The cause, prevention, and treatment of the cattle plague / by John Parkin.

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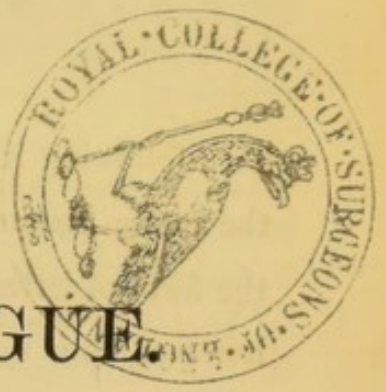
THE CAUSE,

PREVENTION, AND TREATMENT

OF

THE CATTLE PLAGUE.



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LONDON:

HATCHARD AND CO., 187, PICCADILLY.

1865.

PRICE ONE SHILLING.

PREFACE.

THE following remarks were written soon after the appearance of the cattle plague in this country, and sent over from Germany, in the form of letters, for insertion in one of the journals. Finding, however, on my return to England, that they had not been published—the reasons are immaterial at the present moment—I am induced to take this method of making my opinions known; and, as my principal object is to save the lamentable destruction of stock, now daily taking place, I shall feel much obliged to those individuals, who may be induced to adopt the plan of treatment now recommended, to make the result public, for the benefit of others.

J. PARKIN.

London, September 16, 1865.

THE CAUSE.

This part of the subject is not only interesting in a scientific point of view, but it is highly important practically, for unless we have clear and correct ideas respecting the cause, the measures that may be adopted for the prevention of the disease will necessarily be useless, if not injurious. The general opinion is— and the regulations enforced by Government are based on the assumption—that it is not only contagious and infectious *per se;* but that it is produced and propagated by these means, and by these alone: that it is, in fact, an imported disease. This conclusion, as I hope to be able to show, is an entirely erroneous one.

The arguments advanced by Professor Symonds and others, in proof of the contagious and infectious character of the disease, are as follows.

They remark, in the first place, that the disease is confined to the bovine tribe: as such, we must look to them, and to them alone, for the origin of the disease. But no conclusion can be drawn from this fact, for it is characteristic of all epidemics to attack by classes. Not only is this observed with respect to different races, but it is also found to occur even in the same species. During the prevalence of the Black Death of the 14th century in Europe, it was remarked that the epidemic attacked one class, more particularly, at one visitation, and another at the next; while, in some of the outbreaks, the disease was confined exclusively to one class. At one period, the old and the weak would be the principal victims; at the next, the young and the strong, or the middle aged, while the former escaped. At one visitation, pregnant women were invariably attacked; at another, they remained entirely exempt. During one particular outbreak, young men in the prime of life were alone carried off; and, hence, the *sobriquet* which the epidemic then acquired of the *Trousse galant.* But the most remarkable instance was that which occurred in Germany, the students at the different universities being attacked during the vacancies, and while residing with their parents, in localities far removed from each other—the residents in the same

house, and in the same town, remaining unaffected. And yet the disease, in all these instances, was the same. It is no proof, therefore, that the cattle plague originated with the affected animals, merely because it is confined to a particular species.

Another circumstance has been adduced, in order to show that the disease is propagated from animal to animal. It is stated that in Egypt, where no precautions were adopted to isolate the sick, nearly all the cattle died, or, 80 per cent.; but, in Austria, where measures were enforced to prevent the spread of the disease, by the separation of the sick from the healthy, only 2 per cent. have been carried off. But this variation can be explained without reference to the doctrine of contagion. Egypt, we must remember, has been, from time immemorial, one of the most unhealthy countries on the face of the globe; we should have expected, therefore, that the cattle plague, in common with all others, would assume a more severe form there than elsewhere. But in Austria, which is not only a more healthy country, but in which the ravages of the epidemic cholera were much less than in many other countries—much less than in Russia—we might have inferred, *à priori*, that the cattle disease would also prevail to a less extent, more particularly if these two diseases be connected, as it will be my object to demonstrate hereafter, inseparably together. The non-extension of the disease in Austria, may therefore be due, not to the establishment of quarantine, but to the fact that this country lies beyond the morbific boundary, which the disease has established for itself at the present moment.

To show how liable we are to err, when drawing general conclusions from isolated facts, I may refer to a circumstance that occurred during the first invasion of the epidemic cholera in Russia. On the commencement of the disease in one particular town, formed of one street only, it was remarked that all the cases were on one side of the street. The disease being then considered to be contagious, a barricade was immediately erected along the centre of the street, in order to prevent communication between the infected and the non-infected side. The disease was confined to that one side; and the fact was adduced, as an incontrovertible proof of the contagious character of the epidemic, and of the benefit to be derived from the isolation of the sick. But the same result was subsequently observed in many other towns, where no barricade was erected, and where the communication between the two sides of the street was free and unrestrained. The vagaries, in fact, of epidemic

diseases are such—spreading along particular *lines* of the earth's surface, and attacking, not only particular countries, and one part of a town, or one side of a street in preference to the other, but even certain houses in the same street, or certain floors of those houses—that they lead to the idea of the infectious character of the disease, wherever quarantine measures are adopted. The exemption of the non-infected houses is, of course, ascribed to the isolation of the sick, while the attacks in others are as naturally referred to communication with the sick—a cat, a rat, a bird, or some inanimate object, being readily found, when no other and direct means are known on which to lay the blame.

In order to afford another argument in support of the conclusion that the disease has been imported, we are told by Professor Symonds, that the disease does not belong to this country, but to Russia. This, however, is a very erroneous conclusion, for the disease is no more Russian than it is English. Not only did a disease, in all respects similar to the present, prevail in England in the middle of the last century, but, from time to time, during the previous five or six centuries. In 1586, there was so great a dearth of butcher's meat, in consequence of a murrain among the cattle, that human flesh was said to have been eaten. The same result was witnessed in 1588-9, during the *Great Famine*, "when," according to the phraseology of the day, "one did eat another for hunger." The only difference between the two countries is, that in Russia murrain continued to prevail for a longer period than in England, after the cessation of the epidemics of the middle ages; while it has re-appeared there, previously to manifesting its malign influence in England. It must therefore be regarded, not as an endemic peculiar to that part of the world, but merely as an epidemic, springing up at a peculiar time, and prevailing only for a certain period in one country the same as in another. Such being the case, we may be allowed to ask, how did the disease originate in Russia in the first instance; or, in the first cases? Not by contagion, or by importation, for we have no evidence of the disease existing previously in other localities; while, if we had, we should still be reduced to the same dilemma, in order to account for the cause of the outbreak. There must have been a time and a place, when the disease first manifested itself; unless it could be shown that it had existed from time immemorial, which we know to be contrary to fact. As regards the idea of such a disease being generated, in the first instance, in the body of one animal, and, then, of being propagated by infection to others, such a conclusion is simply

absurd. Epidemic diseases generally prevail for centuries, but only at certain intervals, and at particular periods; it is impossible therefore to suppose, that precisely the same causes should be in operation in so many different animals, at various epochs, and in different places, so as to produce precisely the same effects at each visitation. There are some diseases, as syphilis and smallpox in the human race, and glanders in the horse, which are capable of being propagated from individual to individual; but, in these, a particular matter is formed, which is cognisable to our senses. Even then, the direct application of that matter to an absorbing surface, or its introduction into the veins by a puncture of the skin, is absolutely necessary to produce any effect. In these cases, also, the effects will be found to vary with different individuals, and at particular periods, while they are frequently different to the original disease—as in the inoculation for smallpox. We observe no such variations with epidemic diseases. They present invariably the same symptoms, at all times, in all places, and with all individuals; the cause therefore, that produces them, must be single and universal, not local and individual. If, therefore, there be a cause—a general and universal cause—productive of epidemic diseases, irrespective of contagion, the subsequent spread of the disease by infection is rendered highly improbable, if not impossible. Not only would it be unphilosophical to conclude, that there are two causes in operation productive of precisely *the same results*, but it would be contrary to the law laid down by Newton, as characteristic of nature's operations, viz., "a multiplicity of effects, but a paucity of causes." Besides, if disease could be produced by infection—by the breath, or by the secretions—the world would have been depopulated long since.* But it fortunately happens, that when an epidemic has arrived at its height, and when the greatest number of presumed *foci* of infection, or contagion, exists, it suddenly declines, and disappears for a longer or shorter period.

Not contented with enunciating false opinions, the advocates of the doctrine of contagion have attempted to show that the disease can be actually traced to the cattle imported from Russia. But the evidence on this point is the most vague and unsatisfactory of any

* I do not think it necessary to discuss the validity of the theory proposed by the late Dr. Snow—and supported by Dr. Budd and others—of the propagation of epidemic diseases from the contamination of the drinking water by the secretions—intestinal and others—not only because it is a very nasty one, but also because it is, in my opinion, the most illogical and ridiculous of all theories.

that I remember on similar occasions. Assumptions and preconceived opinions appear to have been taken at once as facts—strong as proofs of Holy Writ. It is, no doubt, a somewhat singular circumstance that the importation of cattle from Russia has assumed so large a proportion the last few months, but, then, we must remember that coincidence is not cause. Were it so, we might, as Sir John Herschell has quaintly remarked, consider the day to be the cause of the night, or *vice versâ*, for these two phenomena are inseparably connected together. But we do not argue thus in the physical sciences, nor should we in medical inquiries. Before drawing any conclusion on the subject, we must have other proof than this of the importation of the disease.

It is stated, in the Report of the National Association for the Prevention of Cattle Diseases, that the plague in England commenced shortly after the arrival of a cargo of cattle from Revel at Hull, in May last; and that one animal had to be supported on brandy and water during the voyage; but we are not told whether the animal was labouring under this particular disease at the time, or was merely suffering from sea-sickness. Nor is it stated whether any of the other animals were ill at the time of their arrival. Fortunately, we are enabled to fill up the gap thus left in the history of the outbreak. At a meeting of cattle-dealers held at the Salutation Tavern, in Newgate-street, Mr. Hunt, the importer of the cattle in question, affirmed that, with the exception of the one taken ill during the voyage—and this, he added, exhibited no symptoms of the plague—they were all more than usually healthy. True, the disease may have been latent in the system at the time; but then these animals, in that case, would, or ought to, have been the first attacked subsequently. No information, however, as far as I am aware, has been given to show that this was the fact. The evidence, as far as it goes, is all the other way. Mr. Gibbens, the Chairman of the Market Committee, stated, at a meeting of the medical officers of health, that, "Up to the previous Wednesday, there was no instance of a beast having been condemned, on arriving from the Continent, in the ports of London, Hull, or anywhere else. *Not a single diseased animal* had been found in the Metropolitan Market which had come from abroad, but there had been many instances of the disease among milch (English!) cows in the Market." But, were it otherwise, and had some of the animals arrived with the disease upon them, or had they been the first to be attacked in this country, these circumstances *alone* would have afforded no proof of the contagious nature of the disease, or, of its

importation. The disease has been prevailing for some time in Russia, and it might therefore happen that some of the cattle, sent over from that country, were attacked during the journey, and about the time of its appearance in England. But then the arrival of the diseased cattle and the appearance of the epidemic, instead of standing in the relation of cause and effect, may merely have been accidental circumstances, if it can be shown, as I hope to be able to do hereafter, that the disease is of spontaneous origin. Allowing also, for the sake of argument, that the cattle, although arriving in an apparently healthy state, were the first to be attacked in this country, even this circumstance can be explained without inferring that they brought the disease with them.

It is a law, common to all diseases, that strangers are more susceptible to an attack than the residents of an infected locality. For instance, if a stranger—particularly if he comes from a more healthy country—visits one of the malarious districts of Spain or Italy in the summer season, he will be almost certain to be attacked with ague, the surrounding inhabitants being, possibly, entirely exempt at the time. The same fact is observed during the prevalence of epidemic diseases, and when it occurs, the unfortunate individual is at once accused of importing the disease, no matter whether he comes from an infected or non-infected locality. But no such accusation is heard in the case of endemic diseases, and why? Simply because the residents in that locality are accustomed to be attacked every year with the same disease, and they know, from experience, that this would occur, whether a stranger had been previously attacked or not. Then, why, I would ask, should we draw a different conclusion with respect to epidemic diseases? There is no reason that I am aware of, and it is the explanation that I should myself offer on such occasions.

If the preceding arguments be of any value, we must reject the conclusion that the cattle plague has been imported into this country from Russia—an inference that is confirmed by a variety of facts.

At the Meeting of the cattle-dealers before referred to, it was stated by one gentleman, that the vessel which brought the stock on the 20th May, from Revel to Hull, had been employed ever since in the conveyance of stock to and from the same ports, but no sign of disease had manifested itself among any of the cattle imported. Several speakers also affirmed that the disease did not exist at the ports to which the cattle were brought. Other facts, still more important and conclusive, were adduced at the same Meeting. It was remarked by one speaker, that at the Islington Market, on the

previous Monday, there were 3,800 head of foreign cattle, and 3,100 head of English; and that of the many diseased animals seized on that day by the authorities, *all belonged to the latter class.* Another dealer stated that he had fifty English breeding cows, which had mixed freely with about 200 head of foreign cattle, purchased at different times during the season, but neither the one nor the other had manifested any symptoms of the disease. But the most important fact, as mentioned by one gentleman, is that the disease had manifested itself in Leicestershire and Devonshire, in situations in which no foreign stock had been introduced.

Dr. Tripe, of Hackney, also stated, at a meeting of the medical officers of health, that "in his district sixty-four cows had died, and 114 had been destroyed, making nearly a sixth part of the whole number, but *in no instance* had he been able to trace any infection from without. In one case, where thirty-two cows had been destroyed, the disease originated with two heifers that had never left the pasture in which they were bred and born; while, in another, there had not been a single fresh head of cattle for months, and the disease broke out in a place where there could have been no means of infection."

We may therefore conclude, from the preceding facts, that the bovine plague now prevailing in England has not been imported from Russia or any other country, and that it is of spontaneous origin. It only remains therefore to consider what cause can be assigned for the outbreak. On the solution of this problem will necessarily depend the measures that ought to be adopted for the prevention of the disease. Hence its importance, not only in a theoretical, but in a practical point of view.

The first circumstance that demands attention, while entering on this inquiry, is the important fact that we are now living in an epidemic period, characterised by the advent of a new disease—the epidemic cholera; for although attempts have been made to prove the contrary, no evidence exists of the prevalence of such a disease before 1817. There must therefore be a new cause in operation to have produced this effect; and, as a similar result—viz., the production of a disease, if not new, presenting, at least, peculiar and characteristic symptoms—has occurred in the bovine race, it would not be unphilosophical to infer that both effects are due to one and the self-same cause. We are strengthened in this conclusion by the fact, that both diseases made their appearance in Europe in the same locality—viz., in Russia. We have not, it is true, had any account

of the existence of murrain in the countries previously invaded by the epidemic cholera, with the exception of Egypt; but this exemption is easily accounted for. In India, and in the countries lying between that part of the world and Russia, very few cattle are kept. A casual death among them, therefore, would hardly be noticed; but it is different where large herds are congregated, and where the mortality would necessarily be in proportion to the number.

It may be argued, however, that as the disease in the bovine race is different to the cholera, the cause productive of these different affections cannot be the same. To this I would reply, that the primary, remote, exciting cause of the epidemic cholera has not confined its influence to that single disease, but has evidently been productive of other effects, even in the human race. Since the advent of the cholera, another new disease has made its appearance —viz., diphtheria; while all the ordinary diseases, and, more especially, fever, have been regularly and gradually on the increase, in all the countries invaded by this modern scourge. In London, the deaths from fever, which only amounted to a few hundreds annually, at the commencement of this century, have increased since 1832 to two and three thousand. In some instances, new forms of fever have presented themselves, as the recurrent fever, for instance, which has prevailed in the United Kingdom of late years, and in Russia during the present.* As these different diseases could not have been produced from each other, not only on account of the dissimilarity of the symptoms, but also because they have not prevailed at one and the self same time; so, we must infer, if there be any relation, or connexion, between them, that they are all due to the operation of one universal and common cause.

Then, again, it may be said that the cattle disease has not travelled, like the epidemic cholera, regularly, and step by step, from Russia to England, some of the intervening countries having escaped up to the present time. But then it must be remembered, that this is not the first murrain we have had since the advent of the cholera. The previous one, termed the lung disease, or pleuro-pneumonia, not only invaded the same countries in Europe as the cholera, but travelled regularly over the same lines from Russia to England. It first appeared in Europe in 1835, but did not reach this country until 1839, and was then confined, principally, to the

* The Russians might, with equal justice, have called this the English fever, and have accused us of importing it into Russia, as for us to accuse them of importing the cattle plague into this country.

thin skinned and more delicate breeds, as the Devon. It reappeared in 1844, 1845, 1846, and 1847, occasioning great mortality in the latter year. In 1849, also, 20 per cent. of the cattle perished from the same cause, while it was again general in 1851.

Although the epidemic cholera travelled, slowly and regularly, from country to country, and from east to west, during the first invasion of the disease, no such result has been observed in subsequent visitations. The disease has appeared in the west this year, in the east next, in the north at one period, in the south at a subsequent one; while it has been confined to a peculiar, and, comparatively small, portion of the globe. In the same way, as the other forms of disease, before alluded to, appear to be *sequelæ* of the epidemic cholera, they have followed the same law as the latter disease in its subsequent visitations; appearing in this locality one year, in another at the next outbreak. The present murrain, as we might have anticipated, has observed the same rule, and hence the exemption of the countries lying between Russia and England. In these peculiar and local visitations, no other conclusion can be drawn than that they are of spontaneous origin. Not that the spread of the epidemic cholera from country to country, during its first invasion, could be accounted for by the doctrine of contagion; on the contrary, it set at defiance all the laws on which this doctrine is founded. Instead of taking the most direct route to Europe—that of commercial traffic and human intercourse—it proceeded by the most circuitous and by the least frequented road from India to this part of the world. For instance, the epidemic cholera reached Egypt, by one offset of the disease, as early as 1823; and it was expected that it would thence have spread, like radii from a centre, to every part of Europe. Instead of this, it proceeded slowly, but regularly and step by step, by its main trunk, through the steppes of Persia, Asia Minor, and the mountainous regions of the Caucasus, to the southern extremity of Russia, which it did not reach, however, until seven years after the invasion of Egypt. M. Moreau de Jonnes, who wrote a work expressly to prove that the epidemic cholera was propagated by contagion, had the candour to acknowledge afterwards, that the subsidence of the disease in Egypt, and the invasion of Europe by the least frequented of all routes, were irreconcilable with that doctrine.

But the operation of this cause has not been confined to the animal kingdom. Similar results have also been observed in the vegetable creation—the laws regulating the spread of the disease

being the same in both instances. Like the epidemic cholera, the potato disease first appeared in Germany and the north of Europe, and then spread gradually and regularly to England, along the same route as that which had been previously pursued by the former disease. From England it extended to France, Spain, and Italy, like its predecessor, passing over the same lines, and in the same order, but attacking, in these countries, the vine as well as the potato, which it had also done in England, for this vegetable epidemic was not confined to the potato crop. Now contagion could not have been the cause of the propagation of the disease in these instances, not only in consequence of plants being fixtures, but also because the plants, in the same field, were attacked almost simultaneously. The blight, in fact, as Mr. Milne has rightly observed, was *the business of a single night!* The regularity of its march, and the limitation of range of its effects, also preclude such an hypothesis. "It appeared," said a member of the Poor-law Board, "to be travelling with myself, so suddenly did it appear in crops which had been sound and luxuriant a few hours previously." And an American correspondent added, "The disease seemed *to run in veins*," traversing a field, and leaving the plants on either side of the morbific line unaffected. Hence, also, one field or one district was attacked, others spared, although placed apparently in precisely the same circumstances.

Finding, therefore, that the vegetable epidemic attacked the same countries as the animal one, and that it observed precisely the same laws during its march from country to country, we are justified in inferring that it was produced by one and the self-same cause. In addition to this, it was my object to show, in a work written at the time (The Cause, Nature, and Treatment of Disease in the Potato and other Crops), that the epidemic cholera and the potato disease were not only produced by the same cause, but, also, by *the same poison* —the agents which had been shown by me to neutralize the effects of the poison in the one instance, having produced the same results in the other.

This is not all. There are other phenomena, not in the animal or in the vegetable kingdom, but in the material world, which would appear to be effects of the same cause. I allude to atmospherical vicissitudes and terrestrial commotions. These phenomena were more particularly observed during the prevalence of the black death of the 14th century, at which period disease in the human race, murrain in the cattle, blight in the vegetable creation, and its

concomitant, famine, with violent storms, floods, inundations, and, although last, not least, earthquakes, followed each other in rapid succession. This will be evident by a reference to my own work, as also to that of Dr. Hecker, "The Black Death of the Fourteenth Century." In fact, disease, want, misery, and despair, according to the testimony of all historians, were general throughout Christendom at that period.

We must not infer, that the atmospherical vicissitudes are the cause of disease in the animal, or, in the vegetable kingdom; a reference to the history of these phenomena will show that this cannot be the case. The aerial and the physical phenomena occur in general, indeed almost invariably, *after* the advent of those in the organic kingdom. As the latter, in this case, cannot be the effect of the former, so, it is equally clear, that the former cannot be produced by the latter. They must therefore be common effects of a common cause, if they have any relation or connexion with each other.

In order to show that these conclusions are not hypothetical, or formed after the events have occurred, as also that they are not accidental and isolated facts, it may not be irrelevant to mention that the majority of them were predicted by me before their occurrence. In 1840, at a time when only one phenomenon had occurred —the advent of the epidemic cholera—a work was written by me in order to show that we had then entered upon a new period, an epidemic period. Not only was it then inferred that this modern plague would return, again and again, after certain intervals, for an indefinite period, but, that it would be followed by all the other phenomena that have been observed at similar epochs. This prediction has unfortunately been verified to the letter, of which we have had a striking example in the present year, for all these phenomena have occurred simultaneously, with the exception of earthquakes. But these will follow in due course.

Again: when the potato disease made its appearance, I issued a small *brochure* (The Cause of Blight and Pestilence in the Vegetable Creation), in which it was stated, that this vegetable epidemic would not only continue to recur, from time to time, for a long period, but that it would be followed, sooner or later, by disease in other crops—as in wheat, &c., and, also, by murrain. As a consequence of this conviction, and in order to guard against the occurrence of future famines, I recommended that efforts should be made to draw larger supplies of food from other sources, viz, from the

mighty deep. Not that the finny race is exempt from the operation of those causes that produce disease in terrestrial creatures, as such is not the fact; but then the effects would appear to be less, while the supply is almost exhaustless. In a subsequent pamphlet (The Utilization of the Sewage of Towns) I brought forward the same facts, and adduced them as reasons for applying the sewage not only to grass lands but to the grain crops. A larger supply being raised, the loss would not be so severely felt, when blight and scarcity made their appearance.

According to these inferences, the cattle disease, so far from being an accidental occurrence, due to the importation of a few cattle from Russia, is one of the inevitable consequences of a cause that has been in operation for the last thirty years in Europe.

Having arrived at this conclusion, the next question that presents itself is, What can this cause be? Unfortunately, this is a question that cannot be answered on the present occasion. In the first place, the majority of medical men conclude that the cause—the remote and essential cause—of epidemic diseases is unknown; while, of those that have a theory scarcely two are found to agree on the subject. In the next place, having a particular theory of my own, I feel reluctant to refer to it, or to advance a single argument in its favour, on the present occasion, when facts only, and not theories, should be advanced. It will be best therefore to infer, for the moment, that the remote cause of epidemic diseases is still a problem.

Although unacquainted with the remote cause, there cannot be much doubt with respect to the immediate cause. This is the presence of a deleterious agent in the atmosphere: as it is only on this supposition, that we can account for all the phenomena observed at epidemic periods. Not that the poison is generated in the atmosphere; the effects produced are too limited in their range to admit of such an explanation. Observing this limitation, we can only infer that the agent is derived from some other source—one with which only a portion of the atmosphere comes in contact. Finding, also, that the poison is more concentrated at lower than at higher altitudes—epidemic diseases prevailing to a greater extent in the former than in the latter situation—we may also conclude that the poison is extricated from the surface of the earth, along particular lines, and in certain spots of greater or less extent. These inferences granted, we may then understand the *rationale* of the measures about to be recommended for the prevention of the cattle plague.

PREVENTION.

If the agent productive of disease be contained in the atmosphere, the best means of preventing an attack would be to shut up the animal in a close, or, in an air-tight, box, only that animals, like men, cannot live without air, and without having a constant and fresh supply. But then it is to be remembered, that only a limited quantity is required daily; and that quantity so small that, when shut up in a stable or a shed, with the doors and windows closed, animals experience no inconvenience in consequence. Bearing this fact in mind, it will be in our power to exclude the external air to a considerable extent, whenever it appears desirable to do so. That will evidently be required in the instance under consideration. When, therefore, the epidemic is prevailing in the neighbourhood, and more particularly if it has broken out among the herd, they should be kept under shelter as much as possible during the day, and entirely so at night. Experience has shown that individuals exposed to the night air, during epidemic periods, are more liable to attacks than others. The reason, as we may infer, is, that the poison productive of all diseases, the same as that well-known substance called malaria, possesses a specific gravity greater than that of atmospheric air. Becoming rarified by the warmth of the sun, it rises into the higher regions of the air during the day, but again falls to the earth, when its rays are withdrawn.

Although present in the atmosphere, the poison, as previously remarked, is not equally diffused in this fluid; it is in a state of greater concentration in one situation than in another. Hence it is, that those living near the source of the extrication of the poison become affected, while those at a distance escape; the poison, by its diffusion and dilution in the surrounding air, becoming innocuous beyond certain limits—hence the limitation of range of epidemic diseases. The fact is still more apparent with endemic diseases; for we not only know the source whence the poison (malaria) is extricated, but the extent of its range. The source is all low, marshy, and alluvial soils, so that higher grounds are either partially, or, entirely, exempted from its deleterious influences. Thus it is, that, in tropical climates, the severest form of fever—the continued—will be found on the plains below; remittent, on the

heights above, and intermittent—the mildest form of all—at still greater elevations. We do not find the same limitation of range with epidemics; the epidemic cholera having been met with at the highest inhabited ranges of the Himalaya Mountains—10,000 feet above the level of the sea. Still, their prevalence is less, and the limitation of their range is much greater, and more defined, at high than at low elevations. Geological formations have, also, some considerable influence, as regards the prevalence of disease. Hence I have laid it down as a law, regulating the march of epidemic diseases, that they prevail to the greatest extent in alluvial and tertiary formations; less so on secondary formations, and least of all on primary rocks.

Whenever, therefore, disease breaks out among a herd of cattle, placed in low and marshy ground, they should, if possible, and if not in contravention to the orders of the Privy Council, be removed to higher ground—more particularly if there are animals, in the latter situation, among whom no disease has manifested itself.

There is another rule that may also be adopted. It has been stated, that the range of epidemic diseases is frequently very limited in a town; they are equally so in other situations. For instance, it has frequently happened, in India, that two corps on march together, have encamped for the night on separate ground, but near to each other. The one has been immediately attacked with cholera; the other has not presented a single case. Observing this, the sick corps changes its encampment, and takes up a position alongside the healthy one. This is no sooner done than the disease ceases; the healthy corps also remaining unaffected, although the sick and the dying were removed at the same time.* When, therefore, it is impossible to remove the cattle to a more elevated situation, another grazing ground, even at the same elevation, may be tried — more particularly if the test mentioned above can be obtained. There is no fear of the healthy cattle being infected by the sickly herd; the example just given will show this. The disease may, of course, break out in this locality, the same as others; but, then, this would have occurred even if the sick cattle had not been removed there. As, however, such a step would be contrary to the regulations at present in force, it will be necessary

* Francis Clater, in his work on Farriery, speaking of the murrain during its prevalence in England, at former epochs, says:—"A hedge often separated the dead from the living,"—a proof that this disease observes the same laws as all other epidemics.

to remove the healthy cattle to another locality, previously to the removal of the sick herd.

But all cattle are not kept in grazing ground; there are some, and more particularly dairy cows, in London and other large towns, which are stall fed. The regulations, that I should propose for these, are the following.

Do not admit more air than what seems absolutely necessary for the purposes of respiration; and let that air be admitted, to use a nautical phrase, on the *lee*, *not* on the windward side of the cow-house. It but too often happens during the prevalence of epidemic diseases, that we are induced to exclaim with the Poet:—

> "The Angel of Death rode by on the blast:
> And smote in the face of the foe as he pass'd."

All the windows and doors, however, may be thrown open, and the place be properly ventilated for an hour, or two, in the middle of the day, more particularly in warm weather, as, for the reasons previously given, there is less danger at that time than at any other. It is the night air that is most to be dreaded.*

These are the only general measures that I should propose for the prevention of the disease: but we must not rest contented with these. There is another, more certain and more specific, method, that I should strongly advise the proprietors of cattle to adopt, whenever the disease is prevailing in the locality, or, in the neighbourhood. This is by the employment of one of the different forms of carbon, as recommended more particularly for the treatment of the disease. My faith in the efficacy of these agents is so great, that I have no hesitation in affirming, they would, if properly administered and in sufficient quantity, preserve an animal from an attack, even in an infected atmosphere. To obtain such a result is of no slight importance at the present moment, when the proprietors of stock are recommended to slay their animals on the first outbreak of the disease,—sick and healthy alike.

Believing this step to be most prejudicial to the interests of the proprietors of stock, and injurious to the welfare of all classes, I cannot close these remarks without entering my solemn protest against this bovicidal mania—if I may be allowed to coin a word. Mr. Gamgee, Principal of the Veterinary College, remarks,

* Those who may wish to pursue this subject further can consult my work,—The Causation and Prevention of Disease,—in which the laws regulating the extrication of malaria from the surface, and its diffusion in the surrounding air have been laid down and explained.

in a letter inserted in one of the journals: "It is highly necessary to inform the public that the present scourge, unlike cholera and similar human diseases, has no tendency to die out, after a brief period of its extension. So long as *living* cattle are within reach of anything infected, or diseased, so long must it go on; and it is chiefly by *wholesale extermination* of stock, that the last embers of the disorder will be consumed." These conclusions, as must be evident from what has gone before, are not only unsound and erroneous, but they are prejudicial in the highest degree to the interests alike of the public, and of the holders of stock. Not only is the cattle plague a true epidemic, but, what is more, it will subside after a time of its own accord, even if all the healthy and all the sick were mixed promiscuously together. If the disease be neither contagious nor infectious, it will be both a crime and a sin to slay a single animal that has been attacked, for as long as there is life, there is hope. Besides, if this wholesale extermination of stock is to be carried out, whence are we to obtain a fresh supply? Russia has already had 100,000 head of cattle carried off, and although other countries in Europe have hitherto escaped, this immunity will not always continue. They also will be brought, sooner or later, under the malign influence of the same cause, as will also America, although not a single animal be transported thither from Europe. I would therefore say to the proprietors of stock, Use your best endeavours to prevent the disease; should these means fail, and some of your animals be attacked, think only of how they can best be cured; so that, if they die, the verdict may be: "Died by the visitation of God: *not* by the hand of man."*

* These recommendations are given under the supposition, that they would not be in opposition to the orders of the Privy Council, or, of the Government authorities, which they necessarily would be, to a certain extent, at the present moment. But these orders will, I trust, be speedily modified and altered. Unless this be done, we shall never be able to ascertain what the laws regulating the spread and propagation of the disease really are!

TREATMENT.

Although Professor Symonds tells us, in his Report to the Privy Council, that "the experience gained in this country, confirms Europe, as a whole, viz., whenever the plague breaks from its strongholds in Russia, and invades other countries, medical skill is powerless in arresting its progress, by the application of curative measures," I am ready to maintain the contrary. As the organization of man and of animals is the same, and as the diseases are nearly identical, there is no reason why the cattle plague should not be as amenable to treatment as typhus, or typhoid fever, in the human race. If such a result has not been obtained at present, it must be ascribed to the fact, that the proper treatment and the proper remedies have not been hitherto employed. Convinced of the truth of this conclusion, I am induced to propose the following method of treatment, not only because I have found it to be the most efficacious in human subjects, but also from the fact, that it has been adopted with success, both by myself and by others, in the brute creation—in the murrain that prevailed some years since in England. This is by the employment of the different forms of carbon.

As the gaseous form is that on which the greatest reliance is to be placed, I will first point out the best mode of its administration. As long as the animal takes its drink regularly, and in the usual quantity, the gas may be diffused in the water, which can be easily effected by dissolving one drachm and a half of bi-carbonate of soda and one drachm of tartaric acid in each pailful of water. If, however, the animal refuses its drink, or takes it in less quantity than usual, the gaseous fluid must be poured down the patient's throat; or, it may be given by enema. In this case, a smaller quantity of fluid should of course be employed; while, if an injection be resorted to, the water must be warm—98° fahrenheit, or blood heat. One very good method of administering the gas, by the mouth, is, to pour a bottle of soda-water down the animal's throat—care being taken to prevent the escape of the gas. This should be repeated every two or three hours, until the urgent symptoms are relieved. If more convenient, yeast—brewer's yeast—may be substituted for the soda-water; or, it may be given in combination

with it. In the former case, half-a-pint may be given every three or four hours; in the latter, half that quantity. If a stimulant be required, as is the case in the latter stages of the disease, instead of the soda-water, a bottle of porter, or of ale, if old and *well up*, may be employed instead.

In addition to the above, one of the other forms of carbon should be resorted to; and as we are only acquainted with carbon in its pure form in the diamond, we must employ those compounds in what it exists in the largest proportions, viz., in the hydro-carbons. The best is Naphtha, which contains 85 per cent. of carbon. Two tea-spoonsful of this—the pure, medicinal naphtha—may be given every four hours, in mint or chamomile tea, and be continued until the subsidence of the specific symptoms—those characteristic of the disease. When the naphtha cannot be obtained, a table-spoonful of cod liver, or olive, oil may be substituted for it.

As the object of this mode of treatment is to remove the cause rather than to remedy the effects, it should be resorted to at the earliest possible period of the attack. For the removal of the effects—the debility, &c.—the ordinary methods must be resorted to. I must, however, enter my protest against the employment of stimulants, excepting as a last resource, and in the last stage of the disease. The debility experienced, at the commencement of the attack, is merely the effect of the impression of the morbid agent on the system, and will disappear, in common with the other effects at that stage of the disease, on the removal of the operating cause.

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