Report on murrain in horned cattle, the public sale of diseased animals, and the effects of the consumption of their flesh on human health : addressed to the Right Honourable the President of the General Board of Health / by E. Headlam Greenhow.

REPORT

ON

MURRAIN IN HORNED CATTLE,

THE

PUBLIC SALE OF DISEASED ANIMALS,

AND THE

EFFECTS OF THE CONSUMPTION OF THEIR FLESH ON HUMAN HEALTH;

ADDRESSED TO

THE RIGHT HONOURABLE THE PRESIDENT OF THE GENERAL BOARD OF HEALTH.

BY

E. HEADLAM GREENHOW, M.D.,

Licentiate of the Royal College of Physicians,
Lecturer on Public Health at St. Thomas's Hospital, and
Physician to the Western General Dispensary.

Presented to both Houses of Parliament by Command of Her Majesty.

LONDON:
PRINTED BY GEORGE E. EYRE AND WILLIAM SPOTTISWOODE,
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FOR HER MAJESTY'S STATIONERY OFFICE.

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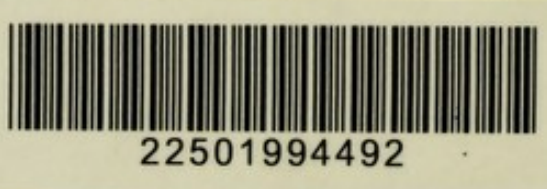

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REPORT ON CATTLE MURRAIN.

To the Right Honourable W. MONSELL, M.P., President of the General Board of Health, &c. &c.

SIR, London, April 24, 1857.

INSTRUCTIONS FOR INQUIRY.

IN a letter of instructions from the General Board of Health, dated March 7th, 1857, my attention was specially directed to the following passages in a recent Report of Dr. Burdon Sanderson. Medical Officer of Health for the district of Paddington:*—"The Inspector of Nuisances has examined during the "last month all the cowsheds in the parish. He has ascertained "that 314 cows are at present kept in Paddington. These "are distributed among 27 cowkeepers. Many of the sheds "are in close proximity to inhabited dwellings. In a large "proportion, the drainage and ventilation are deficient, and "fatal disease has prevailed to a frightful extent among the "animals kept. No less than 19 per cent. of the whole num-"ber of cows have died in the last three months. In one case "all the cows have died."

"No sooner does a cow become attacked with the invariably "fatal pulmonary affection which is at present so prevalent in the "Metropolitan cowsheds, than it becomes the object of the "keeper, without delay, to dispose of it before the disease has "made sufficient progress to render the animal unmarketable. "It is then conveyed to one of the slaughter-houses, of which "there are several in various parts of London devoted to the "carrying on of this disreputable trade. From thence the meat "either finds its way into the market as such, being retailed for "the most part to the indigent classes, and in the lowest neigh-"bourhoods, or passes into the hands of the manufacturers of "saveloys and certain descriptions of sausages, much employed "as articles of food by the same description of consumers."

NATURE AND PURPOSE OF INQUIRY.

I was requested to make an investigation in reference to the facts here stated, and afterwards to ascertain whether similar disease had prevailed in other parts of the Metropolis. In reference to the allegation that diseased cattle are slaughtered, and their flesh sold for human food, I was instructed to collect evidence, both as to the extent of the practice adverted to, and as to any effects on human health which might have been observed to follow the consumption of such meat.

The other objects of my investigation were stated to be "to learn for practical purposes under what conditions the disease is rendered more or less fatal;" and in reference to cases which should come under my notice, I was specially to inquire,—1 to what extent the commencement and spread of the disease had

* Sanitary Report to the Vestry of Paddington for the year 1856, by J. Burdon Sanderson, M.D., L.R.C.P., Medical Officer of Health.

depended on infection; 2 to what extent the ventilation and cleanliness of cowsheds or the use of particular kinds of food or water, had influenced the frequency or the fatality of the attack; 3 whether any means of prevention or cure were considered by veterinary practitioners to be more successful than others; and 4 to note in the course of the inquiry any points that might seem of pathological interest as to the nature of the disease, and its affinities with infective disorders of the human subject.

Several days after the receipt of the above-recited instructions, a series of official Despatches, from Colonel Hodges, C.B., Her Majesty's Consul-General at Hamburg, dated 3rd June 1856 and 21st February 1857, with enclosures from the Vice-Consul at Lubeck, dated 30th May 1856 and 20th February 1857, and subsequently despatches from Her Majesty's Consuls at Warsaw and Koenigsberg, dated respectively March 9th and 11th, 1857, were forwarded to me from the General Board of Health, with instructions to direct my attention to the matters therein referred to. My investigation was thus extended to the inquiry, whether the disease reported to prevail among the horned cattle of London had been imported from abroad, and was identical with the murrain reported to be prevailing in Mecklenburg and other Continental States.

Nature of inquiry.

The inquiry entrusted to me was thus of a twofold character; its first and most important object being the investigation of a matter which, both for the already recited reasons, and on account of the possible relations between the causes of disease in cattle and in the human subject, was of intimate interest to the public health. Secondarily to this, the inquiry was important under an economical and agricultural aspect; supposing the murrain at present prevailing on the Continent to be both contagious and different from the disease recently existing in London. The possible introduction of a new murrain from abroad into the herds of this country was evidently a question of great importance alike to the consumer and producer of meat.

Proceedings.

On the receipt of my instructions, I proceeded without delay to investigate the question committed to me. Commencing with Paddington, I placed myself in communication with Dr. Sanderson, Medical Officer of Health, and with the Inspector of Nuisances for that district, and subsequently pursued my inquiries in Marylebone, St. Pancras, Holborn, Islington, Whitechapel, Limehouse, Shoreditch, and Walham Green. In the course of this inquiry I visited many of the cowsheds belonging to both large and small proprietors, and took evidence from the keepers and other persons in charge of the cattle. I also procured information personally, from Mr. Bark, Veterinary surgeon, one of the inspectors of cattle for the port of London; from Mr. Nice, Veterinary surgeon, Inspector of cattle at the Metropolitan Cattle Market in Copenhagen Fields; from other officers of the same establishment; from several dealers in cattle; from Mr. Fisher, inspector of meat and slaughter-houses for the City of London; and, from Mr. Pocklington, Inspector of Newgate Market. The Association of Metropolitan

Officers of Health having appointed a Committee in June 1856, to "inquire into the facts relating to the alleged sale of diseased "and unwholesome meat in the Metropolis, as well as the ill "effects arising therefrom," and a report of this Committee having been printed, I called upon Dr. Challice, the chairman, and upon several of the members of the Committee, for the purpose of obtaining such information as they might be able to favour me with in reference to the sale of the flesh of diseased animals, and the effect of the use of such meat on the human subject. Lastly, from Parliamentary and other public documents, and from the most reliable literary sources, English and foreign, I have endeavoured to obtain such additional information as could be procured without unduly delaying the presentation of my Report.

I now proceed to report the result of my investigations under the heads of,—

I.—The disease:

II.—The sale of diseased animals to be slaughtered for human food; and

III.—The effects on human health of consuming the flesh of diseased animals.

Division of Report into heads.

I. *The disease.*—An "epidemic" disease—for notwithstanding that this word was originally applied only to diseases of the human subject, I may employ it, as one that is well understood, to designate the analogous diseases of cattle,—has recently prevailed, not only among the horned cattle of London, but in many other parts of England and on the Continent.

I. The Disease.

Simultaneous prevalence in England, and on the Continent.

A. *In England.* I have personally had the opportunity of learning the recent existence of such a disease in the vicinity of Manchester, and am informed that it has been prevalent in Bedfordshire, Buckinghamshire, Shropshire, Cheshire, and, I believe, more or less in most other counties of England. Mr. Radcliffe, M.R.C.S., of Bramley, near Leeds, says in a letter with which he has favoured me on this subject, that the same disease has frequently prevailed in that neighbourhood, although at the date of his communication it had ceased.

A. In England.

The disease referred to in Dr. Sanderson's Report to the Vestry of Paddington, and which is identical with that prevalent in other parts of the country, is commonly known among veterinary practitioners, graziers, and cowkeepers, by the name of "lung-disease." It is more scientifically called exudative pleuro-pneumonia by Professor Gluge, of Brussels, and is identical with the *Lungenseuche* or "pulmonary murrain" of German writers. In this country it is also frequently called "the new disease," to distinguish it from an eruptive disease that preceded it, popularly known as the "foot and tongue disease," and now commonly spoken of by cattle-keepers as the "old epidemic." The latter disease was characterized by apthous ulcerations of the mouth, lips, and nose, and by swelling of the fauces, causing a constant slavering or dribbling of frothy saliva; by vesicles and ulcerations of the feet; and by pustules and ulcers of the teats, accompanied by inflammation and abscesses of the udders. This epidemic was

Identical with Lungenseuche or pulmonary murrain of German writers.

Preceded by an eruptive murrain.

the forerunner of the more serious and fatal pulmonary affection, much as influenza has occasionally preceded outbreaks of cholera and dysentery in the human subject.

First appearance of eruptive murrain.

The *eruptive disease* does not seem to have existed in England until 1839, and only to have become generally diffused in the course of the following year. It would appear to be contagious, but is now much less frequent than formerly. It has often been considered, but as will presently be seen incorrectly, as but a different stage or form of the disease, which, when it attacks the lungs, is called pleuro-pneumonia. Mr. Faussett. who has published a very interesting account of both diseases in the Dublin Medical Press,* considers the eruptive disease as only the primary stage of the pulmonary affection, which he calls the secondary distemper, and which he says follows the former at variable intervals. So far as his inquiries extended, he found the eruptive disease had, with a single exception, invariably preceded pleuro-pneumonia. The fact is unquestionable that both diseases have often co-existed in the same herd. It is equally true that the eruptive affection, which is a comparatively mild disease, very often occurs without being followed by pleuro-pneumonia, which, on the other hand, is very common in animals that have not suffered from the so-called primary distemper. Indeed, the supposed inter-relation of the two affections is unsupported either by satisfactory evidence or by pathological analogy.†

First appearance of pulmonary murrain.

The eruptive epidemic was followed, after an interval of two years, by an epidemic of *pleuro-pneumonia*, or, as I shall henceforth call it, *pulmonary murrain*, a disease which has been very destructive, and fatal, it is said, to upwards of 50 per cent. of the animals it attacks. Pulmonary murrain would seem never to have entirely disappeared since its first outbreak; for although it manifests itself from time to time more generally and in an epidemic form, it never fails to linger in several parts of the country during the intervals between its more extensive visitations. That it really is a disease new to the present generation is unquestionable. The principal English writers that I have consulted for the purpose of this inquiry, — Professor Simonds, of the Royal Veterinary College,‡ and Mr. George Waters, Jun., Member of the Royal Veterinary College, who wrote a prize essay on the subject,§—concur on this point. Their opinions are confirmed by my personal inquiries, for cow-keepers, graziers, and farmers, with whom I have conversed,

Pulmonary murrain a recent disease in England.

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* Observations on the Epidemic Pleuro-pneumonia, or Secondary Distemper of Horned Cattle, by William Faussett, A.B., Licentiate of the Royal College of Surgeons, Ireland, Surgeon of Drumcondra and Richmond Dispensary.—Dublin Medical Press, vol. vi., page 390.

† Faussett, in Dublin Medical Press, vol. vi. p. 390. Report on the Epidemic among Cattle, by Professor Sewell, in Journal of Royal Agricultural Seciety, vol. ii. p. 119. Also, Report of the Census in Ireland, part 5, vol. i. p. 227.

‡ Lecture on the Anatomy, Physiology, and Pathology of the Organs of Respiration and Circulation, with especial reference to the Nature and Treatment of Pleuro-pneumonia in the Ox, published in Journal of the Royal Agricultural Society of England, vol. x. page 570.

§ Journal of the Royal Agricultural Society of England, vol. ix. p. 343.

assure me that they distinctly recollect the first appearance of the disease.

Pulmonary murrain prevailed in England about 1745–60.

There are, however, good reasons for supposing that a similar disease prevailed among the horned cattle of Britain about a century ago. Its invasion was then also heralded, although with a longer interval, by an eruptive disease similar to that which preceded the appearance of pulmonary murrain in 1841. Prior to its appearance in England, pulmonary murrain had prevailed extensively, and proved most destructive to the cattle on the Continent. More than 200,000 cattle are reported to have perished from the murrain in Holland in 1745, and more than 40,000 in Nottinghamshire in 1747, whilst in Cheshire 30,000 died in less than six months. Its importation into this country is attributed either to the introduction of two calves imported from Holland by a farmer at Poplar, or to the introduction of a parcel of distempered hides which had been ordered to be buried in Zealand, but were purchased by an English tanner. The evidence in favour of the importation of the murrain is, however, most inconclusive; although, supposing the disease to have been contagious as well as epidemic, it is impossible to deny the possibility of its having been imported. The destructive nature of the disorder attracted the attention of Government, and after a time orders were issued for the destruction of every animal that exhibited the slightest symptom of infection; the owner, of course, being remunerated for his loss. In the third year of the murrain no less than 80,000 cattle were thus destroyed, in addition to at least double the number that died of the disease. In the fourth year cattle were destroyed at the rate of 7,000 per month, until it was found that the farmers frequently concealed the cattle really suffering from murrain, and brought their otherwise diseased and old and worn-out cattle to be slaughtered, in order to obtain the allowance made by Government for the destruction of such as suffered from murrain. Amongst other measures adopted by Government to check the spread of the disease was the appointment of local Boards of Health, with power to cut off all communication between infected and healthy districts, and to superintend the slaughter and immediate burial of infected cattle. It appears very doubtful whether any of the measures resorted to had much influence over the extension or duration of the disease, which, after a time, became milder in character, and at length, about 1758, began very evidently to decline, although it did not altogether disappear until several years later.*

Ravages of the epidemic in 1745—7.

Supposed mode of importation into England in 1745.

Proceedings of the English Government to arrest the extension of the epidemic.

Spontaneous departure of the epidemic.

Pulmonary murrain not supposed to have been imported in 1841.

The introduction of pulmonary murrain into this country in 1841, is not usually attributed to contagion. Indeed, much

* The above account is chiefly compiled from contemporary authorities, particularly from the pamphlets of Dr. Brocklesby, Dr. Hird, Dr. Layard, and an anonymous treatise by a member of the Royal College of Physicians. Mr. Youatt gives an admirable history of this epidemic in his work on cattle, published under the superintendence of the Society for the Diffusion of Useful Knowledge.

doubt is expressed by many of the English cattle-keepers as to the possibility of its direct extension from animal to animal. Abroad it is universally considered as contagious, and its extension from place to place has been usually attributed to communication with infected cattle.* Upon the whole, perhaps, the weight of evidence is in favour of its possessing some infectious properties. Professor Simonds, who delivered a lecture on the subject before the Royal Agricultural Society,† expressly says that the disease was not introduced by direct importation, but considers it as of atmospheric origin, "and "caused by a destructive poison that has been wafted hither "through the medium of the air, as (he believes) has been the "case with that of Asiatic cholera, and similar pests." Little, however, is really known on the subject, for the unscientific and frequently ill-informed persons who have the management of horned cattle are evidently incompetent to form a clear judgment on a point which has caused so much controversy amongst the best-informed members of the medical profession; and it is most unusual for the dairymen of London to call in any regularly educated veterinary practitioner to their sick cattle, some nostrum vendor or other quack being at most resorted to. Thus, at least in the Metropolis, veterinary surgeons being rarely consulted for the diseases of cattle, the opportunities for studying these diseases unfortunately appear to be fewest at the fountain head of veterinary science, where, we may presume, they would be turned to the most profitable use. One fact, however, came out very clearly in the course of my inquiries. It is, that single cases rarely occur, but that when the disease appears among the cattle of a particular dairy, it is liable to attack several in succession. I found, moreover, that very often whilst some keepers had sustained a considerable loss, others in the immediate neighbourhood had altogether escaped, a fact which appears to be opposed to the view that this disease is caused by a general distemperature of the atmosphere. Whilst, however, on the one hand, this circumstance would seem to favour the supposition that the murrain spreads by contagion, it appears, on the other, that very often the animals attacked are at different portions of the establishment, and that of cows which live together in the same stall, inhale each other's breath, and are in constant contact with one another, one will suffer from the disease, whilst the other escapes it. Moreover, I was informed by more than one intelligent keeper that individual cows have continued to thrive, side by side with which a succession of two or three companions had fallen victims to the disorder. It would have been most

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* *See* Appendix, Numbers II., III., and IV., for the opinions of foreign veterinary authorities on the contagiousness and nature of pulmonary murrain. It is quite clear that some of these writers entertain a highly exaggerated opinion of the communicability of this disease. It is, for example, contrary alike to reason and fact to suppose the flesh of diseased animals to be a means of conveying the contagion.

† Journal of the Royal Agricultural Society, vol. x., pp. 599–606.

interesting if my investigations had enabled me to say whether the animals which have enjoyed this remarkable immunity had previously passed safely through the disease. Upon this head I could learn nothing certain. But I did learn that cows which have really recovered from the disease are considered secure from future attacks, and that animals which have remained in the sheds unscathed, whilst the disease has attacked their companions are believed to be seasoned, and on that account are highly esteemed.

Difference of opinion as to contagion.

As already stated, much contrariety of opinion prevails as to whether the disease be contagious. I met with only one person who thinks that the infection adheres to the building. By him I was informed that he has remarked a tendency of the disease to show itself in cattle placed in stalls from which diseased animals have already been removed. More careful observation would possibly suggest a different explanation of the circumstance, the correctness of which I do not doubt, for my informant was more than usually intelligent. All my informants concurred in asserting that animals which have been recently purchased or removed, are more liable to suffer from pulmonary murrain than such as have been some time in the sheds. This circumstance, perhaps, accounts for the belief so prevalent on the Continent that pulmonary murrain spreads chiefly by contagion,* an opinion very difficult either to confirm or disprove from an inquiry conducted only among cow-keepers in London, because there is here a constant introduction of fresh cows from the country to supply the place of such as becoming dry are sent to market. For example, the Prussian official reports† for 1852–3 state that pulmonary murrain occurs chiefly in the Rhenish provinces, where much cattle is imported from Holland, and attribute its prevalence to this fact, evidently considering contagion as the chief cause of the disease.

Recently purchased cattle most liable.

Pulmonary murrain sometimes developed spontaneously.

Although, as I have already said, pulmonary murrain sometimes arises from infection, it appears equally evident that, under favourable circumstances, it likewise originates spontaneously. More than one person assured me they could not trace its invasion of their stock to any extraneous source, and the German writers, who have devoted far more care to the philosophical investigation of cattle diseases than has been, perhaps, possible in this country, distinctly affirm its occasional spontaneous development.‡ In "An Account of the Epidemical Distemper" that prevailed among black cattle about the middle of last century, written by a member of the College of Physicians, whose description of the disease then prevailing exactly corresponds with that of the pulmonary murrain of our own times,§ it is distinctly stated that "the distemper has sprung up spon-

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* See Appendix, Numbers II., III., IV., and V.

† *Canstatt's Bericht*, 1855.

‡ Loc. citat. 1853 and 1855.

§ Account of the Present Epidemical Distemper amongst the Black Cattle, &c., by a Member of the College of Physicians. London, 1745, p. 12.

" taneously, about the same period of time, in many places " which are very distant from, and have no communication " with each other." The history of the outbreak of pulmonary murrain in Ireland in our own time also supports the view that this disease is frequently developed independently of intercourse with an infected source. According to a MS. communication to the Irish Census Commissioners, from Mr. Doyle, V.S., pulmonary murrain began, as early as 1840, in the vicinity of the metropolis, where it prevailed chiefly among milch cows. "As many as 40 per cent. were lost." The date of its first appearance in Ireland is, however, more usually fixed at a later period, although still so early, and probably so simultaneously with its appearance in England as to render the transmission of the murrain from this country most improbable. It seems to have appeared amongst cattle in the county of Cork in August 1841; in Meath also in 1841, where it, however, prevailed to a greater extent in the years 1842, 1843, and 1844, continued very general for seven or eight years longer, and is reported by Thomas Barnes, Esq., of Moynalty, still to have appeared occasionally so lately as 1855. The murrain appeared in Roscommon in 1842, and in Galway and Limerick in 1843, where it continued to prevail from time to time so lately as the years 1855 and 1856.

Appeared in Ireland simultaneously with its outbreak in England.

Preceded in Ireland by eruptive murrain.

In Ireland as in England, the outbreak of pulmonary murrain was preceded by the eruptive epidemic, or, as it is termed in the Report on the Census in Ireland for the year 1851, pustular disease. By the same authority it is stated that the pustular murrain was highly contagious, and "it was remarked that cattle " were seldom attacked a second time with the malady; although " it gave them no immunity from the lung distemper."* The mortality in Ireland from pulmonary murrain was very great. It was variously estimated in different localities at from 10 to 20 and even 40 per cent. One dairyman near Dublin lost 413 cows from the disease in four months.

Pulmonary murrain among the horned cattle of London.

I have found it impossible to form an accurate estimate either of the extent to which pulmonary murrain has recently prevailed among the horned cattle of the metropolis, or of the mortality it has occasioned. At the time of my inquiry the disease was by no means prevalent. Out of many hundred cattle in the sheds of persons from whom I sought information, only a few isolated and by no means severe examples of the disease were to be found. The chief prevalence of the complaint had been about the close of last year and the beginning of the present; just, in fact, at the period referred to by Dr. Sanderson.† Mr. Stedman,

Period of prevalence.

* The Census of Ireland for the year 1851, Part 5, vol. i. pp. 222, 226, 227, 229, 236, and 357.

† As Dr. Sanderson explained to me, the assertions in his report that the disease is " invariably fatal," and that " no less than 19 per cent. of the whole number of cows " have died in the last three months," require to be read in conjunction with the statement that the animals are disposed of as soon as they show symptoms of illness, and " before the disease has made sufficient progress to render them unmarketable." It was his meaning that this number died of the disorder or were slaughtered on account of it.

a large cow-keeper in the east of London, whose stock of cows varies from 150 to 200 in number, lost 27 cows from disease in the month of January last. Nineteen of these suffered from pulmonary murrain, the remaining eight from a disease that presented features not unlike a disease that will hereafter be described under the name of *dysenteric murrain*. The disease was perfectly new to Mr. Stedman, who says that, although occupied about cows all his life, he never saw anything like it before. The symptoms were profuse diarrhœa, of a kind so rapidly exhaustive as to have proved fatal in most cases within twelve hours. Of the eight animals attacked, only one survived to the third day. In several cases cows supposed to have been in good health at night were found dead in their stalls on the following morning, having in the meantime been profusely scoured. The disease was fatal in every instance, and with one exception was confined to recently purchased animals. On examination of the bodies after death the flesh was very dark coloured, being represented by Mr. Stedman as black. There have been no cases of the disease since January, neither could I learn that the same disease has existed in any other dairy. It is to be regretted that a careful *post mortem* inspection of some of the bodies was not made by a veterinary surgeon, for it is impossible to determine whether the disease was akin to dysenteric murrain, or whether it might not be the consequence of poison. Mr. Stedman, however, informed me that he had no reason to suspect the animals had been poisoned, but, on the contrary, said that he believed them to have died of illness.

Cases resembling dysenteric murrain.

Pulmonary murrain is certainly not invariably fatal, for I saw cows in several dairies that had gone safely through the disease and were again in a thriving condition. Mr. Stedman showed me four that were still ill. Three of them were recovering. The fourth appeared in an unpromising state, its breathing being laborious, its skin firmly attached to the subjacent tissues, and its coat rough and staring. I was informed by several keepers that they highly prized animals which had passed successfully through the disease, as they considered them to be secure from any future attack. One keeper, Mr. George Field, of Upper Gower Mews, showed me three animals that had recovered, and observed that he thought cows that have had a slight attack of the disorder thrive better afterwards.

Pulmonary murrain not always fatal.

The mortality of pulmonary murrain, when permitted to run its course, with or without treatment, has been variously estimated. Probably about one half the fully-developed cases prove fatal, but I am disposed to think that many animals pass through the disease in a mild form, unnoticed by the keepers, and without the development of the more prominent and alarming symptoms. Young animals it is said much more frequently recover than old ones, to whom the disease is mostly fatal, if allowed to run its course.

Mortality of pulmonary murrain.

Animals in poor condition, and recently calved cows, or cows iving a large yield of milk, are the most liable to the disease.

Predisposing causes.

Hence it is found that breeding suffer more largely than fattening stock. According to evidence collected by the Epidemiological Society, and arranged by Mr. Gabriel, the comparative liability is as two to one. M. Delafond indeed reckons over-feeding and too high a condition as among the causes of pulmonary murrain, but he conjoins with these the effect of over-lactation, to which, in common with English observers, he attaches an important share in the causation of this disease.* But by far the most powerful determining cause is removal to a fresh locality. My informants, without exception, said that recently purchased animals are more liable to the disease than those which have been some time in the sheds. Several cow-keepers that have farms to which they remove their cattle in the summer asserted that removing the animals from the town-sheds to the pasture, and *vice versâ*, has the same effect.

Removal of cattle apparently a frequent cause.

Perhaps, one reason of the greater liability of recently-purchased animals to suffer from pulmonary murrain is, that besides being frequently out of condition, they are very often fatigued and disordered by the journey to market. One person, whose cattle had hitherto escaped the disease, attributed the immunity to the fact of his going personally into the country to purchase cows, and so avoiding all unnecessary fatigue in their transit to the sheds. This liability of animals to suffer from "lung disease," after removal to a fresh locality, is so apparent, that several large cow-keepers who have farms a few miles from London, or who rent portions of the Essex marshes for the use of their cattle during the summer months, expressed an intention of not sending their cows out of the town-sheds in future. A prevalent supposition that cattle fed on marshes are more liable to suffer from pulmonary murrain than those fed on dry pastures, seems to be not altogether unfounded.

Cows usually sold as soon as they cease to yield milk.

One reason which rendered it impossible to estimate the extent of the disease, even approximatively, was, that with few exceptions, the cow-keepers of the metropolis send their cows to market as soon as they cease to supply a profitable yield of milk, from whatever cause this may arise. A sudden diminution of milk is usually one of the early symptoms of pulmonary murrain. As animals when attacked by this disease, besides becoming unprofitable as milch cows, lose condition very rapidly, it is now the common practice to send them to market at once, if in tolerable condition. Putting the chance of death out of the question, some considerable time must usually elapse before a cow attacked by this disease can again become profitable as a milker; and in the meantime its value as meat is rapidly depreciated by emaciation. The loss of value during the acute stage of the disease was estimated at 6*l.* per week by more than one of my informants. It would, however, be very inaccurate to assert that most of the animals sent to market by the cowkeepers of London are disposed of because of disease; the truth

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* Loc. citat. ch. vi.

being that a much larger number are sold on account of the natural cessation of the secretion of milk, simultaneously with which the animals usually fatten. The larger proprietors occasionally keep some of their best cows for several years, selling others, however, as soon as they become dry. In the smaller dairies it is unusual to keep cows beyond a few months. From nine to ten months may be assumed as about the average period during which cows are profitable as milkers in the cow-sheds of London. This time accords pretty nearly with that stated as usual in the country, Mr. Stephens, in his Book of the Farm, mentioning ten months as a common period.*

Pulmonary murrain arises both spontaneously and by contagion.

I have already said that pulmonary murrain is thought to be contagious, although not very highly so, and that it is likewise capable of spontaneous development. This view agrees pretty exactly with that of the best continental writers. Bornhausen and Hausmann† both admit the spontaneous development of the disease. Janich‡, on the other hand, observed it to spread rapidly from house to house in Bohemia in 1844 and 1851. M. Delafond, who has devoted much attention to the investigation of this disease, has cited an irrefragable amount of evidence in support of its being at least occasionally propagated by contagion. A large majority of the correspondents of the Epidemiological Society, who reside in all parts of the kingdom, concur in expressing the same opinion. The contagion is reported to be conveyed by the air expired from the lungs of animals suffering from the disease. It is probably not communicable in this manner beyond a distance of eighty paces, and is distinctly stated by Delafond to be incapable of being wafted further by currents of air.§ It is also said to be communicated to healthy animals by the saliva, and by the secretion from the nostrils of those that are diseased.‖

The period of incubation, or the interval that elapses between exposure to the contagion and the appearance of the disease,

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* The following extract from Mr. Stephens' Book of the Farm, a well-known and much-esteemed work, shows the practice of selling cows as soon as they become dry, to be a common custom in dairies in or near towns, and one by no means peculiar to London:—"The cows of a farm in the immediate neighbourhood of towns, and those "in the town's dairies themselves, are fattened when the milk leaves them, and not "allowed to breed again,—the time in which they would remain dry being regarded "as lost." Vol. 1, p. 272. See also Cattle, their Breed, Management, and Diseases, by William Youatt, published under the superintendence of the Society for the Diffusion of Useful Knowledge, p. 262.

† *Canstatt's Bericht*, 1853.

‡ Loc. cit.

§ Delafond believes the contagion to be communicable by means of the bodies of animals that have suffered from the disorder. He cites no satisfactory evidence in support of the supposition, and, indeed, very candidly admits that the facts adduced by him require precision.—*Traité sur la Peripneumonie Contagieuse*, p. 188.

‖ Since the above was in type I have perused the report of a French scientific commission appointed to investigate pulmonary murrain of which M. Magendie was president. The report was drawn up by M. H. Bouley, clinical professor at the Imperial Veterinary School of Alfort, and is countersigned by M. Magendie. The commission instituted a series of costly experiments to investigate the contagiousness of pleuro-pneumonia, the result of which is summed up as follows:—

1. The pleuro-pneumonia of horned cattle is transmissible from diseased to healthy animals of the same species living together in the same stables.

[2. All

Period of incubation.

is variously stated. The discrepancies of authors on this part of the subject, together with the fact that periods of incubation of extraordinary length are spoken of, must be regarded as throwing doubts on the infectiousness of the disease. Mr. Gabriel, who drew up a very brief report, based on the replies from upwards of three hundred veterinary surgeons to queries issued by the Epidemiological Society, says that the period of incubation is uniformly stated to be between three and four weeks. Some of my informants represented it to be as long as six or seven weeks. These periods accord pretty accurately with the facts recorded by Mr. Waters in his prize essay, wherein he mentions the appearance of the disease at periods varying from a fortnight to six weeks after the supposed introduction of tainted animals into a herd. Delafond* calculates the length of time between exposure to contagion and the manifestation of the early symptoms at from thirty to forty days, but says it oftener falls within than exceeds this period. Hausmann,† on the other hand, says the period of incubation may extend to three months.

Causes of spontaneous development.

The causes which produce the spontaneous development of pulmonary murrain are said to be variable and intemperate weather, and hot, crowded, and foul stables. M. Delafond enumerates cold, and especially the respiration of a cold, moist, foggy atmosphere, such as prevails in moist pastures, particularly in spring and autumn, as amongst the causes which generate the complaint independently of contagion. He also attaches much importance to the character of the breed, asserting that a liability to the disease is capable of hereditary transmission. This view harmonises well with a statement made by a friend of mine who has a large farm in Shropshire, that the disease has never been known to prevail among the Hereford breed of cattle, excepting when there was distinct evidence of contagion. In Mr. Gabriel's report to the Epidemiological Society, it is said, "the weather at the majority "of the outbreaks is stated to have been wet, cold, and gloomy; "in a few instances only the disease appearing in fine weather."

Influence of breed and of season.

The members of a Belgian commission appointed to investigate the prophylactic value of inoculation in pulmonary murrain report, that the disease is most prevalent between the months of October and April, and that it rages with the greatest intensity in October and November.

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2. All animals exposed to the contagion do not contract pleuro-pneumonia. Some of those exposed altogether resist the influence of the contagion; others undergo only a mild and brief indisposition.

3. Of animals which contract the disease, some recover, and regain after their recovery all the external appearances of good health; others die.

4. Animals which present only slight symptoms of indisposition after exposure to the contagion appear to be thereby protected from any future attack of pleuro-pneumonia.

5. Animals that have undergone an attack of pleuro-pneumonia seem to be insusceptible of a second seizure —"*Rapport Général des Travaux de la Commission Scientifique instituée près le Ministère de l'Agriculture, du Commerce, et des Travaux Publics pour l'étude de la Péripneumonie Épizootique du Gros Bétail.*" Paris, 1854, p. 75.

* Loc. cit.

† *Canstatt's Bericht*, 1853.

Ventilation and cleanliness of cow-sheds.

Defective ventilation and cleanliness do not appear to have materially influenced the outbreak or extent of the disease in the dairies of London. From the prevalent custom of sending the animals to market on the first appearance of illness, it is impossible to say what effect these circumstances had on the intensity or mortality of the complaint. The disease had, I was told, been most severe in the best-ventilated and one of the cleanest sheds in Paddington; but the ventilation was excessive so that the animals were kept in a perpetual current of cold air. The cow-houses are usually kept as clean as possible internally, being commonly cleansed and washed out twice daily, and the walls lime-washed or whitened several times in the year. The drainage was found to be usually defective, and sometimes the adjoining yards were in a most filthy condition. The arrangements for ventilation were in several cases most excellent; ventilating shafts being carried up perpendicularly through the roof into the open air, thus allowing free exit for the pulmonary and other emanations; fresh air being, at the same time, admitted into the houses by lateral windows. More frequently, the only mode of egress for the exhalations is through the tiles of the roof, which are usually so arranged as to protect the animals from the weather, and yet, being laid without lime, to leave numerous interstices for the passage of air. In all cases there were lateral windows or openings for the admission of air, although, as might be expected, there was much variation in the character and perfectness of the arrangements. An ammoniacal odour was only observable in a few instances. The animals are usually packed pretty closely, two being placed together in each stall, both to economise space, and also to maintain the temperature of the building, for the yield of milk is supposed to be larger and richer when the animals are kept warm. Although I could obtain no positive data as to the influence of ventilation on the health of the animals, it appears that the effect on cattle of inhaling an atmosphere charged with particles of dust is similar to that produced on man, for dusty hay and chaff were said to be aggravating causes of pulmonary murrain. This, however, might fairly have been predicted.

Management of Cattle in the London cow-sheds.

Upon the whole, the cows in the London cow-sheds were said, and indeed appeared, to be healthy. Notwithstanding their unnatural mode of life, many of them being kept tied to their stalls for several months together, they are usually in very good condition. On the other hand, there are many dairymen who have farms, to which their cows are sent in the summer season, so that they are only kept in town during the winter. In other cases, the dairyman has the opportunity of turning them into a yard for a short time daily. It did not, however, appear that either of these classes had enjoyed any remarkable immunity from the disease. Amongst other establishments that I visited was one in Goodman's Fields, to which I was taken by Mr. Liddle, Medical Officer of Health for Whitechapel. The cows, ten in number, are kept in a cellar beneath the footway

Cows kept in a cellar.

of the street. The cellar was clean, well whitewashed, lighted with gas, and ventilated by means of grates in the pavement. The animals appeared in good health, and I was assured by the proprietor he had been most fortunate, not only having had no disease among his cattle during ten years, but having usually sold them at a remunerative price when the milk dried up.

Upon the whole, the disease seems most capricious. I have been told of farms that have enjoyed a complete immunity from the disease whilst it raged on adjoining farms, said to be in all respects similarly circumstanced, both as to soil, management, and the kind of cattle. A cow-keeper at Walham Green, who lost almost the entire stock in 1850, has since suffered little or no loss by the disease. Pulmonary murrain does not appear to be more prevalent in London than in the country. Persons who have farms at different places a few miles from London, and beyond the London atmosphere, have informed me the losses by illness on their farms were quite as large, in some cases larger, than that sustained in the town sheds. Mr. George Field, to whom I have already referred, said he has sustained a heavier loss from this disease amongst the cattle in his fields at Neesdon than among those in his cow-sheds in Hopkins-street, situated in one of the densest parts of the metropolis, and not very far from the centre of the portion of St. James', Westminster, in which the memorable outbreak of cholera occurred in the autumn of 1854. Similar evidence was given by other keepers.

Losses equal in town and country.

Food and Water.

The kind of food seems to have had no influence in the causation or aggravation of the disease, animals fed on grass being equally liable with those fed on grain, mangel-wurzel, and hay or straw. Well-fed animals in good condition are, however, universally allowed to be the least liable to suffer. M. Delafond* mentions the drinking of very cold water in winter and of stagnant water in summer as occasional causes of the disease. I obtained no evidence to show that the kind of water used by the animals had anything to do either with exciting or aggravating the disorder.

Treatment.

As already observed, veterinary practitioners are rarely consulted in London for the diseases of cattle, the most usual treatment being to slaughter the animals for food as soon as they manifest unequivocal signs of illness. There are, nevertheless, some vendors of nostrums who have obtained a reputation amongst cowkeepers for the success of their treatment of this disease. Any attempt to attain possession of their presumed secret would of course have been fruitless, and from what I could learn, it does not appear that these quacks are really a whit more successful than the regular farriers. Bleeding, setons in the dewlap, mercurials, and purgatives have been recommended for the cure of the disease by one set of veterinary practitioners, but apparently with scanty benefit. By others a stimulating mode of treatment has been

* Loc. cit.

advised. According to information obtained from Germany, chalybeate medicines, and particularly the sulphate of iron, given to the extent of half an ounce in the day, are the only remedies which have there been attended with any success. There too, as here, it is however most usual to slaughter the animals for human food on the first appearance of disease. Upon the whole, therefore, my inquiry whether any mode of cure is considered by veterinary practitioners to be more successful than others gave me only negative results.

Inoculation as a preventative of pulmonary murrain.

Various hygienic precautions have been tried for the prevention of the disease, but hitherto with only indifferent success. The only plan that is said to have been serviceable as a preventative is inoculation, but upon grounds so questionable that, had it not been still practised in this country, and referred to in various public despatches and documents placed in my hands, I should scarcely have considered it necessary to devote to it more than a very brief notice. The practice of inoculation is adopted in at least one of the establishments I visited, and is there said to be attended with complete success. As, however, I found several dairies in the same neighbourhood in which there had been no disease, notwithstanding the neglect of inoculation, no real evidence in support of the custom is afforded by the alleged immunity.

Inoculation first tried in England in the 18th century.

Inoculation was recommended and said to be successfully practised* by Sir W. St. Quentin, the Rev. Dr. Fountayne, Dean of York, and other gentlemen, against the disease that ravaged the herds of this country about a century since. The inoculation was performed with matter taken from the running of the mouth, nose, and eyes. As already said, there would seem to have been two different diseases running on side by side among the herds of this country at that period. The cases described by Dr. Layard seem more nearly to resemble the "*Rinderpest*" or steppe murrain than pulmonary murrain, which was then also prevailing in other parts of the country. The plan which thus originated here was also tried with doubtful success in Holland, perhaps because due discrimination was not exercised in selecting the right kind of cases for its employment. Steppe murrain is said to occur only once to the same animal, and to be communicable by means of inoculation. It is therefore quite possible that the practice of inoculation might be successful in steppe murrain, and yet fail in pulmonary murrain. Inoculation could hardly be expected to answer in any but a specific febrile disease. It is, to say the least, more certain of steppe murrain than of pulmonary murrain, that it is of this description. I therefore suspect that the successful cases, if any were really successful, were of this kind, and not of that in which inoculation has recently been tried.

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* An Essay on the Nature, Causes, and Cure of the Contagious Disease among the Horned Cattle in these Kingdoms. By Daniel Peter Layard, M.D., Member of the Royal College of Physicians in London, and of the Royal Society. London, 1757. P. 104.

Inoculation as recommended by Dr. Willems of Hasselt.

The practice of inoculation in the ox was re-introduced in 1852 as a preventive of pulmonary murrain, by Dr. Willems, a physician at Hasselt in Belgium. The matter employed by Dr. Willems consists of the liquid pressed from the lungs of an animal recently slaughtered, or of one that has died of this disease. The matter for inoculation should, according to Dr. Willems, be taken from an animal suffering from the early stage of the disease, and in preference from a portion of lung in which the disease is least advanced, for the use of liquid from the lungs in an advanced stage of disease is, he says, liable to be succeeded by more violent local symptoms. The operation is performed upon the tail, near its extremity, and is followed after an uncertain interval, varying from a few days to thirty, by tenderness, swelling, inflammation, and induration of the wound and its neighbourhood. Sloughing and mortification are very common consequences of the operation, and frequently a portion, sometimes the whole, of the tail is lost. In rarer, but still not very unfrequent instances, the sloughing extends to the perineum and adjoining organs, producing death after a period of much suffering unless the animal be timely slaughtered. The local consequences of inoculation have occasionally lasted two or three months. Dr. Willems asserts that an excessively abundant exudation, analogous to that hereafter to be described as occurring in the lungs of diseased animals, takes place in the swollen region immediately around the point of inoculation.

Local consequences of inoculation.

The liquid obtained from the lungs of oxen affected with pulmonary murrain is considered by the advocates of inoculation as a specific virus (probably meaning specific chemical). They assert that neither the blood nor any other matter taken from diseased animals, with the exception of this liquid, is capable of exciting the true local phenomena, when employed to inoculate healthy ones. The liquid employed for inoculation is considered by Dr. Willems to set up a "dynamical" action*; being absorbed into the circulation, it acts upon and modifies it in such a manner as to influence the whole system and render the animal unapt to contract pulmonary murrain. The bovine race, it is said, are alone susceptible of being influenced by this virus; animals of other races, when inoculated with the same matter, experiencing no specific effect. Not only, it is asserted, does this mode of inoculation preserve animals from pulmonary murrain, but they are said also to fatten better in an epidemic atmosphere than animals that have not been inoculated. The consequences of inoculation are limited to the neighbourhood of the operation, death being caused, when this is fatal, by the extension of the local disease to adjoining organs. *In no case have the lungs been found diseased after death caused by inoculation.* "Morbid degenera-" tion," say the Dutch Commissioners who were appointed to

* The justice of this view is at least very questionable, It is more than possible that the so-called "virus" possesses no properties but those of common inflammatory products.

investigate this subject, "has never been observed in the pectoral "cavity or in the lungs, but as yet only in the belly."*

The use of inoculation not based on scientific principles.

Unfortunately, the great success reported by Dr. Willems to have followed his own trials of inoculation, has not been attained by others. Probably the failure of the scheme might have been predicted, for, admitting pulmonary murrain to be contagious, it is contrary to all analogy that the specific virus of the disease (allowing the fluid squeezed out of the diseased lungs to be such) should not exert its influence on those organs which are the normal seat of the natural disease. Whether a person inhales the small-pox contagion with his breath, or has it inserted into the surface of his body by means of a lancet, is immaterial as regards the seat of the consequent local affection. In either case the characteristic symptoms of small-pox present themselves on the skin. The same rule applies in other contagious diseases. It also applies to common as well as to morbid poisons. However introduced, arsenic affects the stomach and cantharides the kidney. It might reasonably be expected to hold good in pulmonary murrain, if the inoculation really produced any specific constitutional effect apart from the local injury sustained. It is admitted that when pulmonary murrain does occur after what is termed a successful inoculation, its course and severity are uninfluenced by the preceding inoculation. This circumstance is altogether at variance with the pathological fact upon which inoculation is based, namely, that the organism having once passed through certain contagious diseases, either is thereby rendered altogether insusceptible of being affected by the contagion in future, or subsequently undergoes the disease in a very mitigated and comparatively harmless manner. Isolated and rare exceptions only occur to this rule in individuals whose system is either naturally or accidentally very prone to the influence of morbid poisons. In truth, however, if inoculation has ever been of use in pulmonary murrain, its action has resembled that of an issue,† and the immunity produced by it may be compared to the alleged immunity of persons who have chronic discharges from the contagion of plague.

Official investigations into the value of inoculation.

The suggestion of inoculation for the prevention of a disease that had nearly decimated the herds it attacked, was thought so important that several continental governments appointed special commissions to investigate the subject. The reports of two of these commissions—the Dutch and Belgian—have been presented to the House of Commons by command of Her Majesty, in pursuance of an address of the House, dated December 6th, 1852. Notwithstanding the brief time that had then elapsed since the introduction of inoculation as a preventive of pulmonary mur-

* See papers respecting Pleuro-pneumonia in cattle and abstract of experiments made by Dr. Willems of Hasselt, *presented to the House of Commons by command of Her Majesty, in pursuance of their Address of December* 6, 1852, pp. 30, 31, 49, and 58 ; also further papers respecting Pleuro-pneumonia in Cattle, p. 112.

† Issues and setons have frequently been recommended as preventive or curative of pulmonary murrain.

rain, these reports contain sufficient evidence to render the value of the operation at least very doubtful. Dr. Willems had stated in his memorial to the Minister of the Interior, that out of 108 animals inoculated by him in his father's stables, not one had taken pulmonary murrain, whilst of 50 beasts, that not having been inoculated were placed in the same stables, 17 speedily became diseased.* Pulmonary murrain, he adds, which had never been absent from the stables since 1836, was then banished. At a later period, (26th October, 1852,) Dr. Willems, in a letter to the "Central "Commission of Pleuro-pneumonia," states that with few exceptions all the beasts of the bovine race in Hasselt had been inoculated, and adds that the disease was almost unknown, excepting as a sad remembrance, a circumstance which he attributes altogether to inoculation.

Report of Belgian Commissioners.

It is reported by the Belgian commissioners that, exclusive of the 108 beasts belonging to his father, Dr. Willems had before the end of 1852 operated on 1,034 animals of the bovine race. Six of these subsequently contracted pulmonary murrain, but four of them had been unsuccessfully inoculated; in one the success had been doubtful, and in the remaining animal alone had the operation produced its proper result.† This success was, however, more apparent than real, for a deputation, sent by the commissioners to examine into the condition of the animals at Hasselt, reports that the cattle there, whether inoculated or uninoculated, were generally in the most perfect health, the only cases of pulmonary murrain seen by the delegates having been three inoculated animals, in some dark unclean stables abounding in putrid emanations, and an inoculated heifer at the slaughter-house.‡ Elsewhere M. Maris, one of the veterinary surgeons at Hasselt, reports that it was "impossible to establish any distinction "between the inoculated animals and those that had not been "submitted to the preservative."§ Moreover, no case of pulmonary murrain had occurred at M. A. Stellingwerff's stables during the summer of 1852, where inoculation had not been practised, and the disease had on former occasions been absent from both the fattening and lean stock for periods varying from six months to two years. Considering therefore, that, Dr. Willems' private experiments excepted, inoculation had then only been tried for six or seven months, the assertion that the disease had diminished in Hasselt in consequence of inoculation seems but very ill founded.

Unsatisfactory results of inoculation.

On the other hand, both the Dutch and Belgian Commissioners report the occurrence of many cases of pulmonary murrain in inoculated animals. Sixteen out of 132 successfully inoculated animals mentioned in the Dutch Report were subsequently attacked by the disease at periods of time varying from eleven to fifty-one days after the operation. Exclusive of those

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* Papers respecting Pleuro-pneumonia in Cattle, pp. 18–30.
† Further papers respecting Pleuro-pneumonia in Cattle, p. 145.
‡ Loc. cit. pp. 152, 154.
§ Loc. cit. p. 153.

in which the disease showed itself anterior to the fifteenth day, and may therefore be presumed to have been infected prior to being inoculated, seven of these animals, or more than five per cent. of the whole number inoculated, fell victims to the epidemic within eight weeks of the operation, being just one half the estimated average annual loss anterior to the introduction of the so-called preservative. To this loss should be added that of ten animals which died in consequence of the local mischief occasioned by the operation, making the total loss in the animals inoculated under the auspices of the Dutch commissioners larger than the average annual loss among uninoculated animals.* The Belgian commissioners report that out of 4,324 animals that had been successfully inoculated, eighty-six died from the consequences of the inoculation, and seventy-three subsequently contracted pulmonary murrain. Excluding eighteen doubtful cases, the loss by pulmonary murrain in beasts inoculated with unequivocal success is reduced to fifty-five. This, however, is the best aspect of the case, for not to mention that 2,451 of the inoculations were performed in Hasselt or the neighbourhood, where the disease had evidently subsided prior to the commencement of the observations, more than one-half the animals inoculated were fattening for the shambles, in which condition they are generally admitted to be less liable to the disease.†

Mr. Simonds' experiments.

Nor does the result of some experiments performed in this country by Mr. Simonds, at the request of the Royal Agricultural Society, afford any support to the opinion that inoculation either produces the specific disease, or serves as a preservative from pulmonary murrain. Mr. Simonds found the local result of the inoculation to be only "ordinary inflammation, advancing with "greater or less rapidity to suppuration." He also observed the same local consequences to arise from repeated inoculations on the same subject; to be produced by medicinal irritants almost as readily as by the liquid taken from the lungs of diseased animals; and to follow the inoculation of sheep, pigs, and a dog, as well as that of horned cattle. The last fact, especially, is directly opposed to Dr. Willems' assertion, that the bovine race alone are influenced by the so-called virus, and also to his belief that the local disease produced by inoculation is of a specific character; for pulmonary murrain is generally considered as peculiar to the ox. Finally, out of a herd of 100 animals belonging to Mr. Paget, of Ruddington Grange, near Nottingham, that were inoculated under Mr. Simonds' directions, six that had been successfully inoculated became the subjects of pulmonary murrain within a few months.‡

Reports of other observers.

The doubts as to the value of inoculation that arise from a consideration of these facts, are strengthened by the reports

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* Loc. cit. p. 126.

† Further papers respecting pleuro-pneumonia in cattle, pp. 140 and 141.

‡ Second Report on the Prevention of Pleuro-Pneumonia in Cattle by Inoculation. Journal of the Royal Agricultural Society, vol. xiv.

of Prussian and other continental observers. Hildebrand relates that eleven cows which had been inoculated in the tail subsequently died of pulmonary murrain; and Schüger, who had previously been in favour of the operation, says he saw cows die of pulmonary murrain seven months after having been successfully inoculated. Bretsch reports that of 159 cattle inoculated in December 1853, in some of which the operation was afterwards performed a second time, 31 died of pulmonary murrain between the end of February and the middle of June. The most favourable report, with the exception of Dr. Willems' that I have seen, is that of Van Dommelen, who inoculated 211 head of cattle, 132 of which stood in stalls where the murrain prevailed. Eleven of these afterwards died of the murrain, but the remainder continued healthy, although some of them were under observation for six months.

Conclusions of Belgian Commissioners.

I cannot better or more impartially sum up the foregoing evidence on the practice of inoculation for pulmonary murrain, than by adopting the cautious conclusions of the Belgian Commissioners,—"that inoculation with the liquid extracted from a "lung hepatised in consequence of pluro-pneumonia, is not an "absolute preservative against that disease; that the phenomena succeeding inoculation may occur several times upon the "same animal, whether it has or has not been affected with "exudative pleuro-pneumonia; and that the two affections may "go on simultaneously in one and the same individual." Admitting the correctness of these conclusions, inoculation, for the pathological reasons already assigned, and on account of the suffering it causes the animals, and the losses that are its immediate consequence when performed strictly in accordance with the practice of Dr. Willems, is at once a cruel and a useless proceeding.*

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* I had not the opportunity of seeing the report of the French scientific commission appointed to investigate the epidemic pleuro-pneumonia of horned cattle until after this report was in type. The conclusions of the Commissioners on the subject of inoculation agree in many respects with the opinions at which I have arrived, but they believe inoculation to possess some protective influence. The general résumé of their experience is printed in the Appendix (No. V.). The numbers seem far too small to justify conclusions, and no evidence is given of subsequent protection. The following are their conclusions on the subject of inoculation:—

1. Inoculation with the liquid taken from the lungs of an ox suffering from pleuro-pneumonia does not transmit to healthy animals of the same species a similar disease, at least in situation, to that whence the matter of inoculation proceeded.
2. The appreciable phenomena consequent upon inoculation are, in a certain number of inoculated animals, those of a slight local inflammation confined to the seat of the operation; in other cases they are those of a severe diffuse inflammation accompanied by general illness proportioned to the intensity of the local disorder, complicated sometimes with gangrenous mischief which occasionally causes death.
3. Inoculation, with the liquid taken from the lungs of an animal ill with pleuro-pneumonia possesses a preservative power; it invests the organism of most of the animals on which it is practised with an immunity which protects them against the contagion of the disease for a time the duration of which is as yet uncertain, but which in the experiments of the commission has not been less than six months.

The result of the two sets of experiments made by the Commissioners may be thus briefly summed up, the number upon which the experiments were tried being first brought

Pulmonary murrain has resemblances with both hooping-cough and influenza in the human subject. Like hooping-cough, it is at once epidemic and contagious. Pathologically it has a much closer affinity with influenza than hooping-cough, but differs from both in its inflammatory character; inflammation, which appears to be inseparable from pulmonary murrain, being only a complication in these human diseases. Its visitations, like those of influenza, are uncertain, and not immediately referable to any definite condition of atmosphere. Pulmonary murrain does not strike the cattle of a whole district as influenza does the human inhabitants of a considerable area; but attacks by a succession of local outbreaks. Its re-appearance in the present century, after an absence of nearly a century from the herds of this country, is a most important fact in its history, particularly when considered in conjunction with the occurrence of cholera in the human subject, and of the potato disease and other blights among vegetables, at nearly the same period of time. Blight and murrain and pestilence have often been associated as calamities. Perhaps they are not altogether unallied in their causes. Whether the epidemic influences from which man suffers act also on the lower animals and on the vegetable kingdom, and whether the causes of their epidemic diseases affect ourselves, are as yet unopened, but nevertheless important, fields of inquiry. It is indeed true that the materials for solving these questions are at present most scanty, but the study of human with animal and vegetable epidemic diseases could not fail to elucidate many still obscure facts, and to throw important light on the pathology, not only of man, but likewise of those animals whose well-doing is intimately associated with his material prosperity.

Analogies of pulmonary murrain with human diseases.

Coincidence in time with human and vegetable epidemics.

Possible co-relations of blight, murrain, and pestilence.

Pulmonary murrain may possibly be dependent on some obscure circumstances of breed, feeding, or management. It can scarcely be referred exclusively to any atmospherical cause, for it would probably then have been a frequent and well-known visitor, instead of being, as it is asserted, an entirely new disease. In the absence of any specific data upon which to found an accurate opinion on this interesting topic, I can thus only suggest probabilities as aids to other inquirers, by whom they may either be negatived or confirmed. Unfortunately a subject of such paramount interest, especially to the agricultural class, appears to

Possible causes of pulmonary murrain.

brought into correspondence by assuming them to have been 100 in each case; but the real numbers having been 46 for the trial by contagion, and 54 for that by inoculation. Of the 100 animals supposed to have been exposed to contagion by residence in the same stables with other animals suffering from pleuro-pneumonia, 54·34 either did not suffer at all, or suffered from the disease in a very benignant form. The remaining 45·65 * suffered more or less severely. Of these, whilst 36·95 recovered, 8·69 died. Of the 100 animals supposed to have been inoculated, the operation was benignant in 61·11, and more or less injurious in 38·88. Of the last number, 27·77 recovered, and 11.11 died. In other words, of 100 animals exposed to contagion, 8·69 would die, according to the result of the experiments of the commission, whilst 11·11 would die out of the same number of inoculated animals.—"*Rapport Général des Travaux de la Commission Scientifique institués près le Ministère de l'Agriculture, du Commerce et des Travaux Publics pour l'étude de la Péripneumonie Epizootique du Gros Bétail*, pp. 78–80."

* The figures are quoted correctly from p. 80 of the French report.

have hitherto had few investigators in this country, for I have been unable to meet with any special treatise on this kind of cattle disease in the English language, excepting such as were written by members of the medical profession in the last century.

Its pathology. Whether pulmonary murrain be or be not the consequence of a special poison—and I will not stay to speculate upon such uncertain ground—its local consequences are those of inflammation. The inflammation is not of a very acute character, in this respect preserving the analogy already drawn between pulmonary murrain and influenza.* It has been correctly described by Mr. Faussett, M.R.C.S.I.† as an inflammation affecting both the lungs and pleuræ; as a peculiar inflammatory affection of the lungs and pleuræ by Mr. Jekyll, V.S.‡; and also by Mr. Waters, V.S., in a prize essay § presented to the Royal Agricultural Society. To Mr. Waters' essay I beg especially to refer, as it contains a most excellent account of the morbid anatomy of the disease, partly drawn up by Dr. Fisher, Downing Professor of Medicine in the University of Cambridge.

Appearances after death. The lungs of animals that have suffered from pulmonary murrain present an appearance after death very different from any thing witnessed in the human subject. The diseased portion is much increased both in volume and weight, and on being cut into presents a marbled appearance. *Peculiar structure of the lung in the ox.* It is necessary for the right comprehension of this peculiarity to explain that, whilst the essential structure of the lungs in the ox is similar to that of the same organs in man and the higher animals, the clusters of air cells which form what are termed lobules are, in the ox, more loosely tied together by cellular tissue. There is also a greater abundance of the connecting cellular tissue forming partitions, or interlobular septa. These partitions are continuous with the cellular layer of the pleura or membrane covering the organ, and by means of the smooth glistening surface of which it glides without inconvenience, during respiration, over the similar membrane covering the sides of the chest. *Morbid anatomy.* The consequence of this loose connection between the different portions of the lung is, that the plastic deposit poured out in consequence of inflammation, distends the loose cellular tissue that forms the partitions between the separate lobules of the organ, and thus produces the characteristic marbled appearance when the lungs are cut into. On examining the chest of an animal that has suffered from pulmonary murrain, the lungs are often found to be adherent to the sides of the chest, in consequence of the effusion of plastic lymph into the pleural cavity, by which the inner surfaces of the pleura, which ought to glide freely over each other, are glued together. The pleura, where free, is usually covered with a more or less extensive

* Mr. Simonds, lecturer on cattle pathology at the Royal Veterinary College, indeed, says that pulmonary murrain approaches nearer to a dropsical than an inflammatory disease, an opinion the reason of which it is difficult to understand. *See* Journal of the Royal Agricultural Society, vol. x. pp. 606, 607.

† Dublin Medical Press, vol. vi. p. 390.

‡ Veterinary Record, vol. ii. p. 304.

§ Journal of the Royal Agricultural Society, vol. ix.—pp. 346—53.

layer of the same effused lymph. This false membrane, as it is technically called, is sometimes of considerable thickness, and may be stripped off in considerable portions, which present the appearance of white skin. A considerable quantity of liquid, in which lumps of the same plastic lymph are floating, is very often found in the cavity of the chest. I am told the quantity of the liquid sometimes amounts to several gallons. The increased bulk of the lung itself, especially when conjoined with the liquid effusion, distends the diseased side of the chest, so as materially to increase its circumference.

Comparative weight of lungs in healthy and diseased cattle.

The weight of diseased lungs is frequently increased to 20, 30, and it is even said to 40 or 50 pounds. The following are the weights of some diseased and healthy lungs that were taken, at my request, under the inspection of Mr. Fisher, inspector of meat for the City of London. The two lungs of a healthy Norfolk ox, whose entire carcase weighed 100 stones, weighed eight pounds. Those of a healthy Dutch cow, whose entire weight was 70 stones, weighed nine pounds. In a Suffolk cow, with diseased lung, whose whole weight was 45 stones, the left lung was found to weigh 26 pounds; the right, and it may be presumed tolerably healthy, lung only weighed five pounds. So solid does the diseased portion of lung become that it sinks in water.

Characteristic appearance of diseased lung.

On cutting across an affected lung, the diseased portion presents a solid flesh-like appearance, all visible trace of the air-cells and smaller tubes being obliterated. This solid portion is intersected by white bands formed by the plastic effusion into the interlobular partitions; and is sometimes more or less abruptly bounded by these partitions, a comparatively healthy portion still pervious to air being found on one side of some of these bands, whilst a solid and impervious portion of lung exists on the opposite side. The irregular spaces of lung-substance that lie between the white interlobular bands are variously tinged of a dark mahogany red, brighter red, and sometimes pale red colour; the colour being mostly uniform in the same interspace, but differing much in adjoining spaces. The colour depends partly upon the stage and intensity of the disease, and is caused by the copious effusion of blood corpuscles. Assisted by my friend and colleague, Dr. Coote, I made a microscopical examination of portions of diseased lungs from two separate animals. The appearances presented were similar to what is found in ordinary pleuro-pneumonia. On washing away the blood corpuscles, which so obscured the view as to prevent anything else being seen, the lung-tissue presented the appearance of an amorphous granular mass traversed in all directions by bands of elastic fibres. This granular mass was soluble in acetic acid. Imbedded in this mass, or lying on its surface, were various bodies, viz., the red cells of the blood; cells from the surface of the bronchial mucous membrane in various stages of fatty degeneration; free fat and probably other granules; small masses of coagulated fibrin; and the same masses deeply coloured of a red, brown, or black tint, by

Microscopical appearances.

effused colouring matter of the blood. An examination of the pleura; of the false membrane that covered it; and of the yellowish white bands formed by the thickened interlobular partitions, in an early stage of the disease, seemed to show that the inflammation, commencing in the pleura, had subsequently extended by continuity along the interlobular divisions to the interior of the lung. The inflammatory deposit by which the interlobular partitions were also thickened showed no signs of organisation, and disappeared almost entirely on the addition of acetic acid.

Morbid anatomy in an advanced stage of disease.

In a more advanced stage of disease, the deposit in the lungs is found to be softening down and separating from the adjoining healthier tissue at the thickened bands of intersection. In other cases it becomes semi-friable. It is said that abscesses of the lung are an occasional consequence of pulmonary murrain, but I have met with nothing of the kind, in several examinations of lungs at different stages of the disease, perhaps because of the prevalent practise of slaughtering the animals for food as soon as they become diseased. Other changes that occur secondarily to the more characteristic consequences of the disease, are emphysema and the plugging up of many of the smaller tubes with dense muro-purulent secretion. The bronchial mucus membrane is also usually more or less inflamed, sometimes most extensively, and is said occasionally to throw out a plastic deposit analogous to the false membrane of croup in the human subject. The complaint is said by M. Delafond most frequently to commence simultaneously in the bronchial membrane, the lungs, and the pleura, but occasionally in any one of these parts, from which it extends so as to implicate the whole. I have reason to think that it sometimes commences in the pleura, and have little doubt M. Delafond is right in saying the bronchial membrane is also occasionally the earliest seat of the disease. The morbid anatomy of pulmonary murrain is almost exactly that of inflammation of the lungs and their lining and investing membranes in the human subject, modified by the anatomical peculiarities of the ox tribe.

Diarrhœa and the morbid changes with which it is associated.

Diarrhœa frequently sets in towards the close of pulmonary murrain, and proves rapidly fatal. On examining the intestines, but especially the small intestines, in such cases the mucous membrane is found covered with a copious secretion of adherent whitish mucus, on removing which by the free use of a stream of water, the membrane itself is observed to be injected and reddened in patches.

Reasons why symptomatology not investigated.

I have considered it unnecessary to enter into the subject of symptomatology, as its investigation was not a necessary part of the inquiry entrusted to me. I felt, moreover, that the symptoms of the disease could only be adequately described by a veterinary surgeon accustomed to study and treat the diseases of horned cattle. Nevertheless, to render the history of the disease contained in this report as complete as I could, I have printed Mr. Waters' account of the symptoms of pulmonary murrain

in the Appendix, where will likewise be found official reports on the same disease from three foreign veterinary practitioners, forwarded to the Earl of Clarendon by Col. Hodges, C.B., Her Majesty's Consul-General at Hamburg, and from Vice-Consuls Iven and Bird, of Kiel and Flensburg.*

B. *On Continent.* From a Despatch, dated 3rd June 1856, addressed by Col. Hodges, C.B., Her Majesty's Consul-General at Hamburg, to the Right Honourable the Earl of Clarendon, enclosing a Despatch from Her Majesty's Vice-Consul at Lubeck, it appears that the same disease which has recently been prevailing among the horned cattle of London, and other parts of Great Britain, has also prevailed in Mecklenburg Strelitz and Mecklenburg Schwerin. In a senatorial decree published by the Lubeck Government, forbidding the importation of horned cattle into the Lubeck territory, "unless they are certified by the competent authorities "to be entirely free from the disease," this complaint is called *Lungenseuche*, and no doubt correctly so, for the nature and distinctive character of the several diseases to which horned cattle are subject are much better understood in Germany than here. In a second Consular Despatch to the Earl of Clarendon on the same subject, also enclosing a despatch, dated 21st February 1857, from the English Vice-Consul at Lubeck, Colonel Hodges announces the re-appearance of the murrain in Mecklenburg, and the renewal of the decree against the importation of cattle from the infected district into the territory of Lubeck, unless they are "accompanied by satisfactory certificates of their being "free from disease." By favour of Mr. Gebhardt, one of the chief consignees of foreign cattle sent to the London market from the north of Europe, I have seen a private letter, dated 7th March 1857, from Mr. Fred. Janssen, the lately deceased British Consul at Tonning, in which it is said that pulmonary murrain had shown itself some months since on several farms in Holstein, and chiefly in Dittemarsch, but that the spread of the disease had been checked by the slaughter of about 200 head of cattle. Notwithstanding this, I am informed by the same authority that the Danish Government had forbidden the importation of cattle between the Duchies of Schleswig and Holstein,† lest pulmonary murrain should thereby be conveyed into the former mentioned territory, which, although it has suffered severely from the murrain on former occasions, is at present believed to be free from disease. More recent accounts mention the existence of pulmonary murrain at Altona during the whole of last year, and in Saxony and Central

B. *On Continent.*

1. PULMONARY MURRAIN.
Same disease as recently in England.
Has been prevailing in Mecklenburg.

Precautions of the Lubeck Government.

Recent prevalence of pulmonary murrain in Holstein.

Precautions of Danish Government.

* Appendix, Numbers I., II., III., and IV.

† The correctness of this information has since been confirmed by the transmission of the following extract from the Hamburg "Nachrichten" of 21 March 1857 to the Earl of Clarendon by Colonel Hodges, C.B. :—"As several cases of a dangerous pul-"monary disease among the horned cattle still occur at various places within the "Duchy of Holstein, and as the measures directed to be taken in the notification of "the 28th of July last have proved insufficient, the importation of horned cattle from "the Duchy of Holstein into the Duchy of Schleswig is prohibited till further notice."

Prevalence of pulmonary murrain in other Continental States.

Germany for many years. It has prevailed in the neighbourhood of Altona on many occasions, and is supposed to have been invariably imported thither from abroad, usually through Hamburg. On one occasion, the disease is said to have been conveyed by means of a butcher, who, passing from place to place for the purchase of cattle, carried the contagion with him. I have learnt, from a private but reliable source, that the same disease has lately prevailed among the horned cattle in Sweden; and M. Delafond, Professor in the Imperial Veterinary School of Alfort, in a Memoir on this disease, published several years ago, says, that it then existed extensively in France, where it produced a considerable mortality.* If, therefore, we accept the correctness of the official accounts, confirmed as they are in every important particular by such other information as I have been able to obtain, the disease that has been prevailing in those districts of northern Germany, from which the chief importations of cattle into England take place, is identically the same as the pulmonary murrain which during the last sixteen or seventeen years has never been entirely absent from the herds and dairies of Great Britain and Ireland.

Additional precautions to prevent the importation of diseased animals not at present requisite.

The importance of this fact can scarcely be over estimated. It proves that, for the present at least, it is unnecessary to employ any additional restrictions to prevent the admission of diseased cattle from abroad. As nearly one-fifth of the horned cattle sold in the Metropolitan Cattle Market during the years 1855 and 1856 has consisted of animals imported from the Continent, this is of great consequence in an economical point of view.† Even if pulmonary murrain were propagated exclusively by contagion, any attempt to exclude from this country a disease which has already been existing here for many years, by means of prohibitory or quarantine regulations, must be futile. That it does not extend itself exclusively by contagion, but that it is frequently developed spontaneously, is the all but unanimous opinion of the most competent observers both at home and abroad, an opinion which is supported by my own investigations.‡

Precautions adopted by the Board of Customs against the importation of diseased animals.

But, in fact, every reasonable precaution to exclude diseased animals is already in operation. The Commissioners of Her Majesty's Customs have appointed duly qualified veterinary surgeons, at the chief ports of importation, to examine all cattle coming from foreign ports previous to their admission into this country; and where no permanent inspector has been appointed, the collector for the port is authorized to employ a veterinary surgeon to make the inspection, which is directed to be done as soon as possible after the arrival of a vessel on board of which there are any cattle. By printed instructions of 24th December

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* *Traité sur la Maladie de Poitrine du gros Bétail connue sous le nom de Péripneumonie contagieuse*, par O. Delafond, Professeur à l'Ecole royale veterinaire d'Alfort, &c. p. vi. Paris, 1844.

† See a return of the number of beasts exposed for sale at the Metropolitan Cattle Market in 1855 and 1856. Appendix, No. VII.

‡ *Canstatt's Bericht*, 1855. Delafond, *loc. cit.*, ch. vi.

1856, dated from the Custom House, London, it is directed that, *Instructions to veterinary inspectors.*
"after the cattle, sheep, lambs, or pigs have been landed, they are "to be kept in charge until each animal has undergone a careful "examination, and if found free from disease the whole are to be "passed immediately; but in the event of any disease being found "to exist, such of them as may be so diseased are to be immediately "killed, if the same be considered necessary by the veterinary "surgeon; and if upon a post-mortem examination of such "cattle, sheep, lambs, or pigs, the same be found fit for human "consumption, they, and the rest of the importation, are to be "delivered to the owner or owners thereof; but should any of "those so examined be unfit for such purpose, and the disease be "of an epidemic or contagious character, they are to be buried, "or effectually destroyed in the presence of an officer, and the "remainder of the importation detained for further examination "so long as the veterinary surgeon may deem necessary."* That these instructions have been most carefully attended to in the port of London there can be no doubt; for remonstrances respecting the stringent character of the regulations in force have been made by the importers of cattle, both to the Board of Trade and the Commissioners of Customs. The carefulness with which the *Careful nature of inspection.* inspection is conducted is also confirmed by the assertion made to me by Mr. Nice, V.S., Inspector of live cattle at the Metropolitan Cattle Market, that he has not found occasion to seize or detain, on account of disease, a single animal among the many thousands of foreign horned cattle sent for sale to that market.

Besides the pulmonary murrain which, as already shown, has *Other kinds of murrain.* been prevalent in several countries of Northern Europe, contemporaneously with its existence in the cow-sheds of the metropolis, and among the herds and dairies of other parts of this country, two other diseases, are reported to be at present prevailing on the Continent. To these diseases, of which the one is of a contagious, the other of an epidemic nature, it is now necessary to refer. Both in some of the official accounts and by writers for the public journals in this country, these diseases have been confounded with each other, and with pulmonary murrain. Hence, probably, one cause of the exaggerated alarm that has been evinced lest a new, highly contagious, and fatal murrain should be introduced among our herds by means of the cattle imported from abroad. To the first of these diseases, which is in Germany called the *Rinderpest*, I shall apply the term Steppe Murrain, by which also it is known in that country. The other I shall refer to under the name of Dysenteric Murrain.

Steppe murrain is spontaneously developed only in Bess- 2. Steppe Murrain or *Rinderpest.*
arabia, Podolia, and other provinces of Southern Russia.† From

* See appendix, numbers IX. and X.

† The best continental authors, both of the last and present century, are unanimous in the belief that steppe murrain is only developed spontaneously in those countries, and among cattle of the Podolian or steppe breed. Ramazzini (De Contagiosa Epidemia quæ in Patavino Agro et tota fere Veneta Ditione Bovis irrepsit) attributes the appearance of the disease in Italy early in the 18th century to its introduction by means of a diseased animal imported from Dalmatia. Lancisi and Vicq-d'-Azyr

these it is rarely absent, and thence it spreads by contagion frequently into Poland, and occasionally into Austria and Prussia. Official Despatches, having reference to this form of murrain, from B. General Mansfield, Her Majesty's Consul at Warsaw, and from Mr. Consul Hertslet, of Koenigsberg, dated respectively March 19th, 1857, and March 11th, 1857, have been transmitted to me from the General Board of Health. I have also carefully examined a number of despatches and documents on the same subject at the Foreign Office and Board of Trade, to which I have been allowed access by the respective authorities of these departments. Very stringent regulations for the exclusion of this formidable murrain from the territories of Austria and Prussia have long existed. Until lately, the Russian authorities have not taken any measures to prevent the extension of the malady, which has therefore often committed the most formidable ravages among the herds of Russian Poland. Energetic measures, similar to those in force in the adjoining states, have now, however, been adopted by the Russo-Polish authorities. According to a recent return, 20,000 animals have already been slaughtered in accordance with a decree, published on May 9th, 1856, ordering the indiscriminate slaughter of all beasts that should exhibit any symptoms of the disease.

Adoption of precautions by the Russo-Polish Government.

Consular reports of its prevalence in Russian Poland and on the Prussian borders.

In B. Gen. Mansfield's Despatch, the disease is said to be still prevalent in Russian Poland, "though not, as far as he can understand, so much so as it was during the autumn." The disease, he adds, originally comes from the Steppes of the Ukraine, whence vast numbers of cattle are annually driven westward. Mr. Consul Hertslet reports that rumours of the existence of a murrain or cattle plague in Volhynia and Podolia have been current since 1854, and that the disease having gradually advanced in a northerly and westerly direction, had at length reached the immediate neighbourhood of the Prussian frontiers at Kowno and Tauroggen. The disease had not passed into the Prussian territories at the date of his despatch; but a later report says that it has now entered EAST PRUSSIA, having reached the village of *Meldiglanken, near Lansargen*, a place on the Prussian side of the frontier between Tilsit and Tauroggen. In a despatch, dated April 4th, 1857, Lord Bloomfield, Her Majesty's Ambassador at the Court of Prussia, reports that the steppe murrain has been imported into SILESIA by means of some cattle from Galicia. The disease has thus far only manifested itself at two points in the regencies of *Breslau* and *Oppeln*, and has, in fact, been confined to the oxen of the infected herd. The whole of the infected cattle, as well as all such as had come in contact with them, were immediately slaughtered, and the most

Steppe murrain imported into Silesia, and East Prussia.

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agree in referring the introduction of the murrain into Western Europe to contagion. M. Renault, director of the Imperial Veterinary School of Alfort, has fully examined this question in a recently published pamphlet (*Le typhus contagieux des bêtes bovines peut-il naître spontanément sur les animaux de l'espèce bovine étrangers à la race des steppes?* Paris, 1856). I had not the opportunity of examining M. Renault's work until this report was in the press; but the conclusion at which he has arrived, after many years of study, and a careful examination of the public documents of different European states, entirely accords with the result of my own investigations.

active measures adopted to prevent the further extension of the disease. "Judging from the experience of last year, there is every "reason to hope that its propagation will be prevented and its "extinction secured."*

Precautions adopted by Prussian and Austrian authorities.

According to Mr. Consul Hertslet's dispatch, the Prussian government so long ago as the years 1855 and 1856 had taken great precautions to secure the exclusion of the murrain. Not only had parties of military been detached to all the points of egress from Poland below Thorn, but the importation of hides, calf skins, wool, rags, and other articles likely to have been in any way connected with cattle, was prohibited, and all persons suspected of having transactions with cattle were forbidden to cross the border. Similar precautions are employed to exclude the murrain from the Austrian provinces that adjoin the infected provinces of Russia and Poland, the infected animals being killed as soon as they show any symptoms of the disease, and all cattle that have been in contact with them being placed in the most rigid quarantine.

Former existence of steppe murrain in England.

Steppe murrain probably existed in this country about the middle of last century, side by side with pulmonary murrain; for whilst some of the descriptions of the disease then prevalent very exactly accord with the symptoms of pulmonary murrain, as that disease presents itself now, other accounts agree more nearly with the description of steppe murrain given by continental writers of the present day.†

Nature of steppe murrain or Rinderpest.

Steppe Murrain or *Rinderpest* is described as a febrile disease analogous to continued fever in the human subject, but incommunicable to man or to other animals. It is preceded by a period of incubation, during which, however, an experienced observer will, it is said, be able to detect the approaching disease; runs through a definite course; and is accompanied at first by constipation, which usually in the last stage of the disorder gives place to choleraic diarrhœa. The preliminary or incubative period of the disease is said to last about seven days.

Spreads by contagion.

The spread of this disease beyond the steppe country is believed to be exclusively by means of contagion.‡ Official Austrian documents say that it frequently visits the eastern provinces of Austria, being conveyed thither either from Podolia and Volhynia into Gallicia, or from Bessarabia through Moldavia and Wallachia

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* May 12th. This expression of hope has been fully justified by the result, for the active measures adopted by the authorities have effectually checked the disease at all these places.

† The description both of the symptoms and post mortem appearances of the disease observed by the physician, already quoted at p. 13 of this Report, exactly coincide with pulmonary murrain as it is seen at the present day. The descriptions by Dr. Layard of the disease he saw at Godmanchester, and by M. Blondet of the similar disease then prevalent in France, are almost identical with that now given of *Rinderpest* by the best German writers.

‡ Steppe murrain was introduced into Germany and France between 1795 and 1798 by means of cattle brought from Hungary to supply the Austrian army, then in arms against the French. It was again introduced into Western Europe in the train of the allied armies in 1813; entered France with them in 1814, and continued to devastate the herds of that country until 1816. According to several French authorities quoted by Lévy (*Traité d'Hygiene*), numbers of the diseased animals were killed for the food both of the armies and of the inhabitants.

into Transylvania. From these frontier provinces it has occasionally spread into the interior of the empire, destroying great quantities of cattle, and causing ruinous loss to the proprietors. It is believed to be so contagious that men, dogs, and goats, although themselves uninfluenced by the *virus*, are thought capable of conveying the infection from a diseased to a healthy herd. Although cough is a frequent symptom of steppe murrain there is no pathological similarity between it and pulmonary murrain.

Appearances after death.

The post-mortem peculiarities of steppe murrain are, rapid decomposition, the blood vessels being filled with dark fluid blood, the flesh easily lacerable, and of a brownish red or violet hue. The fourth stomach and small intestines are externally of a dirty blueish red colour. Internally they are dark coloured, especially in the vicinity of the glands, which are reddened, swollen, moveable, and often marked with points or streaks of effused blood. The large intestines are but slightly affected. At a later stage of the disease numerous exudations from half a line to a line in thickness and several lines in diameter, yellowish-brown or reddish in colour, firmly adherent at the centre, but loose and curling at the edges, are found attached to the reddened or violet-coloured mucous membrane of the fourth stomach and small intestines. These exudations, which exist chiefly in the pyloric portion of the stomach, and in the duodenum or first portion of the small intestine, are mostly seated on the solitary glands, but attain their greatest size when on the aggregate glands. On removing these exudations, the membrane beneath appears pitted, of a bright red colour, and punctuated with blood, especially at the central point of attachment. In rarer cases an exudation of false membrane is met with on the mucous membrane of the small intestines. Somewhat corresponding changes are met with on the mucous surface of the respiratory passages. The mucous membrane of the larynx and larger bronchial tubes is found to be reddened in streaks or spots in the earlier stage; in the more advanced stage it is either covered with greenish yellow exudations or coated with a whitish coloured skin-like false membrane. The gall-bladder is usually distended and full of thin yellowish-green bile. Its mucous membrane, of a bright red colour and thickened, presents exudations of a similar character to those found on the pulmonary and intestinal mucous surfaces. The spleen, which is much diseased in *Milzbrand*, another form of contagious murrain to which I shall presently advert, is in this disease generally found to be healthy, although sometimes in a disintegrated blueish-black pultaceous condition. The food in the third stomach is represented as being sometimes met with in friable, compressed discs, lodged between the leaves or duplicatures of the stomach. This peculiarity is mentioned by one of Her Majesty's Vice-Consuls in a telegraphic despatch to the Earl of Clarendon. as belonging to the disease now prevailing on the Russo-Polish frontier of Prussia. In other cases the food in the same stomach is found in the form of moist pultaceous masses.

Publication of an Order in Council prohibiting importation from the Baltic.

As soon as Her Majesty's Government received intelligence that this form of murrain had reached Kowno, Tauroggen, and other places in the vicinity of the Russian frontier, an Order in Council was issued prohibiting the importation of cattle, and of horns, hoofs, raw or wet hides, or skins of cattle into the United Kingdom from any port in the Baltic east of Denmark. It was also ordered that no cattle, and no articles supposed to be capable of conveying infection, as horns, hoofs, raw hides, hay, straw fodder, litter, or manure should be admitted into the United Kingdom, which had been on board any vessel coming from one of the interdicted ports, and that if any such cattle or prohibited articles shall be brought to this country, they shall upon their arrival here be destroyed or otherwise disposed of as the Commissioners of Her Majesty's Customs may direct.* Taken in conjunction with the careful examination of all imported cattle made by the professional inspectors appointed for that purpose, both at London and the out-ports, and with the restrictive measures employed to prevent the spread of the disease into Prussia, this precaution seems to remove all danger of the importation of steppe murrain into the United Kingdom from the north-eastern frontier districts of Prussia, where it at present perhaps exists.

Steppe murrain never absent from certain countries.

In truth, however, the consideration of measures for the exclusion from the United Kingdom of this avowedly contagious murrain,—for it is asserted to be highly contagious by persons who are the most competent to express an opinion on the subject,—is not a mere temporary question. Steppe murrain is said in Austrian documents of a public character never to be eradicated in countries adjoining to Austria, and the same documents inform us that it often spreads into the interior of that empire. There is at present no prospect of its extinction in provinces some of which are its natural birthplace, and in others of which no measures had until lately been adopted for its eradication. Any further regulations which it may therefore be proposed to adopt, with the intention of excluding steppe murrain from this country, must necessarily be of a permanent character. A good deal of the foreign cattle sold in the Metropolitan live cattle market comes from Prussia. Some of it is said to come from places eastward of Berlin. The facilities afforded by railway communication will, no doubt, eventually be rendered available for the transmission of cattle to the western markets from districts yet more remote. It is asserted that measures are even now in progress to improve the breed of cattle in those remoter districts, with a view to supplying the markets of western Europe. Our real protection hitherto has lain—

Reasons why steppe murrain has not been introduced here.

a. In the energetic measures adopted by intermediate States to secure the exclusion of the murrain from their territories;—

b. In our insular position; and in the length of the transit from those countries into the United Kingdom.

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* The Danish Government has issued a similar order applicable to the same ports, that the cattle trade between Denmark and England may not be disturbed.

Regulations of continental authorities.

I have already said that measures to prevent the extension of the disease and to effect its extirpation have recently been adopted in the Russo-Polish provinces. Very strict regulations to secure the exclusion of the murrain, or to extinguish it should it be imported over the frontier, have long been employed by the Austrian Government. All infected cattle are immediately killed, and the place where they have been is placed in strict quarantine. In Prussia, all direct traffic over the frontier from infected places is forbidden, the introduction of cattle and other articles likely to convey the contagion being entirely prohibited, and butchers and other persons suspected of having had intercourse with cattle being compelled to undergo quarantine. Similar precautions are adopted when the disease has appeared within the Prussian territories. The infected place is surrounded by military, no intercourse whatever being allowed to take place with it. All oxen, cows, and calves are killed, and buried with quicklime in deep pits. Regulations on this subject dated so long ago as 1803 are still inforce, and a proclamation for the more exact defining of these regulations was issued by the King of Prussia, on the 27th of March1856. In this proclamation it is ordered, that no steppe cattle (Podolian cattle) be admitted into the kingdom, excepting at certain quarantine stations, and after undergoing a quarantine of twenty-one days; that all cattle of the designated breed, after having undergone the prescribed quarantine, be branded on the horns with a particular mark; and that if any cattle of this race, which have not the proper brand, are seen at large in the eastern provinces of Prussia, they be placed entirely apart from all contact with other cattle, and, if they show any suspicious symptoms of disease, be immediately killed. The owners are, of course, indemnified for the loss of their cattle when it is found necessary to destroy them.

Our insular position.

Notwithstanding the severity of the regulations enforced by the Prussian and Austrian Governments, through whose territories all cattle coming from the infected districts must pass before it can reach the United Kingdom, our insular position enables us to maintain a much closer surveillance over imported cattle than is possible in continental countries. Moreover, the incubative stage of the disease being said not to exceed seven days, it is unlikely that infected cattle could undergo so long a journey as that from the eastern provinces of Prussia and Austria to the United Kingdom, including the sea passage, without showing some appearance of indisposition on their arrival at the port of debarcation. There is thus just as much, and no more, risk of steppe murrain being now introduced into this country by means of foreign cattle than has already existed for several years.

The recent alarm in this country unfounded.

The great alarm expressed in this country at the so-called "impending murrain" has been based upon a mistaken supposition, that the disease prevailing in Mecklenburg and Holstein is a disease from which our herds are free, and that it is identical with *Rinderpest* or steppe murrain. On the contrary, as already explained, it is pulmonary murrain, which is as prevalent among

the horned cattle of the United Kingdom as in the herds of Mecklenburg and Holstein. The *Rinderpest* or steppe murrain of German writers has not been prevailing in Mecklenburg and Holstein. It is not more prevalent now in the western provinces of Russia and Poland than it has usually been, and is at present much less prevalent in the territories of Austria and Prussia than it has often been.

3. Dysenteric Murrain.

Dysenteric murrain is referred to in the following extract from a letter, dated February 28th, 1857, addressed to the President of the Board of Trade, and printed by the Commissioners of Customs for the information of the several officers of the Customs, and of the veterinary surgeons employed to examine cattle. There is, however, no reason for believing the writer to be correct in his assertion that the disease has passed by the countries bordering the Danube, "through the Austrian dominions into Germany." Neither is there any present cause for apprehending its extension to countries from which cattle are imported into Great Britain.

Dysenteric murrain at Constantinople.

"In August 1855 I was employed at Constantinople to "purchase bullocks; rumours were then prevalent, that a most "virulent murrain (every epidemic is denominated in the East "by this title) was spreading through the country. The bul- "locks we purchased had been brought some six hundred miles "from the interior of Asiatic Turkey; although poor in con- "dition, they seemed otherwise healthy. But we had not "received them more than three weeks before the epidemic "broke out, both in our camp at Buyuckdere, and in the French "camp, a few miles distant. The whole of our bullocks were "attacked with the disease, and out of upwards of 500, we "lost 116.

"I have no doubt that the same disease is now approaching "our shores; it proceeded from Constantinople in the direction "of Shumla, and thence on the Danube, through the Austrian "dominions into Germany.

"The disease is dysenteric in its character, and approaches "nearer to the Asiatic cholera in the human subject, than any- "thing I have yet seen in Animals, and it is confined to Horned "Stock.

"The parts diseased are the stomachs, liver, and the whole "lining membrane of the bowels.

"It is rapid in its progress, and very fatal in its results. Its "origin is dependent on some atmospheric poison, the nature of "which cannot be determined. It is propagated by contagion, "and chiefly through the excretions, which are of an extremely "offensive character. It spreads with great virulence in cattle "that have been living on bad hay, straw, &c."

The disease here referred to is no doubt correctly described as of dysenteric character, and, as will shortly appear, it really bears the close resemblance to cholera in the human subject attributed to it by the writer of the above quoted letter. Through the courtesy of the Council of the Epidemiological Society, and with the sanction of Mr. Radcliffe, member of the

Mr. Radcliffe's account of

dysenteric murrain at Sinope.

Royal College of Surgeons, and lately attached to the Ottoman army under the command of H.H. Omar Pasha, I have been permitted to examine an unpublished paper communicated by Mr. Radcliffe to that society upon a murrain which prevailed at Sinope during the summer and autumn of 1855, which was evidently the same as that mentioned in the letter to the President of the Board of Trade.* The symptoms of the disease are thus described by Mr. Radcliffe from his personal observation :—

Symptoms.

" The attack of the disease appeared to be invariably sudden, " and the progress of the symptoms was singularly uniform. " The animal attacked was seized with profuse diarrhœa; ex- " haustion rapidly followed, the animal sinking to the ground; " the breathing became oppressed; a thick glairy mucus trickled " from the eyes and nostrils; and death occurred within *nine* " hours from the commencement of the attack; the duration of " the disease rarely indeed exceeding *six* hours.

" The first symptom of the disease was characteristic. The " animal would suddenly void from the bowels, in a thick stream, " an enormous quantity of fluid matter, which was either of " a pale yellow or of a brownish colour. The evacuations " invariably contained shreds and flakes of lymph and generally " sooner or later more or less blood. The most common appear- " ance of the evacuated matter was that of a yellowish coloured " fluid, in which shreds of lymph were floating."

Appearances after death.

A post-mortem examination of the bodies of four animals that died of the murrain was made by Mr. Radcliffe. The morbid changes were characteristic of rapidly fatal alvine flux. With the exception of the mucous membrane of the paunch or first stomach being, in one case, rather darker than usual, and of the existence of a few patches of congestion on the mucous membrane of the abomasum or true stomach of the third animal examined, the morbid appearances were exclusively confined to the large intestines; the stomachs, the small intestines, and the remainder of the viscera being in a natural condition. The several stomachs contained food in the state characteristic of each, and the intestines were full of a pale yellow or straw-coloured liquid, having the aspect of partially digested food, excessively diluted, in which shreads of lymph were floating. There was an entire absence of fæcal odour. Externally, the intestines had a healthy aspect throughout their entire course, and the changes which presented themselves on the mucous surface of the large intestines, were only discoverable when the bowel was examined on its internal aspect. The mucous membrane of the large intestines presented throughout the appearance of congestion, being studded with florid punctuated patches, formed of minute red spots, thickly grouped together. These appearances seem to have been confined to the true mucous surface, for "in no instance were the " vessels of the sub-mucous tissue congested, so that they could " be traced beneath the patches of congestion."†

* The paper is printed at full length in the Appendix, No. VI.

† For full details of the post-mortem appearances, *see* Appendix, No. VI.

The murrain not confined to the animals in the depôt.

The morbid appearances here described are those of rapidly fatal dysentery, but the symptoms during life more nearly resemble the choleraic form of alvine flux. It was reported that the murrain prevailed in several places contemporaneously with cholera in the human subject, a circumstance which might be only a coincidence, and is not necessarily indicative of any direct relation in the causation of the two diseases. The murrain appears to have been uniformly fatal at Sinope, for Mr. Radcliffe did not hear of any instance in which an animal attacked by it recovered. The disorder prevailed with as much severity among the cattle in the town, and in those collected by the Commissariat in the country, at some distance from Sinope, as among those in the depôt. The murrain was considered as highly contagious by the natives, but the evidence adduced in support of the opinion is said to have been vague and worthless. Mr. Radcliffe, however, believes that it was infectious by means of the effluvia given off from the diseased animals when concentrated by their confinement in crowded sheds; and hence, that the sheds which had been occupied by diseased cattle, being impregnated with the diseased excretions, were capable of producing the complaint in fresh and untainted animals.

Spontaneous disappearance of the murrain.

In reference to the probability of the disease spreading into districts remote from its original seat, it is worthy of note that after prevailing in Sinope in the spring it attained its acme in June, and then rapidly declined. It did not, however, entirely disappear, for scattered cases continued to occur until November, when a second violent outbreak took place both among the cattle in the town and in the depôt. This outbreak attained its acme about the end of November, declined during December, and ceased altogether in January 1856. No satisfactory evidence could be procured to show whether the disease had been imported or was developed spontaneously, but the town of Sinope during the prevalence of the murrain is reported to have been both filthier than usual, and excessively crowded from a large number of men attached to the Commissariat Depôt and the depôt of the Land Transport Corps being quartered in it. Probably, if we may judge of the disease on the presumption of its analogy with alvine flux in the human subject, the outbreak was partially due to season and partially to local circumstances. To season, because, like cholera and dysentery in man, it disappeared in the winter. To local circumstances, because the crowding of so many cattle into a district, the sanitary state of which was so entirely neglected, must have led to the accumulation of their excreta, the emanations from which probably were the contagious matter, if the disease really spread by contagion.

Sanitary state of Sinope and its vicinity.

Probable mode of communication.

It has been affirmed on the highest authority that the effluvia arising from the excretions of human dysenteric patients are the means of spreading infection. The disease nevertheless often arises quite independently of any such cause.* As, the large intestines excepted, all the organs of

* *See* Observations on the Diseases of the Army, by Sir John Pringle, Bart., pp. 86, 263, &c.; and Dr. Copland's Medical Dictionary, vol. i. pp. 698, 699.

the animals which died of dysenteric murrain were found to be healthy, it is, perhaps, not assuming too much to infer that this disease, if it spread by contagion, did so in the same manner as the analogous disease in man; that when the circumstances that had originally caused it were removed, its further continuance could only be maintained by this kind of infection; and that its extension into the herds of other districts could only occur through the same channel. The chief practical importance of this conclusion at present is, that if dysenteric murrain be propagable, and only so by means of the diseased excretions, it is unlikely to be imported into this country. Fatigue and exposure are well known to be powerful causes in accelerating the development of such disorders. Any infected animals, therefore, that might be sent to the port of embarcation, would be likely to fall victims to the disease, if not prior to embarcation, at least previous to their arrival in this country. In regard to this particular kind of murrain, it is therefore, only necessary to continue the regulations at present in force, for the inspection of foreign cattle, and to detain all imported cattle among which there may be any suspicion of this disease, until the Inspector is satisfied they are healthy, a question likely to be determined in a very brief period in this instance. Should the disease show itself in any of the cattle thus detained, the only safe course would be to slaughter the entire importation, and to employ effectual means for destroying the excretions and purifying the vessel and other places in which the cattle may have been from every particle of their alvine evacuations.

Suggestions for exclusion of the murrain from this country.

4. Carbuncular Murrain, *or Milzbrand.*

Carbuncular murrain, named in Germany "*Milzbrand,*" or black pock, is another specific cattle disease that prevails among the cattle of several continental countries. On account of the great interest that just now attaches to all the contagious diseases of cattle, and also because I shall have occasion to refer to it in that portion of my Report which relates to the effect on human health of consuming the flesh of diseased animals, I may here, perhaps, be allowed to devote a brief space to its consideration. *Milzbrand* is considered by German authors as a typhus disease originating in horned cattle, but communicable to other animals, as horses, sheep, and dogs, and even to man.* By some writers it is believed not to be communicable in the ox,† an opinion that would appear to be disproved by the circumstance of its communicability from the ox to other animals, and it is asserted even secondarily from them to other animals of the same or a different species. It is developed spontaneously under certain atmospherical conditions, and particularly of long-continued high temperature; but the true exciting cause is believed to be of malarious origin. It is said to be developed under circumstances analogous to those which favour the development of plague, with which it seems to have many affinities. It is chiefly propagated by direct contact, but is reputed, under

Communicable to man and animals.

Causes of its spontaneous production.

* Wunderlich, *Pathologie und Therapie.*

† Kausch, quoted by Heusinger in his chronological notice of works on Milzbrand.

very favourable circumstances, to spread likewise through the medium of the atmosphere. The contagion is considered by Heusinger‡, a German writer who has published a voluminous monograph on the subject, to be of the most energetic and indestructible character, and to appertain to all parts of the animal, but especially to the blood, flesh, and hides. Hides are said to have frequently been the means of conveying the disease, a statement at variance with the fact, that whilst hides coming from districts where *Milzbrand* is known to prevail have been freely imported into England, no instances are on record of their having produced it in tanners or other persons who have handled them.

The chief seats of *Milzbrand* are Poland, Silesia, Hungary, Russia, and it is said, Italy. It prevails in summer, and especially in the months of June, July, and August. Dr. Hirsch, of Danzig, a well-known investigator of epidemic diseases, says, in a private communication with which I have been favoured, that it is common in Russian Poland, from whence it is frequently imported into Prussia.* The poison is most rapid in its effects, inasmuch as the disease has often appeared to commence from the moment of infection, a circumstance which precludes the probability of its importation into distant countries by means of living animals. Like plague, *Milzbrand* is characterised by an eruption of gangrenous carbuncles in various parts of the body. Sometimes analogous disease is developed in the lungs or other internal organs. Decomposition takes place soon after death, there being extensive congestion with extravasations of blood in several of the internal organs, and occasional effusion into the serous cavities. The capillary congestion extends even to the bones, which are often so strikingly of a blueish-red colour as to indicate the existence and nature of the disease. The blood is generally found to be pitchy-black and uncoagulated. The glands are commonly enlarged and dark from effused blood. The spleen is usually much enlarged, sometimes enormously so, softened, filled with black blood, and its tissue often broken down. Hence the name "*Milzbrand*," by which this form of murrain is commonly known. In addition to these appearances, Professor Brauell, of Dorpat, in a recently published paper, says, that vibriones are found in the blood, especially in that of the spleen, immediately after death, and considers their existence before or soon after death as being, in the present state of our knowledge, characteristic of *Milzbrand*.† The post-mortem appearances are said to be analogous, whether man or any of the lower animals may have been the subject of the disease.

Nature of disease.

Appearances after death.

II.—*The sale of diseased animals to be used for human food.* I have already mentioned the custom prevalent, among cow-keepers and other owners of cattle, of sending diseased ani-

II. The Sale of Diseased Animals to be used for Human Food.

* *Ueber Milzbrandkrankheiten*, 1850.

† For this, and several other important private communications which have been serviceable to me, I am indebted to Dr. Hermann Weber, Physician to the German Hospital at Dalston, who kindly wrote, at my request, to several German Physicians for information on the subject of my inquiry.

‡ Virchow's *Archiv.* vol. xi.

Common everywhere.

mals to market. This custom is, however, by no means peculiar either to the Metropolis or to the United Kingdom, for it is common also on the Continent to sell animals that are attacked by

Usually sold at an early period of disease.

pulmonary murrain. Animals in good condition are usually sent to market as soon as they manifest any appearance of illness, and before the disease has materially lessened their value. The cow-keepers I saw did not hesitate at once to admit this practice, and there is no doubt that a large number of animals suffering from pulmonary murrain are habitually sold to be slaughtered for human food. Probably a small number only of those sold in the live cattle market are in an advanced stage of disease; animals having even one lung solidified, and the corresponding pleura distended with fluid, being unable to walk to market or bear the fatigue of a long journey from the country.

Sale at an early period of disease not prevented.

The inspectors of the Metropolitan Live Cattle Market, and of the slaughter-houses and markets in the City of London say, they do not feel justified in seizing animals suffering from an early stage of lung disease, or in preventing the sale of meat because the animal from which it was procured had had that disease, provided the flesh looks healthy. Mr. Fisher, inspector of meat and slaughter-houses for the City of London, who is probably as competent as any one to speak on the subject, says that much of the meat from animals that have had pulmonary disease is of first rate quality. This assertion is quite consistent with the experience of medical men, who do not find the fleshy parts of bodies materially affected by a brief acute illness.

But few unhealthy cattle sent to Metropolitan Live Cattle Market.

Mr. Nice, V.S., inspector of the Live Cattle Market, informed me he had only found it necessary to seize some six or seven horned cattle on account of illness during the last year. I was also told by Mr. Nice, the number of unhealthy cattle sent to market, is much diminished since the removal of the market to its present situation, partly, he believes, because the greater space in the present market lessens the chance of their being overlooked, but in some measure, likewise, on account of its greater remoteness from the cow-sheds.

Both cattle and meat seized at a later period of disease.

At a later period of the disease, when emaciation has taken place, and especially if anasarca (general dropsy) has supervened as a consequence of the pulmonary affection, the animals are seized if taken to market, or, if privately slaughtered, the meat is seized when exposed for sale. All meat taken in the City Markets as unfit for human consumption is sent to the melters, and there destroyed.

Cattle sent to market suffering from various diseases,

Although by far the largest number of diseased oxen that are sent to the Metropolitan Cattle Market are the subjects of pulmonary murrain, there can be no doubt but there are likewise some which have other diseases. I have heard of abscesses being found in the lungs of slaughtered cattle, and occasionally, but less frequently, in other parts of the carcase.

and injuries.

Cattle brought by rail, too, are often injured on the journey, Those that are weak or tired lying down in the vans are liable to be trampled on or kicked by their companions. Such injuries are no doubt the cause of the extravasations of blood said to be sometimes observed in the muscular parts of animals slaughtered for food.

Metropolitan Cattle Market.

During the course of my investigations I several times visited the Metropolitan Cattle Market early in the morning; and, sometimes alone, on other occasions accompanied by Mr. Nice, walked round to look at the cattle. On these occasions I did not see in all more than two or three animals that looked otherwise than well, and these were cows from the London cow-sheds, suffering, I believe, from the earliest stage of pulmonary murrain. On Friday, March 27th, one of the occasions referred to, several very lean, emaciated, poor-looking cattle, which at once attracted my notice as very unlikely to be good meat, were exposed for sale. On inquiry I learnt that these animals were bought by speculators for the purpose of fattening on the Essex marshes, and that very probably the greater number of them would be brought to market again in a few months in greatly improved condition. Had I not examined into the matter, I should have left the market with an impression that, on that occasion at least, a large quantity of poor cattle was sold to be slaughtered for human food.

Lean cattle sold for fattening.

Diseased foreign cattle rarely met with.

Little, if any, of the diseased cattle sold in the London market comes from abroad. Mr. Nice has not had occasion to seize a single foreign ox during the past year. This, no doubt, arises from the strict supervision maintained over imported cattle by the professional inspectors of the Board of Customs. A return of the animals seized by the inspectors of the port of London, furnished to the General Board of Health for the purpose of this inquiry, shows that seven horned cattle were seized and condemned as unfit for human consumption between the 1st of January and 17th March 1857.* This stringency has, no doubt, an indirect beneficial influence by checking any disposition, should it exist on the part of the foreign exporter, to send unhealthy cattle from abroad.

Beneficial effect of inspecting foreign cattle.

The diseased cattle sold in the Metropolitan Live Cattle Market forms but a very small portion of the diseased cattle slaughtered in London for human food. Some is no doubt sent direct to the slaughter-houses and there disposed of, but a much larger quantity is purchased by persons who go from one cattle shed to another for the purpose of buying sick cattle. I am informed these persons buy it even when so ill as to require a cart for its conveyance from the place, and that it is usually removed at night. The animals thus obtained are taken to some of the public† slaughter-houses and killed, their flesh being disposed of to dealers who exclusively traffic in this inferior article.

Private sale of diseased cattle.

No slaughter-houses for the exclusive killing of diseased cattle.

I have been unable to obtain any satisfactory proof of the existence of any slaughter-houses especially devoted to the slaughter of diseased animals, and should think their existence doubtful. No doubt there are slaughter-houses in which a large

* For this return and also for the instructions drawn up for the guidance of the inspectors,—See Appendix, Numbers IX. and X.

† A public slaughter-house is a place where cattle not belonging to the proprietor are killed at a certain charge. They are in no sense of the term public property, or more under the control of the public authorities than private slaughter-houses.

quantity of diseased cattle is killed, but the general tendency of the evidence, I received, was to show that such animals are more or less indiscriminately slaughtered in all public slaughter-houses. It is, however, most difficult to obtain precise information on this point, for the system of inspection is much less perfect beyond the limits of the city, where probably the worst animals are killed.

Slaughter of diseased cattle for food in provincial towns.

Let it not, however, be supposed, that the slaughter of diseased animals for human consumption is confined either to the city or the metropolis. The custom is more or less prevalent in all large towns. Mr. John Summerscales, town clerk of Oldham, in evidence given by him before a Committee of the House of Lords in 1850*, mentions the existence of the practice in Oldham, and he believes in Manchester, Bolton, Ashton, and Bury; and Mr. Rawlinson, in his report to the General Board of Health on the sanitary state of Newton Heath, gives an account of the same system as pursued by the *slink-butchers* of that place. The details of the practice in Newton Heath are furnished in a letter from Mr. Joseph Taylor, surgeon, addressed to Mr. Rawlinson, as Superintending Inspector of the General Board of Health.† These butchers are there described as persons who purchase and kill diseased cows and other animals, and also buy the carcases of such animals as may have died, which they dress up for market, and dispose of wholesale, chiefly for the markets of Manchester and Salford. The meat is chiefly sold to the proprietors of stew and pie shops, but is also partially retailed to the poorer classes, at about 1½*d.* per pound. In a district of Newton Heath, called Gagg's Fields, there are many slaughter-houses of this description, at each of which from five to twenty cows per week, besides other animals, are dressed, for the food of man.

Diseased meat sent from the country for sale in London.

In addition to the diseased cattle slaughtered in the metropolitan slaughter-houses, a great deal of diseased meat is brought ready dressed for sale to London from the country. The sale of this is not exclusively confined to second-rate shops, or localities inhabited by the poor. A first-class west-end butcher, whose business lies exclusively among the wealthier classes, informs me that a good deal of what he calls *hazardous meat* is sold by respectable tradesmen. Dr. Challice, Medical Officer of Health for Bermondsey, also told me he had seized diseased meat in shops by no means of the lowest class. Other persons assert that the sale of inferior and diseased meat is on the increase from the high price of provisions: cheapness being (as was also said by Mr. Summerscales, in the evidence already referred to) so great an inducement to the poorer classes, that they risk the quality of the meat, and buy it where it can be procured cheapest. The facili-

Sale of hazardous meat not limited to second-rate shops or localities.

* Report from the Select Committee of the House of Lords, appointed to consider the operation of the Acts for the Prevention of Infectious Diseases in Cattle, &c., pp. 21, 22.

† Report to the General Board of Health on a preliminary inquiry into the sewerage, drainage, and supply of water, and the sanitary condition of the inhabitants of Newton Heath, by R. Rawlinson, Esq., Superintending Inspector. London, 1852. p. 52.

ties of transmission afforded by railways and steam-boats have tended to increase the amount of ready-dressed meat sent from the country to the metropolis. I have no means of estimating the present amount of dead meat sent to the London markets; but, in the report of the Commissioners appointed to make inquiries relating to Smithfield Market, it is said to have averaged at least 800 tons a week in 1850, and the quantity is understood still to be increasing. It is said in the same report that the number of salesmen in Newgate Market had increased, in the space of 40 years, from 13 to 200, and that the sale of dead meat had more than doubled within ten years, the amount of country killed meat having quadrupled in the like period. As the only restriction on the transmission of diseased meat to London is the danger of its seizure on its arrival in town, it is believed that a great deal of such meat is slaughtered in the country, and sent ready dressed for sale in the metropolis. Mr. John Harper, who had been for several years connected with the management of the Islington Market, asserted in evidence given before the Smithfield Market Commission in 1850, that the London market was at that time very extensively supplied with diseased meat from the country. "There are, says Mr. Harper, "three insurance offices in London, in which gra- "ziers can insure their beasts from disease; it was the practice of "one of these offices to send the insured animals dying from disease "to their own slaughter-houses, situate 160 miles from London, to "be dressed and sent to the London markets." "The diseased animals "when dead become the property of the insurance company, the "party insuring receiving two-thirds of the value of the animal, "and one-third of the salvage; or, in other words, one-third of the "amount the beast is sold for when dead."* He added, in reply to a subsequent question, that the meat was no longer consigned to salesmen in Newgate Market, but sold more privately "in the "slaughter-houses and private places out of the city."

Sale of country-killed meat increasing.

Mr. John Harper on sale of diseased meat.

Excepting in cases of long standing chronic disease giving rise to paleness of the flesh, or to general dropsy, it is often impossible to distinguish the meat of a diseased from that of a healthy animal when cut up for sale. Hence the absence of efficient inspection in many of the places from which dead meat is supplied to the metropolis affords a ready means for the disposal of unhealthy animals. It was indeed affirmed both by Mr. Fisher, inspector of meat and slaughter-houses for the City of London, and also by Mr. Pocklington, inspector of Newgate Market, that the amount of diseased meat sold in that market has of late greatly diminished. Although this may be true of the city markets, in which there is a regular system of inspection, I have reason to believe the quantity of diseased meat sold in the extra-mural portion of the metropolis is on the increase. I was likewise informed that a good deal of very inferior meat is disposed of in the vicinity of

Diseased meat sometimes difficult to distinguish.

* Report of the Commissioners appointed to make inquiries relating to Smithfield Market and the Markets in the City of London for the sale of meat. Minutes of Evidence, p. 70.

Inferior meat sold at unusual hours.

Newgate Market, particularly in Warwick Lane, and that much diseased meat is there sold early in the morning and also late on the Saturday evening. It is the habit, I am told, of many respectable tradesmen, both at Newgate and Whitechapel Markets, to let their rails on Saturday, when their own business is over for the day, to an inferior class of dealers, who sell diseased or poor meat to the humbler classes.

Ready sale for diseased and inferior meat.

It might be supposed that so inferior an article would not obtain purchasers, but for the reason of cheapness already assigned, there is no difficulty in disposing of any quantity of such meat. Mr. Harper, to whose evidence before the Smithfield Market Commissioners I have already referred, said he was certain "that if 100 carcases of cows were lying "dead in the neighbourhood of London, he could get them all "sold within twenty-four hours," no matter what the complaint of which they had died.

Sale of diseased meat for sausages, soup, and pies.

A much greater quantity of diseased and inferior meat is sold in a manufactured form than is disposed of as joints for cooking. Much meat that is diseased and otherwise unsaleable is sold for sausage meat. Dr. Challice, medical officer of health for Bermondsey, informed me he has seized diseased meat in the process of manufacture into sausages; and Mr. Fisher says, that such of the diseased cows as are too bad for sale as meat are chopped up to make German sausages and saveloys. Mr. Rowell, inspector of nuisances for Paddington, expressed a similar belief. Even putrid or at least tainted meat is said to be made available for the same purpose, pyroligneous acid being employed to remove the smell. Mr. Harper, in the evidence already referred to, says, that a great deal of diseased and bad meat is purchased by the soup-shop proprietors, sausage makers, the alamode-beef and meat pie shops, and the manufacturers of polonies. He referred to one soup shop as "doing 500*l.* a week "in diseased meat;" adding, "this firm has a large foreign trade." That the sausages commonly sold for the consumption of the poorer classes are made of inferior meat is evident from their price. Beef sausages, I am told, are commonly retailed at the rate of 4½*d.* to 5*d.* per pound, which is below cost price if they were composed of sound meat.

Efforts of the City authorities to repress the sale of unwholesome meat.

The intention of the law undefined.

It is but due to the authorities of the City of London to repeat, that great efforts are there made to check the sale of diseased and unwholesome meat. These efforts are no doubt partly frustrated from the difficulty of distinguishing diseased meat when cut into joints. Much diseased meat is also sold because of the absence of a definite understanding as to what ought to be condemned. It is, for example, by no means understood that animals suffering from pulmonary murrain are on that account unfit for food. They are therefore permitted to be sold in the live cattle market, unless the disease be in an advanced stage, and the sale of their flesh in the shops is not interfered with, so long as it looks fair and good. A return of the amount of articles seized by inspectors of slaughter-houses, in the City of London, for the two last years, with which I have been favoured

by Mr. Daw, the principal clerk to the City Commissioners of Sewers, is printed in the Appendix.* From an examination of this document it is apparent that the inspection must tend very greatly to diminish the sale of unwholesome meat within the jurisdiction of the Commissioners. It is also not difficult to infer what must be the extent of the evil, where a similar supervision is not exercised.

Varieties of unwholesome meat seized in City of London.

The returns of meat seized by the City inspectors as unfit for food include the three following classes, which are not distinguished from each other in the returns; viz.,

1, Diseased meat,
2, Putrid meat, and
3, Physic meat.

1. *Diseased meat.*

Under the first head, as already mentioned, only such meat as is derived from animals in an advanced stage of disease is included. The flesh of animals dying under accidental violence, or from other obviously local causes, is not seized. It is considered as an inferior kind of meat, looks less fair than such as has been properly slaughtered, and is liable to putrefy sooner; but not being believed to be unwholesome, is permitted to be sold.

2. *Putrid meat.*

Putrid or even tainted meat is invariably seized, and, I am informed by Mr. Fisher, constitutes by far the largest proportion of that comprised in the return.

3. *Physic meat.*

Physic meat is also invariably seized. It is meat derived from animals that have taken medicine in sufficient quantity to impregnate the flesh with its odour. Some judgment is often required to decide whether the smell is from medicine or food, certain kinds of food, such as turnips, tainting the flesh with their special smell.

Alleged sale of carrion.

Whilst my inquiry was in progress, I was informed that the carcases of oxen that die on their passage from Hamburg and other foreign ports, thrown into the river at a particular point, are picked up by a certain class of butchers, dressed, and sent to the dead meat market. I have been unable to verify the precise fact referred to by my informant, but have ascertained that three persons were charged at the Mansion House on October 11th, 1854, with sending the carcase of a putrid ox which had been picked up in the river, off Greenhithe, to Newgate Market. The ox had been thrown overboard from the "Tiger" steam vessel, with cattle from Tonning. The prisoners were committed for trial at the Central Criminal Court, and tried on October 27th, but acquitted in consequence of asserting that they had instructed the salesman, to whom the meat was consigned, not to offer it for sale if found unfit for human food. Having received a severe reprimand from the recorder, they were liberated. As the flesh of animals that die is not forbidden to be sold, there is evidently no check to the sale of such carrion as is here referred to, provided the flesh do not come under one of the three heads of diseased meat, putrid meat, or physic meat.

* Appendix, No. VIII.

III. The Effects on Human Health of consuming the Flesh of diseased Animals.

Absence of satisfactory data.

III. *The effects on human health of consuming the flesh of diseased animals.* I have been unable to ascertain that eating the flesh of animals that have suffered from pulmonary murrain produces any injurious consequences on human health. As, however, animals suffering from other diseases are also sent to the shambles, it is necessary to refer more generally to the subject of diseased meat. Much difference of opinion exists among medical men as to the effects of eating the flesh of diseased animals. Some deny the production of any injurious result from its consumption ; others assert that the use of diseased meat is unwholesome, and frequently attended with most injurious consequences. A third party say, that no bad consequences follow the use of such food, if thoroughly cooked. Perhaps this discrepancy of opinion is partly caused by different forms of disease being referred to, for although the flesh of animals that have suffered from disease may often be innocent and even wholesome, it is nevertheless possible that meat from animals that have had certain diseases may be injurious. Moreover, the flesh of animals that have suffered from particular diseases undergoes more rapid decomposition than that of healthy cattle. This was so evidently the case with that of animals which had suffered from one of the forms of murrain prevalent in this country about the middle of the last century, that Dr. Brocklesby* advises meat to be kept three or four days without being salted, as a test of its wholesomeness. "If it "remains so long in temperate weather without tainting, there "is good reason to consider it wholesome." This affords, however, no real test of the wholesomeness of meat, for the flesh of oxen that have been over-driven is also apt to undergo more rapid decomposition. Such meat is perhaps less profitable to the butcher, from the risk of loss by its spoiling prior to sale, but, if eaten early enough, it is probably not the less wholesome, the tenderness of incipient putrefaction being favourable to digestion.

That the sale of meat from diseased cattle is often a fraud upon the purchaser, must be admitted. That the flesh of animals that have suffered from chronic disease is less nutritious than that of healthy animals, is also very probable. Perhaps these two propositions comprise all that can at present be said with certainty on the subject, so far as England is concerned. It is said, that diseases prevail among horned cattle, both in America and on the Continent, which render the use of their flesh dangerous to man. Happily the diseases referred to are either altogether unknown, or extremely uncommon, in the United Kingdom. The sale of, what has been already spoken of as, hazardous meat by respectable butchers must, strictly speaking, be considered as a fraud ; because, in such cases, the meat is probably sold as a first-class

Use of diseased meat said to be injurious abroad.

Sale of diseased meat often fraudulent.

* An essay concerning the mortality now prevailing among the horned cattle, &c. by Richard Brocklesby, M.D., p. 28.

article, and fetches a first-class price. The sale of inferior and diseased meat in low neighbourhoods, and at a lower price than good meat is known to fetch, bears a somewhat different aspect, as the low price charged for the article at once bespeaks its inferior quality. Upon the whole, perhaps, whilst our knowledge of this subject remains so limited and indefinite, it is not requisite to prevent the sale of meat from animals in an early stage of such diseases as are usually met with among the horned cattle of England, the sale of the diseased organs themselves being of course excepted. On the other hand, when anasarca has occurred, or the aspect of the flesh has become materially changed by disease, no part of the animal should be permitted for sale, for it may fairly be assumed that, if such meat be not actually injurious to health, it is yet ill adapted for supporting healthy nutrition. This is the course said to be pursued by the inspectors of meat for the city of London, and it appears consistent with justice both to the public and the salesmen. It is much to be desired that a similar system of inspection should be extended to other districts. Probably such a system of slaughter-house visitation as provided for the general inspection of all animals, either before being killed, or at least prior to the removal of the viscera, would be the most effectual mode of checking the sale of meat derived from animals in an advanced stage of disease. Whilst upon this subject, it will be well to quote such opinions and facts relating to this branch of my inquiry as will serve to show the real present position of the question.

Desirableness of a general inspection of cattle and meat.

In a report on unwholesome meat, published by the Association of Metropolitan Officers of Health, it is said, "there can be "no doubt but that the use of diseased meat may be a specific "cause of illness." This remark is strictly true, in the sense in which it appears to have been used, as applied to the production of entozoa in the human subject, from eating the flesh of animals which contain the germs of these parasites. It is also said in the same report, that "instances have come under the notice of "Dr. Gibbon, Dr. Challice, and other members of the Committee, "of symptoms of poisoning arising from the use of unsound meat "partially cooked." It is further reported by the same Committee that Dr. Druitt has seen several instances of illness from eating the meat of the overfed cattle that are commonly killed at Christmas. I found, however, on inquiry of these gentlemen, that they were unable to furnish me with any specific facts on the subject. Dr. Challice, the active Medical Officer of Health for Bermondsey, has an impression that diseased meat often causes sickness and diarrhœa, but could furnish no absolute data on the subject; and the case referred to in the Report, as having fallen under Dr. Gibbon's notice, was that of a family poisoned by putrid sausage meat. Dr. Druitt, in a note which he obligingly sent me, in reply to my inquiries, says he "never saw any case of illness arise "from eating the meat of diseased animals." "At least, none that "he could identify." The cases that fell under his observation, in which the meat derived from over-fed cattle had caused illness,

Report of Metropolitan Association of Officers of Health on unwholesome meat.

Dr. Challice.

Dr. Gibbon.

Dr. Druitt.

occurred "a few years since." Dr. Druitt says he was then frequently consulted for cases in which, after partaking of such meat, the patients suffered from vomiting and diarrhœa. The sufferers usually complained that the peculiar strong taste of the fat clung to them. Dr. Druitt cites one instance, in which such illness was caused by eating the kidney of a prize Christmas sheep. It would be unsafe to draw any conclusions from such imperfect data; but if the indisposition was not in these cases chiefly due to repletion, perhaps the explanation of such occurrences might be found in the diet of the animals, and in the retention by the flesh of some strong flavour derived from that source. Taken in conjunction with the fact mentioned in the preceding section of this Report, that the flesh of animals becomes imbued with the smell and taste of medicine, or of particular kinds of diet, the information of Dr. Druitt is suggestive of the inquiry whether the mode of feeding cattle may not sensibly influence the wholesomeness of meat.

Mode of feeding may affect the quality of meat.

Opinnof Dr. Heusinger on the use of diseased meat.

In a letter to Dr. Hermann Weber, in reply to inquiries suggested by myself for my present investigation, Dr. Heusinger, of Marburg, says that he considers the flesh of all diseased animals to be unwholesome, especially when eaten underdone. Dr. Heusinger is a great authority on such subjects, and the author of a most elaborate and excellent work on Milzbrand. M. Payen,* a recent French writer on food, says it is proved by experience that the flesh of diseased animals, even when they have suffered from contagious complaints, may be consumed by man or animals without producing any toxical or deleterious effect. Baron Liebig says that the poisonous matter of the contagious fever of cattle (*typhus contagiosus ruminantium*), which is but another name for steppe murrain or *Rinderpest*, loses its power of contagion in the stomach.†

Of M. Payen.

Of Baron Liebig.

Use of diseased meat at Paris in 1814.

Large numbers of oxen and cows, suffering from a typhous epidemic, followed the allied armies to Paris in 1814. The entire population of Paris and the suburbs, including the troops that surrounded and occupied the capital, fed upon the meat of the diseased animals for two months, without any increased amount of sickness or the production of any epidemic disease.‡ None even of the animals that died were lost. M. Coze, Sen., who made extensive and precise observations upon the effect of meat derived from diseased cattle, relates that a thousand large oxen suffering from typhus were consumed by the allied and French armies, and by the inhabitants near Strasburg, in 1815.§ Many of the animals were slaughtered when actually at the point of death, and their flesh was consumed for food. Yet this food produced no disease, and did not even disorder the

Use of diseased meat at Strasburg.

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* *Des substances alimentaires, et des moyens de les améliorer, de les conserver, et d'en reconnaître les altérations*, par A. Payen, Membre de l'Institut, etc.

† Chemistry in its applications to Agriculture and Physiology. 3rd edition, p. 375.

‡ *Traité d'Hygiéne*, par Michel Lévy. Vol. ii. p. 672.

§ *Loc. cit.* p. 673; also *Mémoires de la Société Royale d'Agriculture de Paris*, vol. xx. 1817.

digestive organs of those who used it. Huzard, J. P. Frank, Parent-Duchatelet, and other writers, have expressed similar opinions. M. Huzard, perhaps correctly, designates the flesh of diseased animals as being meat of inferior quality, and not dangerous to health when cooked. He makes, however, an exception in the case of animals that have had carbuncular murrain, to which I shall presently advert.* A class called Chummars, natives of Hindostan, live upon dead meat, and are, notwithstanding, a remarkably healthy race. They say they will eat any fish, flesh, or fowl, that dies of whatever nature, only let them cook it in their own way. There is among them no particular sickness attributable to their eating tainted or diseased meat; on the contrary, they are reported to be a very healthy race of people, and when ill to suffer chiefly from the effects of drinking to excess, and from the intermittent fevers and other complaints of the climate.† M. Soumille, of Avignon, in a recently published prize essay, says that the consumption of diseased meat may be permitted without danger to health, where there is neither emaciation nor paleness of the flesh. This entire subject has not received the careful investigation in this country that it deserves, for it is surely desirable the question should be so far settled as to lead to the adoption of some uniform police regulations in regard to the sale of diseased meat.

Meat from diseased animals is of inferior quality.

Use of diseased meat in India.

Opinion of M. Soumille.

Dr. Taylor, of Guy's Hospital, in his work on poisons, says that as a general principle "we shall be justified in admitting "that the flesh, as in the *pestis bovina*, must, more or less, "partake of the diseased state of the animal, and thus be "unfitted to serve for human food." *Pestis bovina* is, however, unknown in this country, and the name is often applied indifferently to *Milzbrand* or carbuncular murrain, and to *Rinderpest* or steppe murrain.

Opinion of Dr. Taylor.

Milzbrand, as I have already said, differs in this respect from both steppe murrain and pulmonary murrain, that it is communicable to man and also to many of the lower animals during life. There is also no doubt that handling the carcase after death is very liable indeed to be the means of infection, and that tanners, butchers, and others, have in consequence very often suffered from this very fatal disease.‡ Most contradictory evidence as to the danger of eating the flesh is given by authorities apparently of equal weight. J. H. Kopp says many persons have eaten the flesh without injury, whilst others have suffered from the disease in consequence of doing so.

Supposed communication of carbuncular murrain by the use of diseased meat.

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* *Annales d'Hygiéne*, vol. x., p. 80, &c.

† Report on Small Pox, in Calcutta, and Vaccination in Bengal, by Duncan Stewart, M.D., Surgeon, E.I. Co.'s Service, Superintendent General of Vaccination, &c. Calcutta, 1844. pp. 105–110.

‡ Many examples of the kind are related in Heusinger. *Uber Milzbrandkrankheiten*, 1850.

See also Canstatt's *Bericht*, 1852, vol. vi. p. 67; Rust's Magazine, vol. xxv. p. 105; Jos. Montfils *d'une maladie fréquente, connue en Bourgoyne sous le nom de Puce Maligne. Journal de Médecine*, 1776; and, a recent paper by Professor Brauell, of Dorpat, in *Virchow's Archiv.* Vol. xi.

Montfils*, Thomassin†, Hoffner‡, Garganico§, Rust‖, and others, relate cases in which carbuncular disease, and often death, were produced by eating the flesh of animals that had suffered from this complaint. Some of the examples given appear very clear, but others are more questionable. To the latter class belongs the account given in Rust's magazine of the illness of fifty persons in Westphalia who had eaten the flesh of a cow which had died of *Milzbrand*. They all suffered from symptoms of gastric irritation, but none of them from carbuncular disease, and all eventually recovered. The recovery of the whole is opposed to the usual history of genuine *Milzbrand* produced in the human subject by contagion from animals, a large proportion of such cases proving rapidly fatal. Thomassin relates the occurrence of twenty-eight cases in the human subject in the district of Oppeln in 1834, eleven of whom died. Of thirty persons affected by the same disease in the neighbourhood of Landsberg in 1807, fifteen died. Heusinger estimates the annual deaths in Germany from *Milzbrand*, whether produced by eating the flesh or by immediate contact with the disease, at from two to three hundred, and says it is still more fatal in Italy, Hungary, and Russia. Thousands of men, he says, annually die of this disease in Europe.

Fatality of carbuncular murrain in man.

It is difficult to reconcile evidence of so inconsistent a character, unless by supposing either that the different reporters refer to different stages of the disease, or that the different result depends upon the more or less perfect cooking of the meat. Kottmann, Gesner, Osiander, and others, take the latter view of of the case, and consider the meat of animals that had *Milzbrand* as harmless when cooked. Carbuncular murrain is happily unknown in this country, but, boils and analogous affections in the human subject having increased very much during the last six or seven years, it is not impossible that sooner or later the same cause, whatever it be, which has produced them in man, may also affect the ox. Should this happen, it would become a very very important question whether the flesh of animals that had suffered severely from such an affection ought to be disposed of for food. A case quoted from the "Annali Universali di Medicina" is related by Dr. Taylor¶, in which 60 persons, who partook of the meat from a heifer which had two carbuncles on the buttock when killed, were seized with severe symptoms of gastric irritation. With one exception, all the patients recovered, under the use of simple remedies. As the flesh of animals that have suffered from such affections undergoes much more rapid decomposition than is the case in healthy animals, possibly the meat in question was in a state of early putrefaction. Coupled, neverthe-

Poisonous effect of eating the flesh of animals that have suffered from carbuncle.

* Loc. cit.
† *Diss. sur le Charbon Maligne, &c.* Basle. 1782.
‡ Aschaffenburg. 1783.
§ Rust's Magazine, vol. xliv.
‖ Magazine, vol. xxiv. p. 490.
¶ Guy's Hospital Reports. Second series. Vol. i. p. 16. Hufeland's Journal, 1815.

less, with the injurious results that are said to have so often followed eating the flesh of animals which have suffered from *Milzbrand*, this case suggests the necessity of care in regard to that of animals that have had carbuncle, until the danger or the harmlessness of eating such meat shall have been more thoroughly investigated.

Poisonous meat in America.

The cattle of a certain district in America are subject to a disease which renders their flesh poisonous to man. The subject attracted the attention of Hennipin in the last century, and was investigated afresh conjointly by Drs. Post, Hosack, and Chilton, of New York, in consequence of the occurrence of a number of cases of virulent sickness in that city in December 1842. It was found on investigation that all the sufferers had partaken of smoke-dried beef purchased from the same grocer. It does not conclusively appear whether the illness in the particular instances, which led to the investigation, might not have arisen from the meat having undergone a modified form of putrefaction; but an extension of the inquiry proved that a disease peculiar to animals exists in the districts of Indiana, Illinois, and the western states north of the Mississippi, "which has long been known to exert a "deleterious influence on all individuals of the human race who "have consumed either the flesh, the milk, or the butter of these "animals." "In the early settlement of the country the existence "of this scourge in any given locality was frequently sufficient "to break up many a community that was in other respects "most advantageously situated. The condition on which many "large settlements *exist at the present day* is, entire abstinence "from the flesh of their cattle, as well as the milk, butter, and "cheese made in their own district of country." It does not appear necessary for the animal to have the disease in order that the flesh or other product should produce the poisonous effects on man, for the milk and flesh often acquire poisonous properties whilst the animal itself enjoys good health. Perhaps, as has been suggested, the use of a particular kind of herbage, upon which, within certain limits and under particular conditions, the animal is able to feed with impunity, may render its flesh and other products poisonous to mankind.*

General considerations on unwholesome meat.

The great importance of this subject and the uncertainty with which it is beset render it perhaps not improper for me to enter briefly into the general question of unwholesome meat, and the mode in which it acts injuriously on human health. The consideration of meat rendered unwholesome by putrefactive change, or by the diet of the animals from which it is derived, is so nearly allied to that of diseased meat that it is difficult to treat satisfactorily of the one without also referring to the others. I propose, therefore, to consider them together

MODE OF ACTION OF UNWHOLESOME MEAT.

Admitting that in certain exceptional cases the disease existing in an animal at the time of its death is capable of communication

* I have been unable to procure the original Report. The above account is taken from Dr. Stewart's "Report on Small Pox in Calcutta," &c. 1844, p. 94—104, and from the "Edinburgh Medical and Surgical Journal." July 1844.

to persons who consume its flesh, unwholesome meat may evidently act very seriously on the human constitution in one of the following ways, namely :—

1. As containing parasites;
2. As containing matter directly poisonous ; whether,
   a, resulting from some peculiar food of the animals during life, or
   b, formed by decomposition after death.
3. As conveying the infection of specific brutal diseases.
4. As containing certain putrefactive ferments.

Beneficial effects of cooking.

With the exception of meat rendered poisonous by some peculiar food of the animal during life, and, perhaps, also of that which has been made poisonous by the products of decomposition after death, the effects on health must, in all these cases, be much influenced by the process of cooking. The temperature to which meat is exposed when thoroughly cooked will probably always destroy parasites, disinfect it of contagious properties, and arrest the progress of putrefactive fermentation in albuminous matters, which might otherwise be the means of setting up an analogous action in the living body.

1. Meat containing parasites.

1. *As containing parasites.* Although the introduction of parasites into the human organism by the consumption of the flesh of infected animals is a very important question, it has not formed a part of my present investigation, and may, therefore, be passed by with the brief reference already assigned to it.

2. *As containing matter directly poisonous.*

2. Meat containing matter directly poisonous:— a. resulting from the food of the animals during life ;

a. The mode of action of meat rendered poisonous from the use by the animal during life of food harmless to the beast, but deleterious to man, must depend on the special character of the poison. It may be exerted locally on the stomach, or it may be absorbed, and thus act more indirectly upon some remote organ. The well-known fact that the use of particular kinds of food and medicine influences the odour and taste of meat, and the assertion that ruminating animals can eat plants with impunity that are injurious to the human being, suggest the possibility of this mode of poisoning. If it be true, as is said, that the milk, butter, and flesh of animals inhabiting certain parts of America are poisonous, whilst the animals from which they are derived continue to enjoy good health, this supposition seems to afford the only rational explanation of the circumstance.

b. formed by decomposition after death.

b. The diarrhœa and vomiting caused by the eating of tainted or putrified meat in persons unaccustomed to its use, affords an illustration of the mode in which meat, rendered poisonous by decomposition, acts injuriously on human health. Probably the poisoning of the forty-three persons who had eaten smoked beef purchased at a particular shop in New York, in all of whom the symptoms were of a choleraic character, is referable to this class. It would be easy to cite numerous illustrations of a similar

description; but the following, related by Dr. Christison, is important, and will suffice for my present purpose.* "In the autumn of 1826, four adults and ten children "ate at dinner a stew made with meat taken from a dead "calf, which was found by one of them on the sea-shore, "and of which no history could be procured. For three "hours no ill effect followed." But they were then all seized with illness. "One person died comatose in the "course of six hours; the rest eventually got well." The meat, they said, looked well enough at the time it was used, yet the remains of the dish, which formed the noxious meal, had a black colour and nauseous smell; and some of the flesh, which had not been cooked, had a white glistening appearance, and was so far decayed that its odour excited vomiting and fainting. The only conjecture which the facts will warrant, as to the cause of the poisonous quality of the meat, is that, in consequence of having lain long in the water, the flesh had begun to undergo the adipocerous putrefaction, and that in the course of the changes thus induced the meat became impregnated with a poisonous principle.

Poisoning by decomposin veal.

3. *As conveying the infection of specific brutal diseases.* Unless we admit the complaint caused by using the flesh of the poisonous oxen of North America to arise from contagion, carbuncular murrain is at present the only disease reported, on good authority, to be propagated from brutes to man by means of the flesh when used for food. There is no doubt, from the references to continental authorities given in the preceding section, that the flesh of animals which have suffered from carbuncular murrain at the time of death is capable of communicating the infection when eaten. The only question is whether it does so when cooked. Probably a good deal depends upon the heat to which it may be exposed in the process of cooking, for whilst it is scarcely probable that a contagious poison should resist the action of an elevated temperature, it is quite possible that half-raw, underdone meat might retain its infectious properties. This is more likely to occur with roast than boiled meat, the albumen of the central portions of a roast joint very often remaining uncoagulated after the cooking is considered complete.

Meat conveying the infection of specific brutal diseases.

4. *As containing certain putrefactive ferments.* Putrid infection is a more frequent consequence of meat in an early stage of putrefaction than of that which is undergoing rapid and more perfect change. It is also very often caused by a peculiar form of the putrefactive process which arises in meat that has been imperfectly cured.

4. Meat containing certain putrefactive ferments.

At a public festival at Zurich, in the year 1839, upwards of 600 people partook of veal which was afterwards found to have

Poisoning by putrid meat at Zurich.

* Christison on Poisons. Third Edition. p. 594.
London Medical Repository. Third series, iii. 372.

been in an early stage of putrefaction. At variable intervals afterwards, nearly all those who had attended on the occasion were taken ill with symptoms akin to those of typhus fever. Many of the cases proved fatal.* The best illustration of putrid infection by means of imperfectly cured meat is afforded by the history of the well-known poisonous sausages of Germany. The symptoms of poisoning seldom begin until twenty-four or even forty-eight hours after eating the poison. In this respect the sausage poison resembles the true zymotic diseases, which have invariably an incubative stage prior to the commencement of symptoms, during which it may be presumed the exciter is communicating its peculiar condition to the fluids of the patient. After very remarkable symptoms the patient either dies between the third and eighth days, or recovers after a very tedious and protracted convalescence.† All the accounts concur in stating that the bodies of persons who have died in consequence of this poison resist putrefaction. Baron Liebig says, that there is, during life, a gradual wasting of the muscular fibre, and of all the similarly composed constituents of the body, accompanied by emaciation. Liebig attributes these effects to the inability of the stomach to arrest the decomposition in the sausages, which, entering the blood whilst still in a state of progressive change, impart their peculiar action to the constituents of that fluid. The sausages, during the decomposition of which this formidable poison is generated, are said to undergo a peculiar form of putrefaction when improperly cured. The putrefaction begin at the centre, and is not accompanied by any appreciable evolution of gas. The sausage becomes paler in colour, more soft and greasy, and is found to possess an acid reaction. Such sausages are usually eaten without any further culinary process. It is probable that thorough boiling would destroy the putrefactive process, and, if it did not remove the poison, would at least modify its mode of action. Prof. Liebig, indeed, says, that boiling water and alcohol completely destroy the poisonous properties of the sausages, without themselves acquiring similar properties. It is also worthy of mention, that Baron Liebig suggests the possession of alkaline or neutral properties, as the reason why the contagious matter of special diseases may be received into the stomach with impunity, whilst the poison of sausages, having an acid reaction, retains its dangerous properties under the same circumstances.‡

Poisonous sausages.

Reason assigned by Liebig why contagious poisons do not act when received into the stomach.

RÉSUMÉ.

The result of my investigations may be briefly summed up as follows :—

I. *Pulmonary murrain.*

I.—1. The cattle disease I was desired to investigate is not of recent origin, but has prevailed among the horned cattle of the United Kingdom for the last fifteen or sixteen years.

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* *Journal de Pharmacie et de Chimie.* August 1842. Guy's Hospital Reports, Second series. Vol. i. p. 11.

† Christison on Poisons, p. 585; also Dr. Dann *De Veneni Botulini viribus et Natura.* 1828. "Edinburgh Medical and Surgical Journal," xxxiii. p. 28.

‡ Liebig's Chemistry of Agriculture and Physiology. Third Edition. pp. 336, 337, and 375.

2. It is not peculiar to London, but is generally prevalent in country districts, and among cattle in pastures as well as in those that are exclusively stall-fed.

3. It is probably infectious, but is also developed spontaneously in consequence of some unknown peculiarities of breed, management, season, or locality, and is not supposed to have been imported into the United Kingdom.

4. It is identical with the *Lungenseuche* or pulmonary murrain now or lately prevailing in Mecklenburg, Holstein, and other continental countries.

5. It has no affinity with the disease called in Germany *Rinderpest* or steppe-murrain, with which it has been often confounded by writers in this country.

II. *Murrain on the continent.*

II.—1. Steppe-murrain is probably more highly contagious than pulmonary murrain, and is said only to originate spontaneously among cattle of the Podolian breed, and in the steppe countries of Southern Russia.

2. Steppe-murrain is probably at present not more than usually prevalent in the south-eastern countries of Europe, and has on former occasions often prevailed more extensively than now in Austria and Prussia.

3. The only probable chance of the importation of steppe-murrain into the United Kingdom is by way of Prussia. It has recently shown itself at a few places only on the eastern frontier of that country, and has in each case been speedily exterminated by the active measures adopted by the authorities to secure its extinction.

4. The regulations enforced by the authorities to exclude steppe-murrain from the Prussian territory, and to extinguish it when it is imported thither, are of so stringent a character as to render its introduction into the United Kingdom by way of Prussia unlikely.

5. Any measures which it may be considered necessary to adopt for the exclusion of this disease from the United Kingdom must necessarily be of a permanent and not of a merely temporary character, as steppe-murrain is always more or less prevalent in countries adjoining to the eastern frontiers of Austria and Prussia. Perhaps the case would be satisfactorily met if the importation of cattle were prohibited, except from countries which, as regards steppe murrain, have clean bills of health and require similarly clean bills from other countries importing to them.

III. *The sale of diseased meat.*

III.—Meat derived from animals suffering with pulmonary murrain, and probably with other diseases, is commonly and extensively sold both in London and elsewhere for human food.

IV. *The effects on human health of using the flesh of diseased animals.*

IV.—1. There is no satisfactory proof that the consumption of meat derived from diseased cattle, has in this country been productive of direct injurious consequences upon those who have eaten it.

2. There are reasons for supposing that the use of meat from animals suffering from diseases unknown among the cattle of

the United Kingdom has abroad frequently been attended with serious consequences on human health.

3. The consumption of meat undergoing decomposition has frequently been injurious, and such meat cannot be eaten with safety even when cooked.

SUGGESTIONS.

The inquiry only of a preliminary character.

In concluding an investigation which was, from the first, only designed to be of a preliminary nature, with a view to such further steps as the circumstances might render necessary, I beg, in reference to such further proceedings, to observe :—

1. *As regards steppe-murrain.*

1.—That any investigation into the nature, history, and causes of steppe-murrain, which should consist only in collecting information from the veterinarian practitioners of the countries where this disease prevails, is unnecessary, as full reports on the subject are already accessible in the writings of Lorinser and other German authors.

2. *As regards pulmonary murrain.*

2.—That if it be considered right to investigate more completely the history of pulmonary murrain and the circumstances under which it has prevailed, for the purpose of elucidating its causes and of discovering some method of prevention, the inquiries must be conducted in a much more extensive field of observation than that afforded by the cow-sheds and dairies of the metropolis and its immediate vicinity. The results of the present investigation are only of a negative character ; but they show that if any benefit is to be obtained from a further inquiry, it can only be from a systematic investigation of the disease by professional observers, skilled in the study of disease, acquainted with the management and pathology of cattle, and carried out under one general superintendence.

3. *As regards the consumption of unwholesome meat.*

3.—That the effect on human health of consuming the flesh of diseased animals has been only partially considered in the present Report ; partly from the difficulty of obtaining accurate and reliable data, but also because only a very small section of the subject fell legitimately within the limits of my commission.

Conclusion.

It remains for me now only to express my sense of the courteous and valuable assistance most cheerfully accorded to me in the course of my inquiry by every person of official position from whom I have had occasion to seek information. I am also indebted to several private individuals for valuable assistance. I beg particularly to record my obligations to my friend Dr. Whitley, Medical Registrar of Guy's Hospital, for collecting for my use many interesting facts from German authorities.

I have the honour to be,
Sir,
Your obedient servant,

E. HEADLAM GREENHOW, M.D.

APPENDIX.

No. I.

SYMPTOMS of PULMONARY MURRAIN, extracted from *Pleuro-Pneumonia among Cattle*, by GEORGE WATERS, jun., M.R. Coll. Vet. Sur.—*Journal of the Royal Agricultural Society of England, Vol. IX., pp.* 344–6.

THE first and most constant symptom of this disorder is a cough of a dry or husky character, which may continue for a greater or less period before other symptoms of a more decided nature present themselves. The frequency and severity of this cough may be influenced by circumstances: for instance, I have observed when the animal is fed exclusively upon hay, straw, &c., or when it is lodged in a close ill-ventilated hovel, or turned into a low, damp, marshy spot, the cough has become aggravated, and other symptoms of the disease have more speedily presented themselves. Again, the age and condition of the animal appear to govern its duration in this stage of the disorder: I have observed it, in young and well-conditioned animals, to continue longer than in those which are old and emaciated.

I will now inquire what modifications of the healthy sounds may be detected in the chest in this stage of the malady. In the majority of instances no morbid sounds have been discovered; but I have occasionally found a crepitation or rattling along the upper borders and bases of the lungs. In some cases the animal has been noticed to cough up now and then, and discharge by the mouth a thick mucous secretion.

I consider that the occurrence of this cough is an index to the commencement of a mild character of bronchitis, and which may exist for some time previous to the lung or pleura becoming diseased. Those symptoms which generally exhibit themselves at the time when the services of the veterinary surgeon are usually required, and which I consider indicate the second stage of the disease, are the following; for the better description of which I will instance a milch cow. If in a meadow with others, she is observed to separate herself from her companions and to be generally lying down whilst the others are feeding, with an aspect spiritless and haggard, staring coat, surface of skin rigid, and almost immoveable over the ribs, increased temperature of horns, muzzle dry, back somewhat raised, head projected forwards and inclined downwards, impaired appetite, and rumination partially or totally suspended; pulse increased in frequency and oppressed, pressure on ribs and spine produce flinching, respiration quickened, and accompanied by a peculiar grunting and grating of teeth; which symptoms of pain are aggravated upon coughing, as also upon any alteration of the position of the animal; decreased secretion of milk with alteration of colour, being usually of a yellowish cast; it sometimes coagulates when boiled; tenderness of udder and teats upon being milked; bowels costive, and, when moved, the fæces are hard and lumpy; urine scanty and paler than natural; cough short and frequent, and increased upon exertion.

Upon applying the ear gently to the sides of the chest, so as not to frighten the animal, one or other is found to be affected, and the right much more frequently than the left—sometimes, though rarely, both are implicated—but whichever lung be affected, the respiratory murmur in the other becomes louder and coarser than usual; the sound on percussion is natural.

On the affected side, if the pleura should be inflamed coincident with the lung or a portion of it, a peculiar crackling or fine crepitus is audible; this is limited to a small space in the beginning; but as the disease advances it becomes more diffused: this crepitus at first may be mingled with the ordinary respiratory murmur, which it nearly obscures; as the inflammation advances, it becomes more and more decided, until at length no respiratory murmur whatever can be heard throughout the part or parts occupied by the crackling. As the morbid action proceeds, the crepitus gradually disappears, giving place to other sounds: one of a puffing or blowing description may be heard during inspiration, as if confined to the bronchial tubes, and when the animal grunts or coughs the sound is conveyed directly to the ear. These sounds are most distinctly heard when the inflammation is confined to the upper and anterior parts of the lung, and when no effusion has taken place into the cavity of the pleura.

At the same time, and in variable spots, another symptom presents itself to the ear, viz., that of friction or rather creaking: this sound may be heard both on inspiration and expiration, but is more pronounced during the former; it is very inconstant, both as regards its duration and locality; for in-

stance, we have heard it most distinctly in one particular spot one day, when no trace of it could be detected in the same place on the following.

On striking the affected side at this stage of the complaint a dull sound is usually elicited to a greater or less extent; but this will depend upon the amount of lung that has become inflamed, and the presence or absence of fluid in the chest.

These sounds offer various modifications accordingly as the pleura or substance of the lung itself is most inflamed; thus, if pneumonia predominates, the creaking is but slightly if at all heard, and the dulness on percussion is not so flat and general; while, if a larger proportionate amount of pleurisy exists, bronchial respiration, bronchophony, and the rubbing sound may be heard, while little or no crepitation is audible; a marked difference is also observed on percussion, the dulness is more defined and dead, and principally confined to the lower parts of the chest owing to the presence of fluid, which, in all cases we have examined, has become rapidly and abundantly effused when much pleurisy existed.

Should the animal survive this state, which it seldom does, the third and last stage of the disorder now rapidly sets in, and we may be certain of its existence when we observe a death-like appearance in the aspect of the animal; the surface of the skin becomes cold and moist; coldness of horns, ears, and extremities; head still projected, with nose thrust into a corner, if in a hovel or stall; extreme restlessness; while she stands, which she frequently does, her fore-legs are placed wide apart, while her hind-legs are crossed one over the other; she is heedless of the approach of any one; respiration is rapid and intensely laborious; fœtid breath; there is a dirty-coloured viscid fluid occasionally mixed with purulent looking matter, discharged from the mouth; no secretion of milk; pulse rapid and weak, sometimes intermittent; extreme emaciation and prostration of strength, with inability to cough or swallow. In the majority of cases no sound whatever is heard on the diseased side, except a loud gurgling, which is audible at some distance; general dulness on percussion. This condition may continue for a few days, when she becomes reduced to a mere skeleton; at last her groans grow louder and more frequent; she makes ineffectual efforts to breathe from apparent suffocation; total insensibility sets in, which is quickly followed by death.

No. II.

Translation.

Pulmonary Disease in Cattle.

Peripneumonia Exudativa Contagiosa. By Dr. Warnecke, of Kiel. Inclosed in Mr. Vice-Consul Iven's Despatch of March 30th, 1857.

The malady consists of an inflammation of the parenchyma of the lungs, with considerable exudation of a plastic nature in the cellular structure. By its very contagious nature it is destructive, and has obtained the designation of malignant pulmonary disease. Whatever variety of opinions may have been published in recent times on the nature of the malady, what is stated above prevails here in the country universally. As belonging to the inflammatory class (*phlogosen*), the malady follows the character of the family, and is sthenic or asthenic, according to the constitution of the animal, &c. These modifications occur as in other inflammatory diseases (*phlogosen*). It is very difficult to make a definite diagnosis of this malady when it first happens to an animal. This is difficult for the scientific veterinary surgeon, who has much experience in the sort of disease, but far more so, even impossible, to the non-medical man.

The symptoms are the same as in the non-contagious pulmonary maladies. The premonitory symptoms are a dry, sharp cough, which in cases of feeble constitution may rather be termed a gasping (*keuchen*); the cough becomes subsequently more frequent, as in taking food, or drinking, or in moving. The beast shrinks from a pressure on the back, and it shows, by bellowing and bending down its back, the pain which this causes. The cough becomes continually worse and more painful; the breathing is accomplished with strong and short sudden movement of the flanks, *connected with a peculiar quick moaning;* the beast stands with its fore knees far out from its body; the hair is rough, dead, and without polish; the natural heat of the body is unequally distributed, and wholly gone in the extremities. The circulation is gradually more rapid, but the pulsation does not become bounding at the same time, nor hard. Auscultation shows us, by the cessation of the sound of the breath on one side, that the seat of the malady is on that side. After six to eight days the symptoms increase to their highest. The breathing becomes ex-

ceedingly difficult, and is effected with outstretched neck and head; the nostrils are dilated; the back is at the same time hollowed; the fæces are either stopped entirely, or else thin and fetid. Urine is seldom passed; it is dark, and deposits sediment. The beating of the pulse and heart continually increases in quickness. The animals get thin with extraordinary rapidity; cows in calf miscarry; in individual cases watery tumours (œdema) appear. The animal lies down, soon gets up again; it foams at the mouth in breathing; the diarrhœa is exhausting; tympanitis and meteorismus supervene; life ends.

Duration.

The duration of the malady is from two to ten days; it differs according to the constitution of the animal and the treatment.

Dissection.

In opening an animal that has died of the malady, or has been killed immediately after seizure, the muscle and fat is found but little altered. The same may be said in many cases of the posterior organs of the body. But the cavity of the chest shows us the existence of the malady there more clearly than in almost any other malady, if there had been any doubt during life. The exuded plastic stuff is found there in such large quantities that the cavity is wholly filled with it, from the mediastinum to the pleura. Such a lung will weigh from 20 to 52 lbs. Hamburg weight. If the lung be dragged out from the cavity, to which it clings with force, and cut through, the cut surface appears marbled, yellow, rose red, violet, dark red; the lung crumbles easily. Usually one lung only is attacked, while the other is healthy. In dissecting cattle that have died of the malady, if the disease did not proceed with violence, we find one lung somewhat *firmer* and harder than the other; but if the malady had gone far, and the treatment was bad, so that it was left to the healing force of nature, large capsules are then found in the lung, either empty or filled with pus. No doubt can well exist but that this pus would have brought on a renewed attack at a later period.

Ætiology (Causes).

It becomes every day more evident in this country that the pulmonary disease is not indigenous here; that it has not developed itself spontaneously here, but that it owes its presence *entirely* to contagion arising from the importation of *foreign* cattle.

Contagion.

The matter of contagion of the pulmonary disease is both fixed and fugitive; when there is no wind, the latter retains its capability of contagion within a circle of 100 paces radius, but may be carried still further by *porous* woollen stuff, &c. The fixed matters of contagion are,—the mucus from the nose, the excrements, the remains of carcases; they retain their power of contagion very long.

Treatment.

Here in this country, the question of treatment hardly ever arises, because the beasts attacked by the pulmonary disease, as well as all those that have been in contact with them, are by law slaughtered immediately. The State affords a compensation for such slaughtering of the cattle attacked by the disease, three-fourths of their estimated value; when in cutting up they are found to be healthy, then it pays the full estimated value. It is true, that this is a costly measure, but it is the most useful, as the contagion is stopped by it as far as possible. Under curative treatment, indeed, from 40 to 60 per cent. of the beasts attacked will sometimes be restored; but the danger of spreading the contagion is augmented three or fourfold. In those countries where the State pays no compensation for the losses caused by the pulmonary malady, and where consequently it does not require the cattle attacked to be slaughtered, a pure antiphlogistic method has proved to be the most advisable at the commencement of the disease, and afterwards the daily administration of from ʒi to ʒiss. ferri sulph. in three doses, in a decoction of linseed.

In regard to inoculation and its results, there has been no experience in this country.

The whole of western Holstein, the marshland especially, is at present to be considered as infected, while the eastern part has remained wholly free. The reason of this is, that the marshes are in constant intercourse, as to barter of cattle, with the Altona markets, and therefore with foreign countries, whereby a door is opened and a way made for the contagion.

Precautions.

The avoidance of contagion; the slaughter of infected beasts; the prohibition of keeping cattle by those whose cattle have been slaughtered, during ten weeks after the last case occurring; the disinfection of stalls vacated by slaughtering; the closing of infected places to all passage of cattle;

especial attention to the removal of the dung and of the remains of carcases of slaughtered beasts; and finally, undeviating severity of the law against infringement, with a strict supervision of those officials who are entrusted with the execution of the measures directed by the State to be taken against the spread of the pulmonary disease.

(Signed) D. WARNECKE,
Veterinary Surgeon to the General Cattle Insurance Company for Denmark.

Kiel, 29th March 1857.

No. III.

Translation.

REPORT respecting the PULMONARY DISEASE now prevailing among the HORNED CATTLE in the neighbourhood of HAMBURG. By G. W. SCHRŒDER, Veterinary Surgeon to the Government of Hamburg, being Enclosure No 1, in Despatch dated 1 April, 1857, from Col. HODGES, C.B., Her Majesty's Consul-General at Hamburg.

THE pulmonary disease among the horned cattle is a disease so generally prevalent that there are only few countries in Europe where it has not existed at times, more or less, and there are few veterinary surgeons, particularly in places where cattle are abundant, who are not acquainted with it from personal observation. Even in England this disease has been known in various parts during the last ten years, as appears from the reports of the English newspapers, and of the London journal, the "Veterinarian." The books written on the subject of the pulmonary disease would fill a small library. But it should not be confounded with the "Rindviehpest," *the Murrain*, as it is called in England.* Both are contagious diseases, but not akin to each other. The care and energetic measures of the Prussian government have prevented the spreading of that most dangerous disease, the "Murrain," which appears to have had its origin in the steppes of Southern Russia; for though, during the late war between Russia and Poland, several cases appeared in different districts near the Prussian frontier, the further spreading was soon stopped by the precautions taken. The pulmonary disease, as already mentioned, being generally known, I think I may limit my remarks to a short report, the more so, as the symptoms may vary in some respects, though, in general, they will be everywhere the same.

The symptoms in the first stage of the disease, from the taking or first attack, are so little peculiar, they are similar to those of any other febrile attack. In general, a slight cough may be observed for some time; then, if the disease increases, the fever augments and the respiration becomes accelerated, accompanied by violent coughing, but without throwing out mucus.

Milch cows give little or no milk at this period of the disease, and cows with young frequently slip their calves; and, on striking the breast, the places may be ascertained where parts of the lungs have already become hardened and adhere to the ribs.

In the last stage of the disease the restlessness and pain of the animal increase to the highest degree; it often lies down, but soon gets up again, and refuses to take food; knotty swellings will appear under the flanks; the dung is watery, and the belly collapses, though sometimes it swells with wind. Under these circumstances death soon takes place. On dissection water is generally found in the cavity of the breast, and one lobe of the lungs is partially or totally hard, and, if cut through, has a marble-like appearance. Other appearances on dissection are too rare to need mention here.

As to the treatment of this disease nothing satisfactory can be proposed. Various modes of treatment have been tried, sometimes with a very favourable result, but which in other cases did not succeed, and were, therefore, soon abandoned. The same may be said as to inoculation, which latterly has been highly praised by different persons; and it seems but right to await further impartial observations made during a course of years before any decisive opinion can be given with respect to the value of this proposed remedy. Bleeding, likewise, has not always succeeded, but issues and powerful embrocations on the sides of the breast have been resorted to by all veterinary surgeons. Of course, the state of the animal, and the nature of the disease, must be taken into account before applying these various remedies, which, therefore, must be attended with different results.

All proposed remedies for this contagious disease having been attended with doubtful

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* The *Rindviehpest* is the same disease as *Rinderpest*, so frequently mentioned in the foregoing Report. The term *murrain* is not exclusively used to designate any particular disease, but is applied indiscriminately to all pestilential epidemic diseases among cattle.

E. H. G.

and unsatisfactory results, nothing will avail to get rid of it, or to prevent its further spreading, but the keeping off contagion by isolation, closing the stalls where it has broken out, or slaughtering the herd of cattle of which one has been attacked by the disease. Experience shows that animals coming from such stalls, though they have been examined and found quite sound in appearance, may propagate the disease several months afterwards.

In Hamburg, therefore, a notification has been issued directing that no cattle shall be brought in if they are not accompanied by official certificates, stating that the disease in question has not prevailed for the last six months at the places whence they come.

In the neighbourhood of Hamburg, the pulmonary disease prevailed at Altona and Oltensen, in Holstein, during the whole of last year, and all exertions to get rid of it have proved in vain. At other places in Holstein the disease appears to have been got rid of. Hanover, like Hamburg, has prohibited the importation of cattle from Holstein and Denmark.

Hamburg, March 30th, 1857.

(Signed) G. W. Schrœder,
Veterinary Surgeon to the Government of Hamburg.

(Signed)
T. C. Blumenthal,
Chief of the Hamburg Police.

No. IV.

Report on the Lung Disease in Cattle. By G. P. A. Hansen, Veterinary Surgeon. Inclosed in Mr. Vice-Consul Bird's Dispatch from Flensborg, of April 6th 1857.

Nature and Infectiousness.

The lung disease is contagious, *i.e.*, it developes a power of infecting.* It attaches and extends itself not alone by material objects (such as stalls, fodder, persons, and cattle, which either come in contact or within the influence of the exhalations from the diseased cattle), but also transmits itself to a limited distance through the air. Experienced practitioners estimate the range of its influence at about 80 paces. It is generally supposed that an infected object, for example, a stall, is capable of transmitting the disease, even several months after having been used for affected cattle, and upon this point we have no particular data to go upon. The disease is often transmitted by butchers who go from one stall to another; it has also been so on an estate in the south of Holstein, by a butcher from Hamburg.

It is considered probable that the grass meadows and the water retain the power of infection for some time, but nothing certain can be said on this head.

The disease commences with general uneasiness (allgemeinleiden), and in character depends upon the nature of the attack (sthenic, asthenic), but settles sooner or later upon the lungs.

At what stage this general uneasiness (allgemeinleiden) commences, and whether during its continuance the cattle so attacked are able to infect others, is uncertain. It can, however, be proved that as soon as the disease has begun to affect the lungs it is contagious; that cattle which were removed from infected herds got the disease after 12 weeks; also that the lung disease broke out among the other beasts, in stables to which such cattle, or even convalescent cattle, were brought.

Convalescent cattle infect others several months after their apparent recovery, and they have been known to have a second attack of the disease.

The principal means by which the disease is transmitted from infected beasts are, the breath, the exhalations from the skin, and the natural excrements; and it is therefore dangerous to allow infected cattle upon the roads, &c., where healthy cattle are driven. It is possible that some beasts may have a certain predisposition for the disease, for it is certain that some beasts have been exposed to infection without really being attacked. Thus among a number of diseased beasts there may be some which remain quite healthy, and again, only one beast may be attacked out of the entire stock. Cattle can also be attacked by the disease irrespectively of infection, and it is presumed that the following are the principal causes:—Cold, dampness, marshy grazing ground, bad drinking water, spoiled fodder, ill ventilated and unclean stalls, an excessive proportion of watery food, &c. However, in Schleswig these causes are so exceptional that they could neither produce nor maintain the disease. It can be pretty clearly shown by facts that the disease has always been introduced here from abroad, *viâ* Hamburg, or Altona, and then propagated by occasional cases of infection. This is proved by its having first shown

* *Entwickelt einen Ansteckungsstoff*, developes contagious matter.—E. H. G.

itself near Altona, and by its gradual extension towards the north; by its repeated suppression and subsequent reappearance from the same quarter; and by its appearing principally in those districts where an active cattle trade exists. Thus in the year 1842 it showed itself in and near Altona; in September 1843 the importation of cattle over the frontier at Altona was prohibited, and all infected cattle were killed; after some years the disease was entirely suppressed.

In 1847 it appeared for the second time in the neighbourhood of Altona; in 1849, 1851, it again showed itself there, extending to Pinenberg, Uetersen, and other places in the south of Holstein.

In some of the cases it appeared probable that the disease had been introduced by cattle imported from Hamburg, and in one case by a Hamburg butcher. In 1851 it extended to some few places in the south of Schleswig; Husum, Bredstedt, Lügumkloster, Tondern, Flensborg, and unto two miles (nine English) from Flensborg; subsequently also near Eckenfiorde (Altbulk and Birkenmoor), but soon vanished entirely from here in consequence of the stringent regulations adopted. In 1853 it was quite gone.

Altona and the south of Holstein were the districts where the disease again became prevalent in 1856, and it then extended also to the Holstein marshes. In February 1857 it appeared for the second time in the Eiderstedt district, though only on two or three estates, but was again lost sight of on the re-introduction of the Government regulations. Even in Holstein the disease has never been general; for example, during the summer half year of 1856, only 180 beasts were killed, and those for the most part merely suspected cattle.

The Symptoms.

The symptoms of the disease depend upon the degree of its development, and are passed through sometimes quickly, sometimes slowly; sometimes it shows itself lingeringly, sometimes violently, sometimes with evidences of violent fever, &c., sometimes without. Its first appearance is made known by a loud hard cough, which often appears to leave off periodically, returning with greater violence; then becoming more painful, shorter and drier; fever sets in; the hair stands up on the belly and back; the breathing gets quicker, amounting to gaspings interrupted by cough; the appetite becomes changeable; and the fore legs are placed wide apart. These symptoms shortly increase in intensity; pregnant cows miscarry; a violent diarrhœa takes place; and in a few days the beast dies of suffocation.

Sometimes the disease does not go so far, but slowly becomes milder, and, after some weeks, appears to be gradually passing away. Beasts which thus have the disease do not thrive for a very long time after. The symptoms are not sufficiently peculiar to establish the existence of the lung disease, except to a veterinary surgeon, for the same symptoms appear in cases of inflammation of the chest and lungs, lung apoplexy, dropsy in the chest, French sickness (perlseuche), &c. A more decisive proof is given, if several beasts of a herd sicken at or about the same time; and especially by the condition of the lungs after death, for in this disease the lungs assume a very remarkable appearance. The chest, lungs, and various parts of a cow's lung are enveloped in the same serous covering, the breast skin (pleura?).

As the seat of the disease is at this part, there are here shown the symptoms usual in all cases of inflammation, viz., the sweating out of a plastic lymph. The inflammation, however, very rarely extends over the whole breast skin, but is generally confined to a space about as large as a fist, invariably beginning in the lung itself.

On this account a section of such a diseased lung always has a marbled appearance—dark red to grey being produced by the colour of the lung, and yellow and bright red by the colour of the lymph and of the lung skin. No other disorder in the lungs causes such an appearance; and this may therefore be assumed as a decisive symptom of the lung disease. Sometimes, also, the lung becomes enormously heavy (the lung of one side weighing 20 to 50 lbs.); the lung grows fast to the coat of the ribs; water overflows into the windpipe; and boils may be present in the lungs, but are not characteristic.

The disease is not contagious for human beings or for any other animals, and the flesh of even diseased cattle is wholesome, the sale of such flesh being permitted by the Danish government, if it is otherwise fit for food. Thus at Altbülk in 1852 the flesh of 117 infected cattle was sold by auction to butchers. The degree of disease can only be determined by the extent of the inflammation in the lungs. Sometimes it appears with no other perceptible symptoms than a stubborn cough, erection of the hair on the belly and back, bad condition and reduced secretion of milk, leaving the beast after six weeks to 12 weeks in perfect health; at other times it runs its course in four to eight days, and is most violent in its operations.

Prevention.

Those who are acquainted with the nature and danger of the disease will be in no doubt as to the best means of preventing it. Wherever it has not become general, an [inspection and physicking proves but a poor prevention:*]—1st. Because the danger of infecting other herds is always very great unless the communication both with man and beast is entirely cut off. 2nd. Because such an [inspection] of considerable herds is attended with great expense and loss. 3rd. Because a large proportion of the herd would nevertheless be sacrificed. And, 4th. Because a perfect cure cannot possibly be effected in less than four to six months. Therefore, the course adopted by the Danish government appears the best adapted to suppress and prevent the disease, namely, immediately to kill all affected cattle, and temporarily to isolate those suspected. With respect to the removal of diseased beasts, it should only be allowed on such roads where it can be proved that during six weeks, in a circle of half a mile (2¼ Eng.), the lung disease has not appeared.

With respect to healthy cattle, immoderate exertion, spoiled fodder, bad water, too close packing in vapouring stalls, unclean iness in the stalls (the dung not being removed), and also bedding the cattle on wet straw, must be carefully avoided; when cattle are at grass on marshy cold land, a watchful eye should be kept on the beasts, and the surface water should be carried off by ditches, drains, &c. The most effective means of preventing the spread of the disease in Schleswig is, however, undoubtedly the prohibition of the import of cattle from Holstein to Schleswig; for notwithstanding that this must necessarily cause great injury to the trade and the graziers, experience has clearly enough shown us that the disease has always come from the south; and it is my conviction that by rigorously maintaining the prohibition the disease will soon be banished from Schleswig.

Extirpation.

The Danish government by its present prohibition has shown us the best way to drive out this disease. The regular course of the Danish cattle trade is from north to south,—from Jutland and Schleswig to Holstein and to foreign countries. Hamburg, however, is a market where meat and cattle are collected from all parts, forming, therefore, a hot-bed for the disease as long as it exists; and by the intimate connexion of Hamburg with Altona the disease is started northwards and spreads to Holstein. If, therefore, the intercourse with cattle is entirely cut off at the most northerly part of the country, and where the disease does not exist, the danger of a general extension cannot be great. In districts where the disease is not general, it is also proper to kill all diseased and suspected cattle immediately, for the compensation is insignificant when compared with the damage which might be occasioned; by a general extension of the disease 50 to 80 per cent. are usually lost. A cure should only be attempted under circumstances where a further spread of the infection is scarcely possible; the means then recommended are a strong antiphlogistic; and according to Kœnig, strong doses of iron vitriol repeated daily; and according to Leer, homœopathic doses of phosphorus. The best means, however, are to be found in the police regulations, and in cutting off all communication with dangerous places.

Gerlach says,—The lung disease always yields to police regulations; whole districts as well as individual farms, where the disease had existed for several years, have invariably been freed from it within a twelvemonth on the prescribed measures being rigidly carried out. Inoculation can be tried as a preservative in districts where the disease is very prevalent. The results are reported to have been as follows: out of 6,864 head on which it had been tried, it succeeded in 5,434 cases, and had no effect in 1,430 cases; 113 head died in consequence of the operation, and 118 head of the lung disease; in this country it has not been tried, and the data we at present possess are insufficient to lead to any definitive conclusion.

Police Regulations in Denmark.

The Danish government has always endeavoured to prevent the importation of cattle from the south *viâ* Hamburg, &c., and in this country the most energetic means (such as killing all diseased and suspected cattle) have been adopted for the suppression of the disease. These means have also succeeded so far as to prevent the disease becoming general, and even repeatedly to get rid of it entirely; but it has always returned when the regulations have been relaxed.

On its first appearance in the year 1852, the authorities issued a circular, dated

* The translator appears to have read *Durchseuchung* as *Durchsuchung*, or otherwise to have misunderstood this paragraph. The meaning of the original in the first sentence is, that *the spread of the disease is not prevented by letting the murrain run its course under medical treatment in the herds first attacked*; but, for the reasons specified, must be prevented by the more decided measure of sacrificing the affected cattle. —E. H. G.

July 5th, which still remains in force, and is as follows :—

1st. All persons, amongst whose cattle appear such symptoms as may be assumed to be symptoms of the virulent lung disease, are hereby strictly enjoined immediately to separate from the herd all those beasts which appear affected. Notice of the case must then be given to the veterinary surgeon of the district, and also to the parish bailiff. The symptoms of the virulent lung disease, as above referred to, consist of a hoarse cough, which gradually increases, and more especially shows itself after the beast has drunk or been in motion, a reduced appetite, slow rumination, reduced smoothness of the coat, the hairs bristling up in various places, and lastly, when the above symptoms have lasted some time, fever sets in.

2dly. If the notices are not duly given as prescribed no claim for compensation will be allowed, and a fine of from 10 to 50 Rdlrs. (1*l.* 2*s.* 6*d.* to 5*l.* 12*s.* 6*d.*) will be inflicted.

3dly. All cattle exhibiting symptoms of the lung disease shall be valued by the proper authorities and at once killed under the inspection of the district veterinary surgeon. The same course may also be adopted by the authorities as respects even suspected cattle, in cases where there is great danger of the disease spreading. After the beast has been killed, it shall be opened by the veterinary surgeon, and if it is found to have had the disease, the owner shall receive two-thirds of its declared value as a compensation; if not diseased, the full value shall be paid. The beast shall then, upon the veterinary surgeon's order, be buried with skins, entrails, &c., &c., at a depth of three to four feet, in some unfrequented spot.

4thly. Beasts which fall ill without exhibiting symptoms of the lung disease must for a time be carefully separated from the remainder of the herd, and be subjected to the veterinary surgeon's inspection.

5thly. Beasts which have had the disease, or which have stood or grazed with diseased beasts, are regarded as suspected, and must be subjected to the veterinary surgeon's special inspection. Such suspected cattle must be kept carefully separated, and cannot be regarded as healthy until 12 weeks have been passed without any appearance of the disease.

Beasts which have had a violent attack of the disease must not be put with healthy cattle until 18 weeks from the date when the illness began.

6thly. Every stall or other place where diseased or suspected beasts have stood, also all articles which may be suspected to retain the infection, must be carefully cleansed with boiling water, under inspection of the veterinary surgeon, and then repeatedly rinsed with a mixture of chloride of lime and water, or be subjected to the influence of steam from chloride of lime.

All iron-work must be made red-hot. Such places and articles must not be used for healthy cattle until the expiration of six weeks from the prescribed cleansing. Attendants upon diseased or suspected beasts must not approach healthy cattle; in cases where this cannot by any means be avoided such persons must scrupulously follow the instructions which will be given by the veterinary surgeon.

7thly. Grass lands on which diseased or suspected beasts have grazed must not be used for healthy cattle until the expiration of six weeks from the date when they were last grazed off. Fodder which has been exposed to infection must not be used for horned cattle, but it is harmless for other animals.

8thly. The fences and ditches round fields and fens where diseased or suspected cattle have stood must be carefully maintained in order to prevent infection of other beasts. If the fields and fens which are used for diseased or suspected cattle adjoin roads or other grass lands, proper means must be taken to prevent the cattle getting within a distance of 25 feet from such roads or other grass lands. If the suspected cattle are driven every day to and from the field, they must not be so driven upon roads used for healthy beasts. In fact, the removal of suspected cattle should, if possible, be avoided, and a fold be erected for them in the field.

9thly. Bulls which have served cows in suspected herds must not be allowed access to healthy herds.

10thly. The sale of infected beasts is not allowed; suspected beasts must not be sold, except by written permission of the authorities, and under strict observance of the precautionary measures which will be given by them. Owners of diseased or suspected beasts must scrupulously carry out the instructions given respecting them by the police authorities and by the veterinary surgeon.

Infringements of the regulations will be visited by fines of from 10 to 100 Rdlrs. (£1 2*s.* 6*d.* to £11 5*s.* 0*d.*)

These regulations also apply to such persons as have the care of cattle at grass, in all cases where the owner resides at a distance.

Other circulars have been issued, but they are of less importance, and in fact most of them have been recalled. With respect to the sale of the flesh of diseased beasts, the

following regulations were resolved upon at Altbülk.

1st. The flesh shall be salted at once, and laid in well-closed tubs.

2ndly. The flesh must not be used until Professor Ischerning shall have inspected and declared it fit for human food. A special payment shall be agreed upon for the hide and tallow of the beasts whose flesh cannot be eaten.

3rdly. The hides shall be salted on the spot, and sent to the tanners in closed tubs.

4thly. The slaughtering and the curing of the meat, &c., shall be effected as soon as possible after closing of the bargain, and at latest within 14 days.

The buyer shall defray all expenses.

5thly. The buyer shall carry out the instructions given by Professor Ischerning and Veterinary Surgeon Martinsen. The persons who have been employed at the slaughtering, the curing of the meat, &c., shall change their clothes when they leave the place where these processes are performed. The buyer shall give approved security for the payment, which shall be made to Baron von Plessen, upon delivery of the cattle to the slaughterers.

Flensborg, 1st April 1857.

(Signed) G. P. A. Hansen,
Veterinary Surgeon.

(True Translation.)

Flensborg, 6th April 1857.

(Signed) Edward Bird,
British Vice-Consul.

No. V.

Résumé Général des Expériences de la Commission Scientifique de la Péripneumonie.

Extracted from "*Rapport Général des travaux de la Commission Scientifique Institutée près le Ministère de l'Agriculture, du Commerce, et des Travaux Publics, pour l'Etude de la Péripneumonie Épizootique du Gros Bétail.*" pp. 72, 82.

La commission scientifique de la péripneumonie a institué deux séries principales d'expériences ayant pour but :

Les premières de rechercher l'influence que peut exercer sur l'organisme des animaux sains de l'espèce bovine leur cohabitation avec des animaux malades de la péripneumonie ;

Les deuxièmes d'étudier les effets de l'inoculation de la péripneumonie sur les animaux sains de l'espèce bovine, et surtout de reconnaître si les animaux, inoculés avec le liquide extrait des poumons d'une bête affectée de cette maladie, acquéraient par ce fait le privilége d'une immunité qui les mît à l'abri de la contagion.

Voici le résumé de ces deux séries d'expériences, et les conclusions auxquelles elles conduisent :

A.—*Expériences sur la Cohabitation.*

La commission, en instituant ces expériences, s'était proposé la solution des questions suivantes :

1° La péripneumonie épizootique du gros bétail est-elle susceptible de se transmettre, par voie de cohabitation, des animaux malades aux animaux sains ?

2° Dans le cas où la contagion de la péripneumonie s'opérerait par cette voie, tous les animaux de l'espèce bovine qui vivent dans un foyer d'infection, contractent-ils la maladie, ou en est-il qui resistent à l'influence contagieuse ? Dans ce dernier cas, quelle est la proportion des animaux qui deviennent malades et des animaux qui restent sains ?

3° Parmi les animaux qui contractent la maladie, combien récupèrent leur santé et dans quelles conditions ?

Combien succombent par la maladie ?

4° Y a-t-il des animaux de l'espèce bovine qui soient décidément réfractaires à la contagion de la péripneumonie ?

5° Les animaux de cette espèce sont-ils préservés à l'avenir des atteintes de la péripneumonie, lorsque à la suite d'une première cohabitation ils n'ont présenté que les symptômes d'une indisposition légère, caractérisés principalement par une toux plus ou moins persistante ?

6° Les animaux qui ont contracté une première fois la péripneumonie, ne sont-ils plus susceptibles de la contracter de nouveau ?

Pour obtenir la solution de ces questions la commission a soumis à différente, épreuves de cohabitation 46 animaux de l'espèce bovine, parfaitement sains, et dans de telles conditions de provenance qu'ils n'avaient jamais été exposés à l'influence du contact d'animaux atteints de la péripneumonie.

Ces 46 sujets d'expérience ont été répartis ainsi qu'il suit :

20 à la Pomeraye (première expérience) ;
2 à Charentonneau (deuxième expérience) ;

13 à Maisons-Alfort (troisième expérience) ;
11 à Charentonneau (quatrième expérience) ;
Sur ce nombre, 21 animaux ont paru réfractaires à la contagion, dans une première épreuve de cohabitation ;
10 ont éprouvé une indisposition passagère ;
15 ont contracté la maladie.

Total - - 46

Sur ces 15 malades de la péripneumonie, contractée par cohabitation, 11 sont guéris et 4 sont morts.

Conséquemment, le nombre des animaux réfractaires, en apparence, à une première épreuve de cohabitation, s'élèverait,
à 45,65 pour 100.
Celui des animaux indisposés,
à 21,73 pour 100.
Celui des animaux malades et guéris,
à 23,91 pour 100.
Celui des animaux morts,
à 8,69 pour 100.

Mais si, au lieu de s'en rapporter aux apparences extérieures des animaux exposés à la cohabitation, on prend en considération les résultats donnés par les autopsies, qui ont démontré que 6 des 11 animaux, mis en expérience à la ferme de Charentonneau (quatrième expérience), avaient contracté la maladie, on voit qu'il faut compter 6 animaux en plus, comme malades par suite de la cohabitation, et 6 réfractaires en moins, ce qui donne, en définitive, les résultats suivants :

15 réfractaires - -	32,61 pour 100.
10 indisposés - -	21,73 pour 100.
17 malades guéris	36,95 pour 100.
4 morts - - -	8,98 pour 100.
46	100,27

Sur les 42 animaux qui ont été exposés aux premières épreuves de cohabitation faites à la Pomeraye et à Charentonneau, et qui en sont sortis avec leur santé sauve ou recouvrée, 18 ont été soumis une deuxième fois aux mêmes épreuves, et sur ces 18, 4 une troisième fois.

Ces 18 animaux se décomposaient ainsi qu'il suit :

5 avaient contracté la maladie à la suite de la première cohabitation et en étaient guéris ;

9 étaient demeurés réfractaires à une première influence contagieuse ;

4 n'avaient été qu'indisposés par suite de la première cohabitation.

Quant aux 4 animaux qui furent soumis à la troisième expérience de cohabitation, ils faisaient partie de la catégorie de ceux qui avaient contracté la maladie par le premier contact, et qui en étaient guéris.

Aucun des 18 sujets soumis à ces nouvelles épreuves, dans ces conditions, ne contracta la péripneumonie et ne présenta même les plus légers symptômes d'indisposition.

De résultats de ces expériences de cohabitation, la commission a tiré les conclusions suivantes :

Conclusions.

1° La péripneumonie épizootique des bêtes à cornes est susceptible de se transmettre par voie de cohabitation, des animaux malades aux animaux sains de la même espèce.

2° Tous les animaux exposés à la contagion par cohabitation ne contractent pas la péripneumonie ; il en est, parmi eux, qui demeurent complétement réfractaires à l'action contagieuse, et d'autres qui n'éprouvent, sous son influence, qu'une indisposition légère et de peu de durée.

3° Parmi les animaux qui contractent la maladie, les uns guérissent et récupèrent après leur guérison toutes les apparences extérieures de la santé, et les autres succombent.

4° Les animaux qui ne présentent que des symptômes d'une indisposition légère à la suite d'une première cohabitation, paraissent préservés par ce fait, à l'avenir, contre les atteintes de la péripneumonie.

5° Les animaux qui ont été atteints une première fois de la péripneumonie, ne paraissent plus susceptibles de la contracter de nouveau,

Telles sont les conclusions générales que la commission s'est crue autorisée à déduire de ses expériences sur la contagion par cohabitation. Quant aux questions de savoir quelles peuvent être, dans un troupeau soumis à l'influence de la contagion, les proportions relatives des animaux qui demeurent réfractaires à son action ; de ceux qui deviennent indisposés ; de ceux enfin qui contractent la péripneumonie, et parmi ces derniers quel est le rapport des morts aux guérisons, la commission n'a pas pensé avoir réuni un assez grand nombre de faits, pour formuler une conclusion qui fût l'expression absolue de ce qui se passe dans les conditions habituelles de la pratique. Elle a dû se borner à énoncer ici les chiffres qui résultent de ses expériences particulières.

D'après le relevé de ces expériences, 45 animaux sur 100 ont contracté la péripneumonie par le fait de la cohabitation, et 21 ont éprouvé une indisposition légère ; ce qui fait, en résume, 65 animaux qui ont ressenti l'influence contagieuse à des degrés divers, et 32 qui s'y sont montrés réfractaires.

La proportion des animaux qui ont récupéré toutes les apparences extérieures de la santé, après avoir contracté la maladie, a été de 83 pour 100 des animaux malades, et celle des sujets qui ont succombé a été de 17 pour 100.

B.—*Expériences sur l'Inoculation de la Péripneumonie.*

Les questions que la commission s'était proposé de résoudre par ses expériences sur l'inoculation de la péripneumonie, étaient les suivantes :

1° La péripneumonie est-elle susceptible de se transmettre aux animaux sains par l'inoculation du sang, de la bave, de la matière de l'écoulement nasal, et des matières excrémentitielles provenant d'animaux affectés de cette maladie ?

2° Les animaux sains que l'on a soumis à l'inoculation de l'une ou de l'autre de ces substances, ont ils contracté, par ce fait, une immunité à un degré quelconque, contre l'influence contagieuse de la maladie ?

3° La péripneumonie est-elle susceptible de se transmettre, avec sa forme et ses symptômes caractéristiques, aux animaux sains de l'espèce bovine, par l'inoculation du liquide extrait du poumon d'une bête malade de cette maladie ?

4° Dans le cas où l'inoculation de ce liquide ne déterminerait pas sur les animaux sains une répétition exacte de la forme et des symptômes de la maladie inoculée, comme cela se remarque à la suite de l'inoculation de toutes les maladies contagieuses, quels sont les phénomènes locaux ou généraux qui en sont la conséquence ? Dans quelles proportions et avec quels caractères plus ou moins graves d'intensité ces phénomènes se traduisent-ils ? Combien d'animaux succombent aux suites de l'inoculation ? Combien récupèrent la santé après avoir été soumis à son épreuve, et dans quelles conditions ?

5° Les animaux de l'espèce bovine soumis à l'épreuve de l'inoculation du liquide pulmonaire, acquièrent-ils par ce fait, le privilége de résister à la contagion de la péripneumonie ?

Les expériences faites pour résoudre la question de la contagion de la péripneumonie par l'inoculation du sang, de la bave, du mucus nasal, etc.—n'ayant porté que 6 animaux, la commission n'a pas pensé qu'elles fussent assez nombreuses pour servir de base à une conclusion quelconque, aussi ne les a-t-elle fait enregistrer dans ce compte rendu que pour mémoire. Toutefois, la commission a cru devoir signaler ici cette circonstance, que les 2 vaches qu'elle a fait inoculer avec le mucus nasal, et qu'elle a soumises ensuite à lépreuve de la contagion par cohabitation, n'ont pas contracté la péripneumonie.

Les expériences d'inoculation du liquide extrait des poumons d'une bête affectée de la péripneumonie, ont été faites sur 54 animaux parfaitement sains, et dans de telles conditions de provenance, qu'ils n'avaient jamais été exposés à la contagion de la maladie.

En voici le résumé :

Des 54 sujets inoculés, aucun n'a contracté la péripneumonie par le fait de l'inoculation.

Sur 33, les effets de l'inoculation ne se sont traduits que par une inflammation légère et très-circonscrite ;

Et sur 21, cette inflammation, consécutive à l'inoculation, a été très-grave, très-étendue, et s'est compliquée de phénomènes gangréneux, dont les conséquences ont été mortelles pour 6 des sujets inoculés.

Conséquemment, le nombre des animaux sur lesquels l'inoculation a été bénigne, s'élève à - - - - 61,11 p. 100

La proportion de ceux dans lesquels la gangrènes s'est déclarée à la suite de l'inoculation et a déterminé la chûte de la queue, est de - - 27,77 p. 100

Et enfin, celle des morts est de - - - 11,11 p. 100

Donc 88,88 sujets sur 100 sortiraient des épreuves de l'inoculation avec leur santé sauve ou recouvrée, et 11,11 succomberaient à ses suites.

Des 48 sujets sortis sains ou saufs des épreuves de l'inoculation, 2 sont morts d'accidents étrangers à cette opération et 34 ont été exposés pendant une période de cinq à six mois à l'influence directe de la contagion par cohabitation, avec 24 sujets de même provenance non inoculés, devant servir de termés de comparaison.

12 animaux inoculés, qui avaient été placés dans une étable à part pour être utilisés à des expériences ultérieures, ne furent pas exposés au contact direct d'animaux malades de la péripneumonie, mais ils furent pansés par le même vacher qui était chargé du soin de ces malades.

Sur ces 46 sujets inoculés, un seul (soit 2 pour 100), habitant l'étable non contaminée, contracta la péripneumonie, tandis que sur les 24 animaux non inoculés, servant de termes de comparaison, qui furent soumis à l'influence directe de la contagion, en même temps que 34 des sujets inoculés, 14 (soit 58 pour 100), avec ou sans symptômes apparents, ont ressenti l'influence contagieuse.

Des résultats de ces expériences sur l'inoculation de la péripneumonie, la commission a tiré les conclusions suivantes.

1° L'inoculation du liquide extrait des poumons d'une bête bovine, malade de la péripneumonie, ne transmet pas aux animaux sains de la même espèce auxquels on la pratique une maladie semblable, tout au moins par son siége, à celle d'où procède le liquide inoculé.

2° Les phénomènes appréciables, consécutifs à l'inoculation, sont ceux d'une inflammation locale, légère et circonscrite au lieu de l'inoculation, sur un certain nombre des sujets inoculés; grave, diffuse, accompagnée d'une réaction générale, proportionnelle à l'intensité de la réaction locale, et la compliquée d'accidents gangréneux sur un autre nombre des animaux inoculés, pouvant enfin se terminer par la mort pour quelques-uns de ces derniers.—(Dans les expériences de la commission, l'inoculation a été benigne dans ses effets sur 61 pour 100 des sujets inoculés; grave et compliquée d'accidents gangréneux sur 38; mortelle pour 11. 88 sujets, sur 100, ont donc récupéré leur santé après l'inoculation; 61 sans présenter des traces apparentes de l'opération qu'ils avaient subie, et 27 avec des lésions extérieures locales, plus ou moins étendues et accusées, suivant l'intensité des accidents gangréneux auxquels l'inoculation avait donné naissance.)

3° L'inoculation du liquide extrait des poumons d'un animal malade de la péripneumonie possède une vertu préservatrice; elle investit l'organisme du plus grand nombre des animaux auxquels on la pratique d'une immunité qui les protège contre la contagion de cette maladie, pendant un temps qu'il reste à déterminer, mais qui dans les expériences rapportées plus haut n'a pas été moindre que six mois.

— Si maintenant, pour apprécier la valeur économique de l'inoculation dont l'expérience directe démontre les propriétés préservatrices, on voulait comparer les résultats que sa pratique a donnés dans les différents essais rapportés plus haut, avec ceux qui ont été fournis par toutes les expériences de cohabitation relatées dans ce compte rendu, voici les conclusions auxquelles ce rapprochement conduirait :

Du relevé statistique des expériences faites par la commission, il résulte d'une part :

Que sur 100 animaux de l'espèce bovine exposés à l'influence de la contagion par cohabitation,

32,61 sont épargnés, et

21,73 n'éprouvent qu'une indisposition passagère et de peu d'importance pour leur santé; considérable cependant, en ce sens favorable, qu'elle les prémunit à l'avenir contre les atteintes du mal;

Soit en tout 54,34 sujets, sur lesquels les effets de la cohabitation sont ou tout à fait nuls ou très-légers;

45,65 sujets contractent la maladie à un degré plus ou moins intense;

35,95 en guérissent, et

8,69 succombent aux suites de la maladie.

D'autre part, il résulte des expériences d'inoculation faites par la commission, que sur le même nombre 100 d'animaux soumis à l'épreuve de cette opération :

61,11 n'en éprouvent que des effets très-bénins; qu'elle est plus ou moins dangereuse, ou tout à fait nuisible par ses suites, pour 38, 88 sujets;

Que sur ces 38,88 sujets, 27,77 guérissent après avoir éprouvé des accidents gangréneux plus ou moins graves, et 11,11 succombent par suite de ces accidents gangréneux.

Le tableau suivant présente, en regard, les résultats chiffrés donnés par les deux expériences d'inoculation et de cohabitation faites par la commission :

COHABITATION.		INOCULATION.	
Le nombre des sujets d'expérience étant supposé	100	Le nombre des sujets d'expérience étant supposé	100
La cohabitation serait ou nulle dans ses effets, ou très-bénigne pour	54,34	L'inoculation serait bénigne pour	61,11
Et plus ou moins nuisible pour	45,65	Et plus ou moins nuisible pour	38,88
Dans ce dernier chiffre, la guérison serait représentée par	36,95	Dans ce dernier chiffre, la guérison serait représentée par	27,77
Et la mort par	8,69	Et la mort par	11,11
En résultat définitif, le nombre des animaux sortis des épreuves de cohabitation avec la santé *sauve* ou *recouvrée* s'élèverait, d'après ce relevé, au chiffre de	91,21	En résultat définitif, le nombre des animaux sortis des épreuves de l'inoculation avec leur santé *sauve* ou *recouvrée* s'élèverait, d'après ce relevé, au chiffre de	88,88
Et celui des morts à	8,69	Et celui des morts à	11,11

Le premier fait qui ressort de ce rapprochement, est que l'inoculation a causé une mortalité plus grande que la maladie dont elle avait pour but de prévenir les ravages.

En outre, il faut considérer que les animaux qui ont résisté aux accidents gangréneux consécutifs à la l'inoculation, ont perdu une grande partie de leur valeur vénale après leur guérison, parce qu'ls n'ont pu recouvrer leur santé qu'après un long temps de souffrance qui les a beaucoup amaigris, et qu'ils demeurent à jamais tarés et d'une manière difforme, par la perte d'une partie plus ou moins étendue de leur queue; tandis que, au contraire, les vaches qui, dans les expériences de la commission, ont contracté la péripneumonie et en sont guéries, ont récupéré à peu pèrs leur valeur après leur guerison, la maladie n'ayant laisse

sur elles aucune trace extérieure appréciable, et n'ayant pas sensiblement modifié, par son influence, l'aptitude des animaux soit à la lactation, soit à l'engraissement.

Mais il est juste de dire, pour faire entrer en ligne de compte tous les éléments de la solution impartiale de cette grave question, que le plus grand nombre des animaux qui récupèrent les apparences de la santé après avoir contracté la péripneumonie ne guérissent pas complétement de cette maladie. Dans l'immense majorité des cas, ainsi qu'en témoignent les autopsies faites par la commission, une partie de leurs poumons, plus ou moins étendue suivant l'étendue de la maladie primitive, reste frappée d'une véritable mortification. Cette lésion demeure isolée, il est vrai, au milieu du reste de l'organe conservé parfaitemen t sain ; il s'opère autour d'elle un travail remarquable de séquestration, en vertue duquel toute communication est interceptée entre les conduits aériens et la partie mortifiée qui échappe ainsi à la décomposition putride, et c'est ce qui explique comment une lésion de cette nature peut, malgré sa gravité apparente, n'être pas incompatible pendant un assez long temps tout au moins, avec la conservation des aptitudes de l'animal à l'engraissement et à la lactation ; mais ce mode de terminaison de la péripneumonie ne peut pas, après tout, être considéré comme une guérison, dans le sens rigoureux du mot, et en définitive il est juste de dire que si, au point de vue économ que, le plus grand nombre des animaux qui récupèrent la santé après avoir contracté la péripneumonie, n'éprouvent pas dans leur valeur vénale de dépréciation notable, ils n'en sont pas moins atteints de lésions assez graves d'un organe essentiel qui, au point de vue physiologique, ne laissent pas que d'avoir une grande importance, et qui peut-être finiraient par faire sentir leur influence, si la vie des animaux de l'espèce bovine se prolongeait davantage.

Doit-on conclure des résultats donnés par le relevé statistique des expériences de la commission, que l'inoculation ne saurait être conseillée dès aujourd'hui comme une mesure pratique à opposer à la propagation de la péripneumonie, et que les propriétaires de bêtes bovines auraient moins d'avantage à l'adopter qu'à laisser la maladie se repandre dans leurs troupeaux, suivant son mode habituel ?

Non sans doute, car il faut considérer d'une part que les tâtonnements des premiers essais, les imperfections des premiers procédés ont pu grossir, dans les expériences de la commission, le nombre des accidents et des pertes que la pratique de l'inoculation peut entraîner, tandis que d'un autre côté le chiffre de 8 pour 100, qui dans ces expériences représente la mortalité causée par a contagion de la péripneumonie, est del beaucoup inférieur à celui qui exprime les pertes déterminées par la marche naturelle de cette maladie, dans les circonstances les plus graves et peut-être les plus ordinaires de la pratique ; différence qu'explique sans doute la rusticité du plus grand nombre des sujets dont la commission s'est servis, dans ses expériences sur la contagion par cohabitation.

En définitive, quoiqu'il ne ressorte pas des expériences actuelles de la commission, que l'inoculation soit économiquement une mesure avantageuse ; cependant, comme ces expériences paraissent démontrer sa vertu préservative, en présence de ce fait considérable, la commission est d'avis que la pratique de l'inoculation doit être encouragée, et elle a l'espérance qu'elle deviendra profitable à l'agriculture lorsqu'elle aura été perfectionnée, dans l'application, par une étude plus complète.

No. VI.

Notes on the Murrain which prevailed at Sinope, during the Summer and Autumn of 1855. By J. N. Radcliffe, Esq., M.R.C.S., lately attached to the Ottoman Army under the command of His Highness Omar Pasha.

A deadly murrain prevailed among the cattle in several districts in Asia Minor, during the summer of 1855. Towards the termination of the autumn and during the winter of that year, I was stationed at Sinope, and had an opportunity of ascertaining a few particulars respecting the murrain, as it prevailed in that town. My information was derived principally from the authorities in charge of the British Commissariat Depôt at Sinope, and from observation of the diseased cattle in the sheds of the Depôt, and in the town. I was unable to obtain the numerical data which were requisite to form a correct history of the outbreak of the murrain, its rapidity of extension, and its mortality ; moreover, an attack of sickness brought my inquiries to a somewhat summary conclusion.

The murrain was developed towards the termination of spring, or early in the summer. I was foiled in my endeavours to obtain a trustworthy account of the earlier cases of the disease, but there appeared to be no doubt that, in the month of June, the murrain reached an acme, after which it rapidly declined. Scattered cases occurred, however, from time to time, until November, when, about the second or third week of that month, the disease broke out again with great fierceness, spread rapidly

among the cattle in the Depôt and in the town, reached a second acme about the termination of the month, declined during December, and ceased altogether in January, 1856.

The attack of the disease appeared to be invariably sudden, and the progress of the symptoms was singularly uniform. The animal attacked was seized with profuse diarrhœa; exhaustion rapidly followed, the animal sinking to the ground; the breathing became oppressed; a thick glairy mucus trickled from the eyes and nostrils; and death occurred within *nine* hours from the commencement of the attack,—the duration of the disease rarely indeed exceeded *six* hours.

The first symptom of the disease was characteristic. The animal would suddenly void from the bowels, in a thick stream, an enormous quantity of fluid matter, which was either of a pale yellow, or of a brownish colour. The evacuations invariably contained shreds and flakes of lymph, and generally, sooner or later, more or less blood. The most common appearance of the evacuated matter was that of a yellowish coloured fluid in which shreds of lymph were floating. Frequently, as the animal lay exhausted upon the ground, gouts of mucus streaked with blood would be seen in and about the anus.

I examined the carcases of four cattle that had died from the murrain. In the *first* case the animal had died after six hours' illness, and had been dead three hours when the examination was made. The *rumen*, the *reticulum*, and the *psalterium* were full of masticated oats and oaten straw, and the *abomasum* was full of partially digested food. The mucous membrane of the *rumen* seemed to be of a somewhat darker colour than usual. The *intestines* were full of a pale yellow or straw-coloured liquid, in which shreds of lymph were floating. The liquid in every respect, excepting the presence of the shreds of lymph, had the aspect of the partially digested food in the *abomasum*, excessively diluted, and there was an entire absence of fæcal odour. The *cæcum* and the whole of the *colon* were studded with patches of florid punctuated injection, and over many of the patches there was a layer of mucus, tinged or spotted with blood. The summits of the *rugæ* of the *rectum* were somewhat redder than natural; and in the contents of the *rectum* was floating a large thick piece of coagulable lymph, spotted with bloody points. The remainder of the viscera appeared to be in a natural state.

In the *second* case, the animal had died after six hours' illness, and it had been dead about half-an-hour when the examination was made. The *rumen*, *reticulum*, and *psalterium* were filled with masticated oats and oaten straw, and the *abomasum* with partially digested food. The intestines were filled with a pale yellow liquid, in which floated flakes of lymph, and which was precisely similar in aspect and character to that observed in the first case. The mucous membrane of the *colon* was studded with patches of florid punctuated injection, above which, in several places, blood was effused; and the *rugæ* of the *rectum* were red at the summits. The lungs were gorged with frothy mucus, but all other portions of the viscera were healthy.

In the *third* case the animal had been dead seven hours when the carcase was examined. The *stomach* presented the same appearance as in the first and second cases, except that a few patches of congestion were observed on the mucous membrane of the *abomasum*, near the orifice of communication with the *psalterium*. The intestines were full of a brownish coloured liquid, in which shreds of lymph floated, and which was free from fæcal smell. The mucous membrane of the *cæcum* and *colon* were studded with patches of florid punctuated injection; and the *rugæ* of the *rectum* were reddened at the summits. The *lungs* were gorged with frothy mucus.

In the *fourth* case the animal had also been dead about seven hours, and the appearances found on examining the carcase differed in no respect, except in the absence of congestion of the mucous membrane of the *abomasum*, from those observed in the third case.

In each case the patches of injection observed in the cæcum and colon were of a vivid colour, and they consisted of minute red spots, thickly grouped together. In no instance were the vessels of the sub-mucous tissue congested, so that they could be traced beneath the patches of injection; and in no instance could the position or existence of the injected patches be discovered by an inspection of the bowel externally. Externally the intestines in each instance had a healthy aspect from the stomach to the anus.

The fatality of the murrain was excessive —indeed, I did not hear of any instance in which an animal attacked with the disease recovered. The disease appeared to prevail with as much severity among the cattle in the town, as among those in the Commissariat Depôt.

The cattle-sheds of the Depôt were three in number. They were large and lofty, floored with wood, and well roofed, and each shed was capable of containing 320 cattle. The sheds were kept in excellent order, and they were very free from smell. Even in the morning, when the cattle were turned out to graze, the odour within the sheds was not so strong as might have been anticipated. Each shed was divided from

end to end into eight divisions; the cattle were arranged in four double rows, head to head, and between the feeding-troughs was a path for the attendants. A division also ran transversely across each shed, at the level of the feeding-troughs, and twenty cattle were arranged on each side of this division in the different ranges of stalls. The sheds were on a slope outside the suburbs of the town, near the sea, and they faced the south, being well sheltered from northerly winds. The cattle were fed night and morning on unthrashed oats, and the supply of water was good and abundant. Every attention was given to the ventilation of the sheds, but, notwithstanding this, the prudence of cramming so many animals into a single shed seemed to me somewhat more than doubtful, and during the prevalence of murrain the crowding would be apt to prove most noxious.

I got the impression that the animals were attacked with the disease more frequently during the night, or soon after being driven out of the sheds in the morning, than during other periods of the day, but my information was insufficient to enable me to form a trustworthy opinion.

The murrain, in the second outbreak, was not noticed to prevail more extensively among the cattle which had been recently brought from the country than among those that had been in the Depôt some time, but the data respecting this point could not be depended upon.

The measures adopted at the Depôt to check the murrain were, careful tending of the cattle, and the non-admission of fresh animals after the disease had fully broken out. No veterinary surgeon was attached to the Depôt at any period during the prevalence of the murrain.

During the summer the fatality was as great among the cattle which the Commissariat had collected in the country, at some distance from Sinope, as it was among the cattle in the Depôt. It may be added, incidentally, that while the murrain prevailed, both in the summer and autumn, few, if any, cattle were sent from Sinope to the Crimea.

The condition of the town, and of the adjacent country, during the prevalence of the murrain, was most horrible. The beach, the ditch, the base of the walls, the roads, the woods, the hill sides, and the open spaces were studded with putrifying carcases, and foul stenches assailed the nostrils on every hand.

It was reported that the murrain prevailed in several places contemporaneously with epidemic cholera. In Sinope two or three fatal cases of cholera occurred in November, and common continued fever prevailed to an unusual extent. The town, however, was not only in a filthier state than usual, but it was excessively crowded, from a large number of men attached to the Commissariat Depôt, and the Depôt of the Land Transport Corps being housed in it. Moreover the great demand for articles of food, in consequence of the increased number of inhabitants, caused the markets to be very scantily supplied, and the diet of the poorer classes was considerably impoverished.

In the autumn and winter a great mortality prevailed among the camels in the Land Transport Corps' Depôt, and the majority of them died. Powerful causes were, however, acting, which, of themselves, were sufficient to induce the fatality. For the camels were densely crowded together in sheds and pens; little attention was given to the cleanliness, and to the healthy and fitting situation of the buildings in which they were stabled; and it was suspected that the feeding was bad and insufficient from peculation by the native attendants. Among the remainder of the animals (some 7,000 in number) in the Depôt of the Land Transport Corps, no other disease than *mange*, so far as I am aware, prevailed epidemically, but there were scattered cases of *glanders*.

The acme of the second outbreak of the murrain was contemporaneous with wide and sudden oscillations, and a long continued *mean* depression of the barometer; with a comparatively high thermometer; and with a succession of heavy but brief gales, sharp squalls, and rapidly varying winds. The decline of the outbreak was contemporaneous with the formation of a barometric wave which commenced on the 14th of December, and terminated on the 12th of January.

From a series of barometrical and thermometrical observations which I made at the time, I was led to the conclusion that the great oscillations of the barometer, the storms, and the variable winds, which were observed about the period when the second outbreak of the murrain culminated, were probably due to a local atmospheric disturbance, Sinope being within the area of disturbance.

The double outbreak of the murrain at Sinope, and the uniformity of the symptoms of the disease, and of the pathological changes observed after death from the disease, seemed to me facts worthy of note, and although my notes are meagre, they may, nevertheless, suffice to induce others who have had more favourable opportunities of studying the progress of the murrain, to give their observations to the public,

Bramley near Leeds, December 1856.

I have great pleasure in acknowledging the assistance which I received, in making the foregoing inquiries, from Habeeb Risk Allah Effendi, M.R.C.S.L.

No. VII. RETURN showing the NUMBER of HORNED CATTLE exposed for Sale in the Metropolitan Cattle Market in the Years 1855 and 1856.

1855.			1856.		
Date.	Total Number of Beasts exposed for sale.	Number of Foreign Cattle included in first column.	Date.	Total Number of Beasts exposed for sale.	Number of Foreign Cattle included in first column.
January 5	5,288	410	January 4	4,092	355
„ 12	5,406	540	„ 11	4,601	532
„ 19	4,885	433	„ 18	4,800	563
„ 26	4,663	610	„ 25	4,465	564
February 2	5,054	508	February 1	4,445	596
„ 9	4,441	705	„ 8	4,978	685
„ 16	4,534	699	„ 15	5,050	699
„ 23	4,295	615	„ 22	4,974	629
March 2	3,639	684	„ 29	4,587	471
„ 9	3,968	390	March 7	4,952	480
„ 16	4,842	210	„ 14	4,631	208
„ 23	5,222	415	„ 21	4,429	380
„ 30	4,691	249	„ 28	3,810	250
April 6	4,652	401	April 4	5,212	311
„ 13	3,729	275	„ 11	5,103	501
„ 20	4,193	165	„ 18	4,215	61
„ 27	4,915	203	„ 25	4,537	181
May 4	5,265	406	May 2	4,922	277
„ 11	5,255	190	„ 9	5,283	74
„ 18	4,960	360	„ 16	4,931	307
„ 25	5,245	710	„ 23	4,886	682
June 1	4,728	796	„ 30	4,543	438
„ 8	4,932	504	June 6	4,577	704
„ 15	4,724	117	„ 13	4,128	520
„ 22	5,881	290	„ 20	4,938	140
„ 29	5,062	176	„ 27	4,314	189
July 6	5,107	710	July 4	4,271	574
„ 13	4,502	514	„ 11	4,403	618
„ 20	4,215	220	„ 18	4,208	150
„ 27	4,223	1,084	„ 25	4,648	1,149
August 3	4,570	786	August 1	5,432	2,024
„ 10	5,048	2,110	„ 8	5,785	1,789
„ 17	5,550	1,894	„ 15	3,931	1,350
„ 24	5,372	1,540	„ 22	4,523	1,533
„ 31	5,290	2,109	„ 29	5,740	1,829
September 7	5,889	2,480	September 5	6,195	2,320
„ 14	6,856	1,976	„ 12	5,949	1,949
„ 21	6,916	2,472	„ 19	6,712	2,253
„ 28	5,964	1,908	„ 26	6,775	2,432
October 5	5,956	1,794	October 3	6,955	2,593
„ 12	6,567	2,567	„ 10	6,663	3,021
„ 19	6,676	2,789	„ 17	6,534	2,706
„ 26	6,439	1,409	„ 24	6,081	2,146
November 2	5,951	2,105	„ 31	6,519	2,193
„ 9	7,332	2,245	November 7	6,695	1,946
„ 16	6,763	2,585	„ 14	7,259	2,530
„ 23	6,084	2,315	„ 21	5,904	1,500
„ 30	6,263	1,768	„ 28	6,237	1,566
December 7	5,749	1,165	December 5	6,633	712
„ 14	6,554	764	„ 12	6,072	540
„ 21	7,788	596	„ 19	7,553	574
„ 28	1,756	284	„ 26	2,343	419
Total for the Year	273,849	53,250	Total for the Year	271,423	53,213

26th March 1857.

(Signed) WILLIAM SHANK,
Clerk, Metropolitan Cattle Market.

No. VIII.

AMOUNT of ARTICLES seized by INSPECTORS of SLAUGHTER HOUSES in the CITY of LONDON for the Years 1855–56, as returned to the Commissioners of Sewers of that City.

Articles seized.	1855.	1856.
Live Cow, diseased	1	—
Calves, carcases	45	32
Pigs „	64	64
Sheep „	507	321
Cows „	-	3
Beef, quarters	661	438
Mutton „	22	66
Lamb „	9	26
Veal „	4	39
Pork „	-	9
Joints, various	227	217
	stone lb.	*cwt. qrs.*
„ weighing	106 96	13 17
Sheep, live	25	—
Veal, sides	8	—
Tongues	3	5
Heads	15	10
Kidneys and Heart	3	—
Plucks	-	228
„	-	a lot
POULTRY, various heads	144	719
Deer	1	—
Fawns	8	6
Rabbits	431	1,197
Hares	90	52
Black Game	107	—
Ptarmigan	67	—
Fowls	17	—
Goats	-	2
Bucks	-	10
Ducks	21	—
Leverets	24	27
Puffins	75	—
„ 1 Basket	—	—
Venison, pieces	29	6
„ haunches	6	1
„ quarters	11	1
„ shoulders	9	2
Partridges	412	265
Pheasants	1	28
Grouse	392	52
Pigeons	120	14
Snipe	1	—
Turkey	1	—
Widgeons	-	18
Game	-	1 box
„ and Rabbits	-	1 hamper
„ and Larks	-	4 „
„ and Poultry	-	1 „
Giblets	-	1 basket
Rabbits	-	2½ cases
„	-	2 hampers
FISH, Salmon	174	1
Cod	449	210
Trout	107	—
Whitings	150	—
Smelts	2,700	7,700
Plaice	12,103	6,778
Herrings	29,737	—
Sprats, Bushels	40	—
Turbots	26	17
Haddocks	2,256	868
Miscellaneous	30,557	9,895
Lobster	3,519	1,635
Crabs	2,387	1,375
Shrimps, Gallons	549	31
Soles, Pairs	341	460
Whelks, Bushels	16	5
Mussells „	32	10 bags
Periwinkles „	34	20
Brills	12	7
Eels	—	5 lbs.

The return of Fish seized in 1856 extends down to Midsummer only, no return having been received since that.

The Market for Live Cattle being removed away from the City, the Commissioners do not exercise any Jurisdiction therein.

We have no means of distinguishing in these returns the Articles seized as "diseased," as distinguished from those seized on account of decomposition.

(Signed) JOSEPH DAW,
Principal Clerk,

Sewers Office, Guildhall. 8th April 1857.

No. IX.

INSTRUCTIONS in respect to the DELIVERY of Cattle. Approved by the Commissioners of Her Majesty's Customs, on September 6th, 1856, and ordered to be delivered to the Officers in London, and transmitted to the Collectors and Comptrollers at the several out-ports.

The Commissioners of Customs deem it necessary, for the guidance of their Officers in all cases to which their General Order $\frac{74}{1856}$ applies, but with special reference to a contagious disease, called "Murrain," which has recently broken out amongst the horned cattle at Mecklenburg, to issue the following General Instructions, together with the accompanying statement of the symptoms of the particular disease in question.

1st. On the arrival of a vessel with cattle, sheep, lambs, or pigs, the attendance of the veterinary surgeon is to be obtained as soon as possible.

2nd. After the cattle, sheep, lambs, or pigs have been landed, they are to be kept in charge until each animal has undergone a careful examination, and if found free from disease the whole are to be passed immediately; but in the event of any disease being found to exist, such of them as may be so diseased are to be immediately killed, if the same be considered necessary by the veterinary surgeon; and if upon a post-mortem examination of such cattle, sheep, lambs, or pigs, the same be found fit for human consumption, they, and the rest of the importation, are to be delivered to the owner or owners thereof; but should any of those so examined be unfit for such purpose, and the disease be of an epidemic or contagious character, they are to be buried, or effectually destroyed, in the presence of an officer, and the remainder of the importation detained for further examination so long as the veterinary surgeon may deem necessary, and dealt with as before directed. The expenses incurred in detaining the whole or any part of the importation, or in killing and destroying those unfit for human food, to be defrayed by the owner or owners.

3rd. Sheep and lambs are not to be examined after dark, daylight being absolutely necessary for the detection of certain diseases.

Lastly. The veterinary surgeon is to be required to keep a record of the particulars of each transaction agreeably to the annexed form.

No. X.

A RETURN showing the NUMBER of ANIMALS imported from Foreign Ports which have been destroyed in consequence of being unfit for Human Food, through Disease, with the nature of the Complaint with which affected.

Date.	Port.	Number of Animals.	State and Condition of Animals.
Between 1st January and 6th March 1857.	London	One Cow -	Labouring under Pleuro-pneumonia. Sent to the knackers and destroyed.
„	London	One Ox -	Labouring under inflammatory fever. Sent to the knackers and destroyed.
„	London	One Calf -	Labouring under fœtid fever of an infectious character. Sent to the knackers and destroyed.
Between 7th and 8th March.	London	Two Cows	Labouring under inflammatory fever. Sent to the knackers and destroyed.
17th March	London	Two Oxen	Labouring under Pleuro-pneumonia. Sent to the knackers and destroyed.

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REPORT

ON

MURRAIN IN HORNED CATTLE,

THE

PUBLIC SALE OF DISEASED ANIMALS,

AND THE

EFFECTS OF THE CONSUMPTION OF THEIR FLESH ON HUMAN HEALTH;

ADDRESSED TO

THE RIGHT HONOURABLE THE PRESIDENT OF THE GENERAL BOARD OF HEALTH.

BY

E. HEADLAM GREENHOW, M.D.

Licentiate of the Royal College of Physicians,
Lecturer on Public Health at St. Thomas's Hospital, and
Physician to the Western General Dispensary.

Presented to both Houses of Parliament by Command of Her Majesty.

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FOR HER MAJESTY'S STATIONERY OFFICE.

1857.