers from which the infection will continually spread.

LUNG PLAGUE NOT GENERATED BY FEEDING THE REFUSE OF GLUCOSE AND STARCH FACTORIES.

We have shown above that among the hundreds of thousands of cattle fed in the West on the swill of distilleries, no case of lung plague has ever been generated. We have only to add, with regard to the acid products of glucose and starch factories, that, however injurious they may be to the digestive organs when fed in excess, they have never generated the virus of lung plague. At Buffalo, N. Y., large factories of this kind are in existence, and the products are distributed widely for cattle-feeding, but, as our investigations show, lung plauge is not to be found in the vicinity of that city. There may be developed diseases of the digestive organs and of assimilation, as shown in Dr. Farrington's report, but no contagious affection of the lungs. Its absence is the more conclusive that the city cows pasture on commons adjoining the stock-yards, so that the disease once set up would have been perpetuated and disseminated. That it has not been so, is abundantly shown by the continued absence of the disease in Western and Central New York and the whole of New England. The same is true of other factories of the same kind in the Western States. Had the disease been generated there, it would have been spread through the channels of the cattle traffic, and have been perpetuated at all the great cities on the different routes.

THE UNVARYING ABSENCE OF LUNG PLAGUE, APART FROM CONTAGION, A PERFECT GUARANTEE THAT IT CAN BE PERMANENTLY ERADICATED.

The above extended review of the history of lung plague has been furnished mainly to overcome the scruples of legislators who come to the subject unacquainted with its nature. The first lesson to be learned from it is that in no historic time and in no part of the world has this disease ever been found to appear *de novo* apart from the introduction of the virus furnished by a pre-existing case. On the contrary, in every invasion of a new country we can unerringly trace the cause in the importation of infected cattle or infected products; and in every case in which a nation has bestirred itself and stamped out the infection no new cases have appeared until there has been another importation of infected stock or their products. We have deemed it needful to unearth and disprove all the subterfuges which have been adopted to assail the above position, and have, as we believe, established our proposition on an impregnable basis. This established, it follows of necessity that it is yet possible for us to *stamp out* this plague from the United States, and to exclude it for all future time. And in such a matter, in which any delay may mean, and long delay certainly will mean, the extension of the disease to our open cattle-ranges, and the *impossibility of stamping it out*, the possibility of to-day becomes a most imperative and urgent obligation. With the near prospect of a general extension of the plague, and the yearly sacrifice of tens and scores of millions of dollars to its insatiable craving, to say nothing of the continued incubus on our foreign market, to delay the work of extinction which is now in our power savors of criminality. If this lung plague had ever invaded a new country without the previous importation of strange (infected) animals or their products as a direct and demonstrable cause, we might well find excuse for hesitation. If history failed to show us a number of instances in which the invasion of the plague had been met and driven back by proper sanitary measures, and in which such countries had thereafter remained permanently sound, or sound until the plague was reimported, there might have been ground for temporary inaction. Had the plague spread through the air from east to west against the current of our cattle traffic, it might have been feared that the mere local extinction of the infection would prove ineffective, and it might have been pardonable to doubt somewhat the results of stringent measures of suppression. But with the extension of the poison in the past thirty-three years only in the direction of cattle traffic from the centers primarily infected, and its non-extension along those lines where the absence of large cities and the fenced state of the country were inimical to its maintenance, we have the amplest guarantee that judicious suppressive measures would be thoroughly and permanently successful. If the plague had already gained a footing in our western plains and unfenced ranges generally, so that it had reached the source of our cattle traffic; if it had begun to spread from herd to herd over our whole grazing territory; or if it had cast its withering spell on the wild herds of buffaloes, sanitarians and statesmen might well have paused ere they grappled with the danger. Had there been the slightest ground for assuming that this pest of cattle could be generated anew by any special climate, hot, cold, wet, dry, steady, or changeable; or by the fatigues and sufferings of travel, or by the close air of unwholesome buildings, there would have been some apology for at least a temporary arrest of action.

But no country invaded by this pestilence has ever been offered a fairer chance to exterminate it; no country in which the affection has been so long neglected has been so mercifully dealt with as the United States; and therefore to no country will more blame justly attach if the plague is yet allowed to overstep all limits, and to give rise to a general and irremediable infection.

YEARLY INCREASING DANEGRS FROM LUNG PLAGUE.

Every country which harbors a single case of lung plague is in imminent peril of its general diffusion and uncontrollable sway. It is the most consummate folly to speak as many do of only a few cattle being infected among our forty millions. It is because we have forty millions of *sound* cattle that we are called upon to protect them from the plague affecting the thousand, the hundred, or the single animal. Equally absurd is the comparison between the hundred and thirty thousand cattle exported to Great Britain, and the *paltry* ten or twenty that it is claimed were suffering from the lung plague on their arrival. The British Government do not forget that it was a single importation from Holland which infected Ireland in 1839, and that in spite of the absence of all subsequent importations that island has since remained one of the most badly infected countries of Europe. It was but a single beast that carried to Cape Town the infection which for twenty-seven years has devastated the whole of South Africa. It was a single cow which carried to Australia that virus which has ravaged her herds for twenty-two years. It was the single cow which, entering the Brooklyn stable of Peter Dunn, introduced the infection which has never since left our eastern seaboard. It was the four Dutch cows imported into Boston which spread this infection over a great part of Massachusetts, and cost the commonwealth five years of arduous effort to effect its extermination. We may see in these examples, and above all by the terrible devastations of the plague on the *open pastures* of South Africa, and Australia, what would overtake us if but *one infected beast* were carried out to *our unfenced* ranges in Texas, or other western States and Territories. Except under the influence of some great war, or of some newly-opened and gigantic trade, like the English importations after the passage of the Free Trade act, this disease rarely invades a new territory by the arrival of hordes of infected animals. On the contrary, it has come silently in the single unsuspected beast to those countries in which it has wrought the greatest ruin. Keeping this in mind, we can the better estimate the increase of our peril to-day in comparison with that of the past.

INCREASED IMPORTATION OF CATTLE ENHANCES OUR DANGER.

The transatlantic trade in cattle in either direction is of comparatively recent development. When the stock was brought in sailing ships, which were weeks in place of days on the passage, the extra provision, time, and care necessary, and the prolonged danger of the voyage, all contributed to deter the importer. But of late years the employment of steamships, and the greatly increased interest in such breeds as the Ayrshire, the Jersey, the Hereford, the Holstein, and the Polled Angus, have led to a great increase in our cattle imports, and have correspondingly increased the danger of infection.

Many of our great importers have their stock-farms in the western States, so that these importations are especially liable to carry infection westward toward the Plains.

The following table illustrates this truth, in showing the great increase of breeding (thoroughbred) animals imported, though the particular number of cattle is not named:

Statement showing the number and value of dutiable cattle and of free animals for breeding purposes, imported and entered for consumption in the United States during the fiscal years ended June 30, from 1872 to 1881, inclusive:

Year ended June 30.	Free of duty.		Dutiable.	
	Animals for breeding purposes.		Cattle.	
	Number.	*Value.*	*Number.*	*Value.*
1872	.....	$424,715 40	24,483	$604,850 36
1873	5,684	415,133 92	34,998	826,764 51
1874	4,790	459,970 74	45,715	884,961 29
1875	.....	623,767 50	45,310	748,151 71
1876	5,685	622,839 00	30,068	458,264 82
1877	5,370	416,476 75	31,893	314,094 37
1878	8,006	395,768 00	41,933	475,526 42
1879	8,189	469,282 00	47,862	467,538 79
1880	11,103	745,106 00	43,534	462,559 97
1881	21,268	1,245,607 00	41,824	384,066 59

JOSEPH NIMMO, JR.,
Chief of Bureau.

TREASURY DEPARTMENT,
Bureau of Statistics, January 3, 1882.

THE NATURAL INCREASE OF THOROUGHBRED CATTLE INCREASES OUR DANGER.

The natural increase in our home herds of thoroughbred cattle is an element of even greater danger than is the increase of imports. The imported stock are now subjected to a three months' quarantine, and if this is accompanied by a most rigid and frequent examination of each animal the danger of the introduction of chronic cases is reduced to a minimum. But from our home thoroughbred herds, many of which are in the near vicinity of infected areas, stock can be sent west without any hinderance, and with every such shipment there is the danger of the conveyance of disease. This disease may come from the herd itself, from fodder, or litter furnished for the journey, from infected cars, or from infected yards or buildings, in which the cattle are temporarily placed.

That thoroughbred herds within the infected areas are frequently attacked is a notorious fact. Mr. Chenery's herd at Belmont, Mass., is a case in point; Mr. Richardson's, of New Jersey, is a second; Dr. Bathgate's, of New York City, is a third, all referred to above; we might add a herd of Ayrshires on Staten Island, six years ago; two herds of Jerseys, in New Jersey in 1876 and 1877; Mr. Watrous's herd at Perth Amboy, N. J., in 1879, and Mr. J. A. Hayt's herd at Paterson, N. Y., in 1881. One of these New Jersey herds left home sound, and returned infected from a public exhibition; a second (Mr. Watrous's) was apparently infected by an animal purchased at a public sale, while Mr. Hayt's received the infection through fresh purchases made in New Jersey and in the vicinity of Baltimore, Md. It is quite true that herd-book animals are less likely to be exposed to diseases than common

stock. But the very care which thus seems to protect them, serves to secure them against suspicion, and affords them a better opportunity for conveying infection than is the case with common cattle. It will be readily recalled that nearly all the great extensions of lung plague in modern times have been through thoroughbred stock. We need only name that of Ireland, Norway, Sweden, Denmark, Holstein, Oldenburg, Würtemburg, Africa, Australia, and Massachusetts.

It is these thoroughbred cattle which are sought after by the cattle kings and shipped west and south to improve their vast herds in Texas, Kansas, &c., where there are no fences to limit the freedom of infected stock. That the cattle shipped in this way are not always selected with the care necessary to avoid contagion may be seen from the instances above adduced. Indeed, it is no uncommon thing for the western or southern stock raiser to send to an agent in the east to purchase and send on thoroughbred bulls for the improvement of his herd. He thereby places himself entirely in the hands of a third party who, living in the midst of infected cattle, is not likely to entertain such dread of infection, and who in any case is very unlikely to realize the terrible consequences of the shipment of disease to our open cattle ranges.

As showing the working of this carelessness, may be noted an instance to which Short-horn and Jersey calves, in waiting for vessels to convey them from New York to Texas and South Carolina, respectively, were temporarily placed in a stable along with an English bull then in quarantine. On the discovery having been made their going was delayed until they too had undergone quarantine. Quite recently, too, a prominent Illinois breeder purchased and shipped west a large herd of Herefords from the immediate vicinity of Baltimore, now one of the most infected districts in the United States, and the one to which most recent cases of new extensions of the disease have been traced.

As giving some idea of the great increase of thoroughbreds in recent years, it may be stated that Short-horns, of which there were less than 50,000 in the country ten years ago, can scarcely be set down as less than 500,000 to-day. Add to this enormous increase the fact that Short-horns have recently fallen to prices at which every good farmer can secure a first-class bull to cross on his native cattle, and we have some conception of the enormous increase of sales of this class of stock. So far as this active movement of stock enters the eastern infected areas, it multiplies enormously the dangers of the propagation of lung plague to other parts of the nation.

Some of the other breeds are moved in greater numbers from infected regions to-day than are Short-horns, and the dangers are correspondingly great.

IMPROVEMENT OF WESTERN HERDS A CAUSE OF DANGER.

Ten years ago it was an easy matter to tell a bullock from Texas or even from the plains. At that time the old Spanish blood was still pure or nearly so, and it was a standing joke to pack a bullock in his own horns. But to-day our western cattle have no longer the Spanish form, and many Texans even can scarcely be distinguished from Short-horns. The breeders have found out the advantages of early maturity and of prices at least double those which their old stock would have brought, and in spite of Texas fever they are crowding the markets of the north for bull calves of the beef-making breeds. Every such shipment from the east of the Alleghanies risks the introduction of lung plague into Texas, and its permanent establishment in the State. So of every ship-

ment to the West; for there, too, the spirit of progress and the desire to secure the best blood are everywhere seen, the more so that no gulf-coast fever threatens to kill off the imports.

THE TRADE IN EASTERN CALVES A SOURCE OF DANGER.

Though individual owners of western ranches have practiced the shipment of calves from the east for a number of years, it is only three years since this trade has assumed any considerable magnitude as carried on through consignees, who resell the stock in the western stock-yards. The growth of this trade has been so rapid that Mr. Frank D. Bartlett, of McCurdy, Beveridge & Bartlett, the principal dealers in this class of stock in Chicago, assured us that $1,500,000 worth of calves had passed through the Chicago stock-yards in the fifteen months preceding August 30, 1881. The effect on the eastern market has been such that calves which formerly would bring $6 to $10 have this year brought $12 to $15.

Formerly, in the dairying regions of New York and Pennsylvania, most calves were killed (*Deaconed*) at birth, but the new demand for young animals has taught the dairy farmer that he can bring up calves largely by hand, on skim- or buttermilk or whey, with a reasonable addition of linseed meal or malt, and thus secure a double profit from the milk and cheese on the one hand, and the young stock on the other.

There are fortunately several reasons why the supply should be drawn from the dairying regions of central and western New York and Pennsylvania rather than from the infected area east of the Alleghanies. 1st. The price of milk in the vicinity of the the large cities is so high that none can usually be spared after the two or three days which follow parturition. 2d. The milk being sold *sweet*, there is no available product—buttermilk nor whey—to feed to the calves. 3d. Calves can be easily disposed of at any time to be worked up into sausages or other questionable products. 4th. Throughout Long Island and New Jersey there is a large demand for calves of all ages, the very young to be put upon milch cows for speedy fattening, and the older to be raised as store cattle. 5th. The railway journey from the infected districts to Chicago and other western marts is a long one and trying to the young stock; especially to such as have been already shipped one or two hundred miles eastward to the New York market. For very young calves, fed exclusively on milk, the long journey is virtually prohibitory.

There is, however, another side to the question: 1st. Eastern milkmen may soon learn to raise calves on malt and linseed meal, and virtually without milk. 2d. The eastern demand for calves is not continuous, the area to be supplied being a limited one, and more easily filled up than the boundless West. When, therefore, the New York or Philadelphia market is glutted, and the calves are being held at a large daily outlay, there comes a strong temptation to ship them to where a certain market awaits them. 3d. The poorest lots, which take the market worst, and will not pay for keep, and which are usually the most suspicious, are the most likely to be thus shipped. 4th. The distance from New York city to Chicago is no greater than from Jefferson and Saint Lawrence Counties, New York, from which many of the calves are now sent. 5th. The through rates of freight from the large cities in the east, to those in the west, are more favorable to the shipper than they are from the country districts where the calves are now mostly picked up. 6th. Finally, that the dealers themselves look to the eastern cities for stock, we have the evidence of a letter from a Chicago com-

mission merchant to a party in Philadelphia urging shipments from that point.

On the whole, we look upon this shipment westward, of eastern store calves, as one of the greatest of our dangers, and accordingly, in August last, we memorialized the Governor of Illinois to prohibit the introduction of such calves into his State, and thereby cut them off from the two greatest distributing points—Chicago and East Saint Louis. After due consideration, Governor Cullom issued the following proclamation:

STATE OF ILLINOIS,
Executive Department, Springfield, Ill., November 1, 1881.

In pursuance of the act of the General Assembly of the State of Illinois, entitled "An act to suppress and prevent the spread of pleuro-pneumonia among cattle," approved May 31, I, Shelby M. Cullom, Governor of the State of Illinois, do hereby proclaim that I have good reason to believe that pleuro-pneumonia among cattle has become epidemic in certain localities in the States of Connecticut, New York, Pennsylvania, New Jersey, Delaware, and Maryland, viz: in the county of Fairfield, in the State of Connecticut; in the counties of Putnam, Westchester, Kings, and Queens, in the State of New York; in the counties of Lehigh, Bucks, Berks, Montgomery, Philadelphia, Delaware, Chester, Lancaster, York, Adams, and Cumberland, in the State of Pennsylvania; in the counties of Bergen, Hudson, Morris, Essex, Union, Somerset, Hunterdon, Middlesex, Mercer, Monmouth, Ocean, Burlington, Camden, Gloucester, and Atlantic, in the State of New Jersey; in the county of Newcastle, in the State of Delaware; and in the counties of Cecil, Harford, Baltimore, Howard, and Carroll, in the State of Maryland; and I hereby, as required by said act, prohibit the importation of any domestic animals of the bovine species into this State from the the aforesaid counties in the States of Connecticut, New York, Pennsylvania, New Jersey, Delaware, and Maryland after the 10th day of November instant, unless accompanied by a certificate of health properly signed by a duly authorized veterinary inspector. Any corporation or individual who shall transport, receive, or convey such prohibited stock shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined not less that $1,000 nor more than $10,000 for each and every offense, and shall be liable for any and all damage or loss that may be sustained by any party or parties by reason of the importation or transportation of such prohibited stock. (Sec. 4 of act approved May 31, 1881.) In testimony whereof I hereto set my hand and cause the great seal of State to be affixed. Done at the City of Springfield, the day and year above written.

S. M. CULLOM.

By the Governor:
HENRY D. DEMENT,
Secretary of State.

This is not all that could be desired, for beside having been misled in some way as to the counties at present infected, it applies the prohibition to the infected counties only, and leaves the way open for the evasion of the order by driving infected cattle over the county line and shipping them from the next adjacent county. To make such an order effective it should draw the line as we recommended, not further east than the western side of the Alleghany Mountains. Yet the movement is a hopeful one, and gives promise of such future action on the part of the Western States generally, as shall afford a real measure of protection against this and other animal plagues. Meanwhile it should incite Congress to enact such a measure as shall render impossible the infection of the West by these eastern store cattle.

INCREASED RAILROAD FACILITIES A GROWING SOURCE OF DANGER.

Year by year our railroad system is extended, and with every such extension comes a greater facility for the transportation of cattle and cattle disease. The new connections that render it possible for New York and Europe to avail of the fat cattle of Colorado or Dakota, make it equally possible for Colorado and Dakota to introduce the thoroughbred bulls of Europe and of the Eastern States. These facilities for

transport and the consequent improvement of the western herds are, in a great measure, revolutionizing the cattle traffic. A dozen years ago the cattle of the southern and western grazing grounds were poor and backward, and were sent to the rich prairies of Illinois and adjacent States for fatting. At the convention on Texas fever, at Springfield, Ill., in 1868, it was alleged that it would not be profitable for the Illinois or Ohio farmer to introduce eastern calves for fattening. They could do much better with the two or three year olds from Texas and Colorado. But to-day the Texas and Colorado cattle begin to tread on the heels of those of Illinois. Many of them come into the market in fair condition for beef, and as the lean produce of these States decreases, the demand of Mississippi Valley States for eastern calves must increase. Thus the railroad facilities, the improvement of the western and southern herds, and the increased demand for eastern calves must advance together as they have in the past; and with the steady extension of the first two, there must be a corresponding increase in the last. It is not to be supposed that we have as yet seen anything like the full development of this trade in eastern calves. The increasing demand and the rising prices must secure a fuller supply, as the dairymen and farmers of the East find in this a new and certain source of income; and under such a stimulus the deterrent conditions which we have enumerated above will gradually diminish and disappear, and our long boasted barrier of the Alleghanies cannot long remain an effective one.

We are not wrong, therefore, in the assertion that the future is far more pregnant of danger in respect to the propagation of lung plague than has been any period in the past. We have, as it were, reached a crisis in regard to this plague, and unless we sternly and judiciously face the emergency, we may expect an extensive invasion of the West.

VITALITY OF LUNG-PLAGUE VIRUS.

There can be little doubt that this contagium, like most others, is robbed of its virulence by free exposure to air. Even infected buildings will usually be purified by being left with open doors and windows for three or four months. In a case at Ridgewood, Queens County, New York, in 1879, the stable of T. Ryan was badly infected throughout spring and summer, as many as 20 cattle having died, while over the fence in a stable, not 40 feet distant, the herd of George Van Size kept healthy throughout. In another instance, on Seventieth street, New York, in the same summer, Joseph Hyde lost 20 cows in four months from two stables, situated one building lot apart from each other, while a German, who kept cows in a building on an intervening lot, kept free from the affection. On the contrary, instances of close stables remaining infected, though empty, for three or four months are not uncommon.

In September, 1879, John C. Cheever placed five Jersey cattle in a barn near Yonkers, N. Y., which had been vacated five weeks before by the infected herd of the previous owner, Odell. Before the end of the year the whole herd was infected, and the last of them were slaughtered March, 1880.

Patrick Green, in April, 1879, took a farm at West Farms, Westchester County, New York, ignorant of lung plague having been upon the place, under the previous tenant, some months before. The plague broke out in May among his cattle, selected from healthy western districts, and 14 perished before its progress could be arrested.

Messrs. Niedlinger, Schmidt & Co., brewers, East Twenty-seventh

street, New York, had a cow die August, 1878, of lung plague; another was put in the stable three months later, did badly, and finally developed lung plague in August, 1879.

Another case is that of the deer park, at Biel, East Lothian, Scotland, in 1856–'62. Pasturage for a number of cattle in this was yearly let, and during the years mentioned lung plague appeared among these year after year. Yet the park was vacated by cattle, the deer and sheep only being left for the five winter months, November to May.

Other things being equal, the infection will be most lasting where it has been most thoroughly dried and most closely covered up. Thus, in dry, close buildings, with doors and windows habitually closed; in those having rotten wood or deep cracks in the masonry, in which the virulent matter may be stored away and closely covered; in those with confined and unventilated spaces under a wooden floor, and in those containing rubbish, hay litter, feed, lumber, &c., the virus will be preserved much longer than in buildings that are empty, clean, open, and well-aired.

This is only the statement of a general truth applicable to most, if not all, contagions. A certain amount of air is essential to the growth of a disease-poison, but an excess of air proves destructive to it when in a moist condition. In preserving vaccine lymph, we receive it into capillary tubes, and seal them hermetically, or if it is taken on ivory points, these are dried and closely wrapped in lead-foil. So in the preservation of lung-plague lymph Bruylants and Verriest found that after seclusion for over a month in hermetically-sealed tubes it still retained its vitality. The germs of typhoid fever are preserved indefinitely in the close sewer or cesspool, but are quickly rendered inert on exposure to the air. The cholera germ is long preserved in impure soils, &c., but loses its virulence in five days if freely exposed to the air (Sanderson). The germ of yellow fever is only preserved in the close hold or well of a ship, or in the filth-laden interstices of a hot soil under a tropical sun, and loses its power for mischief as soon as the air is rendered pure and wholesome. The bacterium of anthrax may be cultivated in free air until it becomes absolutely harmless (Greenfield, Buchner). The same is true of chicken-cholera (Pasteur) and of swine-plague (Law). We may even go a step farther, and say that the growth of these poisons in suitable media, and in a limited amount of air out of the animal body, fits them for living with greater ease within the animal fluids, and thereby renders them more deadly. This has been shown by Buchner in the case of anthrax, by Professor Law in the case of swine-plague, and by Gravitz in the case of various of the common molds.

As this question of the vitality of lung-plague virus involves the consideration of its conveyance through different media, it may be well to advert further to some of these.

INFECTION CARRIED IN CLOTHES.

1st. In the winter of 1847–'48, infected oxen were brought on the farm of Pitcox, East Lothian, Scotland, and the infection reached the neighboring farm of Pleasants, a mile and a half distant, in the following manner: The herdsman on Pitcox being the son of the farm steward on the Pleasants, visited his parents on the latter place every Sunday, and invariably went out to see and handle his father's cow. In a few weeks this cow, which stood in a building alone, sickened, and from her the infection spread to the other cattle on the premises. The steward's cow could not have herself brought the infection to the Pleasants, as she

had already been there for several years, her owner having served under the previous farmer prior to 1846. She could not have contracted the malady from other stock on the place, for they all, with hardly an exception, contracted the disease later, which they could not have done had they already suffered, for in this disease, as in small-pox and measles, one attack fortifies the system against a second. There was no risk of her infection by passing cattle, as the stock were at the time (winter) confined to the buildings, and no public road came within a considerable distance of the latter. A bull was kept on the farm, so that neither this cow nor others were sent off for service. The malady could not have been contracted from the feeding oxen on the Pleasants, for these were West Highlanders, from a breed and district unknown to the lung plague; therefore they could not be suspected of carrying old encysted masses of diseased lung in the chest. Moreover, as already stated, almost all subsequently contracted the disease. The other cows on the farm were separated from the steward's cow by the feeding courts; they had all been a length of time on the farm, and, like the oxen, were some time later in showing the disease. The facts will bear but one explanation—that the Pitcox herdsman carried the infection in his clothes to his father's cow. One of our number (Professor Law) lived on the Pleasants at the time, and can attest the facts.

2d. William Walker, of Quincy, Mass., was present at Squantum when cattle suffering from lung plague were slaughtered by order of the State commissioners. He closely examined portions of the diseased lungs, and walked through the blood of the slain animals. He then rode home, a mile and a half, went to his barn, and fed his cattle. These soon after sickened with lung plague. He sold two of his cattle to E. B. Taylor, and of his herd of twenty-one all but three fell victims to the pestilence. This is attested by Dr. Thayer.—(See Report of Cattle Commissioners of Massachusetts for 1863.)

3d. In February, 1879, Ditmas Jewel, of East New York, took an active part in opposing the work of the State officials dealing with lung plague, and daily visited several of the infected herds. He also paid much attention to a favorite Jersey cow, which he kept alone in his stable surrounded by ample grounds. Toward the end of March this cow sickened and died of lung plague, a victim of its owner's ill-considered visitations of the sick.

4th. In July, 1879, William Tice, of Columbusville, Newtown, Queens County, New York, employed two men who had been working in Ellis's stables, one of the most infected places in Brooklyn. These men slept in the barns with the cattle. In September, two months after the men's arrival, lung plague broke out among Tice's stock, and has continued uninterruptedly until the present day (1882).

In this connection it is only just to notice that it is not at all improbable that this affection should be carried out to our western herds in the germ-laden clothes of a workman employed about cattle. If the infection can be carried in the clothes of persons walking or riding a mile or two in the open air, if it can be preserved for months in the dried condition in infected buildings, if it can retain its virulence for over a month shut up in a glass tube in liquid condition, what is to hinder its preservation in a closely-packed trunk for the three days of a railway journey? Infection carried in this way would most likely be set down as a spontaneous development seeing that no cattle had been carried that way; and yet this is likely to happen at any time so long as we tolerate the existence of a single infected center or a single infected animal in the country.

INFECTION THROUGH THE FOOD.

We have already referred to the preservation of the lung-plague germ in closely-packed fodder, but in dry seasons or places where the exhalations from the diseased lungs are quickly dried up the close packing is not absolutely needful. As an example of this we have only to refer to the infection of McKinnon's oxen through feeding on Mr. Boadle's infected pastures at Melbourne (see page 18).

Of its conveyance through liquid food we have an example in every infected swill stable. It is often the case that a single row or two rows facing toward each other present more cases of the plague than do those at some distance. The mode of feeding explains this. The troughs running the full breadth of the building are slightly inclined from one end to the other so that the swill run in at the one end will slowly flow along and supply the whole row. If, then, a sick animal is placed at any point on the course of this trough he breathes upon the swill and saturates it with his nasal defluxion as it flows past to the other cattle in the row. This provision of a common trough for thirty or forty animals becomes therefore one obvious reason for the prevalence of lung plague in swill stables. Let the germ once be introduced, and between the closeness of the building and the common feeding troughs it has the most ample means for extension. That the swill can be fed with impunity even in an infected district was well illustrated at the Blissville distillery stables in 1879. These had been so badly infected that they were cleared out, disinfected, and closed to cattle for the summer. In autumn over 700 western steers were put into them and kept in the strictest seclusion, not even a visitor being allowed to enter the premises, and not a case of lung plague developed. Yet, at the very time referred to, half a dozen herds in the near vicinity were in a bad condition of infection.

This conveyance of the poison through the medium of clothes, fodder, animals of other species, and solid objects generally, is fully recognized by the best authorities of Europe, including Delaford, Bouley, Reynal, Gerlach, Rolloff, Rychner, Röll, Lafosse, Fleming, &c., and receives the amplest confirmation from the wide-spread practice of inoculation. (See *inoculation.*)

Rychner says:

> The affection breeds a disease-germ—a contagium of a volatile nature. That it attacks the cow which stands in an uncleansed, infected stable, the *many proofs of its conveyance through men and through horses that have stood in stables as mates with cattle,* its steady extension through the same stable or herd, and, finally, its sure arrest by the seclusion of stables and localities, afford the most conclusive evidence of this. (Bojatrik.)

Röll says:

> Contamination occurs from the contact of sound animals with sick on roads, on pastures, in stables, *through the medium of food, of straw that has been breathed upon and soiled by the infected beasts, through utensils that have been used about the latter, and through men that have attended them.* (Lehrbuch der Pathologie und Therapie.)

Fleming says:

> Healthy cattle have been contaminated after being lodged in stables that were occupied by diseased ones three or four months previously. Hay soiled by the sick cattle has induced the disease even after a longer period, and pastures grazed upon three months before have infected healthy stock. (Veterinary Sanitary Science.)

ANIMALS SUSCEPTIBLE.

Unlike the other great cattle plagues (rinderpest and aphthous fever) this confines its ravages to the bovine genus. Currency has at different times been given to reports of the infection of sheep, goats, and deer, but the transmission of the malady to these animals has never been satisfactorily proved. In Great Britain sheep have

mingled in the fields with infected cattle for thirty-seven years without any observed transmission of the malady to the sheep. The same is true of Australia and the Cape of Good Hope, where the plague has driven many colonists to replace their cattle by sheep. Goats live in a large proportion of the stables of New York and Brooklyn, yet we have never seen a goat infected. As respects deer, the lung plague prevailed for a series of years in the deer park at Biel, Scotland, but the deer never suffered. These, it is true, are but negative proofs; they show only that in certain climates and conditions exposure fails to produce infection; what might occur in a different environment, which materially modified the disease, remains to be shown. At present there is no reliable testimony that other animals than cattle will contract the affection.

Among cattle no race, breed, nor age materially modifies the susceptibility. In countries where the malady has prevailed for centuries the attacks are somewhat less severe; but this holds true of all plagues of man or beast. In time the more susceptible races die off, and by a natural selection the survivors have the disease in a milder form. Sex gives no immunity; bulls suffer as much as cows, and oxen and calves, if equally exposed, furnish no fewer victims than bulls and cows.

IMMUNITY CONFERRED BY A FIRST ATTACK.

Like the different forms of variola (small-pox, sheep pox, cow-pox, &c.), rinderpest, measles and scarlatina, the lung plague is usually taken but once by the same individual. Some claim that the immunity lasts but about two years, after which the disease may be contracted anew; but the mass of evidence goes to show that second attacks are exceptional, and they are probably no more common than second attacks of small-pox, measles, or scarlatina. The acquired immunity in infected districts gives a special value to animals that have passed through the disease, and upon this are based the practices of protective inoculation, and of the exposure of young and valueless calves to the infection, that the losses from the plague may be materially reduced.

MORTALITY.

In recording the mortality caused by the plague the most varied figures are set down by authors. Much of the discrepancy arises from the point of view taken. Thus if we estimate the losses as a percentage of all the cattle in a district, they will appear very small, inasmuch as it is rare to find all the herds affected. Thus Loiset states the losses for the entire bovine race of the department *du Nord*, France, at 4 per cent. per annum. For distillery stables, sugar factory stables, &c., it was 12 per cent., and for farms but 2 per cent. This is accounted for by the frequent changes in the former and the inevitable introduction of contagion. The same applies to city dairies, where he found a mortality of 25 or 26 per cent. In the Nord in 19 years it had killed 212,800 beasts, of a total value of 52,000,000 francs (over $10,000,000).

Yvart, estimating for infected herds only, stated the losses in Aveyron, Cantal, and Lozere at 30, 40, 50, 68 and even 77 per cent., the average being at least 35 per cent.

Gamgee secured records of 88 dairies in the city of Edinburgh for the year 1861–62, and found that with an average holding of 1,830 the plague cut off 1,075, or over 58 per cent. The yearly loss was £14,512 ($70,000). The actual losses in Dublin and other large cities were found to correspond, those of London alone being estimated at £80,000. The losses for the British Isles, computed from agricultural statistics, the records of insurance companies, &c., were close upon £2,000,000 ($10,000,000) per annum.

Finlay Dunn shows from the English Cattle Insurance Company's statistics that from 1863 to 1866 the losses from this plague were 50 to 63 per cent. per annum.

In Holland Sauberg records a yearly loss of 49,661 head, while in Wurtemberg it amounted to 39 per cent.

The French commission of 1849 found that out of 20 cattle exposed, 16 took the disease, 10 severely. (The Lung Plague Law.)

MORTALITY ENHANCED IN WARM CLIMATES AND SEASONS.

The ratio of deaths has been found to rise with the heat of the weather. Thus, while in France 20 per cent. resisted the contagion and 50 per cent.

escaped death, in South Africa Mr. Lindley reports that it was not uncommon for a whole herd of 100 or 200 to be attacked so severely that every one perished. The average recoveries he believed were not over one per cent.

In corroboration of Mr. Lindley's testimony we submit the following letter, called forth by a published article of Professor Law's:

CENTRAL CITY, *Lawrence County, Dakota, March* 11, 1879.

DEAR SIR: I was much interested by your article in the New York Tribune on pleuro-pneumonia in cattle, and trust that the authorities will at once act up to your advice; for I know from experience, dearly bought, that if they do not, and the disease gains a foothold in the large grazing centers of the United States, nothing can prevent the graziers and the public in general suffering as much as the inhabitants of Australia, South Africa, &c, the climatic influences being not more favorable here than there. I have lived some years in Natal, a British colony in South Africa, and it was for some years before my arrival a good pastoral country, and well stocked with cattle when the disease was first known. Where it was introduced from I forget, but most probably came with freight oxen from the Cape Colony. Now for the last fifteen years, to my knowledge, the country has never been clear of it, and it is continually breaking out, generally brought by the passage of freight oxen through the country (the only means of transport).

At first the cattle were slaughtered, but eventually, the disease spreading too rapidly, inoculation was introduced, and though much stock died from the inoculation, still the remnant would be tolerably safe from the disease a second time; and "salted" cattle, *i. e.* those that had passed through the disease, were valuable for freighters, and so fetched a fair price. Cattle were selling during my residence from $25 to $75, the price now on account of the limited supply from death.

I have known 75 per cent. of herds die, and I regret mislaying a letter I received from there a few months ago telling me of losses my friends have suffered from it. Lately, since inoculation, the percentage is much lessened, but the disease is always lurking about, and introduced to a greater or less extent each time of inoculation.

Some ranchmen inoculate their calves every year, others only when they buy fresh cattle, or the disease breaks out in their herds. No other attempt of cure or mitigation is practiced, excepting perhaps a seton in the dewlap. Most of the freight oxen have lost their tails (oftentimes cut off to assist their sale).

In the Zulu country, adjoining where the war now is, they have been fairly clear, allowing no cattle to cross from the adjoining countries into Zululand.

All cattle sold by auction were guaranteed free from lung sickness for three weeks, and if they broke out within that time were at the seller's risk. I remember my partner writing me that he had the lung sickness among the cattle, but that the skins brought a little ready money (cattle at that time being sold on time); it was the only consolation we had for losing 70 head out of 90. Cattle that were lung-sick at the time of inoculation were not susceptible to the influence of the virus.

I am no savant, nor do I understand pathology, so my letter and ideas are naturally crude, but I am thoroughly alive to the value of the advice contained in your article.

I am, sir, yours, faithfully,

EVERARD B. CORBET.

This common-sense letter, from one who has suffered, substantiates Mr. Lindley's observations in every particular, not only as to the high death-rate, but as to the intractability of the disease on open pasturages, its propagation by ox-teams, and its ruinous effects on the cattle industry. It adds one important item on which we shall comment later—the propagation of the disease by inoculation.

The high mortality in South Africa finds its exact parallel in American herds during the heats of summer. At this season the disease becomes unusually violent, the period of incubation is shortened, nearly all cases run a rapid and often fatal course, and it is not uncommon to see a whole herd swept off without exception. One or two instances may be given by way of illustration:

In 1878 William Post, Old Wistbury, Queens County, Long Island, bought a cow out of a passing herd which had been brought by Levy, a dealer, from Brooklyn. She infected his herd and his brother's so universally that they had to slaughter the whole. (This was before the days of government interference.)

Mrs. Murphy, Brooklyn, in 1878, bought a cow of McCabe, a New York dealer, which infected her whole herd, so that she had to slaughter the whole.

In 1878 Mrs. Kelly, Hazelton, Jamaica, Long Island, bought a cow of Braun, a Brooklyn dealer, which sickened and died and fatally infected her three remaining cows so that all perished.

In February, 1879, Mr. Carr, One hundred and forty-sixth street, New York, had a cow sent on trial by Geissmann, a dealer. She stood but one night in his stables, being removed next day because she looked bad, and another was sent in her place. Carr's whole herd of five contracted the disease severely, and were slaughtered accordingly.

Patrick McCabe, Seventy-second street, New York, bought a cow of McDonald, a dealer, in 1871. Six weeks later she sickened and infected his five remaining cows, all of which perished. He placed four fresh cows in the stable, and started anew, but lost the whole in the course of two months.

This is but a repetition of the South African experience. During the cold and dry winter in New York the disease is comparatively mild, and the percentage of losses low; but with the return of hot weather all this is changed; the disease often kills after two or three days of observed illness, and the percentage of deaths will rise to seventy, eighty, ninety, or even one hundred. This is full of solemn significance to the United States; let the plague once reach the Southern States, and this high mortality would be maintained throughout the greater part of the year; let it reach the Mississippi Valley, and the excessive heats of the summers would make it no less destructive during that season; so that in estimating the probable losses in case of such extension we can no longer accept the losses of Europe as a guide, but must seek for a parallel under the burning sun of Africa. If we continue to neglect the affection until it shall have spread to these places, we shall subject ourselves to the severest condemnation in thus neglecting to avert a great and lasting public calamity.

PERIOD OF INCUBATION.—LATENCY.

The time that elapses between the receiving of the germs into the system and the manifestation of the earliest symptoms of the disease, varies greatly. Delafond sets it at from six to sixty days, Verheyen from ten to sixty days, the French Commission extends the period to sixty-seven days, Reynal has seen it exceed ninety days, and Röll and Gamgee quote from eight days to one hundred and twelve. It is true that Gamgee qualifies this by the statement that when an animal sickens four months after purchase, two or three latent instances of the diseases have preceded the obvious one. Australia, South Africa, and Norway were each infected by cattle that had shown a period of incubation of three months. I have frequently seen cases in which cattle have passed three or four months after the purchase in poor health, yet without cough or any other obvious diagnostic symptoms, and at the end of that time have shown all the symptoms of the lung plague. But as such cows are considered by the ordinary observer to be well, and as many of them will convey to the mind of the veterinarian nothing more than unthriftiness, we must, as a working rule, accept as possible an incubation of three or even four months. All quarantine regulations for this disease must be based on this occasionally long period of latency.

As regards the real or regular period, we may deduce something from the exudation and swelling in the tail in inoculated cases. The average period is on the ninth day, though it may appear as early as the fifth, or it may be delayed till the thirtieth or fortieth day. In the experimental transmission of the disease by cohabitation, under the French Commission, a cough—the earliest symptom—appeared from the sixth to the thirty-second day, and sometimes continued for months, though no acute disease supervened. (The Lung Plague. Law.)

It may be stated in this connection that in the recent experiments of Professors Bruylants and Verriest on the artificial cultivation of the micrococcus of lung plague in albuminous solutions, thirty hours were found

sufficient for the multiplication of the germs so as to render the solution quite turbid.

It should be added that hot climates and seasons appear to abridge the period of latency; thus, the disease will develop more rapidly in summer than in winter, and in the South than the North. Any febrile condition of the system will also favor its rapid development; therefore symptoms are often hastened by parturition, by *heat* (*œstrum*), and by other exciting causes.

PROLONGED INCUBATION A SOURCE OF GREAT DANGER.

The Short-horn cow which infected Australia must have been 112 days from the time of sailing from England to the first symptoms of disease in Australia. The case, however, is not quite clear, for there is a report that she had suffered from the same disease over a year before in England; and, if so, this may have been a relapse, after the infection had been carried for at least an entire year encysted in the chest. Such second attacks are met with, though only very exceptionally, in the case of all diseases—small-pox, cow-pox, scarlet fever, measles, &c.—in which, as a rule, the first attack fortifies against another.

No such objection can be made to the case of Norway, where the cattle were found to be diseased 93 days after leaving the Scottish coast, nor in the case of South Africa, where the disease was observed 102 days after the bull had sailed from Holland.

During all this period of three months and a half the most skillful expert would fail to detect the slightest sign of lung disease, or even of ill health; in such a case, therefore, the examination of the individual animal can give no guarantee whatever of soundness. Even the examination of an entire herd may similarly fail to detect any trace of this disease, though the seeds of it are present, and it is only by a series of examinations of the entire herd, extended over the period of the longest-known incubation (90 to 112 days), that any assurance of safety can be obtained.

This is a sufficient answer to the constantly repeated demand that imported animals should be examined, and, if no sickness can be detected, should be allowed to pass into the interior; also, that animals for export should be examined, and in the absence of any sign of disease should be furnished with a certificate of health. A similar demand is constantly made that cattle in transit from place to place of the same country should be examined and certified sound, irrespective of any examination of the herd from which they come or the risks of infection during transit. Certificates based on no more than such examinations are, at best, but so much waste paper. In case of the infection of any of the animals examined they become great and positive evils. They certify, on insufficient data, to what is not a fact; they mislead the unwary buyer into the conviction that his purchase is assuredly sound, and not only induce him to take the diseased stock upon his farm, but to pasture or stable it with his healthy herd. It may even be made an accessory to the profitable sale of cattle known to be infected, by an unprincipled vender. The owner of the herd infected with this plague is submitted to the constant temptation to turn off, at a fair sound price, animals that he knows will almost certainly fall victims to the pestilence; and by the long period of incubation, during which no sign of the presence of the disease can be detected, he is furnished with the amplest opportunity to make such sale without suspicion. Honorable men would scorn to take advantage of such an opportunity, yet it cannot be denied that every community con-

tains some who would readily succumb to the temptation. But if the temptation is great for the stock-owner, it is even more so for the dealer. His daily study, to buy in the cheapest market and sell in the dearest; places the bait in exact parallelism with his habits of thought, and with him it requires a special effort to shut his eyes to the advantage which confronts him. How much stronger is the temptation when, perchance, even he has been betrayed into buying stock which he discovers to have come from an infected herd, but too late to annul the bargain. Moreover, he is especially exempt from the risk of suspicion of evil design; none can charge him with knowledge of the antecedents of cattle which he bought at sight, and for which he paid, risking his money, and, to some extent, his reputation. If the fact of his having sold infected animals is finally charged upon him, he too can appear as the innocent victim and charge back on the original owner, perhaps an unknown party, the crime of selling such stock.

But what would be thought of a civil authority or a professional man who would aid and abet such transactions by granting a certificate of soundness on a simple examination in transit, or an examination of one or more cattle without reference to the herd from which they come?

We shall refer to this subject again in connection with international and interstate quarantine, and the quarantine of infected and suspected animals, herds, and places, all of which to be effective must meet every contingency implied in the occasionally prolonged incubation as above set forth.

SYMPTOMS.

These vary in different countries, latitudes, seasons, altitudes, races of animals and individuals. They are, *cæteris paribus*, more severe in hot latitudes, countries, and seasons than in the cold; in the higher altitudes they are milder than on the plains; in certain small or dwarfed animals, with a spare habit of body, like Brittanies, they appear to be less violent than in the large, phlegmatic, heavy-milking, or obese short-horn, Ayrshires and Dutch; a newly infected race or cattle in a newly infected country suffer much more severely than those of a land where the plague has prevailed for ages; and finally certain individuals, without any appreciable cause, have the disease in a much more violent form than others which stand by them in precisely the same conditions.

Sometimes the disease shows itself abruptly with great violence and without any appreciable premonitory symptoms, resembling in this the most acute type of ordinary broncho-pneumonia. This, however, is mostly in connection with some actively exciting cause, such as exposure to inclement weather, parturition, overstocking with milk, heat, &c.

Far more commonly the symptoms come on most insidiously, and for a time are the opposite of alarming. For some days, and quite frequently for a fortnight, a month or more, a slight cough is heard at rare intervals. It may be heard only when the animal first rises, when it leaves the stable, or when it drinks cold water, and hence attracts little or no attention. The cough is usually small, weak, short and husky, but somewhat painful and attended by some arching of the back, an extension of the head upon the neck, and protrusion of the tongue. This may continue for weeks without any noticeable deviation from the natural temperature, pulse or breathing, and without any impairment of appetite, rumination, or coat. The lungs are as resonant to percussion as in health, and auscultation detects slight changes only, perhaps an unduly loud blowing sound behind the middle of the shoulder, or more commonly an occasional slight mucous rattle, or a transient wheeze. In some cases the disease never advances further, and its true nature is to be recognized only by the facts that it shows itself in an infected herd or on infected premises, and that the victim proves dangerously infecting to healthy animals in uninfected localities. It may be likened to those mild cases of scarlatina which are represented by sore throat only, or to the modified small-pox, known as varioloid.

In the majority of cases, however, the disease advances a step further. The animal becomes somewhat dull, more sluggish than natural, does not keep constantly with the herd, but may be found lying alone; eats and ruminates more tardily and less frequently; breathes more quickly (20 to 30 times per minute in place of 10 to 15); retracts the margins of the nostrils more than formerly; the hair, especially along the neck, shoulders and back, stands erect and dry; the muzzle has intervals of dryness,

and the milk is diminished. The eye loses somewhat of its prominence and luster, the eyelids and ears droop slightly, and the roots of the horns and ears and the limbs are hot or alternately hot and cold. By this time the temperature is usually raised from 103° Fahrenheit, in the slightest or most tardy cases, to 105° and upward to 108° in the more acute and severe. Auscultation and percussion also now reveal decided changes in the lung tissue.

The ear applied over the diseased portions detects in some cases a diminution of the natural soft breathing murmur, or it may be a fine crepitation which has been likened to the noise produced by rubbing a tuft of hair between finger and thumb close to the ear. Where this exists it is usually only at the margin of the diseased area, while in the center the natural soft murmur is entirely lost. In other cases a loud blowing sound is heard over the diseased lung, which, though itself impervious to air and producing no respiratory murmur, is in its firm, solid condition a better conductor of sound and conveys to the ear the noise produced in the larger air-tubes.

Percussion is effected by a series of taps of varying force delivered with the tips of the fingers of the right hand on the back of the middle finger of the left firmly pressed on the side of the chest. Over all parts of the healthy lung this draws out a clear resonance, but over the diseased portions the sound elicited is dull, as if the percussion were made over the solid muscles of the neck or thigh. All gradations are met with as the lung is more or less consolidated, and conclusions are to be drawn accordingly.

In other cases we hear on auscultation the loud, harsh, rasping sound of bronchitis with dry, thickened, and rigid membranes of the air tubes, or the soft, coarse, mucous rattle of the same disease when there is abundant liquid exudation and the bursting of bubbles in the air passages. In others there is a low, soft, rubbing sound usually in jerks when the chest is being filled with or emptied of air. This is the friction between the dry, inflamed membrane covering the lungs and that covering the side of the chest, and is heard at an early stage of the disease, but neither at its earliest nor at its latest stage. Later there may be dullness on percussion up to a given level on one or both sides of the chest, implying accumulations of liquid in the cavity. Or there is a superficial dullness on percussion, and muffling of the natural breathing sound with a very slight, sometimes almost inaudible, creaking due to the existence of false membranes (solidified exudations) on the surface of the lung or connecting it to the inner side of the ribs. This is often mistaken for a mucous rattle that can no longer take place in a consolidated lung in which there can be no movement of air nor bursting of bubbles in breathing. The mucous rattle is only possible with considerable liquid exudation into the bronchial tubes and a healthy, dilatable condition of the portion of lung to which these lead. In rare cases there will be splashing sounds in the chest, or when the patient has just risen to his feet a succession of clear ringing sounds becoming less numerous and with longer intervals until they die away altogether. These are due to the falling of drops of liquid from shreds of false membrane in the upper part of the chest through an accumulation of gas into a collection of liquid below. It has been likened to the noise of drops falling from the bung-hole into a cask half filled with liquid. Peculiar sounds are sometimes heard, as wheezing in connection with the supervention of emphysema, and others which it is needless to mention here.

In lean patients pressure of the tips of the fingers in the intervals between the ribs will detect less movement over the diseased and consolidated lung than on the opposite side of the chest where the lung is still sound.

As seen in America, in winter, the great majority of cases fail to show the violence described in books. The patients fall off rapidly in condition, show a high fever for a few days, lie always on the same side (the diseased one), or on the breast, and have a great portion of one lung consolidated by exudation, and encysted as a dead mass, and yet the muzzle is rarely devoid of moisture, the milk is never entirely suspended and may be yielded in only a slightly lessened amount as soon as the first few days of active fever have passed.

During the extreme heats of summer, on the other hand, the plague manifests all its European violence. The breathing becomes short, rapid, and labored; each expiration is accompanied by a deep moan or grunt, audible at some distance from the animal. The nostrils and even the corners of the mouth are strongly retracted. The patient stands most of its time, and in some cases without intermission, its fore legs set apart, its elbows turned out and the shoulder-blades and arm-bones, rapidly losing their covering of flesh, standing out from the sides of the chest so that their outlines can be plainly seen. The head is extended on the neck, the eyes prominent and glassy, the muzzle dry, a clear or frothy liquid distils from the nose and mouth, the back is slightly raised, and this together with the spaces between the ribs and the region of the breast-bone are very sensitive to pinching, the secretion of milk is entirely arrested, the skin becomes harsh, tightly adherent to the parts beneath and covered with scurf, and the arrest of digestion is shown by the entire loss of appetite and rumination, the severe or fatal tympanies (bloating), and later by a profuse watery

diarrhea in which the food is passed in an undigested condition. If the effusion into the lungs or chest is very extensive the pallor of the mouth, eyelids, vulva, and skin betrays the weak, bloodless condition. The tongue is furred and the breath of a heavy, feverish, mawkish odor, but rarely fetid. Abortion is a common result in pregnant cows.

COURSE.—TERMINATION.

In summer, when the disease shows its greatest violence, the mortality is not only high, but early. Cattle will die after a few days' illness from the great prostration attendant on the enormous effusion into the organs of the chest, the impairment of breathing and the impairment or suspension of the vital functions in general. Others die from early distension of the paunch with gas. In others, still, the profuse scouring helps to speedily wear out the vital powers. In severe cases, that survive, for some time, the rapid loss of flesh is most surprising. A loss of one-third of the weight in a single week is by no means uncommon, and even one-half may be parted with in the same length of time in extreme cases.

In fatal cases, with a moderately rapid course, all the symptoms become more intense fo several weeks; the pulse becomes more and more small, weak, and accelerated, and finally imperceptible; the breathing becomes rapid and difficult; the mucous membranes of the mouth, eyes, &c., become pale and bloodless; emaciation goes on with active strides, and death ensues in from two to six weeks.

In other cases, and especially in cold and dry weather, a portion of dead lung may remain encysted in the chest, submitting to slow liquefaction and removal, and such animals will go on for months doing badly, only to sink at last into such a state of debility that death ensues from exhaustion and weakness.

In others still, the retention of such diseased masses and the consequent debility, determines the appearance of consumption (*tuberculosis*), which cuts off the animal.

Purulent infection and rupture of abscesses into the chest are other causes of death in this disease.

In cases about to recover, the symptoms gradually subside, life and appetite are reacquired, and a more or less rapid recovery takes place. In the most favorable the exudations are slowly reabsorbed, and the lung may be restored to its natural state. In others, the exudation, which is mostly in the interlobular tissue, becomes in part organized into fibrous material which, in contracting, compresses the lobules of lung tissue, lessening their capacity for dilation, and leaving the animal short-winded and predisposed to emphysema and other lung troubles. If kept quiet, such convalescents fatten rapidly.

Far more frequently, in this country at least, a mass of lung is entirely lost, being divested of its vitality, inclosed in a fibrous cyst, and slowly liquefied and absorbed through a course of several months. These continue to do poorly for a number of months, and may yet entirely recover, the whole dead mass having been finally removed and the sac having contracted into a dense fibrous structure. Even in this case if the patient has been able to bear up under the continued drain, and has escaped consumption and other risks, it may finally be successfully fattened.

APPEARANCES OF THE CHEST AND LUNGS AFTER DEATH.

If the disease is seen in its earliest stages, the changes are altogether confined to the tissue of the lung. From the examination of the lungs of several hundred diseased animals, I can confidently affirm that the implication of the serous covering of the lung (pleura) is a secondary result. In all the most recent cases we find the lung substance involved and the pleura sound, while in no one instance has the pleura been found diseased to the exclusion of the lung tissue, or without an amount and character of lung disease which implied priority of occurrence for that. Yet in all violent attacks the disease will have proceeded far enough to secure implication of the pleura as well, and hence we may describe the changes in the order in which they are usually seen when the chest is opened.

The cavity of the chest usually contains a quantity of liquid varying from one or two pints to several gallons; sometimes yellowish, clear, and transparent; at others, slightly greenish, brownish-white, and opaque, or even exceptionally slightly colored with blood. This effusion contains cell forms and granules, and gelatinizes more or less perfectly when exposed to the air.

On the surface of the diseased lung and to a less extent on the inner side of the ribs is a fibrinous deposit (false membrane), varying from the merest rough pellicle to a mass of half an inch in thickness, and in the worst cases firmly binding the entire lung to the inner side of the chest and to the diaphragm. These false membranes are usually of an opaque white, though sometimes tinged with yellow, and in the deeper layers even blood-stained, especially over an infarcted lung. A noticeable feature of these false membranes and one that serves to distinguish them from those of ordinary pleurisy is that they are commonly limited to the surface of the diseased portion

of lung, or if more extensive that portion which covers sound lung tissue is much more recent, and has probably been determined by infection from the liquid thrown out into the chest.

In the lung itself the most varied conditions are seen in different cases and at different stages of the disease. The diseased lung is solid, firm and resistant, seems to be greatly enlarged because it fails to collapse like the healthy portion when the chest is opened, is greatly increased in weight and sinks in water. When cut across it shows a peculiar linear marking (marbling) due to the excessive exudation into the loose and abundant connective tissue which separates the different lobules of the ox's lung from each other. This exudation is either clear, and therefore dark as seen by reflected light, or it is of a yellowish-white and when filled with it the interlobular tissue appears as a net-work, the meshes of which vary from a line to an inch across, and hold in its interspaces the pinkish-gray, brownish-red, or black lung tissue.

When only recently attacked the lung may present two essentially different appearances:

1. Most frequently the changes are most marked in the interlobular connective tissue, which is the seat of an abundant infiltration of clear liquid, while the lung tissue, surrounded by this, retains its normal pinkish-gray color, and is often even paler and contains less blood than in health. It has, in short, become compressed by the surrounding exudation, and air and blood have been alike in great part expressed from its substance. This extreme change in the tissue surrounding the lobules and the comparatively healthy appearance of the lobules themselves, have led many observers to the conclusion that the disease commenced in this connective tissue beneath the pleura and extended to the proper tissue of the lung. There is, however, as pointed out by Professor Yeo, a coexistent disease of the smaller air tubes corresponding to the lobules that are circumscribed by this infiltration, and there is every reason to believe that the infiltration in question is the result of antecedent changes in the air tubes.

2. Less frequently we find the lobules of the lung tissue presenting the first indications of change. The lobules affected are of a deep red and more or less shining, yet tough and elastic. They do not crepitate on pressure, yet they are not depressed beneath the level of the adjacent healthy lung tissue as they would be if collapsed. The interlobular connective tissue, devoid of all unhealthy exudation, has no more than its natural thickness, and reflects a bluish tint by reason of the subjacent dark substance of the lung. Here the lung tissue itself is manifestly the seat of the earliest change—congestion—and the interlobular exudation has not yet supervened. Specimens of this kind may be rare, but a number have come under the writer's observation, and in lungs, too, that presented at other points of their substance the excessive interlobular exudation.

Both of these forms show a tendency to confine themselves to particular lobules and groups of lobules of the lung. They correspond, in short, to the distribution of particular air tubes and blood vessels, as will be explained further on. The fact, however, is noteworthy as characteristic of this disease, that it attacks entire lobules, and the limits of the diseased lung tissue are usually sharply marked by the line of connective tissue between two lobules, so that one lobule will be found consolidated throughout, and the next one in a perfectly natural condition.

The two forms just described differ also in cohesion and power of resistance. The lung saturated with the liquid exudation has its intimate elements torn apart and is more friable, giving way readily under pressure, while that in which there is red congestion, but no extensive exudation, retains its natural elasticity, toughness, and power of resistance.

Hepatization.—Another condition of the diseased lung tissue, more advanced than either of those just described, is the granular consolidation or hepatization. In this condition the affected regions of lung are as much enlarged as in the dropsical condition, but they are firmer and more friable, and on their cut surface present the appearance of little round granules. These granules are not peculiar to the lung tissue proper, though most marked on this; they characterize the interlobular connective tissue as well. They consist mainly of lymphoid cell growths, filling up the air cells, the smaller air tubes, the lymph spaces and the meshes of the connective tissue. The color of these portions varies from a bright reddish-brown to a deep red, according to the compression to which the lung tissues has been subjected by the exudation in the early stages.

Infarction.—Another form of lung consolidation is of a very dark red or black, and always implies the death of the portion affected. The dark aspect of the diseased lobules forms a strong contrast with the yellowish-white interlobular tissue, excepting in cases where that also becomes blood-stained, when the whole presents a uniform dark mass. This form has the granular appearance of that last described, and on microscopic examination its minute blood-vessels are found distended to their utmost capacity with accumulated blood globules. This black consolidation is always sharply limited by the borders of certain lobules or groups of lobules which are connected

with a particular air tube and its accompanying blood vessels, and the artery leading to such lobules is as constantly blocked by a firm blood-clot. The mode of causation is this: The artery being in the center of a diseased mass, becomes itself inflamed. As soon as the inflammation reaches its inner coat the contained blood coagulates; the vein is usually blocked in the same way. The blood formerly supplied by the artery to certain lobules is now arrested; that in the capillary vessels of these lobules stagnates; nutrition of the walls of the capillaries ceases, and these losing their natural powers of selection allow the liquid parts to pass freely out of the vessels, leaving the globules only in their interior. More blood continues to enter them slowly from adjacent capillaries supplied from other sources, and as this is filtered in the same way by the walls of the vessels, these soon come to be filled to repletion by the globules only, and hence the intensely dark color assumed. The color is often heightened by the escape of blood from the now friable vessels into the surrounding tissue, and it is by this means that the interlobular tissue is usually stained. "This black hepatization, or as it is technically called, *infarction*, is an almost constant occurrence in the disease as seen in New York, and the death and encysting of large portions of lung is therefore the rule. If too extensive, of course the patient perishes, but not unfrequently a mass of lung measuring four or six inches by twelve is thus separated without killing the animal."

If at a later stage we open an animal which has passed through the above condition, the following may be met with: A hard, resistant mass is felt at some portion of the lung, usually the lower and back portion, and on laying it open it is found to consist of dead lung tissue in which the hepatized lobules and interlobular tissue, the air tubes and blood vessels are still clear and distinct, but the whole is separated from the still living lung by a layer of a white pus-like liquid, outside which is a dense, fibrous sac or envelope, formed by the development of the surrounding interlobular exudation. From the inner surface of this dense cyst, the firm, thick bronchial tubes and attending vascular systems project in a branching manner like dirty white stalactites, and these, with the interlobular tissue thickened by its now firmly organized exudation, may form bands extending from side to side of the cavity.

At a still more advanced stage the dead and encysted lung tissue is found to have been entirely softened and the sac contains but a mass of white liquid débris, or, still later, a caseous mass of its dried, solid matters, upon which the fibrous covering has steadily contracted, so as to inclose but a mere fraction of its original area. In hundreds of post mortems we have only once seen the dead and encysted lung the seat of putrid decomposition, and never found the cavity opening into a pervious air tube.

There remains to be noticed the condition of the air tubes and accompanying vessels in the diseased lungs. In all cases where we see the starting point of the disease we find in the small tubes leading to the affected lobules, a loss of the natural brilliancy of the mucous membrane, which has become clouded and opaque, and the tissue beneath it infiltrated and thickened. In more advanced cases, and above all, in those showing the dropsical condition of the interlobular tissue, we find a similar infiltration into the connective tissues around the air tubes and their accompanying vessels, and in the hepatized lung this is always seen as a thick, firm, resistant white material, having the compressed and contracted and often plugged air tubes and vessels in the center. (See Heliotype.) These thickened masses have already been referred to as standing out in stalactite form from the inner wall of the sac in which the dead (necrosed) lung is undergoing solution. (Lung Plague, Law.)

It is worthy of notice that though the connective tissue in the walls of the air tubes is invariably the seat of extensive thickening, and though the clear brilliancy of the epithelial layer is usually impaired, yet absolute degeneration of the epithelium is exceptional, the cells remaining in columnar ranks around the lumen of the tube in place of showing any transformation into rounded or lymphoid cells, or breaking down into granular débris, as in active disease. When the smaller tubes are plugged with exudate, the epithelium may be removed as claimed by Professor Yeo, but when the lumen is still clear and pervious the epithelial covering retains its normal condition of columnar cells, as has been demonstrated by Drs. Porter and Hegeman, of New York. In other words the extensive disease changes are found in the connective tissues, and the lymphatic system in the walls of the tubes and substance of the lungs, rather than in the cellular lining of the tubes. The disease is an interstitial lobular pneumonia, rather than a croupous pneumonia.

NATURE OF LUNG PLAGUE.

That the lung plague is determined by an infecting material conveyed from beast to beast is without doubt. The presence of such a specific contagion is demonstrated in all experience of the disease and its propagation, and in the value of inoculation as a protecting measure. The intimate nature of that contagion may now be held as all but proved by the investigations of Professors Bruylants and Verriest of the University of Louvain.

As early as 1852, Willems and Van Kempen, of Hasselt, Belgium, recorded the presence in the lymph of the diseased lung, of myriads of peculiar corpuscles which were absent from the juices pressed from a healthy lung. Others at different times confirmed these observations as to the presence of the corpuscles, but their action as factors in the causation of lung plague remained unproved.

In the course of the past year Bruylants and Verriest in a long series of experiments found the organisms in question in the liquids of the freshly diseased lungs, and in that of the local swellings resulting from inoculation, but not in the blood nor textures of the body generally, and not always in the liquids effused into the chest. They have cultivated this germ through a succession of generations in glass flasks, and found that at any time it continued to prove infecting to susceptible bovine animals, and that it retained its virulent qualities after it had been preserved for a month in a hermetically sealed glass tube. Cultures made with fresh portions of healthy lungs and those made with small particles of other tissues led to no milkiness nor other change from the growth of micrococci in the organic liquids, and produced no specific inflammation in wounds when inoculated. Finally a moist heat of 60° Cent. (140° Fah.) for fifteen minutes invariably proved fatal to the germ, so that this may be held to be the limit of its viability, and boiling water or colorless steam may be accepted as an efficient disinfectant.

In the light of these experiments, it seems that the lung plague is a true bacteridian disease, like malignant anthrax and swine plague, the seat of the malady being determined by the point at which the micrococcus gains access to the system. Thus inspired, as it usually is, with the air, it finds its way through some slight abrasion of the pulmonary mucous membrane, or through the delicate lining of the air cells or muciparous follicles into the submucous connective tissue, where it propagates itself abundantly, destroys the integrity of the lymphatic radicles, and leads to the extensive inflammation and exudation. Inoculated on some superficial part, where there is a great abundance of connective tissue, as the dewlap or shoulder or root of the ear, it leads to a similar extensive inflammation and exudation, followed usually by death. But if inoculated on the tip of the tail, where connective tissue is scanty and the lymphatic system is but poorly developed, it gives rise to a small and harmless swelling, usually not exceeding the size of a hen's egg.

The morbid processes are mainly confined to the connective tissue and lymphatic system, and there is some reason to suppose that the micrococcus can live with difficulty, if at all, in the living blood. This may be inferred from the fact that the disease does not attack the natural seat of its invasion—the lungs—when it has been inoculated on the tail, nor does it affect any distant part of the body when it has occurred naturally in the lungs. Add to this that Bruylants and Verriest failed to develop the micrococci with certainty from the blood, or from any other part of the body than the diseased lung, and that Burdon-Sanderson

and Duguid found that injections of virulent lymph into the blood usually rested without any local effect whatever, and we have apparently solid ground for the hypothesis that the germ of this disease does not well survive in the blood. Tentatively, we may call it a bacteridian infection of the connective tissue and lymphatic system, which may be localized in any part of the body supplied with these structures, but is usually seated in the lungs, from the germ being taken in with the inspired air.

CONVALESCENT CATTLE DANGEROUS FROM ENCYSTED MASSES OF DISEASED LUNG.

Animals that have apparently recovered from lung plague are usually supposed to be perfectly safe, and even specially valuable in infected districts, because they will not take the disease a second time. Yet there is reason to suppose that many such become bearers of the infection to healthy stock with which they mingle, and being exempt from suspicion admission to sound herds is freely conceded them.

The explanation of this is probably to be found in the condition of the lung usually left after an apparent recovery. The tendency of the disease is to the plugging of the blood-vessels in those parts of the lung which are most violently inflamed, to the death of such portions for lack of their nutrient supply, and, finally, in case of recovery, to the encysting of the dead mass in a thick, fibrous sac, which completely cuts it off from the adjacent parts of the organ. The seclusion of this *sequestrum* is complete; no air, save such as can permeate the membrane, and no aerial germs being allowed access to its substance. It therefore undergoes no ordinary putrefaction, and after long encystment its faint, peculiar, and slightly mawkish odor is in marked contrast with the intolerable fetor of the ordinary gangrenous lung, in which the aerial bacteria of putrefaction have been working. These dead masses of the hepatized lung, in cases of apparent recovery from lung plague may remain encysted for from six to fifteen months, undergoing very little change, apart from a very slow liquefaction on the surface of the mass, and a corresponding contraction of the investing sac. At the commencement of recovery more than half of a lung may be thus encysted, and six and even ten months later masses of one or two pounds are frequently found awaiting the slow process of liquefaction.

In cases of perfect recovery this process of liquefaction is completed, and the liquid being absorbed, there is left but a soft, cheesy-looking mass of whitish, or yellowish-white débris. The important question is, how long the encysted mass remains infecting after it has been encapsuled and shut off from all other parts of the lung, and after the bearer has apparently recovered?

On this point it must be borne in mind that the encysted portion of the diseased lung was filled with the virulent germs at the period of encystment, and having been from that time shut off from all the processes of nutrition, or physiological change, and having been equally protected against the access of bacterial or other germs from without that might have preyed upon and destroyed the virulent ones, there is a strong presumption that these virulent lung-plague germs, or their descendants, remain unchanged from their infecting condition, as when first encysted.

We may find a tolerably fair counterpart of this condition in the masses of tubercle frequently found in the internal organs of consumptive men and animals. The deposited tuberculous mass is not traversed by

any blood-vessels, and is not subject to the regular physiological changes of a tissue, the subject of nutrition and growth, and yet a minute particle of this encysted, inactive mass, if inoculated on another and susceptible system, speedily develops the same dread disease.

It may be justly answered that cattle bearing these encysted masses in the lungs are often allowed to cohabit with healthy and susceptible animals without infecting the latter. Yet we have reason to suppose that the germ of lung plague does not readily live, if at all, in the blood, but that when inoculated on any one part of the body, it confines its ravages to that spot and those that are in the direct line of the lymphatic vessels leading from it. When inoculated on the tail it may extend to the rump and pelvis, but does not show itself in the lungs. Injections of the virus into the blood have in no case produced local disease. (Sanderson, Duguid.) The encysted germs are only likely to make their exit from the interior of the sac, by being absorbed into the blood-vessels ramifying in its walls. But if the blood globules are naturally either unfavorable to the development of the germ, or destructive to it, much more will the blood of the animal, now rendered insusceptible through a first attack of the disease, prove inimical to the living virus. But the same acquired insusceptibility is equally true of the living tissues generally of the animal bearing the encysted mass, including its lymphatic vessels. It is not, therefore, to be expected that the pent-up virus should readily make its escape from the encysted mass so as to infect other cattle adjacent. It may, however, be conceived of as escaping under one of the following conditions:

1st. In case the insusceptibility of the subject became exhausted, as happens in certain systems with every form of disease which does not habitually occur a second time in the same subject. Thus we have second attacks of small-pox, cow-pox, scarlet fever, measles, whooping cough, and mumps, just as we have sometimes second attacks of lung plague. If, therefore, in a cow bearing one of the encysted masses now under consideration, the acquired insusceptibility becomes worn out, the pent-up germs may suddenly find in the adjacent lung a prolific field for their growth and a vantage point for a new and wide diffusion among other stock.

2d. In certain diseases, like anthrax and swine plague, a system which enjoys a native or acquired immunity is still unable to resist the sudden introduction of a great excess of the disease germ or of a smaller amount in a condition of unusual virulence. Thus it is that the animal often recovers from a small dose of the poison, but succumbs to a large one; and thus, too, that in certain malignant epidemics of measles or small-pox persons fall victims who have resisted exposures to a milder type of the disease for a long lifetime. When therefore from any cause—inflammation, abscess, &c.—the membrane limiting the infecting mass has become broken down or unusually permeable, the insusceptibility may be at once overcome by the great access of infecting material.

3d. In connection with the irritation of the contained mass and its liquid products, the wall of the sac may become ulcerated, so as to establish a communication with one of the air tubes. In such a case it is evident that the contents may escape and that the animal may become infecting to others, though she escapes a second infection herself.

4th. Still one other hypothesis may be hazarded. An attack of simple inflammation implicating the wall of the cyst may be the occasion of the escape of the poison. The cell products of inflammation are more closely allied to embryonic tissue (cells) than are the elements of the

normal textures of the full-grown. They partake, in common with embryonic tissue, of an extraordinary impressibility to external influences, and a liability to destructive changes. These products of inflammation are therefore presumably susceptible to the attacks of the pent-up germs, just as the natural progeny of insusceptible animals are themselves susceptible without reference to the immunity of the parent tissues or system. Again, the inflammation products are now open to the attacks of the lung plague bacterium, just as the same products are more easily destroyed by caustics and other chemical agents than are the sound tissues.

It has been frequently noticed in Europe, that cattle which have apparently recovered from the lung plague have been the vehicle for the conveyance of the disease into new and previously healthy herds. In several countries of Europe, accordingly, cattle that have passed through lung-plague are branded on the horns with the letters L. S. (*Lungenseuche*). This serves the double purpose of publishing the fact that they are not likely to contract the disease anew themselves, and that they may, notwithstanding, convey it to others.

One or two particular instances of the apparent conveyance of the infection in this way may be here cited:

1. In the Récueil de Médecine Vétérinaire for March, 1879, M. Rabouam records the case of a bullock brought from a stable where lung plague had formerly prevailed, and suffering from a chronic discharge from the nose, supposed to be due to bronchitis, but which ox introduced the lung plague into the herd into which he was taken.

2. The English cow which introduced lung plague into Australia, according to one account, was probably a case of the same kind. She was alleged to have suffered from lung plague in England, in 1857, and had a relapse after her arrival in Australia in 1858, when she was the means of infecting the entire colony. It may well be supposed that this relapse may have been due to the great change of climate and general surroundings to which this cow had been subjected, such change being well known to renew the susceptibility to certain other diseases after it had been worn out by a first attack. Thus strangles—the distemper of young horses—which usually attacks the same animal but once, has been known to attack animals thrice in succession, each time after the subject had been removed from one country and climate to another. Similarly the distemper of dogs has been known to attack the same animal thrice, in England, Malta, and India, showing that the example is not peculiar to one disease. That change of climate has a potent effect on the system, is shown every day in the beneficial or pernicious operation on invalids who make a wide change of residence. This influence is seen no less in the effect it has in counteracting the evil effects of consanguinity. If the same family is bred closely, generation after generation, in the same locality, sterility or other failure of vitality soon interferes to cut short its career, but if brothers and sisters and cousins are bred or reared under different conditions, their stamina is far less likely to be undermined.

The consideration of these points, and the woeful example of the infection of Australia, should lead us to guard against all such chronic cases of this affection as carry encysted masses in the lung, and above all to vigilantly exclude all animals imported in this condition, and all movement of such animals from one part of the country to another.

3. Mr. Braun, Lorimer street, Brooklyn, whose stables had been healthy for months up to July 26, 1879, took in at this date a brown heifer which had been removed from the infected Blissville distillery stables January, 1879. This heifer was fat, plump, and, to all outward

appearances, healthy, but on examination, with the view of granting a certificate for removal to the country, it was found to carry a large mass of encysted lung. She was accordingly killed, and an encysted dead mass of about 8 inches by 4 was found. On August 22, a fine Short-horn cow from a healthy region in Central New York, which had passed through the inspection-yard direct to Braun's stable under permit and surrounded with all due precautions, contracted the lung plague and had to be killed and the stable cleared out and disinfected anew.

4. In January, 1879, Charles Reeves, of Success, Suffolk County, New York, bought two calves from the Billard herd, which spread the lung plague broadcast over the east end of Long Island. They did not thrive well, but were not noticed to be specially sick. In June, six months later, he lost several animals infected by the unthrifty calves, and July 19, Professor Law had three more of the herd slaughtered in the advanced stages of lung plague, the result of the purchase of the calves which were affected with these chronic encysted masses.

Instances of this kind can be multiplied, but this will serve no good end. The importance of the matter is seen when we say that in all the infected States at the present time, there are numbers of apparently convalescent animals standing in herds which they may at any time infect, and ready to be sold, it may be, to carry the disease to the most distant parts of our territories.

CHRONIC CASES IN THOROUGHBREDS ESPECIALLY DANGEROUS.

Such a conveyance of the disease is the more probable that it is the high-priced thoroughbred stock which are the most likely to be allowed to recover from the infection, and it is these that are mainly shipped west. Under a false sense of economy the Executives of the different infected States decline to pay a sum at all approximating to the market value of these animals, and the owners decline to have them disposed of at a low figure so long as a chance of recovery remains. Thus it is that our 40,000,000 head of cattle, and their progeny for all time, are recklessly imperilled because men, ignorant of our great danger, refuse to authorize an expenditure which is relatively but as a drop to the ocean.

It is quite true that infected thoroughbreds cannot be so distributed with the same impunity as infected cattle of common breeds. Being registered in a herd-book, and all transfers by sale or otherwise made public, they cannot be sold without buyer and seller being well known to each other and to the general public. They cannot be surreptitiously carried from one State to another, for either they must lose their record and value, or the pages of the herd-book will reveal the transaction and lay the owner open to prosecution. Yet, in spite of all this, there is the great difficulty of establishing the fact of pre-existing disease in the sellers' herd; and there is the expense and uncertainty of the law which will deter most people from entering on a litigation of this kind. Indeed, the usual course in our experience has been to pocket the first loss as the least, and to try to be more particular in future purchases. The dangers from these apparently recovered thoroughbreds are, therefore, almost beyond expression, and no consideration of economy which allows or contributes to their shipment westward or southwa should be entertained for a single moment.

But, beside the great peril, there are reasonable grounds for paying the owners of thoroughbreds as much, relatively, as the proprietors of scrub cattle. First, what is expected is only in ratio with their current

market value, so that here they stand on precisely the same level with the scrubs. Second, the owners of the thoroughbreds have expended these high sums for their stock, and added proportionately to the wealth of the State. The State is, therefore, called on to preserve these valuable animals as well as the low-priced ones. Third, the indemnity, to be an effectual adjunct to suppression of the disease, must be made a stimulus to the reporting of sickness, and whenever it fails in this through inadequacy or otherwise, it fails in the main object of its existence.

INOCULATION FOR LUNG PLAGUE.

For some years past this operation has been strongly advocated in England and Holland, not only as a palliative of the losses from lung plague, but as a means of stamping out the disease. In a report like the present, which is intended to furnish a sound basis for intelligent legislation, it becomes needful to canvass this truly important question.

In December, 1850, Louis Willems, M. D., of Hassalt, Belgium, son of a large distiller, began his essays on inoculation. To determine the susceptibility of different animals, he inoculated with the exudation matter from diseased lungs 6 rabbits, 23 pea-fowls, a number of chickens, 4 dogs, 3 sheep, 7 hogs, and 2 goats, but in all the wounds healed without any unhealthy action. These animals were accordingly set down as insusceptible. Accidental wounds of human beings were equally harmless. He instituted experiments on several cattle which he inoculated with the liquids from healthy lungs. The result was only slight inflammation followed by healings.

He inoculated three cattle, respectively, with blood, buccal mucus and intestinal tubercle taken from sick cows. These produced but slight inflammation, followed by prompt recovery.

He inoculated 108 cattle with the pulmonary exudation of diseased lungs. In a period averaging fifteen days after inoculation a swelling occurred in most of these in the seat of inoculation, and though afterwards kept in an infected stable all these animals resisted the disease. Of fifty uninoculated animals placed in the same stables, seventeen became diseased.

He further reinoculated ten cattle that had been already successfully inoculated, and all the wounds healed promptly without any local swelling such as marked the other cases from the tenth to the thirtieth day.

In none of these cases was there any indication of disease of the lungs, and in a number that were killed these organs were found healthy.

He concluded that when the virus is inoculated on a susceptible animal, "a new disease is produced; the affection of the lungs with all its peculiar characters is localized in some sort on the exterior"; and that this disease is preservative against all future attacks of pleuro-pneumonia.

Various commissions were appointed by different European governments to determine the matter by experiment. The Dutch commission, composed of the faculty of the Veterinary School at Utrecht, reported in 1852, that out of 247 head of cattle inoculated sixteen afterward contracted the disease, these being mainly composed of such as had the least local swelling in the seat of inoculation. They reported that inoculation had "a power, at least temporary, of securing against the contagion of pleuro-pneumonia."

The Belgium commission, presided over by Professor Verheyen, inoculated 197 cattle, fourteen of which were afterward kept in stables with infected animals without contracting the disease.

The French commission, presided over by Professor Bouley, inoculated 54 cattle, of which 48 survived and were made to cohabit with diseased stock. But one of those contracted the plague.

In England a commission was appointed, and, after a series of experiments in 1854–5, they reported adversely.

Since that time inoculation has been adopted extensively in Europe, and still more largely in Australia and South Africa, until to-day it is acknowledged by all who have given attention to the subject that for the individual animals, it is as surely protective as is vaccination for small-pox, and that attacks of lung plague, after successful inoculation, are little if at all more frequent than are second attacks of variola.—(*The lung plague of cattle.—Law.*)

It is not overstating the case to say that many hundreds of thousands of cattle have now been subjected to the test of inoculation, many skill-

fully, and others in the rudest possible manner by unlettered persons, and even with lymph, which has been allowed to pass into putrefaction, so that the resulting wounds were septic sores and the constitutional disturbance a more or less fatal septicæmia. The results have in no way negatived Willems' claim that properly performed, the inoculation of a susceptible animal with the lung-plague lymph, fortifies the system of that animal with a reasonable amount of certainty against any subsequent attack of the disease.

The most recent evidence furnished by Dr. Willems himself of the effect of reinoculation of previously inoculated animals may be here quoted.

Since I have had the pleasure of receiving your last letter [he writes Bouley], I have reinoculated sixteen subjects with the pulmonary virus. The virulent insertion has been made behind the ears, in the neck, and in the dewlap—regions which you say, with just reason—are *forbidden under pain of death*. These reinoculatins have been executed in the stables of four distillers of the town, upon beasts previously inoculated on the tail with such apparent success that they had all lost a larger or smaller portion of this appendage.

The results of these reinoculations made the 24th March, the 9th and 17th April, have been the following: Upon fourteen subjects no manifestation, even local, of the swelling consecutive to the virulent insertion, though I had employed considerable doses of the liquid to inoculate. The wounds cicatrized as readily as simple wounds made with a cutting instrument. Upon the two other subjects tumors have appeared in the places of inoculation, as large as pigeons' eggs, behind the ears. and as large as a hazel nut in the region of the neck in one subject, while in the other there was a hard swelling measuring 10 centimeters long by 7 or 8 broad in the region of the dewlap where the virulent insertion had been made. Upon one of the beasts the tumor of the ear transformed itself into an abscess; the other engorgements disappeared by resolution.

Thus far we fully indorse inoculation. It is unquestionably a most valuable measure for the reduction of the losses from lung plague in a country in which the plague itself has come to be considered as an unavoidable evil. But the advocates of the measure are not satisfied with such claims, and demand that it shall be adopted as an efficient measure for the complete extermination of the plague. Now it might be simply stated that, though this measure has been in operation for over thirty years, it has not up till now succeeded in exterminating lung plague from any country whatever.

Eighteen months ago it was claimed that inoculation had rooted out the lung plague from Holland. Yet in Holland repressive measures were not confined to inoculation, but inoculation was only an addendum to a general compulsory slaughtering of the sick and disinfecting of the premises—measures which, rigidly enforced, would of themselves stamp out the disease. In the second place, the claim that Holland had been purged of the plague proved premature, and in the past year the affection has been again reported from five provinces, extending from Friesland to South Flanders, or over a belt embracing the entire length of the country.

Next it is claimed that inoculation completely eliminated the disease from the city of Edinburgh, Scotland. Now the condition of the Edinburgh dairies is so peculiar that no deduction drawn from the results obtained could be safely applied over an entire country. From a long and sad experience with lung plague, Edinburgh dairyman have been driven to a very peculiar system of management. They no longer dare introduce into their cow-houses any but animals in prime condition, which can be turned over to the butcher without material loss at a day's notice. A very large proportion of these cows, in the past, have been made into beef within three months of their arrival in the city dairies.

In this way the trade is made quite profitable, for the cows are only kept during the period of the fullest flow of milk, and when killed bring a good sum for beef. Hence the remark "the cowfeeders did not know how to make money until *the disease* came." Even the cows that are happy enough to escape the plague are still disposed of for beef as soon as the milk fails. None are kept on from year to year, none are sold to go out into the country, and no calves are born in the dairies and raised for stock. In these very exceptional conditions inoculation could scarcely fail to succeed. The suspension of all cattle traffic, the slaughter of the sick, and disinfection of the premises would of themselves have accomplished the same end independently of inoculation. This has been done in all those countries which have really stamped out lung plague alike in the Old World and the New.

But if we reverse the conditions no such uniformly good results could be expected, and none such have ever been obtained. Let the inoculated cattle be sent from the infected city stables to the country, and they would inevitably have carried the disease to many new centers. Let calves be born and reared in these dairies, or be sent from them to be reared elsewhere, and many of them would contract the disease themselves and convey it to others. Let inoculation be generally adopted over an entire country, and it will be found impossible to prevent the laying up of contagion in the buildings, fodder, &c., to develop the disease in the first susceptible animal that may be introduced. The first new-born calf, or the first cow purchased, must be promptly inoculated if we would protect her against the infected buildings and pastures.

On hearing of inoculation, many conceive that it is the exact counterpart of vaccination for small-pox, and that no more danger attaches to the one operation than to the other. The difference, however, is fundamental. In vaccination it is not the poison of *small-pox* that is used, but that of *cow-pox*, a perfectly mild and harmless disease, which is *utterly incapable of propagating small-pox*. In inoculation for lung plague, on the other hand, it is the virus of genuine *lung plague* itself which is introduced into the system, and the resulting disease, though it develops not in the lungs, but (by selection) in the tail, is due to the propagation in the last-named organ of the *true virulent germs of the lung plague*. As will be seen by a reference above, to the record of Bouley and Verheyen, the inflammatory exudate in the tail contains the same virulent bacteria as the diseased lung products, and, when inoculated on susceptible animals, produces the same series of local disease changes as if the pulmonary product had been used.

INOCULATED ANIMALS INFECTING.

The advocates of inoculation mostly assume that the inoculated animal is not infecting. But such a claim, if it could be established, would demolish their cherished theory of the protective influence of inoculation. The virus they use for inoculation is the virus of genuine lung plague, and if it fails to pullulate and grow, where inserted in the tail, it must equally fail to fortify the system of that animal against a subsequent exposure to this poison. If, however, as we fully concede, it is protecting, it can only be because the germs of lung plague introduced into the system have developed there and rendered the system proof against any subsequent exposure to these germs.

Before the introduction of vaccination for small-pox, some had prac-

ticed inoculation with the small-pox matter itself, with a view of inducing a less dangerous type of that disease than if it were contracted in the ordinary way. What was produced was a mild case of small-pox, which was, however, dangerously infecting to any unprotected person who came within the sphere of its influence. The exact counterpart of this is to be found in the inoculation of lung plague virus on the surface. In both cases alike there is produced a disease of the superficial structures, in which the virulent germs are multiplied by myriads, and from which these germs can be given off through the air or by direct contact to infect other susceptible subjects.

It can be freely conceded that this disease in the tail is far less likely to infect other animals than the same affection in the lungs. The density of the textures prevents that abundant proliferation and swelling which take place in the lungs or other organ of soft texture. There is, therefore, materially less poison to be diffused. But, more important still, the tidal air passing in and out of the lungs continuously acts like a bellows in keeping up a constant efflux of the virulent germs from within. To this there is no equivalent in the case of the inoculated tail. Finally, the air in the substance of lungs is not the pure air which surrounds the tail, and which tends to disinfect and destroy virulent germs, but it has been robbed of 4 per cent. of its oxygen, and charged with 4 per cent. of carbonic acid, beside water, vapor, and organic matter, conditions which greatly favor the preservation of disease germs and the intensifying of their virulence. Much, therefore, which favors the propagation of the disease from the lungs is absent from the affection in the tail. But the difference is only one of degree, not of kind. And numerous instances can be adduced in which inoculated animals have proved the centers for new diffusions of lung plague.

Reynal mentions the case of an inoculated Brittany cow at the Alfort Veterinary School, which infected two others standing on the two sides of her. (Police Sanitaire des Animaux Domestiques.)

Mr. Watson, after a most extended experience in Australia and New Zealand, where they inoculate cattle by the ten thousand, records it as a common observation that the disease is transmitted by inoculated cattle.

Inoculated cattle convey the contagion to those which are not inoculated.—This has been proved by the disease breaking out among cattle, where it had not previously shown itself, after their coming in contact with some inoculated animals which were free from the disease when inoculated. Cases of this sort, and even of cattle being inoculated before the disease had broken out among them, are so few that decisive evidence in this way is far from plentiful, but it is sufficient to establish the general fact. Further, it has frequently been the case, when all the others were inoculated, that a few head have been missed, and the percentage of deaths among those which were not operated on was always excessive; thereby showing that the inoculation of the disease on every side of them not only rendered their escape from the contagion impossible, but seemed to increase the virulency of the disease. (The Breeders' Live Stock Journal, April, 1880.)

In his letter quoted above, Mr. Everard E. Corbet furnishes the same testimony as to inoculation in South Africa, saying that the disease is "introduced to a greater or less extent each time of inoculation."

We might add other instances of this kind that have come under our own notice, but the above are more pertinent as coming from parties who are strong advocates of the practice of inoculation.

LUNG PLAGUE MUST BE SPREAD BY A GENERAL INOCULATION.

Having established the fact that inoculated animals are infecting, it is easy to show that a general adoption of this measure must be a most

dangerous expedient. Knowing what we do of the city cow stables and country barns that would be infected by a general adoption of inoculation, we feel confident that any perfect disinfection of these would enhance the cost of inoculation beyond all expectation. Then again it would be next to impossible to make such a disinfection sufficiently thorough to give assurance of safety. The removal and disinfection of all hay, straw, and other fodder, the destruction of all rotten wood, the removal of wooden floors, and of the saturated earth beneath them, the reinoculation of all subjects that fail *to take* at the first attempt, the rigid quarantine of the herds for thirty days or more, until the effects of the inoculation had passed off, the inoculation of all calves born in such herds, and of all cattle introduced into them, with the repetition of quarantine and disinfection, and the maintenance of sick animals and infected places for the production of the necessary virus, would render the measure far more costly, unwieldly, and uncertain than at first sight appears. In the method of extinguishing the disease by the destruction of the sick and disinfection of the premises, the disinfection is only demanded where the sick animals and their products have been. In such circumstances, and with comparatively but a limited number of infected places, the question of perfect disinfection is not always easy to solve. But with a general inoculation every bovine animal becomes an infected animal, and every building or place where such an animal has been, becomes an infected place. To take even a single city like that of Brooklyn, with its thousands of herds kept in all sorts of out-of-the-way places, with many of the owners unfavorable to governmental interference, and inclined to throw obstacles in the way, it would be an exceedingly difficult process; but when extended to country districts where cattle are often turned out in woods and swamps, where it is exceedingly difficult to find them, it would be inevitable that numbers would be overlooked and missed, as Mr. Watson confesses them to have been in Australia, to be infected later by the inoculated cattle in the same or adjoining inclosures, and to keep up the supply of virus for the infection of new-born calves and fresh purchases. We can easily adduce instances in which inoculated cattle in cities were allowed to pasture on the commons in company with other herds, and others in the country in which the inoculated cattle were separated from neighboring cattle by a rail fence only. Any one who has had to do with the quarantining of cattle on the *parole* of the owner knows how often slips are made and contact is allowed between the stock which are nominally secluded and those of others. The danger thus arising in a limited number of cases under the process of stamping out by slaughter of the sick, would be increased a hundred fold by inoculation though this were confined to infected localities only.

But the increase of such risks implies a corresponding increase of infected places and of the demand for disinfection; and as a certain number of outbreaks are always secreted, and those that take place by evasion of the law are pretty certain to be so, it would be practically impossible to carry the disinfectants along every channel of the stream of contagion.

EXPENSE OF A GENERAL INOCULATION.

At 15 cents per head, which is far below the cost estimated by the advocates of inoculation, inoculation of the 40,000,000 head of American cattle would amount to $6,000,000. But this does not provide for the

sacrifices of sick cattle to furnish the virus to be inoculated, for the disinfection of buildings, &c., where the inoculated cattle have been kept, for the reinoculation of those which fail to take, for the inoculation of new-born calves, for the erection of pens in which to operate on large and wild herds, nor for the percentage of losses of cattle subjected to the operation. The last item alone, at 2 per cent., would amount to not less than $16,000,000 more. Finally, inoculation has failed to eradicate lung plague from any country in which it has been attempted, though for thirty years it has been in extensive practice, so that this work is to be continued year after year upon the coming generations of animals, and the plague is to be rendered permanent in our midst. Thus a permanent tax of a grevious and altogether unnecessary kind would be imposed on the country.

It may be claimed that it will not be necessary to inoculate all the stock of the country, but only those of the infected States. This is conceded as true at present, but it is denied that we can look forward to any continuance of this restriction. The maintenance of the practice of inoculation, even in the infected States alone, implies the permanent preservation of the poison there, and such preservation entails the daily risk of its spread to the West, and thence through all the channels of the cattle traffic. Even independently of this there is at the margins of the inoculated districts an ever present opportunity for a wider extension of the disease; so that apart from a sudden extension to our grazing plains, there remains the probability of a continuous slow march of the disease in that direction.

In addition to all this is the fact that the persistence of this disease is the occasion of the continued embargo on our European cattle trade. We cannot, therefore, hesitate for a moment in advising a speedy extinction of the affection in preference to any mode of palliation of a disease which is now costing between two and three millions per annum, and promises in the future to cost incomparably more. It is simply a question of spending at once a portion of what we now lose in any one year by this disease, or submitting to a continuance of these losses and of their cause.

CONDITIONS IN WHICH INOCULATION IS ADMISSIBLE.

While absolutely condemning inoculation as inapplicable to our own particular case, we fully indorse the operation as a means of reducing the losses or even of exterminating the lung plague under circumstances differing from ours. *For reducing the losses* it is a commendable measure in infected, unfenced countries, such as the steppes of Europe and Asia, Australia, New Zealand, and South Africa. From the open pasture lands of these countries it has been found impossible to eradicate the disease, and the best alternative in the present state of our knowledge is inoculation. By means of this the losses are reduced from 50 to 10 per cent., but it holds out no hope of a final riddance of the disease. This same remark may be applied to countries that are necessarily the recipients of large importations of cattle from infected regions over which they have no control. So with large feeding (distillery) and dairy stables, where very frequent changes of stock are imperative, and where such stock can only be drawn from infected districts. In all these cases there is a choice of evils, and of the two, inoculation is incomparably the least. With us in the United States, on the other hand, we have a

better alternative—the entire extinction of the disease—and there can be no hesitation in the choice.

For eradicating the lung plague inoculation may be advocated in the case of insular or other perfectly secluded localities where the contagion is already widely diffused and still spreading. It must be made on every bovine animal in such place, and repeated on such as *do not take* the first time. A close inspection must be kept up on the whole; the sick, whether chronic or acute cases, must be killed, and all calves born in the herd must be at once inoculated or destroyed. If calves are continually being born in the herd, it will be necessary to destroy them for some time, as their continuous inoculation entails a perpetuation of the poison.

PRESENT LIMITS OF LUNG PLAGUE IN THE UNITED STATES.

In pursuance of our instructions "to investigate all cases of the disease known as pleuro-pneumonia in neat cattle which shall be reported to you, especially along the dividing line between the United States and the Dominion of Canada, and along the lines of transportation from all parts of the United States to ports from which cattle are exported, and to perform such other duties as may from time to time be prescribed by the Secretary with reference to said disease, to the end that cattle shipped from ports of the United States to foreign ports may be known and certified to be free from the disease in question," we have felt it less incumbent on us as yet to make any special investigations in the eastern areas known to be infected, and the limits of which are already fairly well defined, than to determine the question as to whether the disease had already spread beyond these areas and invaded New England or the country west of the Alleghany Mountains.

To this end Dr. Thayer has made extended investigations in New England, and Professor Law in New York, and both in the great cattle centers of Chicago and Peoria; while the other great centers of the live-stock trade have been subjected to rigid scrutiny by veterinarians deputed to the different points. In the same way we have investigated all cases of supposed contagious lung disease of cattle reported to us, and to-day we report a complete failure to find lung plague anywhere west of the Alleghany Mountain range or in the States of New England.

The conclusiveness of this statement will be better understood when we add that in most of our Western cities where cattle markets are held, the conditions for the preservation of this plague are at least equally favorable with those found around our infected Eastern cities, where this palgue has been maintained uninterruptedly for over thirty years. Thus, in all, the supplies of city dairy cows are drawn from the adjacent stock-yards, where cattle of all kinds and from all different points mix and succeed each other in the same inclosures. If, therefore, diseased cattle had passed through these yards the contagion must sooner or later have reached the city dairies, where the infected buildings and the frequent changes of stock, to keep up the milk supply, would have preserved it without fail. So with the herds in the distillery and other feeding-stables. These are supplied from the public stock-yards, and would early receive infection were that present in these yards; and the infection once received into these stables it must have been perpetuated, as it is in distillery stables in the East and in all parts of the world where the infection exists.

Again, in most of the Western centers of cattle traffic, Buffalo, Pittsburgh, Iron City, East Saint Louis, Indianapolis, Chicago, Kansas City, Council Bluffs, Galesburg, and Geneseo, the local herds wandering at large are allowed to come close up to the fences of the stock-yards, and even in some cases to wander along the alley-ways between the inclosures, so that if they failed to contract infection through accessions of new stock drawn from the yards they could not long escape the result of frequent contract with the yarded cattle, if infection existed at all among the latter.

Then, again, in most of the Western cattle centers, Kansas City, Saint Louis, Council Bluffs, Geneseo, Galesburg, Chicago, Milwaukee, Indianapolis, and even in Iron City and Allegheny City (Pittsburgh), and Buffalo, the dairy cows, and sometimes feeding-herds, are turned out in summer on the commons or prairies where the stock of different owners mingle freely, so that we find all those conditions existing which have served to perpetuate this infection in all countries where its ravages are continuous.

As will be seen more fully by reference to the reports of Drs. Farrington, Murray, and Paaren, appended, we found all the conditions usually supposed to cause such disease in cattle existing, but no lung plague resulting. We found swill-feeding, feeding with the refuse of glucose and other factories, crowding, close, ill-ventilated, filthy buildings, absence of all drainage, cattle subjected to long and exhausting journeys by road, to railroad transit in open cars in the depth of winter and the height of summer, under scorching suns and in rain, fog, and snow, but not one nor all served to develop lung plague.

As if to add proof to proof, until doubt became impossible, we traced these conditions along the lines of cattle traffic, from Kansas City, Omaha, and Council Bluffs, through all the successive steps on the journey eastward, through Saint Louis, Peoria, Geneseo, Galesburg, Chicago, Elgin, Milwaukee, Indianapolis, Cincinnati Toledo, Detroit, Grosse Isle, Cleveland, Pittsburgh, Salamanca, Buffalo, Suspension Bridge, Rochester, Deposit, Albany, Boston, Portland, well knowing that seeds gathered into the river at any part of its course, or through any affluent channel, will find their way into the main trunk and spring up at intervals along its banks. Soil and climate being favorable to the growth of these seeds they will appear especially wherever the waters of the river have been delayed and have overflowed their banks. But at no point of detention or overflow, at no market, stock-yard, nor feeding yard, in no herd coming in contact with the inmates of these yards, and in none recruited continually from them, have we been able to find a single trace of lung plague from the source of the traffic at the plains to its terminus in our extreme eastern State.

At the time of our examinations not a shadow of suspicion of lung plague could be thrown upon our Western herds. And with circumstances everywhere so favorable to its preservation, to have had such a plague once introduced in the line of our cattle traffic was equivalent to having it permanently established. Its absence, therefore, at the present moment is a sufficient guarantee of its absence in all past time.

The following table will serve to show the facilities for the infection of local herds in case the lung plague really entered the line of our cat-

tle traffic from the West, and the facilities in common pasturage, mingling of herds, &c., for its perpetuation if once introduced:

	Cattle admitted to stock-yard in 1881.	Dairy herds replenished from stock-yards.	Distillery, &c., herds replenished from stock-yards.	Local herds come in contact with those in stock-yards.	Pasturage in common on unfenced land.	Lung plague in stock-yards.	Lung plague in local dairies.	Lung plague in distillery and feeding stables.	Lung plague at abattoirs.	Lung plague at rendering works.
Buffalo	800,000	Yes.	Yes.	Yes.	Yes.	None.	None.	.....	None.	None.
Suspension Bridge	Few.	Yes.	.....	No.	.....	None.	None.	.....	.....	.....
Rochester	7,000	Yes.	.....	No.	No.	None.	None.	.....	None.	None.
Salamanca	40,000	Yes.	.....	No.	No.	None.	None.	None.	None.	None.
Pittsburgh	380,000	Yes.	Yes.	Yes.	Yes.	None.	None.	.....	None.	None.
Cleveland	Few.	Yes.	.....	No.	No.	None.	None.	None.	None.	None.
Milwaukee	30,000	Yes.	Yes.	No.	Yes.	None.	None.	None.	None.	None.
East Saint Louis	350,000	Yes.	Yes.	Yes.	Yes.	None.	None.	None.	None.	None.
Saint Louis	112,000	Yes.	Yes.	Yes.	Yes.	None.	None.	None.	None.	None.
Kansas City	244,000	Yes.	Yes.	Yes.	Yes.	None.	None.	None.	None.	None.
Council Bluffs & Omaha	300,000	Yes.	Yes.	Yes.	Yes.	None.	None.	None.	None.	None.
Geneseo	100,000	Yes.	.....	Yes.	Yes.	None.	None.	None.	None.	None.
Galesburg	130,000	Yes.	.....	Yes.	Yes.	None.	None.	None.	None.	None.
Peoria	*30,000	.....	Yes.	.....	.....	.....	.....	None.	None.	None.
Indianapolis	?	Yes.	Yes.	Yes.	Yes.	None.	None.	None.	None.	None.
Chicago	1,400,000	Yes.	Yes.	Yes.	Yes.	None.	None.	None.	None.	None.
Elgin	.....	Yes.	.....	.....	.....	.....	None.	.....	.....	.....
Detroit	95,000	Yes.	.....	.....	.....	None.	None.	.....	None.	None.
Toledo	.....	Yes.	.....	.....	.....	.....	None.	.....	.....	.....
Cincinnati	180,000	Yes.	Yes.	.....	.....	None.	None.	None.	None.	None.
Albany	.....	Yes.	.....	.....	.....	None.	None.	.....	None.	None.
Brighton and Boston	.....	Yes.	.....	.....	.....	None.	None.	.....	None.	None.

*Fed.

But our evidence is far from resting solely on our recent investigations. Dr. Thayer, who has been cattle commissioner for Massachusetts since he was instrumental in stamping out this disease from that commonwealth in 1865, has made frequent examinations of the lungs of western oxen in the Brighton slaughter-houses throughout all the intervening years since, but has failed to find any indications of lung plague during the whole of this period. In his official capacity he has been called upon in all cases of diseases among farm animals supposed to be contagious, but in all these eighteen years he has not met with a single case of lung plague of cattle within the borders of Massachusetts.

Professor Law, who has spent over thirteen years at Cornell University, and as consulting veterinarian to the New York State Agricultural Society, has been similarly called to any contagious disease in domestic animals occuring in the agricultural portions of the State, but he has not once met with the lung plague to the west of the Alleghany Mountains, nor to the north of Putman County.

Dr. Paaren, State veterinarian of Illinois, who has spent a number of years in Chicago, has been most extensively consulted on diseases of cattle in all the surrounding States, and has, in connection with the commission, made special investigations at Peoria, Chicago, and Elgin, has not once, in all this long experience, met with a genuine case of lung plague in the West.

Mr. J. H. Sanders, of our commission, whose business for many years past has led him to note with extreme care every indication of contagious disease among the cattle of the Western States and Territories, has caused every suspicious case or circumstance that has come to his

knowledge during all these years to be carefully investigated, and has failed to find a single trace of lung plague.

Prof. A. J. Murray, formerly of the New Veterinary College, Edinburgh, and of the Cirencester Agricultural College, has spent fifteen years in Detroit, Mich., and part of this time has been State veterinarian, and who is well acquainted with the lung plague as seen in Great Britain and on the European continent, has never seen a single case of this malady in Michigan.

Drs. Somerville and Son, veterinarians in the great cattle center of Buffalo, have not, in a forty years' residence, seen a single case of this plague. Drs. Myers and Son, veterinarians in Cincinnati, have not, in an equal length of time, seen any such case in that city.

Dr. Farrington's report, hereto appended, furnishes similar evidence from all the points visited, so that the sum of the evidence, past as well as present, attests the entire freedom of the West and South from this infection.

In the course of our investigations it must be admitted that contagious diseases of cattle have been met with—Texas fever, tuberculosis, anthrax, &c., but not a single case of lung plague.

Dr. Thayer, investigated at East Rindge, N. H., a disease apparently closely allied to anthrax, which killed off a herd with one exception, and in which the lungs were sometimes congested and in other cases not. At Southborough, Mass., he made a necropsy of a recently imported cow, which showed hypostatic congestion of one lung but the real malady was disease of the liver. At Pictou, Nova Scotia, he made inquiries into a dropsical affection which prevails fatally in that region, but found that it showed no lesions allying it to lung plague (see Report on Disease at Pictou).

Inflammatory and other diseases of the lungs are likewise met with again and again, both in the East and West; but the symptoms, lesions, and history in every case out of the well-known infected area showed the disease to be distinct from the lung plague.

On the occasion of a visit of the commission to the Chicago stockyards September 5, 1881, they were presented by the meat inspector with a portion of a bullock's lung which he had secured that morning as the one suspicious case out of the thousands slaughtered in the course of a few days. In this the interlobular tissue was puffed up with air to an average thickness of half an inch, and the surface being somewhat dried and blanched it contrasted strongly with the red lobules, and the whole to the casual glance presented a strong resemblance to the lesions of lung plague. This, which has doubtless been often mistaken for the genuine contagious disease when seen in the slaughter-house, we found afterward to be a not uncommon condition of the lungs in swill-fed bullocks. The warm swill, often fed at 100° F. and even warmer, together with the dense water vapor which rises from it, irritate the throat and lungs, causing coughing, especially in the new-comers. In the Chicago and Peoria swill stables cattle with a temperature of 103° and 104° F., with accelerated breathing and weak husky cough, were on examination found to be mainly affected with this *interlobular emphysena.*

In other outbreaks of pulmonary inflammation in young cattle investigated in New York and Iowa the cause was found in the myriads of round worms (*Strongylus micruris*) inhabiting the air tubes and lung substance.

In an outbreak of broncho-pneumonia in Duchess County, New York, investigated by Professor Law, the case was very suspicious because of its proximity to an infected area, because the diseased cattle were recent

purchases, and because in bringing them home from Connecticut they had passed through New York City. It is not surprising that these had been already pronounced genuine cases of lung plague. The facts, however, that the five sick cattle were all attacked at once 105 days after exposure in New York, and coincidently with a sudden access of cold and damp, which had produced catarrh in men, that none of the original herd suffered, and that the symptoms were not quite identical with those of lung plague, procured a favorable diagnosis which has been amply vindicated by four months of subsequent immunity.

Dr. Murray, of Detroit, furnishes an interesting case of pneumonia (in a city dairy cow) which could easily have been mistaken for the contagious disease, but here, too, this favorable verdict has been abundantly sustained by the continued healthy state of the remainder of the herd.

Dr. Murray further discovered a series of interesting cases of circumscribed *lobular* pneumonia, which, apart from the very limited nature of the lesions, bore a strong resemblance to the diseased changes found in lung plague. A close examination, however, detected the presence of the common liver fluke (*Distomum hepaticum*), which he has found to be rather a common denizen of the lungs of Texas cattle, and may, at different times, have brought upon them unnecesary suspicion.

In one instance, at Elgin, Ill., investigated by Dr. Paaren, two cows in the same herd had died of pneumonia, but the facts that no new cattle had been introduced upon the farm for six months, that the herd had had no means of communication with cattle outside, that the disease occurred in December, when the inclemency out of doors and the close air indoors were calculated to induce diseases of the lungs, that the malady killed the subjects in four and five days respectively, whereas lung plague in winter usually takes half as many weeks, and finally that the changes in the lungs were those of simple pneumonia, sufficiently attest that this was a non-contagious form of pulmonary inflammation like that found in Detroit by Dr. Murray.

In still another instance in New York, investigated by Professor Law, where a number of cattle had already perished, and in which the lungs of several that had been opened were found to be consolidated, the disease was found to be due to bacteridian poison, and though the lungs were the seat of blood extravasations in one case, the spleen and liver suffered in a second, and the intestines in a third. Appropriate medicinal and hygienic measures put a speedy period to the mortality.

These will serve to illustrate the nature of the different lung diseases which were found existing in the western and southern cattle. While we have found various forms of these diseases among these cattle, as we find them in other genera of animals, we have not, in a single instance, found what a professional man acquainted with the disease could have mistaken for the lung plague.

We claim, therefore, with the utmost confidence, that up to the end o the year 1881, the lung plague of cattle has been confined to the vicinity of the eastern seaboard, extending from Putnam County, New York, to Fairfax or Prince William County, Va. Connecticut is sound and North Carolina is sound, so that at present the infection is confined to the States of New York, New Jersey, Delaware, Pennsylvania, Maryland, and Virginia, and the District of Columbia.

THE PLAGUE IN NO WAY DISAPPEARING.

While we submit the above undeniable proof of the absence of the lung plague from the West, we are not to be held as for a moment in-

dorsing the optimist views of some as to its decline in the East. The Governor of New York, in his annual message, congratulates the State "that while the cattle disease, known as pleuro-pneumonia, which formerly menaced the farmers in this State, is not entirely eradicated, it has been confined to limited areas, and seems to be gradually disappearing. With a single exception, not likely to cause further trouble, the disease has been confined to a small portion of Long Island, and it is hoped that it may be speedily and entirely eliminated from our territory." It is much to be regretted that the governor should have been so far misled. He has in his regular employ no professional inspectors to inquire into the status of the disease in the State, and manifestly trusts to the owners of diseased herds to report to his office. Every one acquainted with the disease knows that this is the last thing the city dairyman would think of doing, and therefore the fact that no such reports have been made by no means implies that the disease does not exist. This is well illustrated by the fact that for thirty years, from 1848 to 1878, this plague prevailed extensively in New York, Brooklyn, and adjacent districts, yet its existence was not so much as suspected by the Executive at Albany, by the New York State Agricultural Society, nor even by the Metropolitan (New York) Board of Health. The former governor took no action under the law which enjoined him to stamp out and circumscribe animal plagues, until the complaint of lung plague in American cattle came from England in the end of 1878. The secretary of the New York State Agricultural Society, in letters to the British consul, dated January 24 and 25, 1879, expressed in the strongest terms his belief that no such plague existed on the American continent. Finally when the work of stamping out the plague was inaugurated in 1879, the sanitary superintendent of the New York City Board of Health expressed to one of our number (Professor Law), the opinion that he would find no cases in the city of New York. This last opinion was based upon a frequent inspection of the city dairy herds by medical members of the board of health, so that the sanitary superintendent was presumably in a far better position than is the present governor to pronounce upon the condition of these herds. Yet investigation at that time showed that the disease then prevailed most extensively throughout the whole of the city, from Water street on the south to Yonkers on the north.

Judged by the number of cows dying of disease it may be held that the lung plague is decreasing in New York City, but inquiry in the dairies shows that the sick are being disposed of for beef at the onset of illness, in place of being kept until they die of the disease. A sick cow was found abandoned in December, 1881, at Thirty-eighth street and Eleventh avenue, but none of the dairymen in the vicinity would acknowledge any ownership in the animal, nor that they had personally lost any cows for a year or two. John Hearley, Eighty-sixth street and Lexington avenue, keeps 5 cows, and had one sent to the offal dock the last week of November. On inquiry he acknowledged he had sold two more sick to the butcher in the course of the same month. He found it, he said, the most profitable course to turn them off for beef when attacked with sickness. Mrs. Taylor, directly opposite on Lexington avenue, also kept 5 cows, and she too confessed to having sent to the butcher two cows that sickened on the course of November, 1881. Kearney, a few doors further up, keeps 7 cows, and makes no secret of the fact that he turns off the sick to the dealer, and puts in others in place of crowding his stables with sick and profitless animals, which prevent him from keeping a full remunerative stock. Mrs. Hurtin, Seventy-first street and First avenue, keeps 7 cows, and claims that she has

lost none since she entered the business, but her boy confesses that she sold one to the butcher, sick, in December, 1881, and a dead cow was removed from the street adjacent to the offal dock in the same month.

A dairyman at Eighty-second street and Avenue A keeps 11 cows, and claimed to have had no losses for two years. On being confronted with the fact that he had sent a dead cow to the offal dock in December, 1881, he explained by stating that, having been sick, he gave her 3 pounds Glauber salts, which *burned her lungs*. These few items, secured from the only dairies that could be seen in a very hurried visit, sufficiently deny the optimist view that the disease has disappeared from New York City. They show plainly that the lesson learned long ago by the dairymen of the Old World, and more recently by those of Washington, D. C., that it is unprofitable to keep a sick cow at a daily loss when her place can be filled by a fresh one at a daily profit of $1.50 to $2 is now being learned by the milkmen of New York. The debt and credit account on a good cow that is kept eight weeks in a city dairy may be stated thus:

Dr.		Cr.	
Price of fresh cow	$60	Milk at $2 per day	$112
Feed at $2 per week	16	Returned as sold, sick	15
	76		127
			76
		Profit	51

It is easy to see how a remunerative business can be conducted in spite of disease, and as a certain number of animals entirely resist the contagion the profit is sometimes higher than is here indicated. The system makes it difficult to find sick animals on the premises and does away with the chronic cases, which under other circumstances betrayed the presence of the infection, but in the absence of any universal system of disinfection it accomplishes little toward the eradication of the malady. The system is in some respects rather calculated to perpetuate the malady, for the constant changes and the steady influx of fresh and susceptible cows into the contaminated buildings, but adds fresh fuel to the flame.

Another point in the case that should not be lost sight of is that the cows are usually sold not to the butcher direct, but to a dealer. When, therefore, a dairyman wishes to dispose of his entire stock and begin anew, the dealer slaughters only the fresh cows and sells to other dairymen the cows that have been exposed to infection, but which are still apparently healthy. Thos. Kearney, Lexington avenue and Ninety-sixth street, stated that one year he sold 15 cows sick from a standing stock of 7, and that on one occasion he sent his whole 7 for sale to the Union Stock Yards at Fifty-ninth street, and at once filled their places with 7 more. A second instance of the same kind, but related more in detail, recently occurred on Staten Island. An infected herd belonging to a nursery for children at Willow Brook, S. I., was bought by a Mr. Cuttler, of the same place, as sound animals. Discovering his blunder Mr. Cuttler killed 16 and sold 15 for slaughter to Maybaum, a dealer, at $27.50 per head. A few days later Mr. Cuttler saw one of the herd in the stables of Messrs. Pero Brothers, New Brighton, where she had been sent on trial. He remonstrated with Maybaum, who took the cow back, but only to dispose of her anew at $65 to a dairyman at Long Neck, who owned 9 other cows. Soon after the cow sickened and was sold back to Maybaum for $25 and slaughtered. Since that time the whole

herd of 9 have been sold sick to Maybaum. It is further alleged that others of the original nursery and Cuttler herd after passing into the hands of Maybaum found their way into New Jersey, and infected two separate herds at Washington and East Millstone, N. J. To complete the story it must be added that Maybaum continued to deal in cows and to use the same buildings for the accommodation of the transient cattle without having adopted any disinfection or other visible measures of precaution.*

Where such a system is carried on, to trust in the disappearance of the disease is to trust in a delusion. The lack of recorded cases is mainly the result of the absence of inspection, and a different showing will be made when the movement of cattle is prevented, save under license, and, when a thorough inspection is made and repeated at intervals.

Another lesson to be deduced from the above is that no system of the mere purchase and slaughter of the sick, apart from the suspension of movement and a frequent inspection of the herds, can be relied on to stamp out the disease. A herd may be visited twenty times without the discovery of sickness, yet the next occasion may detect the affection, the germs of which have been present throughout.

An impression has been created that the disease has now very little prevalence in New Jersey, but in a visit to Newark, on January 2 and 3, Professor Law found within the limits of a single street at Orange four infected herds, while others were reported in adjacent villages. So far as could be learned, not one of these had been visited or put under any restriction on behalf of the State. He learned further that no separate markets were kept for cattle from healthy and cattle from diseased districts; and that around the cities and villages promiscuous pasturage is still allowed on the open commons. This laxity is doubtless excusable on the ground that the entire yearly appropriation for dealing with this disease in New Jersey, is $5,000, which is utterly inadequate to a successful work of extinction. It is only right that this inadequacy and its consequences should be fully known to those intrusted with Federal legislation on the subject.

With regard to Pennsylvania, it may said that in spite of a very liberal system of indemnity, which is one of the most effective measures that can be devised, the disease was at first perpetuated by the preservation of chronic cases, and throughout by the admission of cattle from all sources and for all purposes—store and beef—into a common market. It is understood that chronic cases are now condemned, but on the other hand the indemnity has been reduced from sound value to one-half, and this, together with the infected markets, have so far served to keep up the disease.

In Maryland a commission was created to attend to the disease, but we have learned nothing of their doings. A State veterinarian was also appointed with orders to report, for the governor's action, all cases of the plague. Extensive prevalence of lung plague was discovered, but

* Since the above was written the following additional cases have come to light: Joseph Hyde started in December last with a dairy of 43 cows in Westchester County, New York.. Soon lung plague appeared; two died and the remainder were resold in the Union Stock-Yards (and sheep-house), New York, for beef and store purposes. They carried disease into different places in New York and New Jersey. On February 24 was found in the sheep-house at the Union Stock-Yards a cow sick with lung plague and in company with 38 other fresh milch cows waiting for purchasers. Two large herds (one of 100 head) in Westchester County have been recently infected with lung plague through cows purchased at the Union Stock-Yards. In December, 1881, A. S. Baldwin, of Patterson, Putnam County, N. Y., bought two cows at the sheep-house, New York, which infected his herd of 32 head, and exposed to infection two herds of 20 and 30 head, respectively in neighboring pastures.

we have not learned that the governor has taken any active measures to stamp out the affection. In the old stock-yards on Baltimore street (Baltimore and Potomac, and Pennsylvania), we found, on inquiry, that cattle from all quarters are admitted indiscriminately, whether from the infected city stables or the uninfected Western States, and that cattle for export, and those for store purposes at home, are shipped to their destination from these inclosures, so recklessly exposed to infection. The result has been that New York, New Jersey, and Pennsylvania have made frequent complaints of infection introduced into these States by infected cattle from Baltimore; and even in Washington we were informed of infected cows having been sent to that city from the capital of Maryland. Partly to remedy this state of things, new stock-yards (Baltimore & Ohio) have been constructed at Baltimore, into which, we were informed, only western and southern cattle were to be admitted, but here again a fatal blunder was committed; Virginia was accounted a Southern State, Virginian cattle were admitted, and, as a result, on the first day the yards were open four chronic cases of lung plague were detected in them.

In the District of Columbia, and in Fairfax County, Virginia, the disease is still extensively prevalent. The free movement of cows from stable to stable, and from place to place, is in no way interferred with, so that the disease finds new channels constantly open for its progress. The treatment of the sick is also a frequent practice, and the distempered beast, standing among the healthy, and in the buildings to be afterward occupied by the healthy, serves through both channels to perpetuate the virus. The city dairymen of Washington, as of other cities, are very apprehensive of official interference as calculated to ruin their business, and, therefore, when a sick cow is discovered, they often lose not an hour in sending her to the slaughter-house and having her carcass converted into beef.

This is a sorry showing for those who are earnestly looking for an extinction of this affection; but it is a state of things which must continue until more stringent measures are enforced over the whole infected territory, including the entire suppression of the free exposure or movement of cattle, the slaughter of all cases of the disease, and the thorough disinfection of the infected premises and things.

That system which ignores the necessity for inspection in localities now or recently infected, which allows the free movement and trading in cattle in such districts, which maintains the practice of pasturing or otherwise exposing the herds of different owners indiscriminately on the same lots, which keeps up markets for the common use of cattle from all sources, infected and uninfected, and concludes that because the disease is not reported it is therefore dying out, would only be equaled by the covering up with putty and paint of the rotten rafters of a decaying tenement. The landlord and tenant may be persuaded that the beams are strong and sound, and the inmates may live on in fancied security, but the final crash will not be delayed by a single day, and the delusion will only be seen when the tumbling building buries in death its trusting victims.

In making these statements nothing can be farther from our purpose than to throw any invidious reflections upon the executive or other officers of the various infected States. We are willing to accord them all due credit for honesty of purpose, but we cannot ignore the fact that they have failed to apprehend the full importance of this work and the necessity for such measures of suppression as can alone be expected to succeed.

CAN CATTLE SHIPPED FROM NEW YORK, PHILADELPHIA, AND BALTIMORE BE FURNISHED WITH CERTIFICATES OF HEALTH?

The ports of New York, Philadelphia, and Baltimore, being situated in infected localities, and the stock-yards at each of these places being open to cattle from all sources, including the infected vicinity, it is manifest that even Western cattle, coming through these yards and shipped from these ports, cannot be guaranteed free from the germs of this plague. In this case it is not the yards, troughs, litter, &c., alone which are to be suspected, and which are frequently infected, but even the cattle-boats, by which the animals are usually carried to the ocean steamers. These boats, at the port of New York, carry nearly all cattle from the New York to the Jersey City stock-yards, and *vice versa*, so that they very frequently convey cattle from infected districts, and even those which are themselves infected.

All the recent outbreaks of lung plague in Pennsylvania have been traced to cattle from the Baltimore stock-yards. Many outbreaks in New Jersey were traced to the Philadelphia stock-yards, and there cannot be a doubt that under the present condition of things, and with the free mingling of all kinds of cattle, infection is occasionally carried from the stock-yards of New York and Jersey City as well. (See foot-note above.) Manifestly, therefore, no guarantee of health can be furnished with cattle from these ports until a better system shall have been inaugurated.

CAN CATTLE SHIPPED FROM BOSTON AND PORTLAND BE GUARANTEED SOUND?

Boston and Portland are both outside the present infected area. They are also in communication with the West by railroad, without coming within eighty miles of the nearest point of infection (Putnam County, N. Y.). It is, therefore, quite possible at the present moment to ship cattle coming from New England, Central New York, and the West, from the two ports in question, with a clean bill of health. It may well be questioned, however, how long the immunity of these ports could be maintained if such a premium were placed upon cattle shipped from them. Suppose Great Britain were to be satisfied with such an arrangement, and to admit store cattle from Boston and Portland, abolishing, so far as they are concerned, her compulsory slaughter of American beeves, the cattle from these places would bring on an average $10 to $20 per head higher than those from other ports of the United States. If no restriction were imposed, it would at once become desirable to ship cattle from our infected ports and districts to these favored ones, and soon their boasted immunity would have fled. For our own protection, therefore, as well as for the protection of Great Britain and of the British trade, it is imperative that certain restrictions be imposed on the movement of cattle from the infected States before any attempt is made to issue certificates of health with cattle shipped from any American port. This brings us to the consideration of measures that are equally essential for the protection of our home herds and our export cattle.

PROHIBITION OF EXPORT OF CATTLE FROM AN INFECTED STATE.

We prohibit the importation of European cattle except under a quarantine of ninety days. For the same reason precisely we should prohibit the movement of cattle out from an infected State or district, ex-

cept under a quarantine of similar length. Every argument that can be advanced in support of the one is equally valid for the other. The same law that condemns murder, condemns suicide also; the same considerations which expel the pillaging foreign army, doom the native robber as well; the same rule which quarantines the yellow-fever ship, sends the city small-pox patient to the hospital. The lung plague in our own infected districts is no less dangerous than that which may be imported from Europe. If we allow this plague to reach our great open pasturages it will matter little whether it has come from Liverpool or New Jersey, from York or New York, the effect will be the same. It will be none the less virulent and deadly in Montana, that it has already devastated the fields of Maryland. When it passes into the busy channels of commerce, it will matter nothing whether it emigrated from the Old World thirty years or thirty days ago; the disaster will be no less great and the ruin no less remediless.

It is a matter of honor and consistency, as well as of self-protection, to prohibit movement of cattle from infected States. We can appreciate the folly of England in imposing compulsory slaughter on American cattle at the port of debarkation, and admitting freely the stock from the plague-stricken mountains of Ireland; and, seeing this, we cease to wonder at the perpetually recurring outbreaks in spite of a most expensive system of repression. We condemn England for this folly, but in so doing we condemn ourselves also.

At the end of 1881 we could pronounce the great West free from this plague, but in the absence of a prohibition of the movement of cattle from infected States, we cannot guarantee this for a single day. Upon the protection of the West all future success in dealing with this plague depends, and thus the prohibition named is the first essential step in the course of extinction.

It is clearly the duty of the Federal Government to forbid the movement of store cattle out of any infected State into any other State, except after a rigid quarantine such as is enforced against foreign infected countries. The prohibition to be effective must debar the store cattle from one infected State from entering another State, even though the latter should also be infected. This will put a stop to most of the smuggling, for transgressors will be made amenable to the Federal law, on whichever side of the State line they may be found.

Shipment westward or southward, which is the great thing to be guarded against, will be most effectually shut off by issuing an order to railroad and other carrying companies, interdicting them from moving cattle out of the State except after quarantine as above specified. The lung plague being confined to the eastern portions of New York, Pennsylvania, and Maryland, the cost of shipping cattle from infected districts to near the western frontier, unloading them, driving them over the line, and reshippping, would be too expensive to be indulged in in the case of common cattle. In the case of thoroughbreds, the herd-book record will expose any transgression to detection and prosecution.

TRANSMISSION OF CATTLE THROUGH AN INFECTED STATE.

In view of the enormous dimensions of our cattle traffic, and the fact that the western supplies for the large manufacturing cities of New England must be carried through New York, a provision must be made whereby cattle from an uninfected State can be carried by certain routes through an infected one into a second uninfected State. It must be provided, however, that this shall be done only on through trains which do

not stop to take up cattle, or fresh unmanufactured products of cattle, such as hides, horns, hoofs, unrendered tallow, entrails, or manure, within the infected State. Thus the New York Central may carry western cattle and transfer them to New England by the Boston and Albany or Hoosac Tunnel roads.

PROVIDE BONDED MARKETS FOR EXPORT AND STORE CATTLE AT PORTS OF EXPORT.

To further protect cattle for export and those intended for store purposes at home, it will be necessary to construct, or otherwise secure, at the ports of New York, Philadelphia, and Baltimore, stock-yards sufficiently near the termini of the railways to allow of the access of cattle to them without risk of contagion. If possible, lines of rail should be constructed to the yards, so that cattle trains may unload into chutes within or alongside them. In case they must be conveyed from the terminus by road it should be by one designated road, where there is no possible opportunity for their coming into contact with, or into close proximity to, other cattle, or fresh products of cattle. When they have to be conveyed by water, it must be by one designated boat only, the manager and owner of which are under bond to carry no other cattle or fresh products of cattle.

The yards should be in charge of a responsible person, or persons, who should see to the rigid execution of all rules in force. To such person, or persons, before any load of cattle is unshipped, should be delivered a way-bill, signed by the railway agent at the point of shipment, giving place of departure, date, number and description of cattle, owner and consignee. The conductor should also furnish a certificate showing that they have come by a through train, and that they have not been unloaded anywhere on the route, nor left standing in the vicinity of common cattle-yards, and that no cattle, nor unmanufactured products of cattle, have been taken upon the train within the limits of the infected State or States.

For the conveyance of these cattle to the bonded markets all railroads (and connecting lines) shall be eligible which connect with the bonded market, and can run through trains from uninfected States according to the rules prescribed.

RULES FOR THE REMOVAL OF CATTLE FROM BONDED MARKETS.

Cattle for export should be shipped from the market on the steamer direct, or, if they must be conveyed on any intermediate boat, it should be on one especially reserved for the cattle going to and from the bonded market, and prohibited from carrying any other cattle or fresh or unmanufactured products of cattle in the intervals of such use. To guard against imposition, and to furnish evidence abroad that the certificate of health pertains to particular cattle, these may be furnished, before leaving the yards, with ear-tags, bearing letter and number, which, with the date, name of vessel, shipper, consignee, &c., may be specified in the certificate, and registered in a book kept at the bonded yards.

In the case of store cattle, not intended for export, the bonded yards will enable local authorities to permit the distribution of sound cattle only, and to insure that they shall be sent to their destination direct, under a permit giving date, number, and description of animals, owner, route, destination, and time of expiry of the permit. While this pertains to the process of *stamping out* the disease, which may be delegated to States rather than undertaken by the Federal Government, yet these

national bonded yards can be made subservient to such *stamping out*, and an essential condition of it.

The precision demanded in connection with such bonded yards may be complained of at first as too severe, *but it is absolutely essential to any sufficient guarantee of soundness*, and even the local dealers will soon realize its advantages, for not only will it secure a valuable certificate of health for export cattle, but in the case of store cattle for home sale it will be an assurance to the buyer that the animals are free from lung plague. To the buyer such an assurance will be most acceptable, so that readier and better sales can always be counted on.

Should it be thought inexpedient to establish such bonded markets, certificates of health could still be granted with cattle shipped from Boston and Portland, *provided all movement of cattle out of infected States is strictly prevented.* This would, however, place a heavy incubus on the export cattle trade of New York, Philadelphia, and Baltimore.

DISINFECTION OF RAILWAY CARS, SHIPS, ETC.

This must be demanded and secured in the case of all cars or other means of conveyance for taking cattle to or from the bonded market. As the railways and ships coming to such market are at least in close proximity to an infected district, and are liable to be used at any time for the conveyance of infected cattle, or their infected products, it is essential to success that they be disinfected in every case before the cattle going to or from the bonded market are placed in them. The following circular, prepared sometime since by this commission, covers this subject:

CIRCULAR CONCERNING DISINFECTION.

In view of existence of contagious pleuro-pneumonia of cattle at points near the Atlantic seaboard comprised between 38° and 42° north latitude, the Treasury Cattle Commission respectfully call the attention of all carrying companies and all others engaged in the transportation or removal of cattle to the following suggestions for the disinfection of cars, boats, places, and things in order to limit the spread of this malady.

1. Disinfection of railroad cars.

A. Cleanse the car with water (preferably boiling), scraping or brushing off all filth; then,

B. Wash the interior thoroughly with one of the following solutions:

a. Chloride of lime, 4 ounces; water, 1 gallon.

b. Sulphate of zinc, 4 ounces; common salt, 2 ounces; water, 1 gallon.

This should be adopted for all cars that have been used for carrying cattle from any herd within the infected area, or from stock-yards, or other places of detention or sale, to which cattle from the infected districts have been admitted. This will include the Union stock-yards, New York; the Jersey City stock-yards; the stock-yards at Philadelphia and Baltimore, and any other cattle marts within the infected area, or in its near vicinity.

Persons moving store cattle within the districts in question should be especially careful to secure the disinfection, as above, of cars, trucks, and other vehicles before their stock are allowed to enter them. The same remark applies to yards, sheds, and other buildings in which it may be necessary to detain cattle while in transit.

2. Disinfection of ships, barges, etc.

All craft employed in the conveyance of cattle by water may be washed and disinfected in the same manner as cars. As an application to the main or lower deck, however, the solution made with sulphate of zinc and common salt is to be preferred to that made of chloride of lime, as the latter gives off vapors which are disagreeable and irritating when confined in an inclosed space.

In the case of steam vessels, the application of the disinfecting solution should be preceded by a current of steam from the boiler directed through a hose upon all parts of the surface in succession. This, if universally applied, is an excellent disinfectant, as the diseased germs cannot survive the temperature of boiling water.

Another measure, which should never be neglected, is the fumigation of the spaces beneath the decks with the fumes of burning sulphur. From five to ten pounds of the flowers of sulphur may be used for an ordinary ocean-going steamer. It may be laid on a bed of glowing coals, in a metallic pot, set on brick or other incombustible material, between decks, the port-holes and hatches being closed for a period of five hours or more. To secure a sufficient fumigation, the sulphur should be allowed to burn until it is extinguished by its own smoke.

4. DISINFECTION OF BLANKETS, BAGS, AND OTHER TEXTILE MATERIAL.

Blankets, rugs, grain-bags, and other textile fabrics and ropes used about suspected animals, should be boiled or steeped in a solution of carbolic acid (2 ounces of the acid in 1 gallon water), or, failing these, should be placed in a close room and thoroughly fumigated with sulphur smoke. The clothing of the attendants on sick cattle should be treated in the same way.

4. DESTRUCTION OR DISINFECTION OF LITTER, FODDER, AND MANURE.

The manure from places occupied by suspected animals, and that furnished by the cars, trucks, wagons, yards, buildings, and vessels which demand disinfection, should be burned, if possible, or, failing this, should be first drenched with a solution of copperas (sulphate of iron) at the rate of one pound of the agent to one gallon of water, and then removed by horse teams. Litter and fodder should not be removed from the inclosure until it has been thoroughly fumigated by burning sulphur, and even then it should be fed to horses only.

5. DISINFECTION OF YARDS, BUILDINGS, ETC.

Yards or other open inclosures which have contained diseased or suspected cattle should be thoroughly cleansed of manure or other refuse, and of all fodder, litter, or other agent which may cover up the infecting material, and should then be thickly sprinkled with chloride of lime, or drenched with a solution of the same in the proportion of one-fourth pound of the powder to every gallon of water. Fences, mangers, racks, and other woodwork must be washed with the same solution.

Buildings having been thoroughly cleansed from manure, &c., and the walls scraped, should be washed with the solution of chloride of lime, to which may be added as much quicklime as will make a good whitewash, and show if the smallest portion of the surface has been missed in making the application.

In the case of cow stables, in which the odor of the chloride is likely to prove injurious to the milk, the following solution may be used instead: Sulphate of zinc, four ounces; common salt, two ounces; water, one gallon. Drains and spaces beneath the floors, all internal fittings or woodwork, and all stable utensils, must be thoroughly drenched with one or other of these solutions.

After the solids have been disinfected in this way, the air should be purified by burning sulphur in the closed building. As in the case of ships, the sulphur may be placed in a metallic pot, and the burning may be allowed to proceed until the flame is extinguished by the accumulating smoke.

In the case of ships, buildings, and other inclosed places, a free circulation of air should be secured as a supplemental measure, as nothing contributes more to keep up infection than confined and impure air, whether from accumulation of filth or absence of ventilation.

JAMES LAW.
E. F. THAYER.
J. H. SANDERS.

UNIFORM QUARANTINE OF FOREIGN CATTLE.

All cattle arriving from the infected countries of Europe should be subjected to an unvarying quarantine of ninety days after arrival at the port of entrance.

This quarantine should be in special yards or buildings erected or selected for the purpose in a safe and suitable locality at the port of debarkation, and no quarantine should be allowed, under any consideration, apart from these places or from the direct and constant control of the Treasury Department. A small impost per head upon the animals may give some return as interest on the money expended in the erection of the necessary buildings.

There is the less objection to such yards that this is not an expedient for which the necessity will expire with the extinction of the lung plague, but it must continue in use so long as cattle are imported from countries where infection exists. These yards can further be used for all contagious diseases in all classes of animals.

The present system of allowing animals to be quarantined at any point which can be reached by coast or inland navigation, and usually on the owner's own premises or others which have been hired by him, and under a verbal or written bond furnished by him, is to be strongly condemned. Instances are spoken of in which the quarantined cattle were separated from the neighboring herds by an open rail fence only, the segregation becoming no better than a farce. Aside even from such willful neglect and carelessness, there can be no guarantee that the quarantine is perfect. The owner indeed may act in good faith and give the most stringent orders that nothing shall be done which may in any way compromise him in the matter of his bond, but who can assure the integrity of his servant when the owner's back is turned? A door left accidentally open, a fence broken down, or the desire of the servant or one of his friends to obtain a cross with the coveted blood of an imported bull is liable to set all precautions and orders at defiance and allow a chance of infection from the imported stock. Nor is such outside infection likely to be easily discovered and stamped out. The owner of the cow served will fear to confess to the stolen use of the bull, and the servant who allowed the act will doubly fear to confess his disobedience of orders, lest he should lose his situation.

Any supposed quarantine in places apart from a constant government control is utterly unreliable, and should be at once amended. Under these circumstances we do not hesitate to advise the erection of permanent quarantine buildings at the various ports where the regular lines of transatlantic steamers arrive and at the port of San Francisco.

PROTECTION OF CATTLE ON BOARD THE OCEAN STEAMERS.

In approaching this subject we are conscious of the wide field opening before us and the difficulty of doing justice to the subject in a report like the present, which is necessarily limited in extent. We think it important nevertheless to draw attention to the more essential conditions of safety in the transportation of animals by sea. We feel this duty the more incumbent upon us, that we are convinced that a sea voyage under proper sanitary provisions is by no means such a serious drawback to the animal as is usually supposed. With proper accommodations and good weather the export cattle usually gain in flesh and arrive in Europe in better condition and consequently of more value than when they left the American ports. Apart from storms, animals on board ship can take no exercise, the warmth of the space between decks obviates the necessity for almost any expenditure of carbon, &c., and the maintenance of the animal heat; they have the further advantage of an invigorating change of air, and if well fed and watered, most of the food consumed is laid up as flesh and fat. In the case of breeding cattle sent on long voyages, as from England to Australia, New Zealand or Singapore, the greatest concern of the shipper usually is the danger of obesity and consequent sterility. We cannot therefore look upon the sea voyage as necessarily an evil to fat cattle, but only as becoming so exceptionally in connection with stormy weather and insufficient accommodations

CAUSES OF LOSSES IN EXPORT CATTLE.

The chief causes of loss on export cattle may be briefly summed up in these: 1st. The bulk and unwieldiness of the beef cattle. 2d. The insubstantiality of the stalls, which, giving way during a storm, allow the cattle to be jammed together, thrown down, and helplessly maimed until they have to be thrown overboard because of their injuries, or to allow the vessel to right herself. 3d. The crowding of too many cattle in one stall. 4th. The shipping of cattle on the upper deck. 5th. The imperfect means of ventilation. 6th. The danger of infection from contaminated ship or cargo.

1. The bulk and unwieldiness of the beef cattle.

To every one who has looked into the subject it is notorious that the losses on the fat cattle exported to Europe are greater than upon the breeding cattle imported into the United States. Much of the discrepancy depends on the youth and activity of the stock imported for breeding purposes. Even in the case of older stock the necessity for maintaining their fertility demands that they should be kept in but fair or moderate condition. These cattle can therefore better maintain their equilibrium under the motions of the ship, and can regain their feet with less difficulty when thrown down. The fat ox, on the other hand, with ponderous body and weak fatty muscles, can maintain his feet with difficulty under the pitching of the ship, and once thrown down, finds it almost impossible to regain them. Then there soon comes to him that obstinate disposition which makes him refuse to try, and he thenceforward tosses at the mercy of the storm. Jammed against the limbs of his fellows, he quickly brings them to the deck as well, and soon with broken limbs, bruises and injuries innumerable, the cargo presents a most pitiable spectacle.

2. The insubstantiality of the stalls.

The dangers above described are enhanced, in proportion to the number of animals that may be thrown together into one mass. Where the cattle are safely fenced off from each other by stalls of sufficient strength this danger will be to a great extent obviated. The Cattle Lloyds stipulate that no more than four head shall be placed together in any one stall, and so far as we have seen, this is now generally adopted, being demanded by the underwriters generally, as a condition of insurance. A still better method, and one which could be adopted with no very great increase of expense, would be to furnish each animal with his own separate stall. If then he were thrown down he could injure no one but himself, and the risk of even this would be incomparably reduced.

The same reason that would demand the restriction of a single stall to one or four animals, would demand that these stalls be made so substantial that there would be no risk of their being broken down. With the selection of proper material and employment of competent workmen, there is no difficulty in making the wooden partitions sufficiently strong and safe.

A method adopted on the steamer Othello of the Wilson Line, especially commended itself to us. At a point corresponding to each of the four corners of the stall, a wrought-iron post is fixed by a strong hinge to the upper deck, so that its whole length may be fixed up to that deck when it is needful to use the space for another kind of freight.

When cattle are to be shipped the iron pillar is let down, so that its lower end is received into a grooved iron block fixed to the upper surface of the lower deck, and into this it is firmly bolted. Then strong wooden bars are inserted in grooves on the different sides of the iron posts and firmly secured by bolts, so as to form the ends and sides of the stalls. In this way the greatest strength is secured at a moderate outlay, and the ship once fitted up in this way can be easily and speedily prepared for any kind of cargo without the further employment of skilled labor.

3. Too many cattle in one stall.

With such an arrangement as that just described there can be no great hardship in supplying a stall for each animal and reducing the dangers of the ocean voyage in this respect to a minimum. The bulky clumsiness of the fat ox, as above remarked, demands that we should surround him with every possible safeguard in this respect.

4. Shipping cattle on the upper (spar) deck.

This again is prohibited by the Cattle Lloyds and by most of the underwriters. Indeed, if we consider the great danger of the destruction of the stalls and the loss of cattle in case a storm is encountered there can be no question as to the impropriety of such shipments. In fair weather it must be acknowledged that such cargoes do well, being surrounded by the best of air, and easily kept clean and attended to, but when really bad weather sets in their case is a desperate one. It would be well if shipping cattle on the upper or spar deck could be altogether abandoned.

LACK OF VENTILATION.

In view of the protection of our export cattle, not against lung plague itself, but against the suspicion of that disease, this is one of the most important points that can claim our attention. From what has been written above (see "Lung plague not generated *de novo* by impure air," page 28) it will be seen that there need be no apprehension whatever of the generation of the contagious pleuro-pneumonia or lung plague, because of the confined air on board ship, provided the ship and cattle have been started clear of all germs of the disease derived from a pre-existing case. But that rebreathed and impure air is capable of generating a congestion or inflammation of the lungs, which might by some be confounded with the lung plague, is a truth too notorious to be denied.

RAPID SUFFOCATION.

In consequence of rapid suffocation from the reduction of oxygen and the accumulation of carbonic acid in the air, the arrest of circulation first occurs in the lungs, the heart continuing to beat for a short time longer, and it appears to be the difficulty of once more starting the circulation in the capillary blood-vessels of the lungs that proves the great obstacle to resuscitation. After death the lungs are found to be gorged with blood, black and heavy, and the same is true of the right side of the heart and the whole venous system. The gorged lungs may create suspicions of a rapidly-fatal type of lung plague.

RAPID EFFCTS OF BREATHING IMPURE AIR.

When large numbers of men or animals are crowded together in a small space with insufficient access of air the above results take place

more slowly, but none the less surely. It has been found that the reduction of the oxygen in atmospheric air by two or three parts in the hundred, and the increase of the carbonic acid to an equal extent renders that air very deleterious to animals breathing it, while if the oxygen is reduced to ten parts in the hundred, it is of no further use for respiration. It may be taken into the lungs, but it no longer relieves the blood of any carbonic acid, nor furnishes it with any vitalizing oxygen. Though the air still contains eleven parts of oxygen in every hundred, it might as well be composed entirely of nitrogen so far as its value to the living system is concerned. How long life may be sustained in such conditions may be inferred from the fact that it is usually impossible to resuscitate suffocated animals when breathing has ceased for from three to five minutes.

Some terrible examples of speedy death from lack of fresh air are on record. The most frequently quoted is that of the Black Hole of Calcutta, a room 18 feet square with two small windows, into which 146 prisoners were forced at the point of the bayonet, and in which they were shut up all night in a tropical climate. Ere morning 123 persons had perished. A second instance is that of 300 Austrian prisoners forced into a narrow compartment after the battle of Austerlitz so that 260 died of suffocation. A third is that of the steamer Londonderry, with its 150 passengers in a small crowded cabin, 70 having perished in a single night, because the hatches were closed down on account of a storm.

Many analogous cases can be adduced of animals. Dr. Thayer reports from memory the case of a steamer (Hooper?) from Boston to Liverpool, with 400 cattle on board, which encountered a storm and came through it with only one animal surviving. Mr. Toffey, of Jersey City, lost 30 head out of a cargo of 300 by suffocation in 1880. This happened, he informs us, on a calm sea on a southern route with a temperature about 90 ° F., and the wind astern and light so as just to keep pace with the ship. The air on board the ship became perfectly stagnant, and there was no means of establishing an artificial current. A still more disastrous experience befell the steamer Thanemore, Captain Sibthorp, of the William Johnson & Co. line. This vessel left Baltimore with 565 cattle on board, of which 228 perished by suffocation before she reached Cape Henry.

EFFECTS OF MODERATELY VITIATED AIR.

When air only moderately vitiated is breathed continuously for a greater length of time the results are still very injurious, and in the front rank of diseases so caused stand pulmonary consumption, and other destructive affections of the lungs. Perhaps no better example of this can be given than that of the monkey houses of the Zoological Gardens of London and Paris. While these houses were small and ill-ventilated the monkeys died in large numbers from pulmonary consumption, but after they had been enlarged and better ventilated the mortality from this cause nearly ceased. (Arnott.)

Town dairy cows which are packed in close ill-ventilated buildings and never allowed to go out are very subject to consumption, while horses kept in no better conditions, but spending nearly half their time in the open air, rarely have phthisis. (With lung plague it will be remembered that the out-door exercise and mingling of herds leads to an increase of the mortality.) Horses newly stabled suffer severely from diseases of the lungs. The same holds true of human beings. A long list of

careful observers have noticed the essential connection of lack of ventilation and pulmonary consumption. Baudelacque, Carmichael, Arnott, Lepelletier, Allison, Sir James Clark, Toyubee, Guy, Greenhow, Sir Alexander Armstrong, Parkes, and Aitken have especially insisted upon consumption being a sequence of lack of ventilation. Dr. Cormac indeed insists with great force that consumption is originated by rebreathed air.

The notorious prevalence of consumption in sailors has been directly traced to the impure air in which they sleep, and an extensive outbreak of lung disease (not tubercular) leading to destruction of lung tissue in the English Mediteranean squadron in 1860 was clearly traced by Dr. Bryson to the contamination of the air. In a nursery hospital at Dublin with entire neglect of ventilation 2,944 children died in four years, whereas after the ventilation had been improved only 279 died in the same length of time.

Parkes (Practical Hygiene) says:

> But not only phthisis may reasonably be considered to have one of its modes of origin in the breathing of an atmosphere contaminated by respiration, but other lung diseases, bronchitis and pneumonia, appear also to be more common in such circumstances. Both among seamen and civilians working in confined, close rooms, who are otherwise so differently circumstanced, we find an excess of the acute lung affections.

In this connection, the statement of the air breathed by an ox per hour and that supplied him on board a ship with insufficient ventilation or none may be instructive. The ox takes in with each breath about 5 liters of air. This is at the rate of 50 liters per minute, or 3,000 per hour = 105.9 cubic feet. This amount of air is therefore rendered all but irrespirable by each animal in the course of an hour. And this, be it noted, is by breathing alone, and makes no account of the contamination by perspiration in the overheated hold, and by the emanations from the accumulating excrement.

On board the steamers we have found the space allotted to each bullock to vary from 150 to 240 cubic feet. On the steamship "Holland," loaded at New York August 21, 1881, we found the stalls amidships allowed the full space of 240 cubic feet per head. In the bow, where there was less height between the decks, the space was considerably less. On the lower deck, where 129 cattle were accommodated, the space allowed each was 217.4 cubic feet. The port-holes in the upper deck were nine inches in diameter, and there was one for each pair of stalls—central and lateral—or for eight oxen. These, being well above the water line, would be available for ventilation in ordinary weather. The port-holes in the lower deck, similarly arranged, were about two feet above the water line, and consequently not available for ventilation save in exceptionally calm weather. The temperature on the main deck of this ship (between the outer and main deck), when only half the cattle had been loaded, was in the neighborhood of 90°, although she was lying in the center of the North River with port-holes and hatches open, and a fresh breeze blowing from the north.

On the "Assyrian Monarch" the space per head was only 192 cubic feet, but this ship was supplied with a ventilating fan or blower capable of delivering over 50,000 cubic feet of fresh air per hour, so that her ventilation was abundantly provided for. In some smaller ships we found the space per head to exceed little, if at all, 150 cubic feet. In these, accordingly, a single hour without any change of air would threaten the life of every animal on board, and two hours would endanger those for which even the larger space is provided. It is true that such

absolute seclusion is rarely required, and that a certain amount of aerial diffusion is always going on through imperfectly closed hatches, companion ways, and ventilators, yet that these are often insufficient has been amply shown by such losses as are reported above, as well as by the bronchitis and tuberculosis which Drs. Whitney, Lyman, and Williams have found in the lungs of American animals arriving in England.

ORGANIC MATTER IN EXPIRED AIR.

The decomposing organic matter given off by the lungs and skin is probably the most injurious of the animal excreta, when allowed to act on the system for a length of time. This exhaled organic matter is easily recognized in the air by chemical tests, or by the putrid odor evolved when cotton wool that has been breathed through is left to soak in otherwise pure water at a temperature of 70° to 80° Fahrenheit. The experiments of Gavarret and Hammond, in which expired air had its carbonic acid and water vapor removed, leaving only the organic matter, showed that the latter was highly deleterious. Hammond found that a mouse died in forty-five minutes in such an atmosphere. It has also been again and again demonstrated that air containing a given amount of carbonic acid as the result of respiration is far more poisonous than air which contains the same amount of carbonic acid as a product of combustion.

WATER VAPOR IN EXPIRED AIR.

The amount of water vapor given off by the lungs varies greatly according as the air is already more or less saturated with water. As the air in the stalls between decks is always saturated with water vapor, we may take the very lowest estimate for each animal, namely, 60 ounces in 24 hours, which for a cargo of 200 head would amount to over 93 gallons. And this is in addition to the exhalations from the skin and the bowel and kidney excretions. The air between decks is therefore constantly saturated with moisture which condenses and runs down in streams on every solid object. Among the ill effects of this saturation may be noted:

First. The saturation of the air with water vapor increases the exhalation of carbonic acid from the lungs. This effect on the excretion of carbonic acid is usually so great as to counterbalance the tendency of warm air to reduce the production of this acid. This saturation, therefore, with water increases the danger of suffocation by the accumulation of the irrespirable carbonic acid in the ship, unless the air is being constantly removed.

Second. The excess of moisture in the warm atmosphere hastens the decomposition of the organic matter derived from the lungs, skin, and manure. Speaking of filth ferments, Simon says: "They show no power of diffusion in dry air, but as moisture is their normal medium, currents of humid air can doubtless lift them in their full effectiveness." Sir Alexander Armstrong, head of the medical department of the British Navy, says: "There can be no more fertile source of disease among seamen, or, indeed, other persons, than the constant inhalation of a moist atmosphere, whether sleeping or waking; but particularly is this influence injurious when the moisture exists between a ship's decks, where it may be at the same time more or less impure, and hot or cold, according to circumstances." It has become an aphorism with sanitarians that "a damp ship is an unhealthy ship," and many instances are

adduced in which a sufficient renewal of the air between decks, with or without stoves to dry it, has transformed a naval pest-house into a salubrious vessel.

All such considerations must emphasize the demand for such a constant renewal of air between decks on steamers carrying cattle as shall serve to obviate all those conditions of ill-health, with congestion and inflammation of the lungs, as have proved in the past a serious drawback to our foreign cattle-trade. To accomplish this and at once remove from between decks the excess of carbonic acid, of decomposing organic matter, and of humidity, and to furnish air approaching in purity and dryness that of the atmosphere outside, we can conceive of nothing more simple and effective than thorough ventilation by fan or heat extraction, as referred to below.

EXPEDIENTS FOR SECURING ARTIFICIAL VENTILATION.

Course and speed of the ship.—With a wind more or less ahead or no wind at all, the speed of the vessel will usually determine a current which, with hatches open fore and aft, will secure a fair amount of ventilation. By increasing the speed it is manifest that this may be availed of to better purpose, and even a slight change in the course may often be of material advantage.

Windsails and Cowls.—These are valuable if well attended to, the former being a sheet of canvass, so spread as to catch a greater volume of air and to direct it down the fore hatch, while the cowl is a trumpet-shaped tube fixed on the top of a cylindroid ventilating tube, and having its open expanded end turned in the direction of the wind so as to act after the manner of a windsail. These succeed well so long as the weather is good and a sufficient current of air can be secured, but they may prove useless in a storm or in a warm season with the wind astern and moving at the same rate as the steamer.

When they fail.—In such circumstances as the last, even the usual spontaneous diffusion of air may be arrested, so that the atmosphere between decks may remain practically unchanged for a length of time. The air outside being of nearly the same temperature with that between decks, there is little tendency to an upward motion from the latter or a downward movement from above. Again, though there may be some difference in temperature between the outer air and that between decks, yet if the wind is following the ship and by reason of her pace the air is practically still, the ventilation remains exceedingly imperfect. An upward and downward current becoming established through the same opening often neutralize each other, so that nothing more than an eddy takes place near the opening, and the air within is practically unchanged. In these circumstances windsails and cowls become useless and some mechanical means of establishing a current must be resorted to.

Booby hatches.—These are special ventilating hatches, constructed of iron and rising four or five feet above the upper deck. They are furnished with iron doors, or covers, sloping at a very acute angle and hinged at the upper edge, so that when partly raised they serve to allow the entrance or exit of air, and yet guard against the entrance of water when that is shipped. These, when properly placed at the extreme ends of the space to be ventilated, must be of the greatest value in securing ventilation during stormy weather. But no one of the above provisions meets the danger of a high temperature and a practical calm aboard ship.

Fans, blowers.—This valuable provision so easily availed of in any steamer, we only found in practical use on one line (Monarch), sailing from the port of New York. We understand that some Boston lines are also furnished with blowers. The circular fan, one foot wide by three feet in diameter, and making 180 revolutions per minute, could deliver over 50,000 cubic feet of air per hour.

Delivered at suitable points and with ventilating outlets properly situated so as to secure a renewal of air throughout the whole space, such an appliance during a storm or a calm like that suggested above must be the means of saving the entire cargo, value, say, $25,000. Indeed we understood that the Monarch line is in the habit of insuring the cargo of cattle for a small extra charge, an arrangement which should work to the mutual advantage of steamboat company and exporter, the usual charge of 5 per cent. being a very large impost on the export.

We have heard the most serious charges brought against these steam blowers, to the effect that they only caused the whirling and circulation of the *bad air*, but even if this were the case to a partial extent when the point of delivery of the air is badly selected and when there are numerous other openings in places ill-adapted to the exit of the impure air, it can furnish no valid objection to the introduction of so much pure air, much less when the points of delivery of the pure air and of the escape of the impure are properly arranged at opposite extremities of the space to be ventilated.

On the whole we would favor the adaptation of the *blower* so as to extract the impure air rather than to force in pure, and then the openings for the entrance of pure air could be made numerous enough and could be sufficiently distributed over the stalls so as to secure to each an abundant supply. These openings for fresh air could be by cowled tubes, booby hatches, or through the hollow masts, and it would be easy to guard them against the introduction of water during storms. It might further be desirable to place boards beneath their internal openings to deflect the air and prevent it from forming a continuous draft on certain animals. Screens of wire gauze or peforated zinc would also serve a good purpose by breaking up the current and preventing drafts.

Extraction of the air by the heat of the furnace.—It seems surprising that this simple means of ventilating steamships has not been long ago adopted. So long as there must be a furnace consuming an immense quantity of air in all weathers, there can be no possible excuse for the lack of any needed ventilation in the ship. All that is requisite is to have the means of closing in the ash-box, and connecting it with tubes leading from the different compartments to be ventilated, and then supplying these compartments with ventilating inlets placed at the opposite side from the extracting tube, and a constant and unfailing supply of pure air will be kept up. If there is an objection to closing in the ash-box because of the heat, or of the irregularity of the current, the same end can still be attained by carrying metallic ventilating tubes up by the sides of the furnace, or of the boiler, so as to avail of the high temperature, and the expansion and rising of gases as the motive force.

In view of the great dangers attending the shipment of beef cattle on the crowded decks of a steamer, and the suspicion that rests on American stock by reason of diseases of the lungs produced in this way, we strongly recommend that each steamer chartered for the cattle trade should be compelled to put in a *blower*, or to avail of the furnace heat, as suggested, for ventilating purposes, and in either case to provide in appropriate places tubes for the introduction of pure air and the extraction of the impure, and thereby secure satisfactory ventilation.

RECOMMENDATION FOR CONGRESSIONAL ACTION.

In consideration of what has been set forth above we earnestly recommend such action on the part of Congress as will confer on our commission, or upon some department of the government, the authority to prescribe rules and regulations under which the sound cattle of any State or Territory, or of the District of Columbia found infected with the lung plague, may be transported or taken therefrom, and under which healthy cattle may be transported or taken through such infected States, Territory, or District; and to provide for bonded yards and quarantine stations, as recommended in the foregoing.

An appropriation of $300,000 will be necessary for the purpose of constructing such bonded yards and quarantine stations and for the supervision of the same. If already existing yards can be secured and safely availed of the outlay will be materially reduced.

The regulations aboved referred to, when officially promulgated, should have all the force and effect of law, and such penalties should be provided as may be thought necessary for their enforcement. Such authority will enable your commission to hedge in the contagion with reasonable certainty and prevent its spread into States now happily exempt; and some such authority, we may add, is absolutely essential to enable an infected State or district to rid itself permanently of this pestilence. New York, New Jersey, or Pennsylvania may stamp out the disease by her local authorities, but so long as it exists on the border of a neighboring State she is powerless to protect herself against a new invasion by cattle smuggled across. A constant and expensive surveillance must be kept up all along the line of the infected region, and the stamping-out process must be continually going on, but will never be accomplished. Federal officials controlling this inter-State traffic can punish the offender whenever or wherever found, and should therefore secure a stricter observance of the law. But, besides enabling us to hedge in the plague, such authority will also enable us to fully accomplish the object for which we were appointed, to wit, the giving of a clean bill of health to cattle for export.

MEANS OF STAMPING OUT THE LUNG PLAGUE IN INDIVIDUAL STATES.

Here we enter debatable ground. There are constitutional objections to the interference of the Federal Government within State limits, and with the property of the citizen of a State. Yet much may be said in favor of granting the Federal Government power to take action in a case of this kind.

REASONS FOR FEDERAL ACTION.

1st. The disease is like a common enemy, and as the Constitution does not forbid the operation of the Federal Government within a State for the repulsion or extinction of an enemy of the nation, so nothing should hinder a similar action with such a dangerous and insidious enemy as lung plague.

2d. The danger being common, the funds to avert the danger should be supplied out of the national exchequer.

3d. Action under one controlling head will be uniform and harmonious everywhere. In the past the conflicting laws and orders in two adjacent States have been most perplexing to dealers and others, and have furnished a temptation to smuggling.

4th. Those that transgress the law, and especially in the matter of smuggling, can be seized and punished anywhere by Federal authority, but not by State authority should they have escaped over the State line.

5th. Federal authority can follow smuggled cattle into any State or Territory and confiscate them or quarantine; State authority cannot.

6th. If the Federal Government cannot interfere within a State, such State may neglect this disease indefinitely and render it permanent, to the peril of all the others.

7th. The British Government declines to accept the assurances of the individual States, and will only accept the guarantee of the Federal Government that any infectious disease has been thoroughly *stamped out*, or its extension beyond the infected regions effectually provided against. To secure this directly and without possible objection, the Federal Government must so connect itself with this work as to be able to attest the results.

REASON FOR STATE ACTION.

One great advantage of suppressive measures by State governments is that the latter can command the active co-operation of municipal authorities and police, and thus without any extra outlay can thoroughly control all movement of cattle and insure a speedy extinction of the disease. It is sincerely to be hoped that in case the matter is placed entirely in the hands of Federal authorities such invaluable help will be freely accorded them by order of the mayors of the cities or governors of the States. Any co-operation of this kind, however, must be hearty and thorough in order to be of any material advantage to the work.

POWER TO ABOLISH OR REGULATE MARKETS.

Whether State or National, the power intrusted with the stamping out of this plague must be authorized to put a stop to all local markets when they can be shown to endanger the propagation of the plague, or to place such markets under such regulations as shall obviate all risk of the spread of infection through them.

While markets generally in infected districts—apart from bonded and fat markets already referred to—should be stopped, other marts in non-infected districts of the same State should be put under certain regulations which would exclude the possibility of infection entering.

Thus free markets near the port of New York in New Jersey, Eastern Pennsylvania, Maryland, District of Columbia, and Northern Virginia would be necessarily abolished, while they could continue under certain restrictions as to entry at Pittsburgh, Pa., and Buffalo and Albany, N. Y. This would provide for the transit of cattle through New York to New England and through Western Pennsylvania to other points without any unnecessary interference with trade. It does not seem necessary to specify such points, but merely to provide that the authority intrusted with this matter shall have power to impose such restrictions on public sales, when necessary, and to make exceptions when it can be safely done.

FAT CATTLE MARKETS AND ABATTOIRS.

To provide for the supply of beef from outside sources to the large cities—New York, Brooklyn, Jersey City, Philadelphia, Baltimore, &c.—it will be necessary to establish markets for fat cattle coming from all sources, healthy and otherwise; but one condition of the entry of cattle into such yards ought to be that they should not be taken away alive,

but only as beef. Abattoirs will therefore be a necessary adjunct to all such markets, and all the great stock-yards in the eastern cities are already provided with such. In such abattoirs the butchers may be allowed to kill and dress their cattle for a reasonable consideration, which should be prescribed and uniform. The beef may be removed to any requisite distance as quarters, and at no very greatly increased trouble or cost.

The objection to letting cattle leave such markets alive is that it is impossible to control the traffic, and a certain number are usually kept for a week or more awaiting slaughter in contact with local store cattle or in dangerous proximity to them; further, it is no uncommon matter for individual animals out of a herd from the stock-yards to be smuggled into city cow stables in place of going direct to the slaughter-house. Coming as they do from a common market where the sick and healthy meet, they are constantly liable to carry infection along with them.

The plan proposed may be held to represent the foreign animals' wharves in England, and is a legitimate and necessary means of preventing any further diffusion of infection. By its means the stock-yards at New York and Jersey City can supply all the surrounding cities with fresh beef, while those who object to sending their cattle there from healthy States, and those who wish to remove their cattle from the yards for slaughter at their own abattoirs have before them the bonded cattle market offering every facility for such a course.

POWER TO PROHIBIT ALL MOVEMENT OF CATTLE EXCEPT UNDER LICENSE.

This is absolutely essential to success in dealing with this disease anywhere, but is especially so in the cities for reasons that are fully set forth in an earlier part of this report. (See under heading "*Why the lung plague has extended south only*," page 22).

POWER TO ENTER ALL PREMISES OCCUPIED BY CATTLE, AND TO INSPECT ALL HERDS IN THE SUSPECTED DISTRICTS.

The want of this is apparent without elucidation.

POWER AND OBLIGATION TO SLAUGHTER ALL CATTLE SUFFERING FROM LUNG PLAGUE, ACUTE OR CHRONIC.

This is a *sine qua non*. So long as the sick live the virus is being multiplied. With their death and deep burial or disinfection, the increase is arrested.

POWER TO SLAUGHTER THE WHOLE SUSPECTED HERD WHEN FOUND EXPEDIENT.

It is often of the highest importance that this power should be possessed and exercised. Cattle that have been exposed to infection but are not yet sick may be so placed that in case of their sickening they will infect other animals, and to obviate great losses it is often imperative that such animals should be killed.

A most important and successful exercise of this power occurred on Montauk, L. I.,New York, where the slaughter of twenty calves saved a herd of twelve hundred cattle of all ages.

APPRAISEMENT OF CONDEMNED CATTLE.

This may be done by two appraisers mutually chosen by the stock-owner and the representative of the government; or in cities, especially where dairymen are most solicitous that the fact of the infection of their herd should be kept a secret, a price may be put upon the cattle by the veterinary inspector, with the concurrence of the owner. As a rule, the remuneration of appraisers is a considerable item, and it is better and cheaper, in the aggregate, that the unfortunate loser of the cattle should receive the extra amount than that it should go to a third party. The award by the veterinarian is, however, usually no higher than that made by an appraiser.

AMOUNT OF INDEMNITY.

Everything considered, a liberal indemnity is the best, most economical, and most successful. It enlists the hearty co-operation of the owner of infected stock, secures the early report of cases, and the correspondingly early extinction of the malady. It was a wise course that Pennsylvania at first pursued, to appraise the sick animals first reported at their actual value as they stood, and all subsequent cases reported in the same herd at full sound value, and to pay an indemnity to this full amount in case they afterward sickened.

In cities, especially where the profits from milch cows are so high, and the loss of a milk-route by sickness, slaughter, or exposure, so fatal to the interests of the milkman, the indemnity should be a liberal one. Everywhere a liberal award obviates the necessity for a vast amount of professional inspection from herd to herd and beast to beast, and is, therefore, a measure of the very soundest economy. A compensation amounting even to the sound value of the animals cannot be objected to as a means of inciting to the willful spreading of the disease, in a district where all movement of cattle, except under special license, has been temporarily abolished. As showing what is saved by a liberal indemnity, it may be named that in States like New York, where a low indemity only was given, the necessary professional examinations for the purpose of detecting the disease and the other essential expenses amounted to three times the amount of the total indemnities. To avoid the continuance of this expensive item of professional examination and reduce it to its minimum, we would, therefore, approve of a measure for the prompt slaughter of all animals in every infected herd, and the compensation of the owner to their full value for all that had as yet shown no signs of the disease. The speed and certainity of such a course will make it the most economical in the end.

In this matter of economy, that course which is the most speedily successful in eradicating the plague must prove by far the best. Not only will it save nearly all of the most expensive item in the work, the prolonged professional supervision, but it will more speedily relieve our cattle trade, home and foreign, the yearly losses on which are probably greater than the value of all the herds now infected with lung plague on this continent.

POWER TO PROHIBIT PASTURAGE OR EXPOSURE ON UNFENCED LOTS, OF TWO OR MORE HERDS ON ONE LOT, OR OF SUSPECTED ANIMALS ON PLACES ADJOINING HIGHWAYS OR OTHER LOTS OCCUPIED BY CATTLE.

This common-pasturage has been the main cause of the perpetuation of this plague in America. It was the main cause of the little good ac-

complished in Brooklyn by the New York Veterinary Sanitary Staff, and the abolition of such common-pasturage was a principal cause of the speedy suppression of the disease in the city of New York in 1879. In deference to the supposed interests of many city cow-keepers, who in summer find free food for their cows on open commons, this matter has been badly neglected in all the infected States, with the result of perpetuating the disease for four years with little change, though nominally the State has been engaged in stamping it out.

POWER TO INSTITUTE AND APPLY MINOR MEASURES.

Special localities will always require particular measures. Thus, for example, in cities it is often desirable that a family cow, kept alone or in a horse-stable in the city, should accompany the family to the seaside. This can be done safely enough if under permit designating route, mode and time of conveyance, &c., provided she is known to the inspector to have been sound and kept rigidly apart from all other cattle for at least three months before. Again, to maintain the valuable milking qualities of a cow, it is needful to keep her breeding, and to permit of this with safety, the local authorities may, in suitable cases, issue permits, available for one day only, for the movement of such family cows as are referred to above, or of cows from herds that have been known and certified to be free from lung plague for the six months antecedent to be served by bulls in herds similarly situated. In view of these and many more such minute provisions, it is better that the official or officials intrusted with the carrying out of suppressive measures should be empowered to make and apply such rules as the necessities of the city or district demand.

CONGRESS SHOULD PROVIDE MEANS.

Whether the work of stamping out lung plague should be intrusted to State or National agents, we recommend that money to carry it on should be furnished from the National Treasury. For this purpose we advise the appropriation of $1,500,000 to be disbursed by a Federal official to be designated by Congress. This should be made available to furnish indemnities for all sick cattle slaughtered, and for a large proportion of the incidental expenses for inspection, segregation, control of movement, disinfection, &c., all such work having been approved of as provided for below.

CREATION OF A VETERINARY SANITARY AUTHORITY.

If the work of exterminating the lung plague can be undertaken by the Federal Government, a veterinary sanitary organization should be created and intrusted with its execution. If, on the other hand, the work of extermination must be relegated to the respective States, to this veterinary sanitary organization should be delegated the duty of advising with the State governments as to the measures requisite to stamp out the disease, and the approval by this organization of the method and execution of the work in the different States should be made a prerequisite to the disbursement of moneys by the Federal official designated above.

TO INSTITUTE PENALTIES FOR TRANSGRESSION OF ORDERS.

For transgression of all orders promulgated by the authority which may be designated to *stamp out* or control this plague, suitable penalties should

be imposed. While the best results are to be expected from measures calculated to secure the hearty good-will and co-operation of the stock-owners, yet certain parties are not to be controlled by such considerations; and for willful offenders, penalties sufficiently heavy and rigidly and impartially enforced are essential conditions of success.

SUMMARY.

1st. Reasons for extension of the report so as to embrace history, nature, and extinction of lung plague, as well as its present limits, and the question of imports and exports:—Introduction.

2d. The designation *lung plague* preferable to *pleuro-pneumonia*.

3d. The whole history of lung plague furnishes no ground for the conclusion that it arises otherwise than by contagion.

4th. The early history of this disease shows its great extensions to have been coincident with extensive wars in Central Europe, when cattle were drawn from all sources, infected and uninfected, for the supply of the armies in the field and constantly moving.

5th. During the intervals of such wars the lung plague continued to prevail in the unfenced mountains and forests of Central Europe, where the few wandering herds had ample opportunity for mutual infection.

6th. Into the mountains and forests of Scandinavia, and the Spanish Peninsula, out of the region of the general wars, lung plague did not penetrate.

7th. In recent times the increasing demand for cattle to feed on the refuse of distilleries, sugar factories, &c., in Western Europe, has led to great extensions of the disease.

8th. The British Isles, infected by imports from Holland, and infection kept up by the free trade act, that admitted continental cattle free of duty.

9th. Ireland, which is not an importing country, has since kept up lung plague by a most mischievous activity and method in her internal cattle traffic.

10th. The outbreaks in Sweden, Denmark, Norway, and Schleswig always traced to imported cattle and invariably stamped out.

11th. South Africa, Australia, Tasmania, and New Zealand infected by imported cattle, and infection rendered permanent by the impossibility of secluding the infected herds on the open, unfenced pastures, and by reason of the common employment of bullock wagons.

12th. Massachusetts, infected by imported cattle, found it possible to *stamp out* the disease, because she lay at the terminus of the American cattle traffic, in place of at its source or on its channel.

13th. New York, New Jersey, Pennsylvania, Maryland, and Virginia, infected by imported cattle, have had the infection perpetuated by the mischievous nature of the city cow-trade, and the habit of pasturing on open commons and unfenced lots around the large and growing cities.

14th. Lung plague failed to extend west and north because of the absence of such large cities and open pasturages, and because of the opposing current of the cattle traffic.

15th. The great profits on town dairies enable the owners to bear, without ruin, the losses caused by the plague.

16th. The risk of lossing a lucrative milk-route makes the city dairyman unwilling to acknowledge the existence of disease in his herd, and this greatly hinders the extinction of the plague.

17th. The practice of dealers in furnishing cows to city stables, receiving others from them, makes their sale stables hot-beds of infection.

18th. An unbroken chain of cases can be traced from the cow imported into Brooklyn in 1848 to the present day.

19th. Prior to that importation lung plague was unknown on the American continent.

20th. The most inclement countries have failed to produce lung plague.

21st. The most torrid regions have failed to produce lung plague, though they aggravate it when once introduced.

22d. Temperate climates apart from imported infection have failed to produce lung plague.

23d. Privations of travel have failed to produce lung plague.

24th. Impure air has failed to produce lung plague.

25th. Feeding distillery swill has failed to produce lung plague.

26th. Feeding the refuse of glucose and starch factories has failed to produce lung plague.

27th. No other conclusion is open to us than that lung plague is caused in Western Europe and America by contagion only, and, if so, we have a perfect guarantee that it can be completely stamped out and permanently excluded.

28th. The infection of the herds on our unfenced Western and Southern pasturages would render it as impossible for us to stamp out the disease as it has been for the people of South Africa and Australia.

29th. The danger of such an infection is being constantly increased with the increase of the infected area in the East, with the increase of cattle imports, with the increase of thoroughbred herds, with the movement of thoroughbreds West and South for the improvement of native cattle, with the increased shipment of Eastern calves to be matured in the West, and with the improved railroad facilities.

30th. The virus of lung plague retains its virulence for over a month in a hermetically sealed glass tube, for months in a close building, and for a variable time, according to exposure to air, in manure, fodder, clothes, &c.; so that the way is open for its propagation through different unsuspected channels.

30th. Lung plague is peculiar to the bovine genus; and other genera of animals, man included, can only assist in the dissemination of the disease by carrying the virus on the surface.

31st. The mortality from lung plague varies much, but may reach 100 per cent. in hot climates and seasons. Hence the necessity for excluding it from the warmer portions of the continent.

32d. The incubation of lung plague, extending from a fortnight to three-and-a-half months, is one of the most dangerous features of this disease, and allows ample time for sending infected but still apparently healthy animals to the utmost confines of our territory. This long period of latency condemns the practice of passing animals as sound on a professional examination, and also the proposed method of sweeping over the country and killing all infected herds; for by reason of the many cases that must necessarily exist of infected animals not at the time showing symptoms of the disease, the process would have to be begun again as soon as it had been once performed.

33d. This long incubation demands, as an essential concomitant of slaughter and disinfection, the entire prohibition or the most rigid control of all movements of cattle in an infected district.

34th. When an animal survives an attack of lung plague there is usually left an encysted mass of dead (infecting) lung inclosed within the living. So that convalescent animals may be held as for a time capable of conveying the disease to others. These encysted masses often re-

main for over a year, and the bearers have often proved the centers of new outbreaks.

35th. Thoroughbred cattle, on account of their high value, are the most likely to be preserved, and if afterward sent West, they become extremely dangerous because of these encysted masses. The large indemnity expected for a thoroughbred should therefore be no excuse for his preservation when infected.

36th. Inoculation for lung plague is calculated to largely reduce the losses, but at the expense of a permanent preservation and general dissemination of the virus.

37th. Inoculation has never yet permanently rid any country of lung plague.

38th. This, together with its expense and the impossibility of making it universal, condemns the measure as a palliation for America, so long as we can avail of the incomparably better method of extinction.

39th. A thorough investigation of the great centers for cattle feeding and cattle traffic has demonstrated that at the close of 1881 there was no lung plague west of the Alleghanies; but that the disease was still confined to an area extending from Putnam County, New York, to Fairfax County, Virginia.

40th. We see no reason to conclude that the disease is disappearing under the present management; on the contrary, the absence of regular inspections in the infected districts leaves it to make its way unknown and unheeded, as it did prior to 1878.

41st. In the present status of the lung plague and cattle trade it is impossible to guarantee the health of even Western cattle exported from New York, Philadelphia, or Baltimore.

42d. It would be possible at present to guarantee the health of Western cattle exported from Boston or Portland, but if this led to the shipment to these ports of cattle from New York City, Philadelphia, or Baltimore, this guarantee would be at once invalidated.

43d. As a prerequisite, therefore, to the furnishing of certificates of health with cattle shipped from Boston and Portland, the Federal Government must interdict the movement of cattle out of any infected State.

44th. This interdiction, supplemented by a control of the through traffic from the West, and the establishing of bonded markets at such places as Buffalo, Albany, and Pittsburgh, would not only protect our exports but secure us against any extension of the plague through the shipment of thoroughbreds or commoner cattle westward or southward.

45th. By providing bonded markets at the ports of New York, Philadelphia, and Baltimore, and by admitting to these cattle from sound States only, under proper regulations as to transit, we could further give certificates of health with Western cattle shipped from these points, and furnish the districts with the means of obtaining store cattle without danger of infection.

46th. The cleansing and disinfection of cars and ships (and their contents) conveying cattle to or from the bonded yards is an essential condition of any guarantee.

47th. The present method of quarantining imported cattle is objectionable, and should be exchanged for one requiring that the detention be for all alike, in premises at the port, provided for the purpose and kept under the control of the Federal Government.

48th. For export fat cattle we recognize the necessity for strong separate stalls on board ship, properly cleated to give firm foothold, and above all, that ample provision be made for ventilation by the use of a revolving fan, or by extraction by the heat of the furnace. This we rec-

ommend, not because impure air or other cause of injury on shipboard would be at all likely to produce lung plague, but because the vitiated air is highly calculated to develop an inflammation of the lungs, which might arouse suspicion of lung plague.

49th. To carry out the above objects, we recommend an ample appropriation by Congress, and the appointment of some Federal official or officials to control the work.

50th. For the extinction of the lung plague in infected districts we consider it necessary that the authority—Federal or State—intrusted with the work should be clothed with the following power:

a. To abolish or regulate markets for store cattle in the infected districts.

b. To require the slaughter at the fat markets in infected districts of all cattle entering these markets. Fat cattle for slaughter elsewhere can be obtained at the bonded market.

c. To prohibit all movement of cattle in infected districts, except under special license.

d. To inspect all cattle in suspected districts.

e. To slaughter all infected cattle, and in exceptional cases those that have been exposed to infection.

f. To have the condemned animals appraised and the owners liberally indemnified.

g. To prohibit all exposure of cattle on highways, or on unfenced or insecurely fenced places in infected districts, or of suspected cattle on a lot adjoining one occupied by healthy cattle or bordering on a highway.

h. To prohibit all pasturage of more than one herd on one pasture in infected districts, unless under special license.

i. To disinfect all premises, fodder, and other articles that have been presumably exposed to inspection.

j. To institute and enforce such minor rules as shall be demanded by the peculiar conditions of particular districts.

k. To provide and enforce suitable penalties for enfringement of orders.

51st. In order to carry out these suggestions, we reccommend a liberal appropriation by Congress, to be disbursed by some designated Federal officer.

52d. In case the work be delegated to the different States, we advise that a liberal appropriation be made from the Federal exchequer, sufficient to cover the greater part of the outlay; and that this be paid over to the Executive of the infected State on the approval of the plan and execution of the work in the particular States by a verterinary sanitary organization designated for the purpose by the Federal Government.

JAMES LAW.
E. F. THAYER.
J. H. SANDERS.

REPORT OF DR. A. M. FARRINGTON TO THE UNITED STATES TREASURY CATTLE COMMISSION.

Prof. JAMES LAW,
Chairman United States Treasury Cattle Commission:

In accordance with the appointment received September 8, as "Veterinary Inspector of the Treasury Cattle Commission, to visit the various cattle markets of the West, and the feeding yards along the lines of cattle traffic, so as to ascertain and report upon the health of animals passing through such places, and further directed to examine professionally such herds as are in near proximity to the above places, and the herds of dairies and of distilleries and other factories which draw upon the large markets for their supplies of fresh live stock," I would submit the following report as the result of my inquiries in that direction:

BUFFALO.

I proceeded at once to Buffalo, N. Y. This is a very important cattle market. For the week ending September 18, the receipts were 16,283 head of cattle. Shipments for the same week, 14,091 head.

The stock yards are located at East Buffalo, upon the line of the New York Central Railroad. An area of 52 acres is devoted to the purpose of marketing stock that is brought here. At these yards is stationed by the city authorities of Buffalo a cattle inspector, whose duty it is to prevent all diseased and disabled animals from passing into consumption in the city.

The present inspector is Mr. Edward Chorriston, who has held this position since January 1, 1881. He has been engaged in the business of slaughtering cattle for eighteen years, and is familiar with the appearance of cattle affected with lung plague, having seen them in Ireland; but he states that he has never seen cattle affected with it since coming to Buffalo. On July 6, he condemned two steers affected with Texas fever, which are the only ones he has seen with this disease this season. The majority of animals he finds it necessary to condemn are those which have received injuries in shipping, and from the feverish state of their systems are unfit for human food. The condemned animals are sent to rendering works, where the hide is taken off, the carcasses are cut into pieces and placed in a large iron tank and thoroughly cooked by superheated steam. When sufficiently disintegrated the flesh is separated from the bones and used in the manufacture of commercial fertilizers.

I next visited some of the rendering works, hoping by this means to see some cattle that had died either in the city or at the stock yards, that I might determine upon examination of the lungs whether any had died from lung plague.

While not ignoring other diseases, my chief endeavor was to ascertain if any lung plague existed among the cattle here; consequently the lungs were the organs I wished to examine. At none of these works were there any dead cattle, and, from conversation with the owners and workmen, I was informed that the number of dead cows they received was very small, and they had not noticed that the lungs presented any peculiar appearance. I think the abnormal condition of the lungs would have attracted their attention if any animals had been affected with lung plague. Mr. Preston, who is engaged in this business of rendering, and who gets the larger portion of cows that die in the city dairies, stated that he got from twenty to twenty-five per year. This is considerably less than the number of dead horses obtained, and goes to show that no contagious disease exists in the cow-stables in the city.

I next visited the slaughtering establishments, and examined the lungs of cattle killed there. C. Klinck has the largest establishment, and kills upon an average two hundred cattle per week, the greater number of which he purchases at the stock yards. Mr. Klinck stated that he has never seen any sickness among the cattle, does not find the lungs diseased, and that the livers of the cattle are more healthy than formerly. He finds the cattle from city feeding-stables and dairies as healthy as those bought at the stock yards. Has killed about a thousand head from Dr. Firmenick's stable, and has found them free from lung disease. The lungs of the cattle slaughtered that day I found perfectly normal and healthy. The cattle in the pens awaiting slaughter were also healthy.

Surrounding the stock yards on all sides are commons or unfenced land, upon which cows belonging to people in the city are pastured, though at the time of my visit the vegetation was nearly dried up, and next to no grass was to be obtained; yet it afforded a place where the cows could exercise themselves. The herds of various owners mingle together here. Herds of fat steers are driven over these commons from the stock yards to the slaughter-houses of their respective owners, and must necessarily come in contact, to a greater or less extent, with the cows there. Here, then, would be a locality where any contagious disease would spread very rapidly, provided an animal affected with it were introduced.

One lot of six cows belonging to Mr. Metzdorff, Clinton street, upon these commons, I examined and found them free from any lung disease, and was also told that none of them had died.

Patrick Grogan, Clinton street, has twenty-six cows, which he turns out upon the commons, but has never lost a cow. I examined them in the stable and found no lung affection. The cows are fed upon brewers' grains and hay, and are kept as long as they give milk, and when dry are fattened and sold to the butcher. Fresh cows are bought at the stock yards. The stable is six feet high, with the cows tied three feet apart along each side, with an alley three feet wide passing along between the rows. No special provision is made for ventilation more than that from the doors at each end of the alley. John Dietzen, Broadway, has twelve cows, and states that he has never lost one. He also turns them upon the commons. I found them healthy, upon examination. He feeds his cows upon brewers' grains, wheat, bran, and hay. The cows are tied three feet apart, with a passage-way behind them two feet wide. Ventilation is provided by a window, eight by ten inches, in front of each cow.

Mr. Alexander, Howard street, has six cows, which I examined and found healthy. They are pastured near the stock yards, and could come in contact with the cattle in the yards. Mr. A. stated that he had not lost one cow in the six years he had been in the milk business. He was formerly a cow-dealer and had accommodation for fifty cows, but has never seen any disease among them.

I was present at the meeting of the board of health, and was informed that they had never known of any contagious disease among the dairies in the city, and were confident that no lung plague existed among the cattle here. L. Taylor, one of the members of the board who was formerly a cattle-dealer, and who had taken considerable interest in the spread of this disease, stated that it did not exist among the cattle here. Mr. Taylor visited with me some of large feeding stables.

Thomas Farthing feeds about 220 bulls and steers upon distillery slops. The loss during the feeding season, five to six months, he stated to be about 1 per cent. The stables were not full at the time of my visit, but the cattle that were there were free from lung plague. Fresh stock is bought at the stock yards, and State cattle are preferred, as they fatten more readily upon the food given.

Ullman and Block have just completed a new stable capable of holding 243 head of cattle. At the time of my visit there were 240 head which were free from lung plague. The annual loss was said to be about 1 per cent. The cattle are tied in three double rows, two rows facing each other, and eating hay from the same rack; consequently their noses would come in contact and the germs of lung plague would be carried by the breath into the lungs, provided any animals were affected with it.

Dr. Firmenick feeds his milch cows upon the refuse of his corn-starch factory. At present the stables contain 210 cows. His method is to buy fresh cows at the stock yards or of the farmers in the vicinity, to milk them as long as they give milk, and when dry to fatten them and sell to the butchers. As a rule they remain in the stable a year and are then replaced by new ones. About a dozen of the cows were not doing well, were running down in condition, growing poor, and were so weak as to require help to rise up. I made a very critical examination of the lungs of these cows, but they presented no lesions. They did not show an elevated temperature, 102° Fahr., and had no cough, and were not suffering from lung plague. As it was not a contagious malady, but one manifestly connected with the feeding, I did not investigate further.

J. C. Hamlin feeds cattle upon the refuse of his grape-sugar manufactory, at Aurora, 15 miles from Buffalo. He said there were at present only 50 head in his stables, as he had just begun to buy fresh stock for the winter. Says he has never had any die from disease, but those that have died suffered from accidents or injuries unavoidable where large numbers of cattle are kept together.

Visited C. Gilbert's starch factory, Black Rock, and interviewed the man who has charge of the cattle. The present number is 150 head, of which 75 are cows, and their milk is sold in the city; the remainder are bulls and steers that are being fattened. He stated that the annual loss was not over 1 per cent. No contagious disease has appeared among the cattle. The cattle remain in the stables about one year, and a fresh supply is taken from the stock yards or the surrounding country.

I also made inquiry of the leading veterinary surgeons, Summerville & Sons, and was told that they had never met with any cases of lung plague in their practice in Buffalo, which extended over a period of about forty years.

From this examination of more than 700 cattle that are confined in stables here and brought from various parts of the country, and not a single case of lung plague among them and no report of any such disease by men who are constantly dealing in cattle and who are financially interested in them, I concluded that this market must be free of that dread plague.

SUSPENSION BRIDGE.

From Buffalo I went to Suspension Bridge. The stock yards here are used only to feed, rest, and water the cattle that are destined to eastern markets. No cattle from the east going west come to these yards, as Canada will not allow such cattle to pass through her territory. But very few cattle have been shipped through these yards this season owing to the "cutting of rates" by the railroads. The majority of the eastern bound cattle go to Buffalo or via the Grand Trunk Railway through Canada. The superintendent here, W. A. Homan, is from Putnam County, New York, and has seen the ravages of lung plague among the cattle there, but has never seen any cattle affected with it at these yards. The cows of neighboring farmers do not come near the cattle in the yards, and would not become infected even if the cattle passing through were diseased.

ROCHESTER.

Rochester, N. Y., was the next place visited. There are no feeding yards, here simply a few pens for unloading stock that is brought here on the Central Railroad. The person in charge of these pens said that on an average seven to eight car-loads of

western cattle came here per week, and were driven direct to the slaughter-houses and killed for beef. I visited the slaughter-house of Conrad Ester, Goodman street, who kills 20 to 30 cattle per week, and states that he finds none of them with any lung affection. All the lungs of cattle killed and the cattle on the place were perfectly healthy. No feeding stables exist in connection with the large breweries, as the refuse grains are used by the dairymen and farmers around the city.

Dr. Stoddard, of the board of health, stated that no disease among cattle had been brought to the notice of the board, and that the cattle kept in and around this city were very healthy. The milk supply comes principally from farmers in the country.

Dr. E. Mink, practicing veterinarian, stated that he had considerable cattle practice, but has never known of any lung plague among the cattle of this section. Some cases of splenic apoplexy in cattle came under his notice a few years ago. Aside from that no contagious disease exists among the cattle here. Dr. Drinkwater, veterinary surgeon, stated that he did not know of any lung plague among cattle here. The man who renders the dead animals for the city said that the number of cows he got was very small—about one per month.

I next examined the cows of dairymen who sell milk in the city. Orin Todd, Big Ridge road, about four miles from the city, has 16 cows, which were perfectly healthy. He feeds his cows upon brewers' grains, corn meal, and hay, and has plenty of pasture during the summer. Has never lost any cows from a contagious disease. He keeps his cows as long as they yield a good supply of milk, and buys fresh ones from farmers in the surrounding country. Clark Douglas, president of the Milkmen's Association of Rochester, had a herd of 28 cows, which I examined and found free from disease. Mr. Douglas stated that he has not lost any cows from a contagious disease, and that he knows of none in the country around. He is in almost daily communication with the milkmen of the association, and any disease among their cows he would be likely to hear about and be consulted as to the best means of getting rid of it. He is now feeding, in addition to hay and corn-stalks, "Buffalo feed,"—*i. e.*, the refuse of the cornstarch factories of Buffalo, and considers it an excellent food for his cows. Formerly he fed brewers' grains with excellent results and saw no bad effects from it, having one cow to which he had given this feed nine years without injuring her health in the least.

C. J. Schaeffer, Waring Road, has 21 cows, which were healthy. Mr. Schaeffer stated that he was often called upon by his neighbors to doctor their cows when sick, and that the principal affection among them was parturient apoplexy, coming on about the time of calving. He feeds brewers' grains in addition to hay and corn-fodder and other crops which he raises upon the farm.

Examined six cows belonging to William Von Est, Waring Road, and found them healthy. George Pease, Lyell Road, has 17 cows, which were healthy; Mr. Rosenback 11 cows, and Patrick Lynch 11, also free from lung plague. These dairymen feed upon brewers' grains, wheat bran, and hay, and also have fenced pastures upon the farms to turn their cattle. They raise calves from their best cows and sell the poor ones for beef, replacing them by fresh cows bought in the neighborhood.

SALAMANCA.

At Salamanca, N. Y., are stock yards which are used almost exclusively as a feeding-place for stock that is shipped by rail to the markets of Jersey City and New York City.

The Superintendent, R. J. McKay, states that from 40 to 50 car-loads come here per week, and remain from three to thirty hours, being allowed hay and water. At certain seasons of the year fresh cows and their calves are shipped by this route into Putnam and Duchess counties, New York. The greater proportion of the stock, however, are fat steers which are on their way to eastern markets. No sales take place at these yards. The neighboring herds do not come up to the yards, as there is a stream on one side and the railroad passes along the other side. Occasionally in the spring of the year a few car-loads of cows come here and are unloaded and sold to the farmers in the vicinity, which would be a means of carrying contagion provided such contagion existed in the yards or in the cattle fed here. Almost the only cattle that pass through here from the east are thoroughbred animals. The previous week a car-load of thoroughbred calves came through from Vermont, via Albany, en route to Kansas. No disease exists among the cattle here, or has ever existed so far as could be learned. The cattle in the yards at the time of my visit were perfectly healthy.

PITTSBURGH.

I reached Pittsburgh, Pa., September 19, and called at the office of the board of health. The health officer referred me for information upon the diseases among cattle to the meat inspector, Thos. W. Lindsay, who is also milk inspector for the board.

In company with Mr. Lindsay, I visited the principal stock yards for Pittsburg, which are the central stock yards upon the line of the Pennsylvania railroad at East Liberty. All the cattle in the yards appeared perfectly healthy.

Geo. Dunkeld, weigh-master at these yards, gave the following statistics as to the number of cattle that are handled here: For the six months ending June 30, 1881, the receipts of through cattle, 146,500 head; of local cattle, 38,654 head. In this time 9,229 calves were received and sold here. Mr. Dunkeld has held this position for ten years, and has seen every steer that has crossed the scales, as he has to count the number of animals weighed, and in no case has he seen cattle affected with disease.

Caleb Martin, superintendent of central stock yards, said that the cattle that came here were perfectly healthy. The causes of death were from mismanagement in transporting, from crowding too many into a car. Some die from drinking a large quantity of water, excessive thirst being caused by feeding salt. This feeding of salt, so that the cattle will drink a large amount of water and increase their weight, is a very dishonest and brutal practice which is carried on by some unprincipled men. John Beal, of the firm of J. F. Sadler & Co., said he had never seen any cattle affected with lung-plague at these yards; neither had he known of any west of Pittsburg. Years ago he had had losses from Texas fever, but the first frost put an end to that disease.

S. Brown, of the firm of J. C. & S. Brown, Louisville, Ky., large dealers in "slop cattle," so called, said that soon after the war he lost cattle from Texas fever, and aside from that there was no disease among the cattle he handled, and he knew of none in Kentucky.

C. H. Peabody, retail cattle dealer, says he has never suffered from loss of cattle by disease. The only report of cattle dying that he has heard of were from Texas fever and from abuse in shipping.

Mr. Rush, editor of the Pittsburgh Stockman, and cattle dealer, says he has no reports of any cattle disease in this section; the cattle coming to and passing through these yards are invariably healthy.

Mr. Lindsay gives the following figures in regard to the number of dead cattle taken from the stock yards to the rendering works: In 1877, 60 head; in 1876, 79; in 1875, 125. When one considers the thousands of cattle that come to these yards in the course of a year this number of deaths can easily be accounted for by mismanagement and abuse.

A smaller stock yard is located at Alleghany City, to which part of the stock for city use is sent. No through consignments come to these yards. About 25 car-loads arrive here per week, sometimes reaching as high as 50 car-loads. The cattle come from the western States of Ohio, Missouri, and Kentucky, and from the western counties of Pennsylvania. The cattle at these yards were free from lung plague.

The fall-master, Dr. Edward Czarneicki, V. S., has the contract for removing the dead animals of the city. He states that as a rule he gets two or three dead cows per week. I visited with Dr. Czarneicki his rendering works, where was a dead cow brought from a city dairy. Upon examination the lungs were found free from any lesions.

Dr. Czarneicki said that he never met with any cases of lung plague either in his practice or among the dead cows that were rendered at his works.

Dr. R. Jennings, V. S., had never known of the disease among cattle in this vicinity.

The slaughter-houses of Pittsburgh are scattered in all directions around the city, and are 52 in number. I visited a number of them, but was unable to examine many lungs as they had been thrown away. The carcasses were free from any erosions upon the parietal pleura. Wm. A. Hoffman, 408 East Ohio street, Allegheny City, who is said to be the largest butcher in the city, kills, on an average, 35 cattle per week. The lungs of cattle killed there I found without lesions. From conversation with butchers in the market they stated that the lungs of western cattle were always sound.

I visited the stable of Daniel Boyle, cow dealer, Frankstown avenue, who states that he sells between 300 and 400 fresh cows a year. He buys them in the stock yards, where they come from the Western States, and from the northern and western counties of Pennsylvania. Six cows then in his stable were healthy. Mr. Boyle says he is called upon when cows are sick in the neighborhood, but has never known of any contagious disease among the herds. The sickness he has to treat mainly is what he calls milk-fever. Of the cows kept in his stable he has lost but one, and that one broke her neck from being improperly tied.

IRON CITY.

Also visited the Iron City cow market, where upon two days in the week fresh cows are offered for sale, and disease must necessarily be contracted if one infected animal were brought. The seventeen cows there were healthy. Part of them had come

from Indiana; the others were from different parts of the surrounding country, and one cow was from a city dairy.

The largest dairy near Pittsburgh is kept by A. Harrison, Oakland, near Fifth avenue. He has 129 cows. Last year the loss from death was three head. He is now milking 75 cows, which I examined and found no diseased ones among them. The remainder of his herd do not give milk now, and were upon a farm at pasture several miles away. He feeds his cows upon brewers' grains, wheat bran, oil cake, hay, and cornstalks. At this season of the year they are only kept in the stable during the time they are milked, and turned out upon the adjoining fields at other times. The principal stable is 8 feet in height from floor to ceiling. The cows are tied with chains, 3 feet apart, in two long rows facing each other, with a passage-way 10 feet wide between the mangers, and an alley 3 feet wide behind the cows. At each end of the latter is a door 4 by 6 feet to admit air. No provision is made for the escape of heated and impure air. Being upon the side of a hill, the drainage is excellent; no stagnant pools of water for the cows to drink from, but pure, running water is provided at different points for this purpose. The cows remain in the dairy as long as they yield a profitable supply of milk, some of them for several years, and when disposed of to the butchers their place is filled by other cows raised upon the farm.

In company with Mr. Broebeck, sanitary inspector for the board of health, I visited some of the smaller dairies in his district.

Peter Owen has four cows which were free from disease. The stable, composed of a stone wall on two sides, is 7 feet high, 30 feet long, and 16 feet wide. The cows are tied 3½ feet apart, with their mangers along the wall. A door 6 feet high and 10 feet wide at the end of a passage-way 10 feet wide admits air. They are fed upon brewers' grains, wheat bran, cracked corn, and hay. They are seldom turned out, except upon the commons occasionally for exercise. When dry they are sold to the butcher, and fresh cows are bought at the cow market to take their place. One cow, which had been in the stable about two weeks, showed a temperature of 102° Fahr.

August Miller, corner of Twelfth street and Washington street, has five cows. They were healthy. One cow bought in the country last March showed a temperature of 101° Fahr. They are kept in one end of a horse-stable 33 feet long and 20 feet wide. A passage-way 4 feet wide separates the cows at each side, and a door at the end and side give a good circulation of air. The feed and general mode of management is the same as in the former case.

Geo. Dietzler, Twenty-fifth street, eight cows, which were free from disease. They were kept in four different shanties or outbuildings, each about 10 feet square, with two cows in each. Treatment same as preceding.

G. F. Betler has 13 cows, which were in a fenced pasture with the cows of several other dairymen. The cows were panting with the heat but there were no indications of disease in the lungs. The stable where these cows are kept is 51 feet long, 10 feet wide, and 8 feet high; each cow has a stall 3 feet wide and 5 feet long. The feed is brewers' grains, wheat bran, and clover hay. The cows of various owners are allowed to feed together upon the commons in this vicinity, but no disease is contracted from so doing.

John J. Williams, Penn street, keeps 12 cows, which were free from lung disease. The stable was built of rough boards, 5 cows in one portion, 3 in another, and 4 in another. These sheds are 8 feet high in front and 7 feet in the rear, with a passage 2 feet wide behind the cows, with a door at each end. The feed is brewers' grains, wheat bran, and hay.

The only large feeding stables in the vicinity of Pittsburgh are at Freeport, about 15 miles up the river, at A. Guckenheimer & Bros.'s distillery. The stables are capable of feeding 300 head of cattle. At the time of my visit there were 125 bulls in the stable, which had been in about three weeks. They were bought at the stock yards in East Liberty and from farmers in the neighborhood of Freeport. The annual loss Mr. Guckenheimer states is very small, and mainly from accidental injuries. Last year not over 8 head died out of the several hundred fed at these stables. The warm slop is run into long troughs, 12 inches wide and 18 inches deep, in front of the cattle four times per day, and hay is fed once per day, usually at night. Fresh cattle are bought in small lots as they can be obtained, about the middle of September; about the middle of the next May they are sold off, a few car-loads at a time, and are all sold off in a month's time, so that during the warm summer months the stables are entirely empty. The ventilation is by means of three openings in the peak of the roof, 16 feet long and 4 feet wide, and provided with doors 1 foot wide, which can be opened or shut as may be necessary—air enters each end of the building through doors 4 feet wide and 6 feet high. Each animal is tied by a chain around the neck, and has a space 3½ feet wide, 10 feet long, with a manure alley 3 feet wide, and a feeding alley 4 feet wide, and the shed is 7 feet high at the eaves and 15 feet at the peak of the roof. One hundred cattle are confined in a building 100 feet long and 60 feet wide. These cattle were all healthy. Some were loose in a yard near by, that were bruised or had sores upon them, so that they could not be tied up. In the spring, when fat, they are sold and shipped to eastern markets.

CLEVELAND.

At Cleveland, Ohio, Dr. G. C. Ashmun, health officer, informed me that the cattle had been very healthy this season. Two years ago the losses had been quite heavy from Texas fever, but the farmers and those keeping cows had learned by experience to keep their animals away from wherever Texas cattle had been, and in observing this simple expedient had been saved heavy losses.

The meat supply, particularly at this time of the year, comes from Texas cattle. Of the 3,000 cattle killed per month, 2,600 are Texans. Diseased livers and diseased spleens are the only diseased organs met with in animals killed for beef. Beef cattle come almost entirely from points west of Cleveland; very few from south of Cleveland.

The cows in city dairies, *i. e.*, those dairies within the city limits, he states are uniformly healthy. In each of these dairies are kept from two to ten cows, and conducted, as far as feed and care go, about as such dairies in other cities. In the suburbs are larger dairies, keeping from thirty to fifty cows each. From these two sources, and from what is shipped in on the cars, the milk supply of Cleveland is drawn. No instance of any lung disease among the cattle has ever come under his notice.

I visited the farm of Joseph Breck, Brecksville Road, five miles from Cleveland. He has 55 cows, and sells their milk in the city. Occasional cases of parturient apoplexy are the only affections from which his cows die. Upon examination I found his cows healthy. He buys fresh cows from the farmers in the country around, and sometimes goes into Indiana and buys a car-load at a time. His cows run at pasture except during the time they are milked, at which time they are fed grain, and sometimes hay or cornstalks. Farmers two or three miles from him have lost cows of Texas fever, but with that exception there is no disease among the suburban dairies.

In company with a sanitary inspector I visited the stock yards. They comprise only a few pens, which are used merely to unload cattle brought here on the cars. From here the cattle are driven to the slaughter-houses, where are pens and conveniences for feeding them as long as the owner may desire. The neighboring herds do not come in contact with the cattle at these yards, as there are no commons around them.

I next visited the slaughter-houses near the stock yards. At John Streibel's slaughter-house, where generally from 10 to 14 cattle are killed per day, I examined the lungs and found them healthy. Most of the cattle killed here are Texans, bought in Saint Louis and shipped by cars to Cleveland. Mr. Streibel states that he finds none of them affected with disease of the lungs. At other places the lungs of cattle slaughtered were free from disease, and the butchers all stated that in cattle they had killed the lungs were sound.

Dr A. F. Martins, veterinary surgeon, said that no cases of lung plague had occurred in his practice, neither had he any reports of its existence in this locality.

MILWAUKEE.

Milwaukee, Wis., October 28. I called at the office of the board of health to obtain information in regard to the health of the cows in the city dairies. I there learned that the board had made strenuous efforts to get the State legislature to pass a law which should provide for the appointment of a milk inspector, whose duty it should be to see that the cow stables were kept in a proper sanitary condition, and that the milk sold should be unadulterated. The salary of such an inspector was to be raised by assessing a tax on each milkman in proportion to the number of cows he kept. This measure was strongly opposed by many of the dairymen, and failed to become a law.

Dr. Wight, health commissioner, then made a personal inspection of all the cow stables which furnished milk for city use. A record of this inspection was kept in the office for the enlightenment of any citizens who might wish to know the condition in which the cows were kept and fed that supplied him with milk.

From this investigation Dr. Wight found at that time, (at the beginning of the year 1879,) that the city was supplied with the milk of 3,041 cows, making 17,014 quarts of milk brought into the city in one day. In this inspection no contagious disease was found to exist among the dairy cows, though many were kept in very filthy surroundings, and in close, poorly-lighted, and poorly-ventilated stables. No knowledge of any contagious disease has ever come to the notice of the board of health, and if any affection had existed among the cow stables such thorough inspection would have revealed it.

I next visited the feeding sheds in connection with John Meiner's distillery. In these sheds were 163 bulls and steers, one-third being bulls and two-thirds steers. The usual number fed in a season is 400, though this year only one-half that number will be fed. The annual losses from cattle dying are very small indeed. Mr. Meiner stated that only two animals had died in the six years he had fed cattle. The cattle

are tied in rows with 48 in each row, each animal having a space 3 feet wide. The sheds are 6½ feet high behind the cattle, and about 10 feet at their head. Troughs 10 inches high and 12 inches wide run along in front of the cattle into which the slop is run. Between this trough and the trough of the next row of cattle is a space 2½ feet wide. Above this space are openings in the roof 1 foot wide and 6 feet long, 6 feet apart, which secures very good ventilation. The semi-liquid manure drains off into gutters in the rear of each row of cattle, and then into a small stream which runs along the end of the shed. In addition to the slop about eight pounds of cut hay per head is fed once a day. Cattle remain in the stable from six to eight months, and at the end of that time are very fat. Fresh stock is drawn from the surrounding farms, and are also bought at the stock yards nearly six miles away. The cattle all appeared healthy at the time of my visit, and seven gave the following temperatures: 101.8° Fahr., 102° Fahr., 103° Fahr., 102.8° Fahr., 101.2° Fahr., 101.4° Fahr., 101.7° Fahr.

The principal stock yards of the city are those on the Chicago, Milwaukee & Saint Paul Railroad. The outline of these yards is triangular, with railroad tracks on two sides and the Menominee River on the other side; consequently the neighboring herds cannot come in communication with the cattle in the yards. The stock that come to these yards come from the States of Wisconsin, Minnesota, Iowa, and Illinois.

There were sold at these yards, in 1880, cattle, 26,142 head; in 1879, cattle, 25,210 head. To this should be added about one-third more to represent the number that are unshipped for feeding and watering only, and then sent on to Chicago.

The superintendent of the yard stated that he never heard any complaints from persons doing business here, of losses from sick or diseased cattle. Mr. Waixelberg, a cattle dealer, stated that he had never seen any sick cattle in these yards, neither does he know of any disease in the State or States that send cattle here. All cattle in the yards at the time of my visit were healthy. All grades of cattle were there; oxen and steers for slaughter, bulls to be fed in distilleries, yearlings which are sold to farmers and fed, and lean cattle which are used by the packing and beef-canning establishments. Fresh cows and their calves brought from adjoining towns and counties were for sale here also.

In Market Square, of the second ward, there is a retail cattle market. Here I saw about 100 fat cattle, nearly all State cattle, some of them driven in from the country, and all perfectly healthy. Fresh cows are also offered for sale here, coming principally from the neighboring country. John Behme, a dealer at these yards, said he found the cattle here healthy.

In company with George Kaeppel, city meat inspector, I visited the city slaughter-house, at which many of the butchers kill the cattle to supply their meat markets. I examined the lungs of about 50 animals, being those killed on three days, and found them healthy. Also visited Plankinton & Armour's beef-packing establishment, where now they are killing 150 cattle per day. Could find no traces of disease. Also visited the meat market of John Moeller, Walnut street, who kills about 35 cattle per week, and examined a number of lungs of cattle killed that day, which were healthy.

Visited the dairy of Frank Schmidt, Fourteenth street, who keeps 12 cows, which were free from disease. The stable is about 7 feet high, with cows tied 3 feet apart, a trough for food in front of them, and a rack for hay above that. A passage-way 4 feet wide behind the cows and a door 4 by 6 feet admits air. The feed is malt or brewers' grains, wheat middlings with hay in winter and grass in summer. Mr. Schmidt says he has never lost a cow. He milks them as long as they will give milk and then fattens and sells to the butcher. Fresh cows he buys wherever he can find them, usually of farmers in the country. The premises were very neat and clean and well drained.

John Ottén, Seventeenth street, had 10 cows in a low, dark stable 5½ feet high. No provision was made for ventilation except from a door in the side of the stable. The cows were free from lung plague, however. The feed was brewers' grains, wheat bran, and hay. No special provision for drainage, and the water stood in pools around the stable. Thirty cows belonging to different owners were feeding on the commons in the vicinity, yet all appeared healthy.

F. Dabberphul, corner of Centre and Ninth streets, had 10 cows, which I examined and found healthy. They were tied in stalls 7½ feet high, 3 feet wide, and 8 feet long, and a passage-way 4 feet wide behind them. The feed was brewers' grains, wheat bran, and hay. The land was flat, sloping very slightly, and water and manure stood at one end of the stable. The ventilation was through doors and windows behind the cows.

F. Bartlett, Centre street, had 13 cows, which were healthy. The space allowed each animal was 3 feet wide, 6 feet long, and 6 feet high, with a passage 3 feet wide behind. Two doors and two small windows were the only means of ventilation. The place was dirty and poorly drained. I examined 9 cows in a small, dark stable surrounded by mud and stagnant water. Each animal had a space 6 feet high, 2½ feet wide, and 7 feet long. Notwithstanding the cramped quarters and filthy surroundings, none of them had lung plague.

August Bartke, Centre street, had 4 cows in a stable capable of holding 20, which were free from disease.

Henry Schwartz had 5 cows in a well-lighted and clean stable, which were healthy. The space per head was 9 feet high, 3 feet wide, and 8 feet long. A window 1 foot square in front of each cow and a door 3 feet wide and 6 feet high gave sufficient ventilation.

F. Koenig, Teutonia avenue, had 9 cows, which were healthy. The space allowed each was 7 feet high, 3 feet wide, and 10 feet long, and a passage-way 3 feet wide behind the cows. The diet was brewers' grains, wheat bran, and hay. Fresh cows are bought in the country of farmers.

No lung plague exists in the dairies of the city or ever has existed, though in very poor sanitary condition.

SAINT LOUIS.

I began the inspection of Saint Louis, Mo., November 7. Upon making known my mission to Chas. W. Francis, health commissioner, he kindly detailed Mr. Hohoff, an officer of the sanitary staff, to accompany me and point out the location of the city dairies and slaughter-houses. We visited first the National Stock Yards in East Saint Louis, Ill. These yards cover an area of 100 acres, and in 1880 the receipts were 346,533 head; shipments, 222,417 head of cattle. There is a high and tight board fence around the yard which excludes cows or other cattle outside from coming in contact with those inside.

Isaac H. Knox, president of the company, stated that he could safely say that there had never been a single case of lung plague in these yards. He stated that 20 per cent. of the trade at these yards is in Texas cattle. That in former years he had had frequent complaints and claims for damages by farmers who had lost cows from Texas fever caused by the Texas cattle shipped to these yards but these complaints were growing less and less each year, and this season no complaints had been made, and but very few cattle had died from it. The cause of this decrease in the number of cases of Texas fever he thought was due to the better care the Texans received. They are not driven on foot such long distances as they were formerly, but are shipped in cars to market, the increase in the number and extent of the railroads in Texas making this possible. Also there is more care exercised in the breeding, raising, and feeding of Texas cattle, and the country is better cultivated, all of which causes contribute to mitigate the disease. There is no trade in cattle from the "far East." Whatever does come from eastern points comes from Kentucky, Ohio, and Indiana, and is mainly thoroughbred stock for the improvement of the native cattle. There is only one distillery from which cattle are sent to these yards.

About four years ago a number of sensational articles appeared in the newspapers about the "swill-fed" and diseased cattle that came from Illinois and were sold in these yards. The company sent Charles T. Jones, superintendent, to thoroughly investigate these stories, and he found there was no distillery at the place where it was said these diseased cattle came from, consequently there could be no truth in the stories, and the newspaper correspondent was obliged to take back the statements he had made. Near the stock yards are the works of the Saint Louis Beef Canning Company. I examined the lungs of cattle killed here and none of them were diseased.

Mr. Hamilton, superintendent, stated that diseased livers were sometimes found, but that the lungs were sound.

My next endeavor was to ascertain if the cows in the dairies were also free from lung plague. I began by examining the cows of Martin Wohlend, 2436 Columbus avenue, who keeps 28 head. They were all healthy. The stable is 12 feet high. Each cow has a space 3 feet wide and 8 feet long, with a passage-way 4 feet wide in front and 2 feet wide behind. in addition to feeding trough 12 inches wide and 9 inches high, and a manure gutter 1 foot wide and 4 inches deep, The food given is distillery slop, brewers' grains, wheat, bran, and hay. The drainage and ventilation was very good.

Twelve cows belonging to Tobias Burk, Columbus avenue, were healthy. None have died. The stalls wese 8 feet high, 7 feet long, and 2 cows had a space 6 feet in width. The diet was slop, malt, bran, and hay.

H. A. Held, Sidney street, 37 cows, also healthy. In four years only 1 cow has died. The stalls were 10 feet high, 8 feet long, with a space 5½ feet wide for 2 cows. It was a square stable, built of brick, with the cows tied in two double rows facing each other, and a passage-way 3 feet wide between each two rows. The stable is lighted by windows in the side of the building. Fresh cows are bought of cow dealers who bring them to the stable, and the purchaser knows nothing of the previous history of the animal, which might have come from an infected stable for anything he knows; but as no disease is developed it is reasonable to suppose that no disease exists where the fresh cows come from.

Frank Young, Jackson street, has 12 cows; all were healthy, and he states that none have died. The stalls were 8 feet high, 5 feet wide, and 7 feet long, and a passage-

way 3 feet wide behind the cows. He buys fresh cows in Illinois and sells fat ones to the butcher.

Xavier Wieget, Columbus avenue, has 50 cows, which were healthy, and states that not one cow has died in five years. This is also a brick stable, arranged similar to the others, and is well lighted and ventilated. A small fenced yard joins the stable, into which the cows are turned in fine weather for exercise.

Hermon Kropper, Rosette street, has 7 cows, that were healthy, and states that but one had died from his herd this season; none of the others were sick.

Frank Rempsberger has 82 cows in one stable that was well lighted, though not sufficiently ventilated. These cows remain tied in their places from the time they come in fresh until they get fat and are sold to the butcher. It was stated that this season none had died, though it is not uncommon in some years for two or three to die. The cows were all healthy. The drainage was into a sewer.

Fresh cows are bought of cow dealers, two or three at a time, as they are needed to keep up the supply of milk. As is the practice with the other dairymen I visited, distillery slop is run into troughs in front of the cattle and they drink it; brewers' grains and wheat bran are mixed together and given them, and in addition hay is fed to them.

On Manchester road are some stock-yards which were formerly used by the Missouri Pacific Railroad, but now the railroad does not land stock, and the yards are used by cow dealers and butchers to keep their cattle in.

H. Bischoff, a butcher who has a slaughter-house in these yards and who kills from 50 to 75 cattle per week, stated that in the cattle he killed the lungs showed less signs of disease than any other of the internal organs. He also stated that several years ago, when the milkmen's cows were dying in great numbers, that he opened several of them and found the heart, liver, and spleen enlarged, the urine bloody, and the fat very yellow. The lungs were not affected. From this description it appears evident that the disease was Texas fever.

In the yards were a herd of about 25 steers which Mr. Bischoff said he was in the habit of herding upon the commons during the day and they were driven into the yards at night. One can readily see how this practice would spread the malady from cows grazing over the same ground with steers.

Several cow dealers said the only diseases they had seen among cows was dry murrain and bloody murrain. From the bloody appearance of the urine in Texas fever, it is obvious that this disease was meant by the latter name.

The Saint Louis Union stock-yards, situated on the Saint Louis side of the river, is also a large cattle market. For 1880 the receipts of cattle were 112,920 head; shipments, 16,480.

W. A. Ramsey, superintendent, stated that the only disease among cattle here was Texas fever, and that this year there had been less than ever of that disease. The cause of its becoming less and less each year, he thought, was due to the fact that the cattle in Texas were becoming more domesticated. Large numbers of wellbred bulls were taken into the State every year and had greatly improved the grade of cattle. A greater amount of land is being cultivated, which changes the character of the herbage and may have some influence in preventing the disease. The number of deaths was greatest in 1876 from Texas fever. He stated that there was but very little trade in eastern dairy calves; the majority of that stock goes to Chicago market and is distributed from there.

Mr. Pegram, a cattle dealer, said there had been less than a dozen loads of eastern dairy calves shipped through these yards this season. He had not seen a single steer die of Texas fever in the yards this season. On account of this disease farmers for whom he does business would not receive "stockers," *i. e.*, young cattle to be fattened by them during the warm summer months, because they would die in large numbers on reaching their farms. This season, however, he had bought and shipped stockers during July and August, and had no trouble about cattle dying; which was pretty good evidence that the disease was not so prevalent as in former years. He said that no cattle here were affected with lung plague.

W. S. Hensley, another cattle dealer, said he had never seen a case of lung plague in the yards or anywhere else; does not know what the disease is. Had not seen three steers sick with Texas fever this season. Other years numbers of cattle had died from it, but it was becoming less and less prevalent each year, due, he thought, to the better breeding of cattle in Texas.

The experience and statements of other cattle dealers was essentially the same as that of those given.

The cattle in the yards and those in slaughter-houses near by were healthy. There are no commons around the yards.

John Crowley, veterinary surgeon, said he had not seen any cases of lung plague since coming to the United States, either in his practice in Saint Louis or in Springfield, Ill., where he had practiced for a number of years before coming to Saint Louis.

I examined the cows of Arnold Steinlager, Prarie avenue, who keeps 60 head. Not

one was affected with lung plague. He states that he has not lost a single cow in two years. Before that he lost 10 cows in one week from Texes fever contracted by allowing them to graze on commons where Texas cattle had been herded. Now he has a fenced pasture, into which no strange cattle are allowed to come, and does not buy fresh cows in the warm summer months, and thus escapes the fever.

Wm. Klinger, Natural Bridge road, has 40 cows, which were free from lung plague. They are allowed to graze on the commons in the vicinity, yet have never contracted any lung disease. He states that none of his cows have died this season. Four years ago, when in another part of the city, he lost fifteen out of twenty-five head from Texas fever. The stable was very dirty and filthy from the manure that was not properly cleaned up, and from the mud on all sides, from lack of provision for drainage. It was very imperfectly built of boards, and large cracks in the sides caused the cows to be exposed to the effects of cold and rain.

H. Bunten, Natural Bridge road, has 40 cows, which were healthy. He stated that none had died this season. Three years ago five had died. These cows are also turned out on the commons. The stable was kept in very good condition.

John Groh, Natural Bridge road, has 50 cows that were healthy, and states that none have died.

Charles Burns, Natural Bridge road, has 22 cows that were healthy, and states that none have died.

All these dairymen are in the habit of feeding distillery slop, which is run into troughs in front of the cattle. Brewers' grains, wheat bran, and hay are also fed. They buy fresh cows of dealers and sell their fat ones to the butcher.

During the warm weather they are a little apprehensive of their cows taking Texas fever, but after the first frost all fears of that disease are removed.

S. W. Steigers, Saint Louis avenue, has a dairy upon a farm that has been used for that purpose for a great many years. He has 150 cows which I examined and found none with lung plague. He states that this summer two only have died. Six years ago 15 died of Texas fever, which was the only serious outbreak of disease that ever occurred upon the place. His practice is to buy springers, either of cow dealers at the stock-yards or of farmers, and to keep them until they calve, when they are placed in the dairy and remain eight or nine months, when they are sold to butchers for beef. The cows have large pastures to graze in, are only put in the stable to be milked, at which time they are fed brewers' grains and wheat bran, mixed together in about equal parts and moistened with slop.

From all the facts that I was able to gather, and from the number of cows examined, I consider that there is no lung plague in the dairies of Saint Louis, but that they have been troubled and have sustained heavy losses from the Texan cattle disease.

KANSAS CITY.

At Kansas City stock yards, in Kansas City, Mo., is one of the most important cattle markets in the West. The receipts in 1880 were 244,709; the shipments, 244,281 head of cattle.

C. F. Morse, manager of the yards, stated that the cattle had been freer from disease this year than for any season since the yards had been in operation, which was ten years. There had not been a sick steer in the yards this season. The only disease that had ever affected the cattle here was Texas fever, and even that did not now prevail to such an extent as it did formerly.

The only calf trade that had been carried on here was done last winter by a few dealers as a sort of experiment. They brought a few car-loads from Ohio and put them upon the market.

Mr. Morse thought the experiment was not likely to be repeated, as those who feed cattle prefer young cattle from Kansas and Colorado, as they are better bred, are higher grades, and take on fat more readily. Dairy cows and their calves are not offered for sale here, as farmers find it more profitable to fatten their cows and sell them for beef.

The cattle handled here are fat cattle and "stockers," though a good many thoroughbreds pass through the yards on their way to the western stock ranges.

There are no commons around these yards, but cows, belonging to people in the city who keep only one cow and turn it out into the streets to get its own living, often wander into the alleys between the cattle pens in search of hay or ears of corn which the cattle did not eat. None of these cows were diseased, though they could become infected if any of the cattle in the pens were infected. All the cattle in the yards were healthy.

I next visited Plankinton & Armour's packing-house. They were killing between three and four hundred cattle per day, as this was the height of the packing season; and after the season was over, they kill from 25 to 30 cattle per day to supply their retail meat market.

The superintendent said that whenever a diseased bullock was found, that it was "tanked," and not sold for food. He had not found it necessary to "tank" more than half a dozen steers since the house was built in 1870. The cattle were very healthy, and were not diseased.

I examined the lungs of a number of cattle, and also found them sound.

The only feeding stable is at the distillery of E. L. Martin & Co. Some new sheds had been put up this fall, that would hold 1,632 head.

I visited the stable November 16, when there were 1,617 steers tied up, the first ones being put in October 19. There were none that showed any symptoms of lung plague. There were two or three that had been badly scalded by the hot slop running over on to them; with that exception none of them were sick. The stable is built near the Missouri River on posts 4 feet high, consequently the drainage was all that could be wished. Each steer has a space 3 feet wide, 8 feet high behind, and 16 feet in front, and 6 feet long. Between the feeding troughs of two rows is an alley 3 feet wide with a door at each end and a ventilator above, 2 feet high along the whole length of the building. There are twenty-four windows 2 feet high and 2½ feet long in each end, and 34 along the side, of the same size, which admit air.

J. E. Fred has a dairy of 125 cows, which he feeds upon slop brought through a long tube from the same distillery. He states that he has lost but four cows, which died of milk fever. He has some cows that he has kept for five years. He buys only the best cows that he can find, and likes to buy the best cows of dairymen who are selling out, which would show that there was no danger of bringing disease in from other dairies. He ties them up only for milking, and allows them to feed in the pasture the remainder of the time. The cows were free from lung plague.

Charles Maukameyer, East Eighteenth street, has 15 cows, which were healthy. In six years he states that but two cows have died.

E. A. Axtel, East Eighteenth street, has 13 cows that were healthy and states that none have died.

Thomas M. Turner has 45 cows that were healthy and none have died.

At the Rock Spring dairy were 60 cows that were healthy. It was stated that two had died this season.

H. N. Smith, Woodland avenue, had 45 cows that were healthy, and states that none have died.

John Lynn, near Old Fair Grounds, had 24 cows that were healthy, and states that one only had died this summer.

These dairymen have very good stables, well drained and ventilated. They have fenced pasture lots and keep their cows from year to year. Whenever new ones are bought they are bought of farmers. The feed, in addition to hay and grass, is wheat bran and corn meal. No lung plague has ever been known among the cattle in Kansas City, though this is a market where large numbers are handled.

HAMILTON, MO.

I had been informed that eastern dairy calves had been shipped from New York city into Hamilton, Caldwell County, Missouri, and it was thought best to ascertain if any with lung plague had been introduced.

On arriving in Hamilton I was informed by Judge Austin, who deals in cattle, that there had been eastern calves brought into this section, and that many of them had died, but from improper treatment and want of care, and not from disease. The only disease that troubled stockowners here, he stated, was Texas fever, and even that was easily controlled.

Jacob W. Esteb said he was engaged in shipping eastern calves, and last season shipped 700, which he bought in western Pennsylvania and eastern Ohio, and not in New York city. These calves he sold to farmers in the vicinity, and about 50 of them died. This season he had bought 170 in nearly the same locality. He was fourteen days on the road, being delayed a week in one place by a wrecked train, and was unable to get sufficient food for the calves. Upon arriving in Hamilton, in a cold storm of sleet and rain, the half-starved calves were turned into a field without shelter and without food. About 25 of them had died, perhaps more; he had not kept account of the exact number. I examined 20 of the poorest of them, the others had been sent to a neighboring farm. They were very poor, shivering with the cold, and covered with snow; icicles were hanging from their hair, as they were unprotected from the cold storm. They ate eagerly of some food that was brought them, as the ground was covered with snow and they could obtain no grass. Some could scarcely stand up, they were so weak and exhausted. The lungs were not hepatized and there were no abnormal sounds in respiration. The temperatures of two was 100°.4 Fah., and 100°.6 Fah. A native cow in the same field with these calves showed no sign of disease. The change of climate from warm stables to cold prairie storms, without shelter and

very little food, was sufficient to cause the high mortality among them. No disease is known where these calves came from.

The only other person engaged in shipping eastern calves was C. J. Puffer. Last season he obtained his calves in Chautauqua County, New York. This season he bought 111 in the vicinity of Garretsville, Ohio. He had used great care in selecting only strong, vigorous calves, and in shipping them had unloaded, fed, and rested them at six different places between here and Ohio. He sold them all to a farmer in Cameron, Mo., September 8, and none had died since that time. The difference was no doubt due to better animals having been selected in the first place, and then greater care having been given to them upon arriving at the farm.

COUNCIL BLUFFS.

The next place visited was Council Bluffs, Iowa. The superintendent of the stock yards, J. F. Boyd, stated that there had not been more than three sick cattle in the yards this season. Since July 1, 152,000 head had passed through these yards to Chicago. They were not troubled with Texas fever, as cattle did not come direct from the plains of Texas here, but had been fed in some of the States west of Iowa for a season before being put on the market, and in that case they did not communicate the fever to native cattle. The only disease he had heard of in the vicinity was anthrax, of which a number of cows that were grazing upon "the bottoms" had died in the spring. Owing to the heavy rains, the river had overflowed its banks, and corn and other vegetable matter floating upon the water had been left upon the land when the water subsided. A very rank vegetation sprang up, and cows eating of this rank grass and the partially decayed kernels of corn became affected with anthrax and died very rapidly. As soon as the cause was known, the people in the city kept their cows away from "the bottoms" and no more of them died.

Dr. Foote, veterinary surgeon, had been employed by the Western Stock Association of Cheyenne, Wyo., and stationed at the yards to examine all cattle going to their stock ranges in Wyoming and Colorado. Mr. Boyd said that he believed none of the cattle had been found diseased, nor turned back as suspicious. Dr. Foote was not engaged at that now, as cattle were coming away from the ranges to the market. No eastern dairy calves came here, and but very few dairy cows. There were then in the yards 10 car-loads of fat steers from Oregon on their way to Chicago. They were perfectly healthy and free from disease.

The only feeding sheds in the vicinity were at Omaha, directly across the river, at P. E. Iler & Co.'s distillery. I visited these sheds November 19 and was informed that cattle had been fed here every season for the last ten or twelve years. Last season 1,800 head were fed, and there were then in the sheds 1,565 head, the first ones having been put in September 18. It was stated that last year during the season about 30 had died, this year so far 13. They had been shipped long distances in the cars, and some had received bruises from which they died. They were wild, never having been tied up, and became entangled in their chains and were choked. They were said to be Montana cattle which had been grazed one season in Colorado and Nebraska and then sent to these stables. No contagious disease has ever appeared among them, neither were there any animals suffering from lung plague at the time of my visit. They are fed here upon slop and hay, as at other distilleries, for six or eight months, and when fat are sent to eastern markets. The space allowed each animal is 3 feet wide, 7 feet long, and 6 feet high behind, 22 feet high in front. A manure alley 5 feet wide, and a feeding alley 4 feet wide, run between the rows of cattle. Air for ventilation enters by an opening 10 inches wide along the whole length of the shed and passes out through an opening 2 feet wide in the peak of the roof for the entire length of the shed. Swinging doors are placed over these openings, so that they may be opened or closed as becomes necessary. All manure and urine pass by well-constructed drains into the river.

About one half a mile from this distillery I examined a dairy of 54 cows, belonging to Henry Henningsen. The cows were allowed to run at large most of the time and mingle with other cattle. The stable was of rude construction yet well drained and clean. The cows were perfectly healthy, and it was stated that none had died.

The cow-stables in Council Bluffs examined were the following: George H. Hopkins, Twelfth street, 150 head, of which 75 were giving milk, the others were yearlings and dry cows; Peter Leouard, 24 cows; John Oberholtzer, 62 cows; George Scherrer, North Ninth street, 32 head, of which 20 gave milk; Thomas Harl, near Driving Park, 100 head, 62 giving milk. None of these animals had lung plague, and their owners stated they never had the disease in their herds. The feed given was brewers' grains, wheat, bran, and corn. The stables were rudely built and afforded little protection from the weather. The cows are kept from year to year; fresh ones, when required, are bought of neighboring farmers.

Charles Rockwitz, South Thirteenth street, carries on the rendering works, and stated that last spring, when anthrax was prevalent among the cows, he got about

50. The deaths were among the cows of people who kept two or three, and let them run at large and get their own living. The dairymen kept their stock in fenced pastures, and they did not lose any. He got about 200 cattle from the stockyards during a year, but that they died from getting down in the cars and trampled upon by the other cattle, or from accidents or injuries received in shipping.

GENESEO, ILL.

At Geneseo, Ill., on the Chicago, Rock Island and Pacific Railroad, are extensive feeding-yards for stock shipped by this railroad. In 1879 there were fed here 77,398 head of cattle; 1880, 92,182, and in ten months of 1881, 105,681. Most of the cattle arrive here in the morning, are unloaded from the cars, are fed and watered, and remain in the pens until night, when they are again put into the cars and started off for Chicago, where they arrive next morning.

Col. J. Galligan, manager of the yards, stated that they never have any sick cattle here. Texas cattle do not come by this route, so that there is no Texas fever. Farmers and feeders living within six or eight miles unload their stockers at these yards, and then drive them out upon their farms. They do not contract any disease by so doing. Owing to the scarcity of feed this year, but few stockers have passed through. The scarcity of feed has also prevented as many eastern dairy calves from passing through as last year. One hundred car-loads passed through on their way west last year; this year not half that number. The calves were brought from Michigan, Ohio, and New York, from districts that are not infected with lung plague. There were no such cattle in the yards at the time I visited them.

Walter Young has had from 15 to 18 head grazing in a pasture adjoining the yards all summer. Only a board fence separated them from the cattle in the pens. Mr. Young stated that none of his herd had been sick or had died during the summer. I examined six of the herd, the others belonged to persons living in town and were sent out to pasture, and found them perfectly healthy.

GALESBURG, ILL.

At Galesburg, Ill., on the Chicago, Burlington and Quincy Railroad are also extensive feeding yards for stock; W. Seacord, superintendent. In 1880, there were fed here 127,184 head of cattle, and it was stated that this year the number would be considerably larger. The cattle remain from five to twenty-four hours. The yards were built in 1870, and there had never been any trouble from sick cattle since that time. The calves that come through here from east come from Indiana, Ohio, and New York. Texas cattle do not come here directly, but after they have been fed a season or two in Kansas, Nebraska, and Iowa, or other Western States. About 100 head of "stockers" had been unloaded here this season going to farms within six or eight miles. A good many cows come here from Iowa on their way to Elgin, Ill., where cows are kept that supply a large part of the milk for Chicago.

In a field adjoining the yards there had been a number of cows pastured belonging to the superintendent and other persons in town, and cold or stormy nights they had been put into the sheds of the cattle pens for protection. Never had any of them been sick or in the least affected with disease. Stray cows would also come into the yards and wander around the alleys and pens without becoming infected.

Geo. W. Foote, M. D., president of the board of health, said cattle in this section had been invariably healthy. For the last forty years he had been more or less interested in cattle and he could say with perfect certainty that there had been no disease among them.

Wm. Clay said he fed about 125 head of cattle and had no disease among them, neither had he heard of any in this section.

PEORIA, ILL.

The next place I visited was Peoria, Ill., November 26th. At the distillery of Woolner Bros. Distilling Company, E. Meyers & Co., of Chicago, are feeding cattle. The present number is 1,300, of which 100 are bulls and the remainder native steers or steers from Iowa, Indiana, Wisconsin, or Minnesota. The first had been put in about six weeks before. The annual loss was stated to be about 1 per cent. The causes of death being from eating too much (tympanitis), from being choked by the chains, from slipping and breaking a leg, or from Texas fever. I examined the lungs of two that had died recently and found them healthy, as were the cattle in the sheds. The sheds are built in the ordinary manner, with the exception of two which are built in two stories with cattle in the basement. These basements are but 6 feet high, which would allow for each only 220.5 cubic feet space. They are dark, light only entering at each end of the feeding alley and by a few windows on one side next to the river.

There is no provision for the warm air to escape, the floor overhead being water-tight, and the air was charged with ammonia from the decomposing manure and damp from the steam of the hot slop. It was stated however that the cattle fatten quicker in this basement, and an additional one had been built this fall. The drainage of this as well as of all the sheds here is into the river. The feed in all these stables is slop three or four times per day and hay once, but in some twice per day. Salt is also given once a day in order that the cattle may drink as much slop as possible. No water is given and no bedding is placed in the stalls for them to lie upon.

At C. S. Clark & Co.'s distillery, C. C. Clark is feeding cattle. The present number is 960, which were begun to be put in September 24th, and in a month's time were all tied up. The stables are wooden sheds and allow for each animal 386.75 cubic feet space. The stock were bought in Iowa, with the exception of a few car-loads from Chicago.

Mr. Clark stated that 9 had died this season, 2 from Texas fever and the others from being crippled. He had been on the lookout for lung plague, but had never found any among his cattle. He took considerable pains to examine the lungs of cattle that died, but never found them abnormal in appearance. Some steers are affected with a wheeze in breathing, but he has found that due to a lump in the throat (probably enlarged thyroid). The only disease he was afraid of was Texas fever, and the chance of getting that among his cattle he avoided by purchasing in Iowa and Northern States.

Mr. Clark called my attention especially to one steer that had what he called "thick wind," and the circumstances of purchase made him suspicious. The temperature of the steer was 101.3° Fah., and the lungs perfectly resonant and healthy. I considered him free from lung plague as well as all the others upon the premises. In a yard, turned loose, were 15 or 20 with sores or bruises upon them that are not tied up until they recover.

At Zell, Rehwabecker & Co.'s, J. M. Greenbaum & Co., of Chicago, are the owners of the cattle. The present number is 2,200 head, part of which were western steers from Colorado, Nebraska, Montana, or Oregon, and the others native steers. One large brick stable would hold 1,150 head, and was well lighted and ventilated. The roof was 14 feet above the floor at the lowest place and 25 at the highest, which would give on an average 672.75 cubic feet space to each. The other cattle were in wooden sheds of the ordinary pattern. The cattle were perfectly healthy, and the annual loss was stated to be 1 per cent. In a yard, loose, were about a dozen cripples.

At the Great Western Distillery, Nelson Morris of Chicago is the owner of the cattle, J. F. Greenhut, agent. One large brick stable built this year and not entirely finished holds 2,700 head. It is built in a series of tiers rising from 10 to 28 feet, giving for the average 714.875 cubic feet space. Instead of being tied with chains, as was the practice in all the other stables I had before visited, the cattle were confined in pens 3½ feet wide and 7 feet long, with a bar across the rear end to prevent them from backing out. A stream of water flows constantly through a sewer in the center of the building, and carries away the manure and urine into the river. The lighting and ventilation was all that could be desired. One-third of these cattle came direct from Council Bluffs, and the others from Chicago. They were put in between October 18 and November 17; three had died since that time.

Mr. Greenhut also stated that there had been less disease this year than for any year since he had been feeding. Sometimes 2 per cent. die of Texas fever, which is the only contagious disease he has seen among the cattle. He never had any lung plague in the stables. The usual loss he stated to be 1 per cent. I examined the cattle and found not one suffering with lung plague.

At Spurk and Francis' distillery, Nelson Morris, of Chicago, is owner of the cattle. The present number is 1,600 head, put in about September 1. The sheds were the ordinary wooden ones. The cattle were free from lung plague.

At J. W. Johnson's distillery, Biggins and Vincent are the owners of the cattle. The present number is 1,245 head that were put in about September 1. It was stated that three had died since that time. The sheds were the ordinary ones. Three cripples were in the yard, but were free from lung plague, as were the other cattle.

At the Monarch distillery, Nelson Morris is the owner of the cattle. The present number is 3,596 head, of which the majority was put in about September 1, though some had been in all summer. The sheds were built of wood, but sufficiently lighted and ventilated. The cattle were confined in pens and not tied. The annual loss was stated to be about 30 head. No cases of lung plague among them.

At G. T. Barker & Co.'s, Wilson & Co., of Peoria, are the owners of the cattle. The present number is 1,503 head, of which 100 were loose in a yard, and the others were tied up in the ordinary wooden sheds. The cattle were shipped direct from Northern Iowa, and it was stated that but one had died since coming here. They were healthy and free from lung plague.

At Bush & Brown's distillery, Sadler & Wilson are feeding cattle. The present number is 820 head, which were put in at different times since the middle of July.

It was stated that three had died in that time. The sheds were the ordinary wooden ones. There were none affected with lung plague.

I visited the rendering works of Axman & Co., who get the dead cattle from the distillery sheds. The number per year obtained was given at from 200 to 300. I examined the lungs of several that had been recently obtained, and they showed no lesions of lung plague.

INDIANAPOLIS.

Indianapolis, Ind., was the next place visited. Dr. Jefferies, secretary of the board of health, said that so far as his observations extended the cattle here were very healthy. Feed was abundant, so that the dairymen were not obliged to keep their cows tied up in close stables and feed them fermenting food, like brewers' grains and slop, except for a short time during the winter. The dairies were in the suburbs, where abundant pasturage could be obtained.

Capt. A. D. Harvey has been engaged in gathering statistics for the Bureau at Washington upon the diseases in neat stock for this township. He stated that the only affection he had learned of among cattle was "sore eyes," where one-third of the animals attacked became blind. He had never heard of any other disease among the cattle in the State.

E. H. Pritchard, V. S., has been practicing in this city nine years and has not had a single case of lung plague. He has had extensive practice in herds of imported cattle in this State and in Eastern Illinois. Complaints connected with calving, and parturient apoplexy, are the chief causes of death among cattle.

John H. Navin, veterinary surgeon, said that in fourteen years' practice here he had not seen a single case of lung plague. In 1858 there was an outbreak of Texas fever among some of the dairy cows. Other veterinary surgeons also said there was no lung plague among the cattle here. The Union Stock Yard Company have 105 acres devoted to their purposes of which 16 acres are shedded over. The receipts of cattle for 1880 were 132,655 head, the shipments 110,599 head.

Col. M. A. Downing, superintendent, said there had never been a disease of any description among the cattle at these yards. Texas cattle come here, but not direct from the plains. The great bulk of the trade is in cattle shipped from the West to the East, and that the trade in the opposite direction consisted principally in "blooded stock" from Kentucky and Ohio, not extending further east than the latter State. Even from Ohio there had not been a dozen car-loads of stock since the yards were built. The yard-master as well as several commission merchants were unanimous in declaring that no contagious disease was known among the cattle here.

M. H. Wright renders the dead animals of the yards. He stated there had been no disease among the cattle. The dead cattle averaged two or three per month. Reference to his accounts showed in September three, August four, October none, and in November three.

Adjoining the yards were fields in which 18 cattle were grazing. They were healthy, and I was assured by the owners that none had been sick or in any way affected. They were on stormy nights put into the pens for cattle. All about upon the unoccupied lots were stray cows feeding unmolested wherever they chose, often straying into the alleys of the cattle pens in search of ears of corn or other food. A cow had even intruded into a park in the very center of the city, and was feeding upon the grass on the lawns.

A. H. Barker's Sons distillery, Mount Jackson, is the only place where cattle are fed. The present number is 350 head, of which 260 are tied up in a stable, and the remainder are loose in a yard. The cattle were bought, part of them in the stock-yards, and part of them in the country. They were put in about September 1, and twelve had died since that time. It was stated that no contagious disease ever existed among the cattle, nor was there any when I examined them. The drainage and ventilation was very good. The stable was built of boards, and gave 420.8 cubic feet space to each steer. Slop is fed three times a day, and wheat-straw once.

Birk & Miller, who render the dead animals of the city, said that the number of cows average per year about 50, and that milk fever was the principal cause of death among them.

The following city dairies I examined, and did not in a single instance find any cattle with lung plague:

J. W. Bruce, College avenue, has 30 head, including 20 cows. He states he has not lost any for three years. He raises his own cows by keeping the heifer calves of his best cows; keeps them in a pasture, except during the time they are milked. Part of the summer they were turned upon the commons near by where were cows from various parts of the city. No disease was contracted. In addition to hay and grass, he gives cut corn-fodder, cabbage, and refuse from corn-starch factory, mixed together, and steamed until soft.

J. L. Kenyon, Central avenue, has 46 cows. His practice is to buy fresh cows at stock-yards, keep them until fat, and sell to the butcher. They are kept in a fenced

pasture away from all other stock, and are put in the stable only to be milked, and in stormy weather. He feeds malt, corn-starch feed, bran, and cut corn-fodder.

North of the city, two miles from those just mentioned, I examined the following:

Andrew Caldwell, Brookside avenue, has 17 cows that were in a fenced pasture near the stable. They are allowed to run upon the commons, across the street, part of the time. In four years three cows had died, but milk fever was given as the cause of death. Fresh cows are bought of farmers in the country, and kept from year to year.

David D. Mills, Keystone avenue, has 25 cows that were roaming about upon the commons, but he assured me he never had any trouble with disease among them.

B. F. Hill had 11 cows upon the same commons, and had no disease among them.

Lewis Page, Pendleton pike, has 20 cows that were in the stable when I saw them, but run upon the commons that surround the place, most of the time. The stable was dirty, poorly built, with no drainage, the manure thrown out at one end and remained there. Cows are bought of cow-dealers, and kept until fat.

Fletcher dairy, Brightwood, near toll-gate, has 70 head, including 30 milch cows. They were in a fenced pasture, away from other stock. They are kept from year to year, and fresh stock is raised. The feed, in addition to hay and grass, is malt, corn-starch feed, and bran.

John F. Candell, Brightwood, 33 cows, that were out upon the commons.

J. W. Crank, Brightwood, 51 cows, that were also upon the commons. No disease is ever contracted by thus allowing their cows to mingle with those of various owners from the neighboring localities. The feed and general management was similar to those before mentioned.

Samuel Sheils, Brightwood, has 16 cows upon a farm dairy a mile away from any of the others; has been in the dairy business ten years in different places around the city and in some large dairies, but says he has never known of a contagious disease among the cows.

East of the city I examined the following dairies:

Henry Wagner, Shelbyville pike, has 34 head, 21 of them milch cows. They are allowed to run on the common most of the summer. Fresh cows are bought of dealers, and fat ones sold to butchers. Feed is malt, corn-starch feed, and bran.

Wm. Melloh, Shelbyville pike, 31 head, 26 milch cows. I examined them in an inclosed pasture; yet commons surround the place, and the cows are sometimes herded upon them. Fresh stock is bought in the country and at stock-yards.

About one mile away were a herd of 52 thoroughbred Jerseys, belonging to Watson J. Hassleman. Some were imported directly from the Jersey Isles, and others were raised upon the place. Their milk is sold in the city, and commands a high price. Wheat-bran is fed in addition to hay and grass. None have died. They are kept in a fenced pasture in summer, away from other stock. On the same farm were 22 cows belonging to Wm. Mead.

Wm. L. Pyle has 50 cows. He has pasturage for them, and feeds besides malt, bran, and corn-starch feed; he buys fresh cows wherever he can find good ones, milks them as long as they give milk, and then fattens and sells to butcher. None have died. I examined the lungs of cattle killed at Kingan & Co.'s, John H. Crosby's, and at other slaughter-houses. They were all healthy.

CINCINNATI.

The last city I visited was Cincinnati, Ohio, December 7. The stock-yards are known as the United Railroad stock-yards. The receipts in 1880 were 188,825 head of cattle; shipments, 84,189. There is stationed here by the board of health a live-stock inspector, whose especial business it is to look after diseased animals and prevent them from being used as food. He stated that there was no contagious disease like lung plague among the cattle. The amount of Texas fever was very small, as the few Texas cattle that came here in the summer time were put in separate pens, away from the other cattle. There were crippled and bruised cattle that he condemned, and were sent to the rendering works. I inspected with him upon several days the cattle offered for sale. There were no sick ones among them. All grades of cattle are put upon the market, from fat cattle that would do credit to any fat-stock show, to very lean and old cows used by sausage-makers. Fresh cows and their calves, "stockers" and "feeders" are for sale also. Commission merchants and cattle-dealers all stated that there was no lung plague in the cattle here.

The feeding-stables, in connection with the Mill Creek Distilling Company, known as "Gaff's distillery," have a capacity for feeding 2,400 cattle. From this number fed last year L. Sadler, of the firm of J. H. Sadler & Co., who own the cattle, stated that only six died during the entire season. The only trouble they have had from disease was two years ago 15 or 20 died of Texas fever. Now they waited until after there had been a good frost before filling up, and avoided the fever. The largest stable is 300 feet long, 131 feet wide, and averages 12 feet high. It will hold 1,000 head, giving 471.60 cubic feet space to each. The ventilation is by a ventilator, 12 feet wide

and 4 feet high, along the whole length of the building. There were 600 cattle in this stable, which had been put in at various times since November 1. It was intended to fill up the stable as soon as the cattle could be obtained. They were all healthy. Among the other stables was one built in 1858, which had been used ever since to feed cattle in. It contained 270 steers put in the last of September. The other stables were built upon the same general plan as those before mentioned. All the cattle were healthy. It was stated that but three or four had died this season.

At White Mills distillery Mr. Duckworth is feeding about 700 cattle. The practice here is to feed two lots a year, one lot put in the stables in August or September, and sold in January; and another lot put in in October and November, and sold in May and June. Cattle have been fed in this way for eight or nine years, and with no losses from disease. The cattle were bought at the stock-yards. Three had died. The sheds were built in the ordinary way, and allowed for each 318.75 cubic feet space. In one end were 30 cows belonging to a milkman, fed in the same manner as the steers. All were healthy.

At G. H. Rabe's distillery Abraham First is the owner of the cattle. There are at present 335 cattle that have been in about two months. The general arrangements for feeding, ventilating, &c., were about the same as at other places. In an adjoining shed H. Beler had 48 cows that were kept for milk and 30 bulls that were being fattened. The shed was built like the others, except that seven feet from the floor it was boarded over and hay was stored above the cattle. This allowed for no escape of foul air through the ventilators in the roof, and gave 294 cubic feet space each. The fat ones are sold to the butcher in the spring, and fresh cows are bought of dealers to fill their places. In the summer they are turned out to pasture during the day. No lung plague among the cattle.

At Maddox, Hobart & Co.'s distillery, Guest street, were 482 cattle. Some of these were bulls that had been fed during the summer. They were very fat, and were being sold for beef. In this way about six hundred cattle are fed during the year. Most of the steers were put in about September 1. In the summer the bulls are given double stalls 6 feet wide; but as the weather becomes cooler steers are bought and put into the stalls with the bulls, giving each a space three feet wide. If any disease were developed during the summer by the cattle tied up during the hot weather it would be contracted by the steers put alongside of them. No trouble of this kind is experienced by those engaged in feeding cattle in this way. The annual loss was stated to be 1 per cent. The sheds were about like the average.

At Walsh, Kellogg & Co.'s distillery were 1,082 cattle, with 696 in one stable and 386 in another. The great part had been put in since October 1. Forty bulls and 64 steers were fed during the summer, put in in May. None had died. Most of the sheds are so arranged that hogs can be fed in them when not occupied with cattle. These stables are built upon a trestle about 30 feet high. The manure and urine are carried away by a stream at one end of the stables. The cattle were healthy.

At Fleichman's distillery, Riverside, were 600 cattle. Most of them were put in about October 1, though 17 steers were put in August 23, and others at various times since then. They were bought at stock-yards, with the exception of 2 car-loads that came direct from Saint Louis. The ventilation of the stables was very good, but they were not sufficiently lighted. There is fed upon slop at this distillery cows belonging to the following owners: Geo. Fennen, 65 cows; H. Fallon, 40; W. Patterson, 26; H. Thomas, 27; H. Olding, 49; J. L. Patterson, 29. The cows are kept in long narrow stables. The stalls—6 feet wide, and containing two animals tied with chains around the neck, and eighteen inches long—are arranged on each side of a passage-way 3 feet wide. Feeding-troughs containing the slop run along each side of the passage-way, and are 1 foot wide and 10 inches high. The cows stand upon a plank floor 6 feet high. At the end of the floor is a manure-gutter 1 foot wide and 6 inches deep; behind this an alley 5 feet wide. Light is admitted by glass windows, 2 by 3 feet, behind every other double stall. Hay is kept over the cattle, so that there is no way for the heated air to pass out, especially when the windows and doors are shut in cold weather. In some stables, however, tubes 1 foot square pass up through the hay-loft and through the peak of the roof every 10 feet. The stables vary from 6 to 9½ feet high. Fresh cows are bought of dealers usually in the spring, are milked about 9 months, and fattened and sold for beef.

From the milk inspector's report for 1880 it appears that there are 284 dairies in operation, containing 9,462 cows. With the exception of 17, slop and brewers' grains is fed to a greater or less extent with other food.

Dr. Denneman, milk inspector, said he made inspections of all the dairies several times a year, but found no disease among the cows kept in them. In company with Dr. D. I examined the following, situated about four miles from the city: Thomas French's Sons, Oakley, who have the largest dairy around the city, have 320 cows. They stated tha they had carried on this business twelve years and had seen nothing like lung plague among their cows. In the summer cows often die very suddenly of anthrax, but this season none had died of the entire herd. They avoid buying cows

in the stock-yards during the summer, but at other seasons of the year they buy them there and also of drovers, or else go into some of the farming towns in Kentucky or Ohio and select what cows they wish to buy. There were no sick ones at the time of my visit. The stable is long and narrow, with the cows along each side of a central alley 4 feet wide, in which passes a car containing the feed. Cows are tied with chains 20 inches long, in stalls 3 feet wide, with partitions on each side, 6 feet long; feeding trough 1 foot wide, 10 inches deep; manure gutter 1 foot wide, 8 inches deep, and a passage-way 4 feet wide behind that. Ten feet above the floor it is boarded over and hay stored. Light is admitted by glass windows every other 4 feet along the side. Feed is malt, bran, corn-starch feed, and clover hay. Pasturage is furnished in the summer. Everything was neat and clean about the premises. Pure water for the cows is obtained from an artesian well.

H. Stagge, Oakley, has 74 cows, and states that none have died this season. The stable is constructed similar to the foregoing, except there are double stalls, 6 feet wide, in place of single ones, and they are eight feet high. Fresh cows are bought of dealers, milked as long as they will give milk, and then fattened and sold to the butcher.

Louis Graber, Norwood, 54 cows; Henry Weghorst, Norwood, 50 cows; A. Chapman, 69 cows.

With Dr. Denman I also examined the following dairies in the vicinity of Guest street, where the cows are fed largely upon slop, some of them the entire season and others only during the winter.

Henry Evers, Guest street, 52 cows, in a stable 90 feet long, 28 feet wide, and 7 feet 5 inches high. The cows have been in the stable since October. During the summer they were upon a farm at pasture. There were three openings 1 foot long and 1 foot wide, connected with wooden tubes that extend through the roof for ventilation. Glass windows, 2 feet by 3 feet, every alternate 6 feet along the side, afforded light. This like many other of the stables, is built with one end on a level with the street and the other upon a very high trestle above Mill Creek, into which all urine and manure is thrown.

George Jasper, Guest street, 30 cows, which were kept in the stable the year round. No provision is made for ventilation except by the doors or windows, and the cows were panting with the heat as in hot summer weather. Each animal has 294 cubic feet space.

B. Martins, 42 cows with similar surroundings and panting; H. Groneman, 14 cows; H. Hesler, 34 cows; B. Overberger, 21 cows and 20 hogs; H. Kunkemoller, 26 cows; B. Evers, 49 cows, that have been in from the country since October; H. Sanders, 44 cows, 54 steers; B. Hopper, 64 cows; H. Kruse, 54 cows; Nick Mey, 130 cows, that were moved in from the country the 1st of October. The stable is 110 feet long, 68 feet wide, and 8 feet high. It is lighted by glass windows in the roof, in addition to those upon the sides. Everything is scrupulously neat and clean.

The following dairies had been condemned by the board of health as a nuisance, and were to be removed in the spring. The drainage was into an open sewer that frequently became stopped up with the offal, and by decomposing creates a bad smell, as well as malarial diseases. The stables were dilapidated and rotting down. From the poor drainage, they were dirty and filthy. The cows were about in the same condition as those in other stables: J. Fischer, 46 cows; Henry Thale, 35 cows; C. Geiskin, 31 cows; A. Buttemeier, 32 cows; H. Weighans, 43 cows; J. Huber, 27 cows, that came in from the country November 5; Henry Steiner, 20 cows.

In Barrsville I examined the following dairies: D. H. Kemme has 64 cows in a stable 108 feet long, 31 feet wide, and 7 feet high. There are five tubes one foot square extending through the roof for ventilation. Pasturage near the stable is provided in the summer. The feed is slop, brewers' grains, and clover hay. He states that in six years two cows only have died. He buys fresh cows of dealers.

A. Austerfeld, 62 cows; Geo. Heidel, 34 cows; M. Groneman, 36 cows; D. Michaeles, 64 cows; J. Hess, 35 cows. Of all these animals examined there was not a single case of lung plague among them, nor could any evidence be found that there had been at any time previous. Many of these dairymen were familiar with lung plague, having seen it in Europe, but had never been troubled with it since coming to this country.

J. Meyers & Son, veterinary surgeons, stated that no cases had occurred in their practice in this city.

Captain Schneider, superintendent of meat and live stock inspectors, stated that in his inspections of the slaughter-houses and of the beef, no cases of the disease were ever found. In company with him I visited a number of slaughter-houses and examined the lungs of cattle killed.

H. & H. Loewenstein kill about 200 cattle per week. According to the Jewish faith, which requires that the lungs should be examined very critically, they state that they never find a diseased lung in the cattle killed. The cattle come principally from the States of Indiana, Kentucky, and Ohio. I examined the lungs of 80 cattle

slaughtered here; they were perfectly healthy, and showed no signs of disease. In other slaughter-houses I examined about 150 lungs; none of them were affected with lung plague in the slightest degree.

I visited the sale stables of Fred. Brown, who buys and sells dairy cows to the number of about 3,000 per year. He acts as a commission merchant for many of the dairymen, selling them fresh cows and buying their fat ones. All the cows in the stable were healthy, and he stated that there was no contagious disease in the dairies.

At the rendering works it was stated that the cattle obtained there both from the stock-yards and stables in the city was between 30 and 40 per month.

CONCLUSION.

The difficulty of obtaining reliable information in regard to cattle diseases is very great, especially where the cattle are as healthy as those of the West. The condition of the cattle themselves, whether sick or well, must then be the criterion. From this standpoint, then, I can say with certainty that of all the animals examined not one was affected with lung plague. The cattle in the markets are free from it, as are those in the feeding yards, feeding stables, and dairies.

Respectfully submitted.

A. M. FARRINGTON.

REPORT BY A. J. MURRAY, M. R. C. V. S., DETROIT, MICH., TO THE UNITED STATES TREASURY CATTLE COMMISSION.

In accordance with the instructions received from the United States Cattle Commissioners at the time of receiving my appointment as inspector, I have examined, between the dates of 2d September and 31st December, 1881—1st, the lungs of a large number of cattle in the Detroit slaughter-houses; 2d, the cattle yards in Detroit, Toledo, and Grosse Isle; 3d, a number of cows and cow stables belonging to dairymen in and near Detroit; 4th, made what *post-mortem* examination was practicable of cows dying in Detroit during the above period.

EXAMINATION OF LUNGS.

During the above period I have examined the lungs of 3,876 cattle at the slaughter-houses of Messrs. William Wreford, Jefferson avenue; John Robison, Michigan avenue; George Duff, Michigan avenue; Capells & Duff, Twentieth street; McIntyre & Robison, Twentieth street; John Loosemore, Foundry street; ——— Reid, Michigan avenue; William Voight, Saint Aubin street; John Rauss, Randolph street. Of that number 2,082 cattle came from States lying to the west and southwest of Michigan. In many instances I could not ascertain from what State the cattle whose lungs I examined had come, but the greater number of them were raised in the States of Illinois, Missouri, Kansas, Colorado, Iowa, and Texas; but other Western States probably furnished a portion of the 2,082. Saint Louis is the point from which most of the cattle brought from abroad to Detroit are shipped; a few are sent from Chicago.

Seventeen hundred and ninety-four of the cattle whose lungs were examined were raised in the State of Michigan. A few whose lungs were examined, however, were Indiana cattle, but I was unable to ascertain the exact number of cattle which had been brought from that State.

In the lungs of the 2,082 which may be termed western cattle, disease was found in nine individuals.

In seven cases the lungs of Texan cattle were found to be diseased. A section through the center of the diseased part of the first lung showed the alteration produced by intestinal pneumonia, but the diseased portion was not much over an inch in diameter, and the nodule which the diseased part formed was about the size of a walnut.

In another lung a small space about the size already mentioned was the seat of hemorrhagic infraction. The exuded material seemed to be liquifying and absorption to be taking place.

A somewhat similar area in another lung had undergone fibroid degeneration.

In the fourth lung an area of about an inch and a half in diameter was the seat of fibrinous exudation. Six or seven small cavities about the size of a bean were exposed in making a section of the nodule. These cavities were filled with pus.

In the fifth lung an area of similar size was in a state of cheesy degeneration. This portion of lung was encysted, and calcareous degeneration was commencing in the contents of the cyst.

In each of these cases the seat of disease was the anterior portion of the lung, and it seemed rather extraordinary that in each case the area of the disease should be so small.

In the sixth lung I found near the base an induration about the size of a moderate-sized apple, which extended nearly from the internal to the external face of the lung.

We could see through the pleura on both surfaces of the nodule a black discoloration, which was irregularly distributed over the surface of the nodule and in the lung tissue adjoining it. The lung tissue in general and that adjoining the nodule were examined. The bronchial tubes were healthy up to the very margin of the nodule, but at different points in the lung, and especially in the vicinity of the nodule, there were small irregular areas of black discoloration surrounded by fibrous tissue, rendering the portions of lung affected impervious. These appearances I attribute to hemorrhagic infraction having taken place, which led to more or less alteration of the lung tissue. On making a section of the nodule, it was found that the lung tissue had been mostly removed by absorption, but that stretching from one side of the cavity to the other were numerous bands or septa. These bands had undergone calcareous degeneration, as also had the walls of the cavity, which I found to contain two flukes (*Distoma hepaticum*). The largest of the two, when drawn out to its full size, was about two inches long. There was a small quantity of a dirty brownish-looking liquid in the cavity, no doubt mostly composed of the *débris* of the softened lung tissue. Adjoining this cavity was a small one, containing a small quantity of the same kind of fluid; but the walls of this cavity were empty and it did not contain any parasites.

This case throws some light on the previous ones, and also on the alterations in the tissue of the lung now under consideration. The wanderings of these parasites are the occasion of the various morbid alterations which have been found in the lungs.

In a seventh case examined shortly after the one above mentioned a similar cavity was found in a lung which also contained two flukes (Distonea hepaticum). This case appeared to be more recent, as the bands stretching from one side of the cavity to the other had only partially undergone calcareous degeneration, and were pink and soft in some portions. The same remark applies to the walls of the cavity. This lung had likewise some small encysted portions of tissue undergoing cheesy degeneration.

On the 22d of October I examined the left lung of a Western animal which showed red hepatization extending from dorsal surface of lung downward and inward to a depth of about three inches; the breadth and length of hepatized portion was about three inches. Did not ascertain anything as to the history of the case or even the sex of the animal. The weather was rather warm at the time of examination.

On the 7th December I found the right lung of a Western animal affected with tuberculosis. The two anterior lobes were almost entirely tuberculous, there being very little sound tissue remaining in them. The lobes were nodulated and irregular, and the tubercular deposit which was of a yellow color was undergoing liquefaction. There was considerable thickness of fibrous tissue surrounding the lobules, which formed white septa encircling the lobules.

I have given at some length the morbid alterations produced in the lungs of the Texas cattle by the invasion of the Distonea hepaticum, as I think it possible that they might be mistaken for the lesions remaining after an animal has *recovered* from contagious pleuro-pneumonia, especially when lungs are examined which do not contain the Distonea hepaticum.

The case of red hepatization presented less resemblance to the lesion of contagious pleuro-pneumonia than did some of the alterations in the lungs of the Texas cattle. In the case of red hepatization the color was uniform, and there was no interlobular effusion.

The lungs of the 1,794 cattle which were raised in the State of Michigan were free from disease of any kind.

2. EXAMINATION OF STOCK-YARDS.

TOLEDO.

In September I went to Toledo and visited the stock-yards at East Toledo, which I examined, as well as the cattle which were in them at the time. I was informed by Mr. A. E. Forster that the cattle-yards cover 35 acres; that no cattle are sold at the stock-yards; they are merely unloaded to be fed and watered, and are then reshipped to continue their journey eastward. Mr. Forster had been employed at the cattle-yards for eight years, and never knew of contagious disease occurring among cattle in the yards or extending from the yards to cattle outside of it.

I called on several veterinary practitioners, some of whom had practiced in Toledo for a number of years; but none of them had ever seen or heard of any cases of contagious disease occurring among cattle in Toledo or its vicinity. I also visited the pound, where stray cattle are frequently brought, and made inquiries as to the occurrence of contagious disease among cattle; but Mr. Hiftlein, who has charge of it, answered my inquiries in the negative. I made inquiries of several other citizens of Toledo, with a similar result.

GROSSE ISLE.

On the 20th October, visited the stock-yards at Grosse Isle, and made an examination of them. These stock-yards are surrounded by a high close fence. Mr. A. Will-

iamson, the superintendent, stated that they contained ten acres. Cattle traveling from the West to the East are merely unloaded to be fed and watered, and are then reshipped. There were no cattle in the yard at the time of my visit. Mr. Williamson had never known of cases of contagious disease occurring there. Cattle occasionally suffer from injuries received during their journey, as happened in the case of a heifer which died on the morning of my visit to the yards; she had fallen down and had been trampled on by the other cattle in the car.

DETROIT.

On the 20th of September examined King's cattle-yards, on Grand River street, Detroit, and also the cattle in the yards at the time of my visit. It is chiefly Michigan cattle which are offered for sale at King's cattle-yards, though cattle from the Western States are also frequently brought there. Dairymen and others residing in Detroit occasionally buy cows at those yards. During the year 1881, 19,138 cattle passed through King's cattle-yards.

No contagious disease has been contracted by cattle brought to those yards with the exception of the Texas cattle disease. Some two years ago a lot of 22 Michigan cattle were bought by a farmer at these yards; while they were at the yard they occupied a pen which previously had been occupied by Texas cattle. After they were driven by the purchaser from the yards to his farm they showed symptoms of Texas fever, and all died from it. This is the only contagious disease which has been contracted by cattle brought to these yards.

On the 15th of October, 1881, visited and examined the Detroit stock-yards on Twentieth street. They cover ten acres, and are surrounded by a close board fence. Both Western and Michigan cattle are brought for sale to these yards, and they are also used for watering and feeding cattle, which are unloaded for this purpose in passing through Detroit on their journey eastward.

Detroit butchers also buy cattle for slaughtering in these yards, and milch cows are also brought for sale to these yards.

The Texas cattle disease has been transmitted to Michigan cattle by their occupying pens which had been previously occupied by Texas cattle. An instance occurred some years ago in which eight Michigan steers were driven from the yards to Dearborn, a village ten miles from Detroit; they all died shortly afterwards of the Texas cattle fever. Texas cattle are still brought to the yards, but they are not put into the same yards as other cattle, and in consequence of greater care being exercised no deaths have occurred during the last two years. This is the only contagious disease which has been contracted in or spread from the cattle-yards on Twentieth street.

Seventy-five thousand five hundred cattle passed through the Detroit stock-yards in 1881; of these, 18,000, were Western cattle, and were chiefly shipped from Saint Louis. Very few are shipped from Chicago.

3. EXAMINATION OF COWS AND COW-STABLES BELONGING TO DAIRYMEN.

On the 13th of September, 1881, examined 17 cows belonging to Mr. Copping, Twelfth street, a little beyond the city limits. The cows were on pasture at the time of my examination, and they all appeared to be in good health. Did not have much sickness among his cows, but had one or two cases of parturition fever some time ago. In addition to what they picked up at pasture each cow got half a bushel of grains night and morning, and corn stalks and a little clover. The cow-stable was comfortable and better than the average. The cows had been bought from cattle-dealers, and have mostly been raised in Michigan.

On 18th September visited S. Lowe's dairy farm, which is several miles from Detroit, on the Pontiac road. His cows are fed on bran and corn and are also pastured during the day. He has not had any sickness or lost any cows for several years. His cows are mostly bought from farmers in Wayne County and at King's cattle-yards. No disease has been introduced among his stock by cows brought from King's cattle-yards.

August Klett, on the Pontiac road, has 12 cows. They are fed on malt, corn, refuse from the manufacture of sugar, and corn-stalks. They are also pastured during a part of the day. Has had no cases of sickness except an occasional case of indigestion from a cow eating too much. His cows have mostly been raised in Michigan and have been bought at King's cattle-yards in Detroit.

John Barnes, Woodward avenue, has 9 cows. Has bought them from King's cattle-yards, Detroit, and from drovers. His cows have been raised in Michigan. Three years ago lost seven cows from the Texas fever. It was contracted by pasturing his cows on commons in the city where Texan cattle had been grazing. Has had no losses since the State law in reference to Texan cattle has been enforced. His cows are fed on malt and corn (the residue after the manufacture of glucose). They are also pastured and have not been housed during the summer.

In the above cases most of the drainage must be through the floor of the stable into the ground; it does not appear, however, that this has any injurious effect on the cows.

In all the stables except one the ventilation was not bad, but in the exception the roof was so low that good ventilation was impossible. This did not appear, however, to be the occasion of disease.

On the 4th of November examined 4 cows at Mr. Sexton's, Baker street, near the Detroit cattle-yards, Twentieth street. He buys his cows in the city. Has not lost any cows by disease. Feeds his cows on hay and middlings. Roof was about 10 feet high and there was ample space behind the cows; and the stable may be described as a comfortable one. Most of the drainage would be through the floor into the ground.

Mr. Stagg, Twentieth street, has 10 cows. Has not lost any cows for two years, but three years ago lost 8 by the Texas cattle fever. This was contracted by Mr. Stagg's cows being turned out on a common on which Texan cattle had been grazing. Has had no losses since the enforcement of the State law in reference to Texan cattle. Feeds hay and refuse corn from glucose factory. Roof of stable very low and amount of space allowed to each cow small. This does not appear to have injurious influence on their health, as Mr. Stagg has had no sickness among his cows since his losses by the Texas cattle disease.

On 31st December, 1881, called at Mr. P. H. Childs', Holden road. He keeps 27 cows. They have been bought at King's cattle-yard, and occasionally from farmers. Cows get hay and refuse corn from glucose factory. Has had no sickness or losses among his cows. In his largest stable where most of his cows are kept, there is 525 cubic feet of space for each cow. He was also feeding 20 yearlings on cornstalks and hay. The barn in which they were was about 20 feet high, so they had a plentiful supply of air. The drainage apparently passed through the floor and soaked into the ground.

Mr. Jackson, Holden road, has 6 cows. The roof of his stable was about 6 feet high. I calculated that there was 240 cubic feet of air for each cow in his stable. The weather was cold on the occasion of my visit, and the stable did not seem close or oppressive on entering. He feeds his cows hay and corn in the ear. He had had no sickness among his cows, and they appeared to be in good health. In several other stables which I examined the number of cubic feet of air to each cow was almost as small as in this case, but I was unable to discover that the cows suffered in consequence.

Mr. Dimmick, Brady street, has 22 cows. Purchased them from the former proprietor a few months ago. Feeds hay, grains, and fine middlings to his cows. Has not lost any by sickness since he owned them. The cows all appeared to be in good health. I calculated that in his main stable there would be 540 cubic feet of air for each cow. In another smaller stable where two were kept, the supply of air would be much larger than this, owing to the roof being higher. In the larger stable, however, there was a shaft running up through the loft to allow the vitiated air to escape.

As a result of my examination of dairy cows and cow-sheds, I was unable to trace that the conditions in which the cows were kept had any effect in originating contagious disease.

4. POST-MORTEM EXAMINATION OF COWS DYING IN DETROIT DURING MY INSPECTORSHIP.

Having requested Mr. Parker, of Detroit, who has a rendering establishment about six miles below Detroit, to inform me when any dead cows were brought there, I made a visit to that establishment on the 9th of September. I made a *post-mortem* of a red cow which was eight or nine years old, which I found to be effected with splenization of the anterior half of left lung and of the anterior third of right lung. The sections made showed in some places bands of yellow lymph effused between the lobules. The pleura which covered the inflamed lung was of a dark-red color, but it was not perceptibly thickened, nor was there any false membrane on it. The costal pleura in patches had the same red color as the pleura covering the inflamed lung. The discoloration of the costal pleura was in the region corresponding to the inflamed portions of lung. Both sides of the heart were filled with what was evidently a *post-mortem* clot. There was no effusion in the cavity of the chest or in the pericardium.

On the 12th September I called on Mr. Fisher, who was the owner of the cow which had died. Found that she had been sick about six days; that he had treated her himself, and that she had previous to this sickness been rather a delicate animal. She had been raised on a farm near Mount Clemens, about 20 miles from Detroit. His other cows were in good health and had been raised in Michigan, and had not for a considerable time before his cow died purchased any new cows.

The attack of sickness occurred during very warm weather, and the roof of his stable was very low—the amount of breathing space being consequently very small

for each animal. In hot weather the heat in such a confined place would be very oppressive, and it is at such times that the disadvantages of defective ventilation are most apparent.

The *post-mortem* lesions and the history of the case, however, both go to show the sporadic nature of the disease.

DR. PAAREN'S REPORT ON ELGIN, ILL.

STATE OF ILLINOIS, VETERINARY DEPARTMENT,
Chicago, Ill., January 11, 1882.

DEAR SIR: Having according to your request visited the dairy district at Elgin, Ill., I hereby submit the following report of the condition of the cattle in the largest dairies:

On Dr. J. Tefft's dairy-farm are forty head of milch cows, twenty-four heifers and calves, and one bull. The bull and six heifers and calves are thoroughbred Holsteins. All of the balance are half and two-thirds grade Holsteins. All are in good condition and healthy.

On G. P. Lord's dairy-farm are sixty head of grade Durham and native cows, and one Durham bull, which are all in good condition and healthy.

On Frank Wright's dairy-farm are seventy head of milch cows, one-third of which number are grade Durhams, and two-thirds are grade Holsteins. There are also thirty grade yearlings and heifers and one thoroughbred Holstein bull. All are in exceptionally fine condition and healthy.

On Abel Gifford's dairy-farm are sixty head of mixed grades and native cows, in good condition and all healthy, except one cow, sick from overfeeding after calving.

On C. H. Larkin's dairy-farm are ninety-one milch cows, and thirty calves and heifers; also one grade Durham bull. The cows and young stock are mixed grades, mainly Durham grades, all of which are healthy and in good condition.

On F. Stringer's dairy-farm are seventy head of milch cows, natives and grade Durhams; also two native bulls. All are in good condition and healthy.

On Thomas Bishop's dairy-farm are forty milch cows, natives and mixed grades, and one grade Durham bull. All are in good condition and healthy. The rumor having spread, through the instrumentality of a cow-doctor, that pleuro-pneumonia existed on this farm, inquiry elicited the fact that two weeks ago two cows had died from simple inflammation of the lungs. These animals were raised on the farm, no purchases of stock had been made for the last half year, and the cows on the farm have had no means of communication with any other stock. One of the cows was sick five days, and the other four days. Post-mortem examination showed that the animals died of acute pneumonia.

On inquiry it was found that the average yearly loss by death, on each of the farms above-mentioned, have been one animal only; with the exception of Mr. Gifford's diary, the health of the stock during the past year has been good. Mr. Gifford's stable arrangement, which is faulty for the lack of ventilation, &c., is no doubt the cause of his more frequently occurring mishaps and diseases.

Respectfully,

N. H. PAAREN.

J. H. SANDERS, Esq.,
Secretary Treasury Cattle Commission.

DR. THAYER'S REPORT ON CATTLE DISEASE AT EAST RINGO, N. H.

A letter mailed at East Ringo, N. H., July 25, 1881, was received on my return from Nova Scotia. The writer states:

"I write to say I have in pasture in this place a small herd of cattle, of which two have died, one is still very sick, one not so sick. The symptoms are difficult breathing, standing with their heads drooped, nose elevated, with copious sweating at the nose; eyes sunken, slight frothing at the mouth. I should like to know what course to follow. I have an idea that they are taken with pleuro-pneumonia. I would like to hear from you soon.

"Yours, very truly,

"HARRISON G. RICE."

On July 30 I replied, requesting that lungs be sent me.

August 1 I received a letter stating: "Since writing, two more have died and are buried. Examined the lungs of one and found the lungs congested, and have no

doubt of its being a case of pneumonia. If there are any more sick, will send the lungs to you."

And the letter dated August 4, says: "We have just returned from pasture, where we have buried another heifer, being the fifth out of the herd. The fourth was buried Friday, and at that time the rest seemed all right. The pasture is five miles away, and circumstances were such that I did not visit the pasture in time to make an examination and to have sent you the lungs as requested. I will telegraph, and would like you to come up and see the animal, provided it can be done without any expense to me."

August 20 received a telegram, "Another animal sick." August 23 went to East Ringo. On arriving at the pasture found the heifer, seen to be sick on Friday, already dead. Had probably died on Saturday, as the pasture was visited on Monday, and it was then dead. The lungs were removed and found to be free from disease. I was unable to discover any disease of the abdominal viscera. Putrefaction had commenced.

The remainder of the herd, six in number, were found and driven into a corner. On inspection one appeared quite ill, head drooping, hair standing on end, pulse feeble, respiration hurried, but not more than was to be expected after being driven a considerable distance; temperature, 106° Fahr. Auscultation and percussion gave no evidence of pulmonary trouble. I so informed the owner, but to satisfy himself he decided to kill the animal.

Autopsy.—The removal of the lungs justified my decision. On removal of the heart the duplicature of the pericardium showed extravasated blood, irregular in outline, covering perhaps a square inch. On removing the skin over the tractea and sterno-maxillary muscles, several spots of extravasated blood were found. The abdominal organs, with the exception of the bladder, appeared to be healthy. The stomach and intestines contained less than the usual quantity found in healthy animals. About one-third of the mucous membrane of the bladder was of a bright-red color.

I was unable to find any evidence of disease other than the above-mentioned. I advised the removal of the remainder of the herd to other pastures. I met a member of the family in Boston a few days ago, who informed me that they were removed, but that all had died excepting one.

E. F. THAYER.

DR. THAYER'S REPORT ON CATTLE DISEASE AT PICTOU, NOVA SCOTIA.

WEST NEWTON, *August* —, 1880.

SIR: Your letter dated July 14, with a copy of a dispatch received from the consul-general of Halifax, also a dispatch from the consul at Pictou, reporting the reappearance of a contagious cattle disease, was received the 16th. In compliance with your instructions I left Boston for Halifax on the 19th, arriving there at 10 a. m. the 21st instant. I at once called at the office of Consul-General Jackson, who informed me that he had not received any further information in relation to the disease in Pictou County since the date of his communication to the department at Washington. I then left Halifax for Pictou, arriving there at 1.15 p. m. The consul, Oscar Malmros, met me at the landing and accompanied me to the hotel, where we met the chairman of the board of agriculture and several others interested in the subject, among whom was one who had suffered severely from the disease. His statement is substantially as follows:

One of his neighbor's cattle were sick; a cow affected with the disease became delirious, escaped, and ran upon the highway and died near the premises. The body was allowed to remain there until putrefaction took place. In a short time his cattle became sick and all died, and he ascribes the cause of the sickness in his herd to exposure to the exhalations from the putrefying body of the dead cow. This occurred about sixteen years ago, and the disease has prevailed in that locality to the present time.

On Saturday, the 23d, in company with the chairman of the board of agriculture, we visited several infected farms. The first animal examined was reported sick this morning. She was standing quietly, the eyes appeared dull, the coat (hair) had an unthrifty appearance, the respiration was normal, pulse 60, temperature 101° Fahr., the discharges from the bowels rather soft, little or no appetite, and the secretion of milk very much diminished.

It was stated that the milk had a very offensive odor, resembling the smell of excrement mixed with milk, but I was unable to detect it. The symptoms were those often seen in practice, and where the diagnosis would be functional derangement of the digestive organs.

The next animal examined was a cow belonging to a Mr. Desmond, whose farm was a mile distant from the above. The animal was standing with disinclination to

move, the eyes dull, the coat standing, the muscles of the hind quarters trembling, respiration normal, pulse 80, temperature 105° Fahr. Auscultation and percussion of the thorax gave no evidence of pulmonary disease. Percussion of the abdomen denoted the existence of a large quantity of fluid. There was diarrhœa, the stools being nearly black in color.

Several other farms were visited, the owners of which had suffered from the loss of cattle by the disease in question.

The description given by one is given in general terms by all, viz: the animal is dull, the coat staring, loss of appetite, secretion of milk diminished, in five or six days diarrhœa sets in—in a few cases extreme constipation—and in two or three weeks death.

In the afternoon, visited the residence of Donald Grant, warden of New Glascow—the cow had been ill five days. Examination: Pulse and temperature normal, respiration quiet, diarrhœa present, stools black, and the secretion of milk diminished.

Monday, 25.—Again examined Desmond's cow; but little change had taken place; the temperature was elevated two-fifths of a degree. A telegram from Dr. McEachran stating that he would arrive on the noon train was received, and further examination was postponed. In the afternoon, in company with him, the chairman of the board of agriculture, and several physicians, we proceeded to Mr. Desmond's, where the same cow was examined by Dr. McEachran; her condition remained about the same.

Blood was taken from the jugular vein and subjected to microscopic examination with 350 diameters. Nothing was found, but afterwards, under 600 diameters, objects (bacteria) were discovered. The animal was then killed by a blow on the head and bleeding; the thoracic viscera were healthy with the exception of a slight pleuritic adhesion, the result of a former pleurisy, the brain was normal, the pleura was quite pale.

On opening the abdomen a large quantity of serum, estimated at more than five gallons, escaped; the same pale appearance of the serous membrane was found as was seen in the pleura. The organs were removed separately and examined. The spleen was firm and weighed one pound eight ounces. The liver was of average size, and firm. The gall-bladder was enlarged and distended with bile; a portion of the latter was dark. (The butcher stated that he had seen the gall-bladder twice as large, and filled with something as black as tar and as thick as molasses.) The whole digestive tract was laid open and examined, but no trace of disease could be found. The kidneys and bladder were healthy.

Tuesday, 26.—Went to Merrigonish, eight miles from New Glascow, where we examined a cow belonging to James Grant. The animal was emaciated; had been sick several weeks. It had the same general appearance as before described. The temperature 104°.2. Pulse not taken, as she had just been driven from the pasture. I would here remark that the pulse in all the cases examined was compressible, not the wiry pulse of inflammatory diseases of serous membrane. This cow was killed in the same manner as that belonging to Mr. Desmond. The brain and a portion of the spinal cord were removed and found to be healthy. The thoracic and abdominal viscera were the same as in Desmond's case, except that in Grant's case the spleen was eight ounces heavier, and there was about one-third less serum in the abdomen.

HISTORY.

It is difficult to form an opinion of the manner in which the disease was introduced into Nova Scotia. There are various theories in regard to it. One of the most prominent is "that many years ago a vessel arrived from Scotland bringing soil in ballast; that the soil contained the seeds of a plant or weed, which has become thoroughly mixed with the grass for many miles in extent, the eating of the weed causing the sickness which almost invariably results in the death of the animal." The plant, as seen by the roadside and in the fields, is from 12 to 20 inches in height, has a yellow blossom, the leaves are tough and emit an offensive odor, and is known as "Stinking Willie." The botanical name of the plant I was unable to learn.

Contagion.—The question of contagion may be considered as an open one. The fact, as stated to me, that cattle mingle together in pastures during the autumn months and are exposed during the winter in barns, without an outbreak of the disease from August until late in June, would seem to point to causes other than contagion.

E. F. THAYER.

Hon. H. F. FRENCH,
Assistant Secretary of the Treasury.

COMPILATION OF THE LAWS OF DIFFERENT STATES IN REFERENCE TO DISEASES OF FARM STOCK; FOR TREASURY CATTLE COMMISSION.

In the belief that a compilation of the laws of the different States bearing upon this subject might aid the commission in the execution of their work, and furnish much valuable information to the department and to Congress, in any effort that might be made to legislate thereon, and also to show how little has been done by the States themselves by way of precautionary and protective measures, a compilation which is believed to contain the substance of all the laws of the States and Territories relating to contagious diseases of cattle has been prepared by the commission, and is herewith submitted:

CONNECTICUT.

[House bill No. 74.)

CHAPTER LXXIII.—AN ACT conferring upon the state board of agriculture the power to kill diseased animals.

Be it enacted by the senate and house of representatives in general assembly convened:

SECTION 1. The State board of agriculture, or in case said board have or shall appoint commissioners on diseases of domestic animals, under the provisions of section 7 of the act to which this is an addition, then said commissioners, may, when in their judgment the public good shall require it, cause to be killed and to be disposed of afterwards as, in their judgment, may be expedient, any animal or animals which, in their judgment, are infected with or have been exposed to and are liable to communicate to other animals any contagious disease.

ILLINOIS.

AN ACT to suppress and prevent the spread of pleuro-pneumonia among cattle.

SECTION 1. Be it enacted by the people of the State of Illinois, represented in the general assembly, that the governor of this State is hereby authorized and instructed to appoint a competent veterinary surgeon, who shall be known as State veterinarian or inspector, and whose duty it shall be to investigate any and all cases of contagious or infectious disease among domestic animals of the bovine species in this State, which may be brought to his notice by a competent veterinary surgeon or practicing physician in the locality where such infectious or contagious disease may exist, and it shall be his duty to make visits of inspection to any locality where he may have reason to suspect that contagious or infectious disease may exist.

SEC. 2. In all cases of pleuro-pneumonia among cattle in this State, the State veterinarian shall have authority to order the quarantine of infected premises, and in case such disease shall become epidemic in any locality in this State, the State veterinarian shall immediately notify the governor of the State, who shall thereupon issue his proclamation forbidding any animals of the kind among which said epidemic exists from being transported from said locality without a certificate from the State veterinarian showing such animals to be healthy. In case of epidemic, as aforesaid, the State veterinarian shall order the quarantine of infected premises, and shall order the slaughter of diseased animals thereon; and in cases of pleuro-pneumonia among cattle, he shall, as hereinafter provided, order the slaughter of all cattle upon the premises which have been exposed to contagion; but before doing so he shall call in consultation with him two (2) reputable veterinarians or practicing physicians residing within ten (10) miles of the infected premises, and shall not order the slaughter of any animals not actually diseased without a written order signed by one (1) or both of said veterinarians or practicing physicians.

SEC. 3. Whenever it becomes necessary, as herein provided, to order the slaughter of animals, the State veterinarian shall notify the nearest justice of the peace, who shall thereupon summons three (3) disinterested freeholders of the neighborhood as appraisers of the value of such animals; said appraisers, before entering upon the discharge of their duty, shall be sworn to make a true and faithful appraisement, without prejudice or favor. They shall, after after making their appraisement, return a certified copy of their valuation to the justice of the peace by whom they were summoned, who shall, after entering the same upon his record, and making an endorsement thereon, showing the same to have been properly recorded, return it, together with the order of the State veterinarian, to the person or persons owning live stock ordered slaughtered.

SEC. 4. Whenever the governor of the State shall have good reason to believe that such disease has become epidemic in certain localities in other States, or that there are conditions which render such domestic animals liable to convey disease, he shall thereupon, by proclamation, schedule such localities, and prohibit the importation of any live stock of the kind diseased into this State, unless accompanied by a certificate of health, properly signed by a duly authorized veterinary inspector. Any corporation or individual who shall transport, receive, or convey such prohibited stock shall be deemed guilty of a misdemeanor, and, upon conviction thereof, shall be fined not less than one thousand dollars ($1,000) nor more than ten thousand dollars ($10,000) for each and every offense, and shall become liable for any and all damage or loss that may be sustained by any party or parties, by reason of the importation or transportation of such prohibited stock.

SEC. 5. If any person or persons who shall have upon his premises any case of pleuro-pneumonia among cattle, and shall fail to immediately report the same to the State veterinarian, or if any person or persons shall willfully and maliciously obstruct or resist the State veterinarian in the discharge of his duty, as hereinbefore set forth, he shall be deemed guilty of a misdemeanor, and upon conviction of either charge shall be fined not less than fifty ($50) nor more than five hundred dollars ($500) for each and every such offense, and upon conviction a second time shall, in addition to the above-named fine, be liable to not less than thirty (30) days nor more than six (6) months' imprisonment.

SEC. 6. The State veterinarian shall annually make a report to the governor of all matters connected with his work, and the governor shall transmit to the Department of Agriculture such parts of said report as may be of general interest to breeders of live stock, to be published with the proceedings of the State Board of Agriculture.

SEC. 7. All claims against the State arising from the slaughter of animals, as herein provided for, shall, together with the order of the State veterinarian and the award of the appraisers in each case, be submitted to the governor, and he shall, after having examined each case, if satisfied of the justness of the same, indorse thereon his order to the State auditor, who shall thereupon issue his warrant on the State treasurer for the same so ordered paid by the governor.

SEC. 8. The State veterinarian shall be entitled to receive for his service the sum of eight dollars ($8) per day for every day actually employed under the provisions of this act, together with his necessary traveling expenses. He shall make an itemized account to the governor, properly signed and sworn to, of the number of days he has served, and of the expenses which he has paid, and the governor shall, if satisfied that the same is right and proper, indorse thereon his order on the State auditor for the amount. The appraisers, heretofore provided for, shall be entitled to receive the sum of one dollar ($1) each for their services, to be paid out of the treasury of their respective counties, upon certificate of the justice of the peace summoning them. The justice of the peace shall be entitled to receive the ordinary fee for issuing summons, to be paid out of the town fund in counties under township organization, and out of the county fund in counties not under township organization. The physicians called in consultation shall be entitled to receive for their services the sum of two dollars ($2) per day, and mileage at the rate of ten (10) cents per mile one way; such compensation and mileage to be paid out of the veterinarian contingent fund. The State veterinarian shall have at his disposition the sum of two thousand dollars ($2,000), to be expended in disinfecting infected premises, and other incidental expenses connected with his work, for which he shall, before entering upon the discharge of his duties, give bond, with good and sufficient securities, in the sum of five thousand dollors ($5,000), and shall make a sworn statement to the governor of the amounts he disburses. Any part of said two thousand dollars ($2,000) not used shall lapse into the State treasury.

SEC. 9. For the purpose of carrying out the provisions of this act the sum of eight thousand dollars ($8,000), or so much thereof as is necessary, is hereby appropriated out of the State treasury, to be paid as hereby provided out of any sums not otherwise appropriated.

INDIANA.

No law except the criminal code. Provides that a party who has cattle in a car, not diseased, may claim damages if another party brings in cattle diseased, *knowing them to be so.*

(Laws, 1881.)

CHAPTER 161.—Cattle—protection of, from contagious diseases.

An Act for the protection of cattle against contagious diseases.

Be it enacted by the Legislature of the State of Kansas:

SECTION 1. That no person or persons shall drive or cause to be driven into or through any county in this State any cattle diseased with a disease known as Texas,

splenic, or Spanish fever. Any person violating any provision of this act shall on conviction be adjudged guilty of a misdemeanor, and shall be fined not less than one hundred and not more than one thousand dollars, and be imprisoned in the county jail not less than thirty days, and not more than one year.

SEC. 2. That upon the arrest of any person or persons charged with the violation of any of the provisions of this act, all cattle found in his or their possession shall, during the arrest and trial of the offenders, be stopped and taken charge of by the officer or person executing the warrant of arrest, to abide the judgment of the court before whom the offender or offenders shall be tried.

SEC. 3. That upon a complaint made to any sheriff within the State, by any citizen thereof, that there are, within the county where said sheriff resides, wild or undomesticated cattle infected or diseased with what is commonly known as Texas, splenic, or Spanish fever, said sheriff shall forthwith take charge of said cattle and corral the same, or otherwise prevent their running at large, until said complaint shall be investigated as hereinafter provided.

SEC. 4. It shall be the duty of such sheriff, upon taking charge of any cattle as provided in sections two and three of this act, to immediately give notice thereof to any justice of the peace in his county; whereupon said justice shall immediately summon three resident citizens of the county to forthwith appear before him for the purpose of inspecting such cattle; and when the persons so summoned, or other persons summoned in their stead, shall appear, it shall be the duty of the justice to administer to them an oath, in writing, that they will faithfully discharge their duties as inspectors of the cattle aforesaid, and without delay make report to him of their finding in the premises.

SEC. 5. Upon taking the oath, as provided in section four of this act, said inspectors shall immediately proceed to examine cattle so in the custody of the sheriff, and if upon such examination they shall find the condition of the same to be such as to endanger the health of other cattle in the vicinity by reason of probable contagion, they shall immediately report their findings to the justice aforesaid in writing, and thereupon the justice shall forthwith issue to the sheriff his order in writing, commanding him to keep such cattle in his custody and under his control until the first day of November next ensuing; and he may employ such assistance as may be required to properly care for such cattle, keeping a correct and itemized account of all such services and the cost thereof, as well as of all feed necessary to be used, and present a report thereof to the commissioners of the county at their next regular session, and if found by them to be correct and reasonable, they shall allow the same, and draw warrants upon the county treasurer therefor; and the sheriff shall be allowed for his services such compensation as the commissioners shall deem reasonable, taking as a basis for their estimate the fees allowed by law for similar services; and the inspectors shall be allowed in like manner for their services not to exceed two dollars per day, for time actually spent in making the inspection, and ten cents per mile for every mile necessarily traveled in the discharge of their duties.

SEC. 6. That, in the trial of any person or persons charged with the violation of any of the provisions of this act, proof that the cattle, of which such person or persons are charged with driving, are wild and of undomesticated habits, shall be taken as *prima facie* evidence that said cattle are diseased with the disease known as Texas, splenic, or Spanish fever.

SEC. 7. Any person or persons who shall drive or cause to be driven into or through any county in this State any of the cattle mentioned in section one of this act, in violation of this act, shall be liable to the party injured for all damages that may arise from the communication of disease from the cattle so driven, to be recovered in civil action; and the party so injured shall have a lien upon the cattle so driven.

SEC. 8. Justices of the peace, within their respective counties, shall have criminal jurisdiction in all cases arising under the provisions of this act.

SEC. 9. It shall be the duty of the prosecuting attorney of the proper county to prosecute on behalf of the State all criminal cases arising under this act.

SEC. 10. Whenever any cattle are taken by the sheriff, or other officer, under the provisions of this act, and shall remain in his possession, he shall, on the first day of November thereafter, deliver the same to their owner or owners, or his or their agent or agents: *Provided*, That before he shall deliver the same, all costs and expenses which have accrued by reason of the taking and detaining of such cattle as hereinbefore provided are paid into the county treasury; and in case such costs and expenses are not so paid within ten days after said first day of November, the sheriff shall advertise in the same manner as is by law provided in cases of sales of personal property that he will sell such cattle, or such portion thereof as may be necessary to pay such costs and expenses; and at the time and place so advertised he shall proceed to sell as many of said cattle as shall be necessary to pay such costs and expenses, and out of the proceeds of such sale he shall pay such amount into the county treasury, retaining the costs of sale.

SEC. 11. Nothing in this act shall be construed to conflict with the provisions of

section one, chapter one hundred and seventy-six, laws of 1879, or acts amendatory thereof.

SEC. 12. Article nine of chapter one hundred and five of the general statutes of 1868, and all amendments thereto, entitled "An act for the protection of stock from disease," is hereby repealed.

SEC. 13. This act to take effect and be in force from and after its publication in the official State paper.

Approved March 4, 1881.

MAINE.

Contagious diseases among cattle.

(Revised Statutes.—Chapter 14.)

SEC. 37. The municipal officers of towns, in case of the existence of the disease called lung murrain or pleuro-pneumonia, or any other contagious disease, shall cause the cattle in their towns infected, or which have been exposed to infection, to be secured or collected in some suitable place or places therein, and kept isolated; and when taken from the possession of their owners, one-fifth of the expense thereof is to be paid by the town, and four-fifths at the expense of the State, such isolation to continue so long as the existence of such disease or other circumstances render it necessary; or they may direct the owners thereof to isolate such cattle upon their own premises, and any damage or loss sustained thereby shall be paid as aforesaid.

SEC. 38. The municipal officers shall, within twenty-four hours after they have notice of the existence of such disease, or have reason to believe that it exists, cause the suspected animals to be examined by a veterinary surgeon or physician, by them selected, and if they are adjudged diseased, they may order them to be forthwith killed and buried at the expense of such town.

SEC. 39. When so killed they shall cause them to be appraised by three competent and disinterested men, under oath, at the value thereof at the time of appraisal, and the amount thereof shall be paid as provided in section thirty-seven.

SEC. 40. They may prohibit the departure of cattle from any enclosure, and exclude cattle therefrom.

SEC. 41. They may make regulations in writing to regulate or prohibit the passage from, to or through their towns, or from place to place therein, of any neat cattle, and may arrest and detain, at the cost of the owners thereof, all cattle found passing in violation of such regulations, and may take all other necessary measures for the enforcement of such prohibition, and for preventing the spread of any such disease among the cattle in their towns and the immediate vicinity thereof.

SEC. 42. Such regulations shall be recorded in the records of their towns, and shall be published in such towns in such manner as such regulations provide.

SEC. 43. Any person who sells or disposes of any animal infected or known to have been exposed to infection within one year after such exposure, without the knowledge or consent of the municipal officers, shall be punished by fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

SEC. 44. Any person disobeying the orders of said municipal officers, made in conformity with the fortieth section, or driving or transporting any neat cattle contrary to the regulations made, so recorded and published, shall be punished as provided in section forty-three.

SEC. 45. Whoever knows or has reason to suspect the existence of any fatal contagious disease among the cattle in his possession or under his care shall forthwith give notice thereof to the municipal officers, and for failure to do so shall be punished as provided in section forty-three.

SEC. 46. Any town whose officers shall neglect or refuse to carry into effect the provisions of section thirty-seven, thirty-eight, thirty-nine, forty, forty-one, forty-two, and forty-three shall forfeit a sum not exceeding five hundred dollars for each day's neglect.

SEC. 47. All appraisals made under the provisions of section thirty-nine shall be in writing, and signed by the appraisers, and shall be certified by the municipal officers to the governor and council, and to the treasurers of their towns.

SEC. 48. The municipal officers of towns may, when they deem it necessary to carry into effect the purposes of this chapter, take and hold possession, for a term not exceeding one year, of any land within their towns without buildings other than barns thereon, for enclosing and isolating any cattle, and they shall cause the damages sustained by the owners in consequence thereof to be appraised by the assessors thereof; and they shall further cause a description of such land, setting forth the boundaries thereof, and the area as nearly as may be estimated, together with said appraisal, to be entered in the records of the town. The amount of said appraisal shall be paid as provided in the thirty-seventh section in such sums and at such times as they may order. If such owner is dissatisfied with the appraisal, he may, in an action of the

case, recover from the town a fair compensation for the damages sustained by him: but no costs shall be taxed unless the damages recovered in such action, exclusive of interest, exceed the appraisal of the assessors, and the State shall reimburse any town four-fifths of any sum so recovered.

SEC. 49. Whenever such disease exists in any town, the municipal officers shall forthwith give notice thereof to the governor and secretary of the board of agriculture, but if commissioners have been appointed as hereinafter provided, such notice shall be given to them.

SEC. 50. The governor may, when he deems it expedient, appoint commissioners who shall have full power to make all necessary regulations, and to issue summary orders relative thereto, for the treatment and extirpation of any contagous disease among cattle, and may direct the municipal officers to enforce and carry them into effect; and any such officer or other person refusing or neglecting to enforce, carry out and comply with any regulations of the commissioners shall be punished by a fine as provided in section forty-three.

SEC. 51. When said commissioners shall make and publish any regulations they shall supercede the regulations made by the municipal officers, during the time those made by the commissioners are in force.

SEC. 52. All losses and damages and reasonable expenses sustained in consequence of execution of the orders of said commissioners shall be appraised as provided in the thirty-ninth section, and paid as provided in the thirty-seventh section.

SEC. 53. The commissioners shall keep record of their doings, and make report thereof to the next annual session of the legislature, on or before the tenth day of January, unless sooner required by the governor; and such record or an abstract thereof shall be printed in the annual volume of transactions of the State board of agriculture.

SEC. 54. The governor, with the advice and consent of the council, may terminate the commission, when, in his judgment, the public safety may permit.

MARYLAND.

(Chapter 439, acts of the general assembly of Maryland, 1880.)

AN ACT to prevent the spread of infectious or contagious pleuro-pneumonia among the cattle of this State.

SECTION 1. Be it enacted by the general assembly of Maryland, that whenever it shall be brought to the notice of the governor of this State that the disease known as contagious or infectious pleuro-pneumonia exists among the cattle in any of the counties of this State, or in the city of Baltimore, it shall be his duty to take measures to promptly suppress the disease and prevent it from spreading.

SEC. 2. And be it enacted, that for such purpose the governor shall have power to issue his proclamation stating that infectious or contagious disease exists, in any county or counties of the State, or in the city of Baltimore, and warning all persons to seclude all animals in their possession that are affected with such disease or have been exposed to the infection or contagion thereof, and ordering all persons to take such precautions against the spreading of such disease as the nature thereof may, in his judgment, render necessary or expedient; to order that any premises, farm or farms, or stables where such disease exists or has existed, be put in quarantine, so that no domestic animal be removed from or brought to the premises or places so quarantined, and to prescribe such regulations as he may judge necessary or expedient to prevent infection or contagion being communicated in any way from the places so quarantined; to call upon all sheriffs and deputy sheriffs to carry out and enforce the provisions of such proclamations, orders, and regulations; and it shall be the duty of all sheriffs and deputy sheriffs to obey and observe all orders and instructions which they may receive from the governor in the premises; to employ such and so many medical and veterinary practitioners and such other persons as he may from time to time deem necessary to assist him in performing his duty as set forth in the first section of this act, and to fix their compensation; to order all or any animals coming into the State to be detained at any place or places for the purpose of inspection and examination; provided, that animals coming from a neighboring State that have passed a veterinary examination in said State, and have been quarantined and discharged, shall not be subject to the provisions of this act; to prescribe regulations for the destruction of animals affected with infectious or contagious disease, or of those in direct contact with such and liable to spread the disease, and for the proper disposition of their hides and carcasses, and of all objects which might convey infection or contagion; provided, that no animal shall be destroyed unless first examined by a medical or veterinary practitioner in the employ of the governor as aforesaid; to prescribe regulations for the disinfection of all premises, buildings, and railway cars, and of all objects from or by which infection or contagion may take place or be conveyed; to alter and modify,

from time to time, as he may deem expedient, the terms of all such proclamations, orders, and regulations, and to cancel or withdraw the same at any time.

SEC. 3. And be it enacted, that any person who shall transgress the terms or requirements of any proclamation, order, or regulation issued or prescribed by the governor under the authority of this act, shall be deemed guilty of a misdemeanor.

SEC. 4. And be it enacted, that any person who shall sell or otherwise dispose of an animal which he knows, or has reason to believe, is affected by the disease or has been exposed to the same, shall forfeit to the State not less than fifty nor more than one hundred dollars.

SEC. 5. And be it enacted, that all the necessary expenses incurred under direction or by authority of the governor, in carrying out the provisions of this act, shall be paid by the treasurer out of any moneys not otherwise appropriated, and upon the warrant of the comptroller on being certified as correct by the governor.

SEC. 6. And be it enacted, that in the event of its being deemed necessary by the governor, or any agent duly appointed by him under the provisions of this act, to prevent the spread of contagion or infection to cause any animal not actually diseased to be slaughtered, the value of such animal or animals shall be fairly appraised, and a record kept and a report made thereof to the general assembly at its session next ensuing with a view to the reimbursement of the owners of such animals so killed, should provision therefor be made by law, it being provided that the carcasses of animals so killed and found entirely free from disease shall, if practicable, be sold, and the proceeds of such sale shall be paid over to the respective owners of the cattle, and the amounts so received and paid over noted against the appraised value thereof.

SEC. 7. And be it enacted that this act shall take effect from the date of its passage.

Approved April 10, 1880.

MASSACHUSETTS.

(Supplement to the General Statutes, 1860, chapter 192.)

AN ACT to provide for the extirpation of the disease called pleuro-pneumonia among cattle.

SECTION 1. The governor is hereby authorized to appoint three commissioners, who shall visit without delay the several places in this commonwealth where the disease among cattle called pleuro-pneumonia may be known or suspected to exist, and shall have full power to cause all cattle belonging to the herds in which the disease has appeared or may appear, or which have belonged to such herds since the disease may be known to have existed therein, to be forthwith killed and buried, and the premises where such cattle have been kept cleansed and purified, and to make such order in relation to the further use and occupation of such premises as may seem to them to be necessary to prevent the extension of the disease.

SEC. 6. This act shall take effect from its passage, and continue in force for the term of one year thereafter, and no longer. (April 4, 1860.)

(1860, chapter 220.)

AN ACT concerning contagious diseases among cattle.

SECTION 1. The selectmen of towns, and the mayor and aldermen of cities, in case of the existence in this commonwealth of the disease called pleuro-pneumonia, or any other contagious disease among cattle, shall cause the cattle in their respective towns and cities which are infected or which have been exposed to infection to be secured or collected in some suitable place or places within such city or town, and kept isolated; and, when taken from the possession of their owners, to be maintained, one-fifth of the expense thereof to be paid by the town or city wherein the animal is kept, and four-fifths at the expense of the commonwealth; such isolation to continue so long as the existence of such disease, or other circumstances, renders the same necessary.

SEC. 2. Said selectmen and mayor and aldermen, when any such animal is adjudged by a veterinary surgeon or physician, by them selected, to be infected with pleuro-pneumonia, or any other contagious disease, may, in their discretion, order such diseased animal to be forthwith killed and buried at the expense of such town or city.

SEC. 3. Said selectmen and mayor and aldermen shall cause all cattle which they shall so order to be killed to be appraised by three competent and disinterested men, under oath, at the value thereof at the time of the appraisal, and the amount of the appraisal shall be paid as provided in the first section.

SEC. 4. Said selectmen and mayor and aldermen within their respective towns and cities are hereby authorized to prohibit the departure of cattle from any inclosure, or to exclude cattle therefrom.

SEC. 5. Said selectmen and mayor and aldermen may make regulations in writing to regulate or prohibit the passage from, to, or through their respective cities or towns, or from place to place within the same, of any neat cattle, and may arrest and detain, at the cost of the owners thereof, all cattle found passing in violation of said regulations, and may take all other necessary measures for the enforcement of such prohibition, and also for preventing the spread of any such disease among the cattle in their respective towns and cities, and the immediate vicinity thereof.

SEC. 7. Said selectmen and mayor and aldermen are authorized to cause all cattle infected with such disease, or which have been exposed thereto, to be forthwith branded upon the rump with the letter P, so as to distinguish the animal from other cattle; and no cattle so branded shall be sold or disposed of except with the knowledge and consent of such selectmen and mayor and aldermen. Any person, without such knowledge and consent, selling or disposing of an animal so branded, or selling or disposing of an animal known to be affected with such disease, or known to have been exposed thereto within one year previous to such sale or disposal, shall be punished by a fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

SEC. 8. Any person disobeying the orders of the selectmen or mayor and aldermen, made in conformity with the fourth section, or driving or transporting any neat cattle contrary to the regulations made, recorded, and published as aforesaid, shall be punished by a fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

SEC. 9. Whoever knows or has reason to suspect the existence of any such disease among the cattle in his possession or under his care, shall forthwith give notice to the selectmen of the town or mayor and aldermen of the city where such cattle may be kept, and for failure so to do shall be punished by a fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

SEC. 10. Any town or city whose officers shall neglect or refuse to carry into effect the provisions of sections one, two, three, four, five, six, and seven shall forfeit a sum not exceeding five hundred dollars for each day's neglect.

SEC. 11. All appraisals made under the provisions of this act shall be in writing and signed by the appraisers, and the same shall be certified to the governor and council and to the treasurer of the several cities and towns wherein the cattle appraised were kept by the selectmen, and mayors and aldermen, respectively.

SEC. 12. The selectmen of towns, and mayor and aldermen of cities, are hereby authorized, when in their judgment it shall be necessary to carry into effect the purposes of this act, to take and hold possession, for a term not exceeding one year, within their respective towns and cities, of any land, without buildings other than barns thereon, upon which it may be necessary to enclose and isolate any cattle, and they shall cause the damages sustained by the owner in consequence of such taking and holding to be appraised by the assessors of the town or city wherein the lands so taken are situated; and they shall further cause a description of such land, setting forth the boundaries thereof, and the area as nearly as may be estimated, together with said appraisal by the assessors, to be entered on the records of the town or city. The amount of said appraisal shall be paid as provided in the first section, in such sums and at such times as the selectmen or mayor and aldermen, respectively, may order. If the owner of any land so taken shall be dissatisfied with the appraisal of said assessors, he may by action of contract recover of the town or city wherein the lands lie a fair compensation for the damages sustained by him; but no costs shall be taxed, unless the damages recovered in such action, exclusive of interest, exceed the appraisal of the assessors, and the Commonwealth shall reimburse any town or city four-fifths of any sum recovered of such town or city in any such action.

(1860. Chapter 221.)

AN ACT in addition to an act concerning contagious diseases among cattle.

SECTION 1. In addition to the commissioners appointed under the provisions of chapter one hundred and ninety-two of the acts of the year one thousand eight hundred and sixty, the governor, by and with the advice and consent of the council, is hereby authorized to appoint two additional persons to constitute, with those now in office, a board of commissioners upon the subject of pleuro-pneumonia, or any other contagious disease now existing among the cattle of the Commonwealth.

SEC. 2. When said commissioners shall make and publish any regulations concerning the extirpation, cure, or treatment of cattle infected with, or which have been exposed to, the disease of pleuro-pneumonia, or other contagious disease, such regulations shall supersede the regulations made by selectmen of towns and mayors and aldermen of cities upon the same subject-matter; and the operations of the regulations made by such selectmen and mayors and aldermen shall be suspended during the time those made by the commissioners as aforesaid shall be in force. And said

selectmen and mayors and aldermen shall carry out and enforce all orders and directions of said commissioners to them directed, as they shall from time to time issue.

SEC. 3. In addition to the power and authority conferred on the selectmen of towns and mayors and aldermen of cities by the act to which this is in addition, and which are herein conferred upon said commissioners, the same commissioners shall have power to provide for the establishment of a hospital or quarantine in some suitable place or places, with proper accommodations of buildings, land, &c., wherein may be detained any cattle by them selected, so that said cattle so infected or exposed may be there treated by such scientific practitioners of the healing art as may be appointed to treat the same. And for this purpose said commissioners may take any lands and buildings in the manner provided in the twelfth section of the act to which this is in addition.

SEC. 4. The governor, by and with the advice and consent of the council, is hereby authorized to appoint three competent persons to be a board of examiners to examine into the disease called pleuro-pneumonia, who shall attend at the hospital or quarantine established by the commissioners mentioned in the foregoing section and there treat and experiment upon such number of cattle, both sound and infected, as will enable them to study the symptoms and laws of the disease, and ascertain, so far as they can, the best mode of treating cattle in view of the prevention and cure of the disease, and who shall keep a full record of their proceedings and make report thereon to the governor and council, when their investigations shall have been concluded: *Provided*, That the expense of said board of examiners shall not exceed ten thousand dollars.

SEC. 5. The selectmen of the several towns, and mayors and aldermen of the several cities, shall, within twenty-four hours after they shall have notice that any cattle in their respective towns and cities are infected with, or have been exposed to any such disease, give notice in writing to said commissioners of the same.

SEC. 6. The commissioners are authorized to make all necessary regulations for the treatment, cure, and extirpation of said disease, and may direct the selectmen of towns and mayors and aldermen of cities to enforce and carry into effect all such regulations as may from time to time be made for that end; and any such officer refusing or neglecting to enforce and carry out any regulation of the commissioners shall be punished by fine not exceeding five hundred dollars for every such offence.

SEC. 7. The commissioners may, when in their judgment the public good shall require it, cause to be killed and buried any cattle which are infected with, or which have been exposed to, said disease; and said commissioners shall cause said cattle to be appraised in the same manner provided in the act to which this is in addition, and the appraised value of such cattle shall be paid, one-fifth by the towns in which said cattle were kept, and the remainder by the Commonwealth.

SEC. 8. Whoever shall drive or transport any cattle from any portion of the Commonwealth east of Connecticut River to any part west of said river before the first day of April next without consent of the commissioners shall be punished by fine not exceeding five hundred dollars, or by imprisonment in the county jail not exceeding one year.

SEC. 9. Whoever shall drive or transport any cattle from any portion of the Commonwealth into any other State before the first day of April next, without the consent of the commissioners, he shall be punished by fine not exceeding five hundred dollars or by imprisonment in the county jail not exceeding one year.

SEC. 10. If any person fails to comply with any regulation made or with any order given by the commissioners, he shall be punished by fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

SEC. 11. Prosecutions under the two preceding sections may be prosecuted in any county in this Commonwealth.

SEC. 12. All appraisals made under this act shall be in writing, and signed by the appraisers and certified by the commissioners, and shall be by them transmitted to the governor and council and to the treasurers of the several cities and towns wherein the cattle appraised were kept.

SEC. 13. The provisions of chapter one hundred and ninety-two of the acts of the year one thousand eight hundred and sixty, except so far as the authorize the appointment of commissioners, are hereby repealed; but this repeal shall not affect the validity of any proceedings heretofore lawfully had under the provisions of said chapter.

SEC. 14. The commissioners and examiners shall keep a full record of their doings, and make report of the same to the next legislature on or before the tenth day of January next, unless sooner required by the governor; and the said record, or an abstract of the same, shall be printed in the annual volume of transactions of the State Board of Agriculture.

SEC. 15. The governor, with the advice and consent of the council, shall have the power to terminate the commission and board of examiners whenever in his judgment the public safety may permit.

SEC. 16. This act shall take effect from its passage.

(June 12, 1860.)

CHAPTER 41, 1861.—RESOLUTION providing for indemnification for cattle killed by order of commissioners.

Resolved, That the commissioners appointed under this act, approved April fourth, in the year eighteen hundred and sixty, and entitled "An act to provide for the extirpation of the disease called pleuro-pneumonia among cattle," be, and they hereby are, required to certify to the governor and council the names of all persons whose cattle were killed by their authority for the reason that they appeared to be afflicted with the disease called pleuro-pneumonia, and not paid for, together with the number, description, and fair value of such cattle, at the time they were killed. Upon the receipt of such certificate, the governor, with the advice and consent of the council, may draw his warrants in favor of such persons, and for such sums as shall appear to them to be justly due. The money so appropriated shall be taken from the appropriation for carrying into effect the provisions of the laws concerning contagious diseases among cattle. (March 28, 1861.)

CHAPTER 28, 1862.—AN ACT concerning cattle commissioners.

SEC. 1. The governor, with the advice and consent of the council, shall have power to appoint a board of cattle commissioners of not more than three members, whenever in his judgment the public safety may require, and may terminate their commissions whenever in his judgment the public safety may permit: *Provided*, That the compensation of said commissioners shall not exceed four dollars per day, for actual service, in addition to their traveling expenses necessarily incurred.

SEC. 2. The powers and duties of the commissioners shall be such as are set forth in chapter 221 of the acts of the year 1860.

SEC. 3. All commissions and appointments made under chapters 192 and 221 of the acts of the year 1860 are hereby abolished.

SEC. 4. This act shall take effect upon its passage.

(February 18, 1862.)

CHAPTER 138.—AN ACT in addition to an act concerning contagious diseases among cattle.

SECTION 1. The commissioners on contagious diseases among cattle are hereby authorized to examine under oath, in the several cities and towns of this commonwealth, all persons possessing, or believing to possess, knowledge of any material facts concerning the existence or dissemination, or danger of dissemination of diseases among cattle; and for this purpose shall have and exercise all the powers vested in justices of the peace to take depositions, and to compel the attendance of the testifying witnesses, by the 131st chapter of the general statutes, and any other laws concerning the taking of depositions. All costs and expenses incurred in procuring the attendance of such witnesses shall be allowed and paid to the said commissioners from the treasury of the commonwealth, upon the same being certified to the governor and council, and approved by him. And the governor is hereby authorized to draw his warrant therefor upon the treasury, the same to be paid out of any appropriation lawfully applicable to that purpose.

SEC. 2. Whenever cattle exposed to contagious diseases are killed by order of the commissioners, and upon a *post-mortem* examination shall be found to have been entirely free from disease, it shall be the duty of the commissioners to cause the same to be sold under their direction, first giving to the purchaser notice of the fact, and if the said purchaser or any other person shall sell said slaughtered cattle or any part thereof, they shall in like manner give notice to the parties to whom the same is sold; and the proceeds of the sales made by order of the commissioners shall be applied in payment of the appraised value of said cattle.

SEC. 3. Cattle commissions, now or hereafter appointed, shall keep a full record of their doings, and report the same to the legislature on or before the 10th day of January of each year, unless sooner required by the governor; and an abstract of the same shall be printed in the annual report of the State board of agriculture.

SEC. 4. Whoever violates any of the provisions of this act shall forfeit and pay a fine not exceeding one hundred dollars and costs of prosecution.

SEC. 5. This act shall take effect upon its passage.

(*April* 25, 1862.)

MICHIGAN.

CHAPTER 46.—AN ACT to prevent the introduction of contagious diseases in cattle.

[Approved April 5, 1869.—Laws of 1869, p. 319.]

[1742.] SECTION 1. The people of the State of Michigan enact that when the governor of the State of Michigan shall be satisfied of the necessity of the same, he shall

have power to appoint three commissioners, to hold their office for two years, and make report annually to the secretary of the State board of agriculture. Such commissioners shall have power to use means to prevent the spread of dangerous diseases among animals, and protect the people of the State from the dangers arising from the consumption of diseased meat. Said commissioners shall have power to administer oaths and appoint assistants for such time as they may deem proper, and to place animals in quarantine, and to do generally whatever may be necessary to prevent the spread of contagious diseases among animals.

[1743.] SEC. 2. No animal shall be permitted to enter or pass through the State which shall be deemed by either of the commissioners capable of diffusing or communicating contagious diseases.

[1744.] SEC. 3. No cattle brought from Texas or the Indian Territories shall be permitted to pass through this State, or any part of the same, from the first day of March to the first day of November, in each year.

SEC. 4. This act shall take immediate effect.

MINNESOTA.

CHAPTER 101.—Offenses against the public health.

SECTION 14. *Importation of Texas or Indian cattle prohibited.*—That it shall not be lawful for any one to bring into the State or have in possession any Texas, Cherokee, Indian, or any diseased cattle, except as hereinafter provided. (1869, c. 42, sec. 1.)

SEC. 15. *Exception as to cattle on hand—Such cattle not to run at large.*—This act shall not apply to any Texas, Cherokee, or Indian cattle, or other diseased cattle now on hand within this State; but persons having such shall be compelled to keep them within the bounds of their own premises, or separate from other cattle; and any damage that may accrue from allowing such cattle to run at large, and thereby spreading disease among other cattle, shall be recovered from the owner or owners thereof, who shall be liable to all the pains and penalties, as provided in section 4 of this act. (*Id.*, sec. 2.)

SEC. 16. *Such cattle may be driven through State, when.*—Nothing contained in this act shall be so construed as to prevent the transportation of such cattle through this State on railroads, or to prohibit the driving through any portion of this State such Texas or southern cattle as have been wintered, at least one winter, north of the northern boundary of the State of Missouri.—(*Id.* sec. 3.)

SEC. 17. *Penalty—disposition thereof—liability for damages.*—Any person who shall violate the provisions of this act shall, for every such violation, forfeit and pay into the school-fund of the county where the offense is committed, a sum not exceeding one thousand dollars, or to be fined and imprisoned in the county jail, at the discretion of the court, though such time of imprisonment shall not exceed six months; and such person or persons shall pay all damages that may accrue to any person by reason of such violation of this act.—(*Id.* sec. 4.)

NEBRASKA.

CHAPTER 3.—*Animals.*—An Act to provide for the protection of stock from contagious diseases. (Passed, and took effect, June 20, 1867. Laws 1876, page 74.)

Be it enacted by the Legislature of the State of Nebraska:

[1.] SECTION 1. That every person shall so restrain his diseased or distempered cattle, or such as are under his care, that they may not go at large; and no person or persons shall drive any diseased or distempered cattle affected with any contagious or infectious disease, into or through this State from one point thereof to another. Any person or persons offending against this section shall, on conviction thereof before any justice of the peace, forfeit not less than five nor more than twenty-five dollars for every head of such cattle, and be liable for all costs and damages.

[2.] SEC. 2. Any justice of the peace, upon proof before him that any cattle are going at large or are driven in or through his county in violation of the preceding section, shall order a constable or sheriff to impound them, and the owner thereof shall be held liable for all costs and damages.

[3.] SEC. 3. The sheriff or constable who may execute the order of any justice of the peace as aforesaid, to impound any such cattle, shall have twenty-five cents per head for the first fifty, and five cents for each additional head, to be paid by the defendant upon conviction thereof, but in case the defendant be discharged then such costs to be paid by the complainant; and if any officer to whom any order under this law is directed should fail to execute (the same,) he shall forfeit, in case of a failure, a sum not less than one hundred dollars.

[4.] SEC. 4. It shall not be lawful for any person to use, let, sell, or permit to run at large any horse, mule, or ass diseased with the glanders. Any person violating the

provisions of this section shall pay a fine not less than five nor more than fifty dollars, and shall be liable for all damages.

[5.] SEC. 5. All fines and forfeitures incurred under the provisions of this act shall be recovered by action before any justice of the peace, and all such fines shall be paid into the school fund, in and for the county having jurisdiction of the case.

[6.] SEC. 6. In all cases of conviction under the provisions of this act, the justice shall enter judgment for the fine and costs against the defendant, and may commit him until the judgment is satisfied, or issue execution on the judgment for the use of the common schools of the county.

[7.] SEC. 7. All acts and parts of acts inconsistent with the provisions of this act are hereby repealed.

[8.] SEC. 8. This act shall take effect and be in force from and after its passage.

Approved June 20, 1867.

AN ACT to prevent the introduction and spread of hog cholera and kindred diseases in the State of Nebraska.

Be it enacted by the legislature of the State of Nebraska.

SECTION 1. That from and after the 1st day of June, A. D. 1877, it shall be unlawful for any railroad company operating its road in this State to bring or cause to be brought into this State from an adjoining State any empty car used for transporting hogs or sheep, or any empty combination car used for carrying grain and stock, that has any filth of any kind whatever in the same; but the railroad company shall, before it allows said car or cars to pass into this State, cause the same to be thoroughly cleansed. Any person or persons, or corporation, violating any of the above provisions, and on conviction thereof, shall be fined in any sum not to exceed one hundred dollars.

Approved February 17, A. D. 1877.

NEW HAMPSHIRE.

(From General Laws of the State of New Hampshire, chapter 116, entitled "Diseases of Domestic Animals."

SECT. 1. Whenever any dangerous or troublesome disease prevails among cattle, horses or other domestic animals, the governor, with the advice of the council, may appoint a board of commissioners of not more than five persons, and may terminate its existence when the public safety may permit, or the governor may direct that the board of agriculture may perform the duties and possess the powers herein specified.

The compensation of such board shall be limited to actual expenses, to be allowed by the governor and council.

SECT. 2. Said board shall have the power to make regulations prohibiting the introduction or transportation of any domestic animals, by railroad or otherwise, and such other regulations as they may deem necessary to arrest or exclude any such infectious or troublesome disease, and modify or annul the same as circumstances may require.

Such regulations shall be in force until the existence and powers of the board shall be terminated by the governor.

SECT. 3. Any person or corporation that shall violate any of the regulations of said board, shall be punished for such offense by fine not exceeding one hundred dollars.

SECT. 4. Any person or corporation that shall bring into the State, between the twentieth day of May and the twentieth day of October, any Texas or Cherokee cattle that have been kept north of the Ohio or Missouri river during the winter immediately preceding, shall be punished for such offense by a fine not exceeding twenty-five dollars for each and every animal so brought into this State.

The term Texas or Cherokee cattle shall be construed to mean the native cattle of Texas and Louisiana, and the classes of cattle known under these names.

SECT. 5. Selectmen shall enforce the provisions of this chapter within their respective towns at the expense of such towns.

NEW JERSEY.

CHAPTER CCXX.—A supplement to an act entitled "An act to establish a State board of health," approved March ninth, one thousand eight hundred and seventy-seven.

1. *Be it enacted by the senate and general assembly of the State of New Jersey*, That in addition to the powers conferred by the act to which this is a supplement, said board shall have full power and authority to examine and determine whether pleuro-pneumonia, rinderpest, or any other contagious or infectious disease exist among animals in any county in this State; and that the sum of five hundred dollars is hereby appro-

priated to defray the actual necessary expenses of said board while making such examinations.

2. *And be it enacted*, That in event of any contagious or infectious disease as aforesaid breaking out or being suspected to exist in any locality in this State, it shall be the duty of all persons owning or having any interest whatever in said cattle, immediately to notify the said board of health, or any one of them, of the existence of such disease, and thereupon it shall be the duty of said board of health, or any member thereof, to immediately proceed to the place or places where said disease is reported to exist, and to quarantine said animal or animals, and take such precautionary measures as shall be deemed necessary; to prescribe such remedies as in their judgment will be conducive to the recovery of such animal or animals, and to inforce such regulations as may be adopted by said board of health.

3. *And be it enacted*, That the board of health aforesaid, and all such assistants as they may appoint, whenever in their judgment or discretion it shall appear in any case that the disease is not likely to yield to any remedial treatment, or whenever it shall seem that the cost or worth of any such remedial treatment shall be greater than the value of the animal or animals so afflicted, or whenever in any case such disease shall threaten its spread to other animals, to cause the same to be immediately slaughtered, and their remains to be buried not less than four feet under ground, and all places in which said animals shall have been kept to be cleansed and disinfected.

4. *And be it enacted*, That in all cases where animals inflicted with, or which shall have been exposed, shall have been slaughtered or killed by the order of the said board of health, or their assistants, it shall be the duty of said board to appoint three competent and disinterested freeholders to appraise the value of the animals so killed or slaughtered, at the time they were so killed; who shall be affirmed or sworn, before proceeding to act, to make a just and true valuation of said animals so killed, at the time of their slaughter, two-thirds of which said valuation or appraisement shall be paid to the owner or owners by the State.

5. *And be it enacted*, That any person or persons refusing or neglecting to notify said board of health, or any of them, of the existence of pleuro-pneumonia, rinderpest, or any other contagious or infectious diseases among cattle, shall be deemed and adjudged guilty of a misdemeanor, and upon conviction shall be punished by a fine of not more than two hundred dollars, or by imprisonment not exceeding one year, or both, at the discretion of the court.

6. *And be it enacted*, That all bills for money expended under this act shall be audited by the comptroller of this State and then submitted to the governor for his approval. After being thus audited and approved by the governor, shall be paid by the State treasurer upon warrant of the comptroller.

7. *And be it enacted*, That said board shall keep a full record of their proceedings, and shall publish the same in the annual report of the State board of agriculture, yearly and every year during the existence of the law.

8. *And be it enacted*, That if any person or persons shall knowingly either buy or sell or cause to be bought or sold any animal or animals affected with pleuro-pneumonia, rinderpest, or any other contagious or infectious disease, all such person or persons shall be deemed and adjudged guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine not exceeding two hundred dollars or imprisonment not exceeding one year, or both, at the discretion of the court.

9. *And be it enacted*, That in case an emergency shall arise and a larger sum shall be deemed necessary than the amount appropriated by the preceding sections of this act, said State board of health shall present the facts in evidence to the president of the State Agricultural Society, and the president and executive committee of the State board of agriculture, who shall authorize such additional expenditure as in their judgment they may deem the exigency of the occasion to demand: *Provided*, That in no case shall the amount of money thus authorized to be expended exceed the sum of five thousand dollars in any one year.

10. *And be it enacted*. That all acts and parts of acts inconsistent with this act be and the same are hereby repealed, and that this act take effect immediately.

Approved March 12, 1880.

NEW YORK.

(Laws of New York—by authority.)

(Every law, unless a different time shall be prescribed therein, shall commence and take effect throughout the State on and not before the 20th day after the day of its final passage as certified by the secretary of state.—Section 12, title 4, chapter 7, part 1, Revised Statutes.)

CHAPTER 134.—AN ACT in relation to infectious and contagious diseases of animals. (Passed April 15, 1878; three-fifths being present.)

The people of the State of New York, represented in senate and assembly, do enact as follows:

SECTION 1. Whenever any infectious or contagious disease affecting domestic

animals shall be brought into or shall break out in this State it shall be the duty of the governor to take measures to suppress the same promptly and to prevent the same from spreading.

SEC. 2. For such purpose the governor shall have power:

To issue his proclamation stating that infectious or contagious disease exists in any county or counties in the State, and warning all persons to seclude all animals in their possession that are affected with such disease or have been exposed to the infection or contagion thereof, and ordering all such persons to take such precautions against the spreading of such disease as the nature thereof may in his judgment render necessary or expedient.

To order that any premises, farm or farms where such disease exists or has existed be put in quarantine, so that no domestic animal be removed from or brought to the premises or places so quarantined, and to prescribe such regulations as he may judge necessary or expedient to prevent contagion being communicated in any way from the places so quarantined.

To call upon all sheriffs and deputy sheriffs to carry out and enforce the provisions of such proclamations, orders and regulations, and it shall be the duty of all sheriffs and deputy sheriffs to obey and observe all orders and instructions which they may receive from the governor in the premises.

To employ such and so many medical and veterinary practitioners and such other persons as he may from time to time deem necessary to assist him in performing his duty as set forth in the first section of this act and to fix their compensation.

To order all or any animals coming into this State to be detained at any place or places for the purpose of inspection and examination.

To prescribe regulations for the destruction of animals affected with infectious or contagious disease, and for the proper disposition of their hides and carcasses and of all objects which might convey infection or contagion; provided that no animal shall be destroyed unless first examined by a medical or veterinary practitioner in the employ of the governor aforesaid.

To prescribe regulations for the disinfection of all premises, buildings, and railway cars, and of all objects from which or by which infection or contagion may take place or be conveyed.

To alter and modify from time to time, as he may deem expedient, the terms of all such proclamations, orders, and regulations, and to cancel or withdraw the same at any time.

SEC. 3. Any person transgressing the terms of any proclamation, order, or regulation issued or prescribed by the governor under authority of this act, shall be guilty of a misdemeanor.

SEC. 4. All expenses incurred by the governor in carrying out the provisions of this act, and in performing the duty hereby devolved upon him, shall be audited by the comptroller as extraordinary expenses of the executive department, and shall be paid out of any moneys in the treasury not otherwise appropriated.

CHAPTER 306.—AN ACT in relation to infectious and contagious diseases of animals. (Passed May 17, 1879, by a two-thirds vote.)

The people of the State of New York, represented in senate and assembly, do enact as follows:

SECTION 1. Whenever in his judgment for the more speedy and economical suppression, or for preventing the spread of any infectious or contagious disease of domestic animals, the public welfare shall be promoted thereby, the governor shall have, in addition to the powers conferred upon him by chapter one hundred and thirty-four of the laws of eighteen hundred and seventy-eight, the power to cause to be slaughtered and to be disposed of afterwards as in his judgment may be expedient, any animal or animals which by contact or cohabitation with diseased animals, or by other exposure to infections or contagion may be considered or suspected to be liable to contract or to communicate the disease sought to be suppressed, or to be prevented from spreading.

SEC. 2. Whenever any animal shall be slaughtered under any order of the governor for the purpose of suppressing or of preventing the spread of any infectious or contagious disease, the compensation to be made by the State to the owner shall be computed upon the basis of allowing for any diseased animal the actual value, if any, at the time of slaughter; for any animal that has been kept in the same stable, pen, field, pasture, or yard, with a diseased animal, two-thirds of the sound value; and in the case of any other animal so slaughtered, the full value at the time of slaughter, without regard to the depreciation due to exposure, or suspicion of exposure, to infection or contagion: *Provided, however*, That if the carcass of any animal so slaughtered shall be sold for more than the amount which the owner would be entitled to receive as compensation aforesaid, the excess shall be paid to such owner: *And provided further*, That no compensation shall be made under the provisions of this section or otherwise

to any person who shall willfully have concealed the existence of disease among his animals or upon his premises, or who shall in any way by act or by willful neglect have contributed to the spread of the disease sought to be suppressed or prevented from spreading.

SEC. 4. This act shall take effect immediately.

PENNSYLVANIA.

AN ACT to prevent the extension of disease among cattle.

SECTION 1. *Be it enacted, &c.*, That it shall not be lawful for any person who may own any cattle or sheep affected by the disease known as pleuro-pneumonia, or other contagious or infectious disease, to sell or otherwise dispose of any cattle, either alive or slaughtered, from the premises where such disease is known to exist, nor for a period of two months after such disease shall have disappeared from said premises.

SEC. 2. That no cattle or sheep shall be allowed to run at large in any township or borough where any contagious disease prevails; and the constables of such townships are hereby authorized and required to take up and confine any cattle so found running at large until called for and until all costs are paid. And in townships where there are no constables, it shall be the duty of the township clerk to perform this service; and the said officers shall be entitled to receive one dollar for each head of cattle so taken up. And any officer who shall refuse to perform the duties of this act shall be liable to a fine of ten dollars.

SEC. 3. Any person offending against the provisions of the first section of this act shall be guilty of a misdemeanor, and upon conviction be sentenced to pay a fine not exceeding five hundred dollars or undergo an imprisonment not exceeding six months.

Approved the 12th day of April, A. D. 1866.

AN ACT to prevent the spread of contagious or infectious pleuro-pneumonia among cattle in this State.

SECTION 1. *Be it enacted, &c.*, That whenever it shall be brought to the notice of the governor of this State that the disease known as contagious or infectious pleuro-pneumonia exists among the cattle in any of the counties in this State, it shall be his duty to take measures promptly to suppress the disease and prevent it from spreading.

SEC. 2. That for such purpose the governor shall have power, and he is hereby authorized, to issue his proclamation stating that the said infectious or contagious disease exists in any county or counties of the State, and warning all persons to seclude all animals in their possession that are affected with such disease, or have been exposed to the infection or contagion thereof, and ordering all persons to take such precautions against the spreading of such disease as the nature thereof may in his judgment render necessary or expedient; to order that any premises, farm, or farms where such disease exists or has existed be put in quarantine, so that no domestic animal be removed from said places so quarantined, and to prescribe such regulations as he may judge necessary or expedient to prevent infection or contagion being communicated in any way from the places so quarantined; to call upon all sheriffs and deputy sheriffs to carry out and enforce the provisions of such proclamations, orders, and regulations; and it shall be the duty of all the sheriffs and deputy sheriffs to obey and observe all orders and instructions which they may receive from the governor in the premises; to employ such and so many medical and veterinary practitioners, and such other persons as he may from time to time deem necessary to assist him in performing his duty as set forth in the first section of this act, and to fix their compensation; to order all or any animals coming into the State to be detained at any place or places for the purpose of inspection and examination; to prescribe regulations for the destruction of animals affected with the said infectious or contagious disease, and for the proper disposition of their hides and carcasses, and of all objects which might convey infection or contagion: *Provided*, That no animal shall be destroyed unless first examined by a medical or veterinary practitioner in the employ of the governor as aforesaid; to prescribe regulations for the disinfection of all premises, buildings, and railway cars, and of objects from or by which infection or contagion may take place or be conveyed; to alter or modify, from time to time, as he may deem expedient, the terms of all such proclamations, orders, and regulations, and to cancel or withdraw the same at any time.

SEC. 3. That all the necessary expenses incurred, under direction or by authority of the governor in carrying out the provisions of this act, shall be paid by the treasurer upon the warrant of the auditor-general, on being certified as correct by the governor: *Provided*, That animals coming from a neighboring State that have passed a veterinary examination in said State and have been quarantined and discharged, shall not be subject to the provisions of this act.

Approved the 1st day of May, A. D. 1879.

RHODE ISLAND.

Public statutes (revised 1881).

CHAPTER 84.—Of contagious disease among cattle.

SECTION 1. Every person bringing into the State neat cattle or other animals which he knows to be infected with any infectious or contagious disease, or who shall expose such cattle or other animals, known to him to be so infected, to other cattle and animals not infected with such disease, shall be fined not less than one hundred dollars, nor more than five hundred dollars.

SEC. 2. The town councils of the several towns may pass such ordinances as they may think proper, to prevent the spread of infectious or contagious diseases among cattle and other animals within their respective towns, and may prescribe penalties for the violation thereof, not exceeding twenty dollars for any one offence.

SEC. 3. The State board of health may prohibit the introduction of any cattle or other domestic animals into that State. Every person who shall bring, transport, or introduce any cattle or other domestic animals into the State, after said board or any one of them shall have published for five successive days in such newspapers published in this State as the said board may direct, an order forbidding such introduction, shall be fined not exceeding three hundred dollars for every such offence; and every officer or agent of any company or other person who shall violate such order shall be subject to the fine aforesaid. In case of the introduction into the State of cattle or other domestic animals, contrary to the order of said board, the introduction of each animal shall be deemed a separate and distinct offence.

SEC. 4. Said board shall endeavor to obtain full information in relation to any contagious disease which may prevail among cattle or other domestic animals near the border of the State, and shall publish and circulate such information in their discretion; and should any such disease break out, or should there be reasonable suspicion of its existence among cattle or other domestic animals in any town in the State, they shall examine the cases, and publish the result of their examination, for the benefit of the public.

SEC. 5. Said board may appoint suitable and discreet persons, on or near the several highways, turnpike-roads, railroads, and thoroughfares in the State, who shall inquire into all violations of this chapter, and report the same to said board.

SEC. 6. Every person who shall sell, or offer to sell, any milk from any such cattle or other domestic animals, shall be fined not exceeding one thousand dollars, or to be imprisoned not exceeding two years, either or both, in the discretion of the court.

SEC. 7. Said board may make all necessary regulations for the prevention, treatment, cure, and extirpation of such disease; and the value of all cattle or other domestic animals killed on the written order of said board shall be appraised by three disinterested persons to be appointed by said board, such appraisal to be made immediately before the cattle or other domestic animals are killed, and the amount of such appraisal shall be paid by the State to the owner of such cattle or other domestic animals; and every person who shall fail to comply with any regulation so made shall be fined not exceeding three hundred dollars, or be imprisoned not exceeding one year.

SEC. 8. Whenever said board shall make and publish any regulations concerning the extirpation, cure, or treatment of cattle or other domestic animals infected with or which have been exposed to any contagious disease, such regulations shall supersede the regulations made by the authorities of the several towns and cities upon the same subject; and the operation of such regulations made by said authorities shall be suspended during the time those made by said board shall be in force.

SEC. 10. All prosecutions for offenses against the provisions of this chapter shall be commenced within thirty days after the same shall have been committed, and not afterwards.

In force on and after February 1, 1882.

VERMONT.

(Revised laws, 1880.)

SECTION 4013. A person who drives or brings neat cattle into a town in this State from another State, or is accessory thereto, knowing that any of them have the disease or have been exposed to the disease known as pleuro-pneumonia shall forfeit to the town not more than $500, or be imprisoned not more than twelve months and not less than one month, in the discretion of the court.

SECTION 4014. A town, at a meeting held for that purpose, may establish regulations, appoint officers or agents, and raise and appropriate money to prevent and

arrest the spread or circumscribe the effect of the cattle disease known as pleuro-pneumonia as such town deems expedient.

SECTION 4015. The selectmen may perform all acts and make all rules and regulations for and in behalf of the town necessary to carry into effect the powers conferred on the town by this chapter, until the town otherwise orders at a meeting holden for that purpose.

SECTION 4016. Every person bringing into this State any neat cattle or other domestic animals which he knows to be infected with any infectious or contagious disease, or who shall expose such cattle or other animals known to him to be so infected to other cattle and animals not infected with such disease, shall be fined not less than $100 nor more than $500.

SECTION 4017. The selectmen of the several towns and the board of aldermen of the several cities of this State may make and enforce such regulations as they may think proper to prevent the spread of infectious or contagious diseases among cattle and other domestic animals within their respective towns and cities, and shall inquire into all such cases coming to their knowledge, and shall immediately report the same to the governor. Any person who shall knowingly violate or refuse to obey any such regulation made by such town or city authorities shall be liable to a fine of $100.

SECTION 4018. The governor may appoint a board of cattle commissioners, to consist of three members, whenever in his judgment the public safety may require, and may terminate their commissions whenever in his judgment the public safety may permit. The compensation of such commissioners shall not exceed three ——— each per day for actual service, in addition to their traveling and other expenses necessarily incurred.

SECTION 4019. Such commissioners may prohibit the introduction of any cattle or other domestic animals believed to be infected with any contagious disease, or having been exposed thereto, into this State, but may not prohibit the transportation of the same in cars through the State, and every person who shall bring, transport, or introduce any cattle or other domestic animals into this State after said commissioners have issued an order forbidding the same, and such order shall have been published for three successive days in such newspapers published in this State as the commissioners may direct, shall pay to the treasurer of the State a fine of not more than $300 for every offence, and every officer or agent of any company, or other person who shall violate such order, shall be subject to the fine aforesaid. In case of the introduction into this State at the same time of a number of cattle or other domestic animals contrary to the orders of such commissioners, the introduction of each animal shall be deemed a separate and distinct offence.

SECTION 4020. Such commissioners shall endeavor to obtain full information in relation to any contagious disease which may prevail among cattle or other domestic animals near the borders of the State, and shall publish and circulate such information at their discretion; and should any such disease break out, or should there be reasonable suspicion of its existence among cattle or other domestic animals in any town in this State, they shall examine the cases and publish the result of their examination for the benefit of the public; such commissioners are also hereby authorized to examine under oath, in the several towns and cities in this State, all persons possessing or believed to possess knowledge of any material facts concerning the existence or dissemination or danger of dissemination of diseases among cattle or other domestic animals, and for this purpose shall have all the power now conferred by law upon justices of the peace to compel the attendance and testifying of such witnesses; and all costs and expenses incurred in procuring the attendance of such witnesses shall be allowed and paid to the commissioners from the treasury of the treasury of the State, upon the same being certified to the governor and approved by him; and the auditor of accounts is hereby authorized to draw his order on the treasurer for such sum as shall be so certified and approved.

SECTION 4021. When any contagious disease exists in the State among cattle or other domestic animals, said board may quarantine all inflicted animals, or such as they suppose have been exposed to contagion; may prohibit any animal from passing on or over any of the highways near the place of quarantine; may enter upon any premises where there are animals supposed to be infected with any disease, and make all investigations and regulations necessary for the prevention, treatment, cure, and extirpation of such disease, and any person who shall knowingly violate or refuse to obey any regulation or order of such commissioners, shall be liable to a fine of one hundred dollars for each violation or refusal.

SECTION 4022. If any person during the existence of said board shall sell or offer to sell any cattle or other domestic animals, or any part or parts thereof, known to him to be infected with any contagious disease, or with any disease dangerous to the public health, he shall be fined not more than one thousand dollars, or be imprisoned not exceeding two years, or both, at the discretion of the court.

SECTION 4023. The value of all cattle or other domestic animals killed by the written order of the commissioners shall be appraised by three disinterested persons, to be

appointed by the commissioners, such appraisal to be made just before the cattle or other domestic animals are killed; and the amount of such appraisal shall be paid by the State to the owners of such animals; and every person who shall fail to comply with any regulation by them so made shall be fined not more than three hundred dollars, or be imprisoned not more than one year.

SECTION 4024. Whenever the commissioners shall make and publish any regulations concerning the extirpation, cure, or treatment of cattle or other domestic animals infected with or which have been exposed to any contagious disease, such regulations shall supersede the regulations made by the selectmen of the several towns, or the board of aldermen of the several cities upon the same subject; and the operation of such regulations made by said authorities shall be suspended during the time those made by the commissioners as aforesaid shall be in force.

SECTION 4025. The commissioners shall keep a record of their doings, and report the same to the governor in the month of September next after their appointment, unless sooner required by the governor.

SECTION 4026. All orders, appointments, and notices from the commissioners shall bear the signatures of a majority of said commissioners.

SCCTION 4026. Any prosecution for a violation of any of the provisions of this act shall be commenced within thirty days from the commission thereof.

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