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THE CATTLE PLAGUE

IN ITS RELATION TO

PAST EPIDEMICS AND TO THE PRESENT ATTACK

BY

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NOTE BY THE PUBLISHERS.

This Essay, which was published in the December number of the *North British Review*, has excited considerable attention, and numerous demands have been made to us that we should publish it in a separate form. The author originally wrote it to support the views of the majority of the Royal Commissioners, in which he was included, at a time when their recommendations were not appreciated. On our representation that the article would have increased usefulness if his name were attached to it, the author has kindly authorized us to do so, and has also made additions, so as to bring the information conveyed in it up to the present period.

January 1866.

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THE CATTLE PLAGUE.

HUMAN plagues, as well as pests among oxen, have been known from the most remote antiquity, and have excited marked attention among authors in all ages. 'A grievous murrain,' which smote the cattle of Egypt, was one of the means employed to soften the obdurate heart of Pharaoh. Classical authors constantly refer to bovine pests, sometimes in vague and uncertain terms, but occasionally with such precision as to leave little doubt that the ancient and modern murrains are identical. Homer, Plutarch, Livy, Varro, and Virgil describe their virulent character, and also allude cursorily to the means which were taken to stay their progress. The contagious character of these plagues is indicated by Columella, in his *De Re Rustica*, at the beginning of the Christian era; while Vegetius, three centuries later, enlarges upon this theme, and prescribes the course adopted by our rulers in the nineteenth century, that plague-stricken beasts should 'with all diligence and care be separated from the herd, and be put apart by themselves, and that their carcasses should be buried.' It is not, however, our purpose to describe the frequent plagues which have devastated Europe in the middle ages. In the year 376 the cattle plague was all over Europe, and Cardinal Baronius assures us that no cattle escaped, except such as were marked on the forehead with the sign of the Cross. In the sixth century the existing

plague seems to have been well known, for Gregorius of Tours gives a full description of its symptoms. The ninth century was particularly afflicted with it, Charlemagne having sown its seeds broadcast during the movements of his army, as Fracastorius and Weierus have fully recorded.[1] We would leap over the history of these ancient plagues altogether, were it not that we find incidental notices of some of them even in this country.

The fourteenth century was especially remarkable in England for the frequent occurrence of human plagues. Fifteen times at least, during that century, did Black Death and its kindred plagues ravage Europe, sometimes preceded, sometimes followed, by grievous murrains among cattle. In the two years 1348–1349 a plague of great intensity attacked the horned cattle in England. They died by thousands, and the herdsmen, panic-stricken, fled from their herds, which roamed wildly about the country, carrying the plague into every district. Many attempts were made to confine the diseased cattle, but with little effect, owing to the belief that they could communicate the plague to man. The harvest in these years was luckily plentiful, but, notwithstanding the abundance of grain, the dearth of cattle was severely felt, and the horrors of famine were added to those of the plagues among men and beasts. About a century later the murrain among cattle was prevalent throughout Europe, and once more fell upon this country. It was again accompanied by a plague among men. But on this occasion the human plague, or 'sweating sickness,' chiefly attacked the middle and upper classes of society, who were thus punished for their gluttony and riotous living; and its accompanying murrain among cattle does not appear

[1] During the year 809 the scourge left scarcely an animal alive in the Commissariat of Charlemagne. It then subsided, and broke out fiercely at intervals all through that century; thus in 820 it ravaged Hungary, and thence spread through Western Europe, and in 850 it desolated the whole of France, leaving but few horned cattle.

to have caused such panic in the poorer classes as on the occasion of its previous visit, when their spirits were weighed down by repeated assaults of Black Death. The years 1348 and 1480 produced no chroniclers of these murrains, so that we are unable either to identify or to differentiate between them and the cattle plague of our own time. The preventive measures used by the Governments of both periods are however identical. The separation of diseased from sound stock, so long since recommended by Vegetius, was then adopted as now; and the free use of the pole-axe to slaughter suspected animals was encouraged then, as it has been in the Order of Council during the present year.

Till 1714, the last year of the reign of Queen Anne, our country was not again visited by any extensive murrain among cattle. This plague, like its successors in 1745, 1768, and 1865, first appeared in the neighbourhood of London, and swept off many cattle. But the pole-axe was used unsparingly; the slaughtered cattle were either burned or buried twenty feet deep under the earth; and the plague was soon stamped out, without extending its ravages much beyond the home counties. Thirty years later the plague once more invaded the country and held it with a firm grip for twelve years; but before recounting the evil that it did then, and the experience which it has left for our guidance now, it is necessary to allude to its general prevalence in Europe during the eighteenth century, for it is from this period that our scientific knowledge of the murrain begins to be developed.

The wars which prevailed during the eighteenth century diffused the plague all through Europe, as a common consequence of the parks of cattle which were formed in the rear of the armies. The years 1711 to 1714 were especially remarkable for the mortality caused by the plague in Western Europe, no less than one million five hundred thousand cattle having perished by the murrain during these years.

This plague originated in the Russian Steppes in 1709, passing through Podolia, Bessarabia, and Croatia into Dalmatia. On the 17th August 1711, Count Trajan Borromeo, a canon of Padua, saw a stray and wayworn ox upon his estate, and, instigated by humane motives, gave it shelter in a cow-shed. This ox was soon reclaimed by its owner, a Dalmatian cattle-driver, who stated that it had strayed from a herd belonging to the commissariat of the Austrian army. About a week after this unlucky visit, the cattle in the shed which had sheltered the Dalmatian beast began to sicken, and shortly afterwards died of a malignant pest. The season was fine, but unusually dry; the pest spread rapidly through the Count's herds, and from them extended widely, passing on to Milan, Ferrara, the Campagna of Rome and Naples, travelled through Sardinia and Piedmont, then through Dauphiny into France, traversed Switzerland, scaled the Mountains of the Tyrol, spread over Germany, and penetrated into Holland, from whence it is supposed to have been imported into England. Italy did not get rid of it for seven years. Pope Clement XI. lost between August 1713 and May 1714, 26,252 cattle in his States, and was so affected by the losses, that he published regulations for the suppression of the plague, on which our own Privy Council, during the existing attack, have made little improvement. The Pope ordered diseased cattle to be slaughtered, their hides to be slashed, so that they might not be used for making leather, and their carcasses to be buried along with quicklime. But, instead of the £20 penalty which our Privy Council exact for an infringement of the order, the Pope, after temporizing for some time, and trying mild measures, ultimately ordained that every man infringing these rules should be sent to the gallows if he were a laic, and to the galleys if he were an ecclesiastic. And yet, with these Draconic laws, it took the Pope nearly a year to expel the plague from his States. During this period Naples lost 70,000

and Piedmont 80,000 oxen, while the neighbouring countries suffered in a like proportion. We have fortunately a full account of this epidemic by two Italian physicians, Rammazini and Lancisi. The former calls the pest the 'pock-plague,' because it was characterized by pustular eruptions, and Lancisi is equally decided as to its eruptive character, saying, 'that the skin is infected with spots and pustules, so that some have thought that the oxen were destroyed, not by the plague, but by the pustular disease called small-pox.'

The wars of Louis XIV., until his death in 1715, aided much in the propagation of the murrain. The armies of the Allies, under Marlborough and Prince Eugene, frequently carried it in their train, or received it in the capture of commissariat cattle from the French. Holland, from 1713 to 1723, lost more than 200,000 cattle, and then had a period of repose from its ravages. In almost every instance during this century, we find the plague spreading with violence whenever Russian and Austrian troops penetrated westward, or when the troops of other countries commingled with the former, either in war or peace. This was specially observed in the War of Succession, on the death of Charles VI. in 1740. It is familiar to every reader of history, that the Hungarians warmly espoused the cause of Maria Theresa, and as the tide of war surged backwards and forwards, the Hungarian cattle used to feed the Austrian armies, carried with them the seeds of the plague, and again spread these broadcast over Europe. Frederick the Great, in his frequent encounters with the Austrians and Russians, took back this cattle plague, as his Nemesis, to Prussia. In eight years after the death of the Emperor Charles VI., the west and centre of Europe alone lost three millions of horned beasts. This was a period of interest to England, and demands careful consideration.

Late in the year 1744, or more probably early in 1745, a murrain broke out among English cattle. The writers of that

period, especially Mortimer, the secretary of the Royal Society, and Layard, the eminent physician, agree in ascribing its importation to two white calves brought over from Holland by a farmer living at Poplar near London. Shortly after the arrival of these calves, some cows on the same farm sickened. The distemper spread among the cattle in the lower part of Essex, and soon reached London, which now, through the metropolitan market, passed it into different parts of the country. Still it did not travel rapidly, for, although the Government issued a Commission in November to prevent its spread, the powers of the Commission extended only to Middlesex. Inspectors, who were butchers and cowkeepers, were appointed to examine cowsheds, in order to separate sick and sound beasts. The former were killed and buried twelve feet under ground, their hides being well slashed, and their carcasses covered with two bushels of quicklime. A compensation by the Government of forty shillings, or about half the average price of cattle at the period, was given for each slaughtered beast. The progress of the distemper was so slow that Government did not treat it as a national evil until one year after its outbreak. In February 1746, an Act was passed, enabling the King to issue Orders in Council for its suppression, and the first Order is dated on the 12th of March in that year. This Order states that his Majesty had consulted the learned men of his dominion, who agreed that they knew of no cure for the disease; and it even deprecates the attempts at cure, 'for while means are used to save the sick, the disease spreads among the sound, and is increased more and more in proportion to the numbers seized with it.' Hence the pole-axe was made the radical cure in 1746, as it had been in 1714, and as it has been by our present Government one hundred and twenty years afterwards. This first Order in Council then proceeds to give directions, which have obviously dictated those issued in the present year, and are little more than a transcript of the rules

laid down by Pope Clement XI.[1] Plague-stricken beasts are to be killed and buried with lime; the litter infected by them must be burned, and the sheds in which they died are to be cleansed, fumigated with sulphur or gunpowder, and washed over with vinegar and water. Men who tended ailing beasts are not to go near sound stock till they have changed their clothes and washed their bodies. Convalescent cattle are not to be brought in contact with sound stock for a month. Travelling cattle are to be stopped on the highways for examination, and the sick beasts must be slaughtered. The local authorities, who are intrusted with the execution of this order, may appoint inspectors to see the rules enforced. Eight months passed, but the local authorities failed to justify the confidence reposed in them. So a second Order in Council laments the want of local co-operation, and directs that, after the 27th December 1746, 'No person do send or drive any ox, bull, cow, calf, steer, or heifer, to any fair, market, or town in England; or do buy, sell, or expose to sale, any ox, etc., except fat cows and oxen ready for immediate slaughter.' The Order further directs that no fatted cattle shall be allowed to be taken from an infected herd; and to insure this Order being obeyed, all cattle going for slaughter must be provided with passes, or clean bills of health, given by a Justice of the Peace, upon information sworn by oath. No such passes shall be issued unless the distemper has ceased for six weeks on the

[1] But the Pope acted under the advice of Lancisi, as George I. did under that of Bates; both seem to have taken at least some of their ideas from Vegetius, who took them from Virgil, and he, perhaps, from Varro:—

'At length whole herds to death at once it sweeps;
High in the stalls it piles the loathsome heaps,
Dire spectacle! till sage experience found
To bury deep the carrion in the ground.
Useless their hides; nor from the flesh the flame
Could purge the filth, nor steams the savour tame.'

VIRGIL, *Georg.* iii. 556.

pastures or sheds of the cattle-owner. These measures produced a very partial effect, so that a new Act was passed in 1747, giving to the King increased powers. This Act was followed by continuing and extending Acts up to 1757. Many other Orders in Council were issued during this period, bewailing local apathy, and urging increased exertion. Sometimes all the fairs in the country are stopped for two or three months; at other times the stoppage is limited to country fairs, fat stock being still allowed to be exposed for immediate slaughter. A few counties got rid of the pestilence, but the neighbouring counties harboured it, and passed it over to the adjacent ones; so now arose a war of county against county, the healthy district proscribing the infected one, watching its roads and every outlet, so that no beasts, either sick or sound, should be allowed to pass. In the second year of the plague, 100,000 head of cattle are supposed to have perished in Lincolnshire; in the third year, Nottinghamshire lost 40,000, and Cheshire 30,000, while many other counties suffered in similar proportion. In the face of these heavy losses, the Government gathered itself up for a desperate effort, and at the end of 1749 prohibits the movement of all stock, whether fat or lean; permitting slaughter only within two miles of where any beast may be, on the 14th January 1750. The object of this prohibition was to let the disease burn itself out without the possibility of extension. But London and Westminster raised a huge clamour, fearing a famine, for roads were then few and bad, and dead meat could not reach these cities in good condition. The opposition to the Order became so great that it was revoked before it came into operation. The Privy Council now became faint-hearted, and left the war to counties, only interfering now and then in cases of grave evil-doing. So the disease wore itself out by pure exhaustion, the animals susceptible to its influence having mostly perished, until, in February 1759, a general thanksgiving announced its cessation,

no cases having occurred in the previous year, and a few only in 1757.

There is no record of the losses which the country experienced during these twelve years. The system of compensation for slaughtered animals would appear to offer a means of record, but it was soon abandoned, as it led to the most serious frauds. Every animal suffering from disease of any kind was knocked on the head, and classed as a plague-stricken beast, in order to insure Government compensation. A more serious evil still resulted; for the payment of losses diminished the motive to exertion, on the part of local authorities, for the extirpation of the murrain. The Treasury records, therefore, afford no clue to the number of cattle which succumbed to the plague, but it is probable that it reached to upwards of 500,000.

It is curious to read the *Gentleman's Magazine* from 1745 to 1757, and see how history repeats itself. We find in it apparently the same energetic correspondents who now send their lucubrations to the newspapers, protesting against the use of the pole-axe, advocating or opposing the system of compensation for slaughtered cattle, framing insurance societies, fighting against ideas of contagion and importation of the disease, and describing all kinds of cure. We have not yet seen one method of cure, except homœopathy, tried in 1865, which was not tried and found wanting in the plague of 1745. Even Miss Burdett Coutts' liberal treatment of the cows at Holly Lodge, with calomel, yeast, castor-oil, porter, port, brandy, and whisky, is to be found in these old chronicles. Copious bleeding and setons in the neck were, of course, from the habit of the time, much resorted to; two quarts of blood, morning and evening, being not thought too much, till it was observed that bled beasts rarely recovered. Even Mr. Graham's sweating system was well known, but did not yield favourable results. We do not recollect to have seen any proofs that the

disorder made its way over to Ireland during this period, though there are some customs now extant among the Irish peasantry which incline us to believe that they at one time suffered from the murrain. Thus, lighting bonfires on the eve of St. John's Day, and pitching into them, originally perhaps as a sacrifice, live hedgehogs, those traditional cow-suckers, and chasing cattle with burning wisps of straw, show the old methods of burning a plague out of a country, and getting up perspiration in affected beasts. This burning out a plague was extensively tried in England during the last century, as it has been partially followed with pots of burning tar during this year. In 1749, it is recorded that a strange superstition was for some time entertained, a celestial angel having descended into Yorkshire with sacred fire, which the farmers kept alive, so as to smoke their cattle with wisps of straw lighted at it.

It will be seen that the experience of the plague of 1745 is highly valuable, though most discouraging, both as to the use of preventive and curative measures. It is certain that the distemper then was entirely identical with that prevailing now, for the old descriptions of the symptoms, and of the morbid anatomy, do not leave the least ground for doubt.

In 1768 the plague was again introduced into this country by Dutch cows imported into London, and thence to Hampshire. But the Government did not temporize on this occasion, for they issued positive orders to kill all affected cattle, and not to permit attempts at cure. The cattle were not killed by effusion of blood, but by strangulation; their carcasses were buried entire, without slashing their hides, and all litter, manure, and fodder infected by them was buried, and not burned. These were the recommendations given by Layard, and followed by the Government. They were quickly effectual, not only in Hampshire, but in subsequent outbreaks in Essex and Suffolk. Although many persons believed that

the outbreak of 1768 was the small-pox, and distinctive from the rinderpest of 1711 and 1745, there can be no doubt of their identity, for Vicq d'Azyr, himself a distinguished writer on this malady, says, in a letter to Layard :—'Il me parait comme à vous que c'est toujours la même maladie qui a regné depuis 1711 ; et qu'elle a des grands rapports avec l'éruption varioleuse.' For a fuller description of these short outbreaks we must refer to Dossie's work of 1771, and to Layard's Letter in the *Philosophical Transactions*, as we must conclude our historical retrospect, and pass to subjects more immediately interesting to us. We may merely mention, as the result of careful inquiries by Dr. Faust, that, from 1711 to 1796, when he ended his statistical inquiry, more than two hundred millions of horned cattle were cut off by the disorder in Western Europe.

The plague followed, as we have seen, in the wake of Russian and Austrian armies, and was propagated by them to allied or opposing armies. The questions now arise :—Are these plagues the natural consequence of aggregations of cattle following in the rear of armies, under circumstances of overmarching and bad feeding ; or have they a common birthplace from which they spread ? The first question may safely be answered in the negative, for armies operating at a distance from Russian and Austrian commissariats do not experience this form of disease. During the warlike reigns of Louis XIV. and Louis XV., the pest was six times in France, but from 1800 to 1814 it was free from the scourge, although still engaged in active warfare. The distemper was only again introduced when the French armies came into collision with the Austrian and Russian troops ; and it left France in 1816 after the withdrawal of the allied forces. During this time Germany was grievously smitten with the plague. A further answer to the question is obtained by the experience of the

wars in India,[1] Algiers, and America,[2] where no cattle plague appears as a consequence of moving armies. But English commissariat cattle were seized with it in the Crimea as soon as we came in contact with Russian troops.

We come now to the second question, Has this plague a birthplace? The experience of a century tells us that the steppes of European Russia form either its birthplace or its nursery. The lower third part of the Dnieper, with its numerous affluents, until it empties itself into the Black Sea, is surrounded by Russian provinces, which breed about eight millions of cattle to feed on the luxuriant herbage of the steppes. Among these herds this cattle plague or 'rinderpest' constantly prevails, though by no means so virulently as it does when it penetrates Western Europe. As soon as the good season begins, merchants, who are generally Jews, buy up cattle in the steppes and carry them to fairs for sale. Some of the most notable of these fairs are held in Beltzy in Bessarabia, Elizabetgrad in Kerson, Balta in Podolia, and Berditchev in Volhynia. Balta has at least 500,000 head of cattle at its fairs in a single season. From these centres of traffic, great herds of cattle are driven to feed the populations of Russia proper, Poland, and Hungary with its dependencies. Our interest in the cattle which are distributed through Russia is limited, for, with the exception of the famous Revel cargo, we have no direct dealings in live cattle with that empire, though it may be well to mention that the steppe cattle rarely reach as far as St. Petersburg. But it is otherwise as re-

[1] Should the plague ultimately prove to be of the nature of small-pox, then it is also known in India and Ceylon, where, in 1806 and 1815, it committed great ravages, not only among cattle, but also among the wild ruminants of the jungle. The symptoms closely resembled those at present prevailing.

[2] America, indeed, claims credit for having extirpated the plague recently in Massachusetts; but on reading the description it is clear that this attack was not the rinderpest, but pleuro-pneumonia.

gards Poland and Hungary, for the former receives infected stock, which may pass the Prussian frontiers, and the latter supplies weekly the metropolitan market with the long-horned breed of oxen. The Russian provinces of Podolia, the Ukraine, and Volhynia, annually supply Poland with about 30,000 head of cattle of the steppe kind; and though Poland fights manfully against the introduction of the pest, it frequently crosses over her borders, and commits devastation among the native herds. Cattle for immediate slaughter are admitted into Poland after three days' quarantine, but lean cattle, and those destined for exportation, undergo twenty-one days' detention. Our Consul at Warsaw, writing on 4th April 1857, draws the attention of the Foreign Office to this subject:—'I beg very particularly to draw your Lordships' attention to this part of the subject, it being beyond doubt that vast numbers of steppe cattle find their way, in consequence of the railway extension, to all parts of Germany, a few days after the Austrian and Prussian frontier has been passed by them. The trade in live stock is very active, and every new mile of railway tends to produce, on the Continent of Europe, an equalization in the price of cattle, similar to what we have already seen in England on a smaller scale.' Luckily for this country, Prussia, when she is at peace, has hitherto been a rampart against the extension of the plague, for the police measures to destroy diseased cattle, and even dogs and birds, which might carry infection over the borders, are prompt and severe. But smuggling still takes place, so that the disease occasionally breaks out in the border villages. Round these, military cordons are drawn, and the pest is stamped out with merciless rigour.

Austria has never been so successful in her preventive measures. Nearly a hundred thousand steppe cattle are believed to pass annually into Galicia and Hungary. Every six or seven years the pest appears to ravage the herds of the

latter country. In the three years 1849–1851, it attacked 300,000 head of cattle, while in 1863 it was more severe than on any previous occasion, having seized on 14 per cent. of all the cattle in Austria, with the exception of Silesia, Bohemia, Upper Austria, Salzburg and the Tyrol, Carinthia, and Venice. At this moment it is still in Hungary, and has attacked sheep as well as horned beasts. This has been a peculiarity of the recent irruption of the pest, for before 1863 Poland also had not experienced its extension to sheep or goats.[1]

We draw attention to these facts, because it must be apparent that the completion of the two great lines of railway which, traversing Southern and Central Germany, connect Rotterdam and Hamburg with Pesth and Lemberg, have opened up to us the supplies of Hungary and Galicia, and have vastly increased the danger of a constant importation of this plague. In fact, through Rotterdam, and under the name of Dutch beasts, we have of late frequently recognised in the metropolitan market the long-horned oxen of Hungary. If we have been rightly informed by an official on the Galician railway, there is scarcely any quarantine for beasts destined for exportation, the old rules being now found inapplicable to the modern demands of speedy transit. It seems to be certain that steppe oxen can carry about on their hides the virus of the plague, without themselves being necessarily smitten by it, although, on being overdriven, underfed, or badly watered on their journey, the plague breaks out with virulence. Scientific men have kept this poisonous matter for three, six, and even eleven months without any deterioration of its properties, the proof being that it still possessed the power of communicating the distemper to an ox by inoculation. It is quite possible, therefore, that an animal might carry about the poison in a

[1] Nevertheless Fracastor, writing in the middle of the sixteenth century, speaks of the plague as sweeping away not only 'the wretched cattle, but also nearly the whole of the unhappy flocks of sheep.'

dry state on its skin, hoofs, or horns, and that the *contagium* only begins to reproduce itself under favourable conditions for its growth.

There are not a few people in this country, who, in spite of the evidence of men of science, persist in believing that the murrain which now prevails is a disease of spontaneous origin, or of home growth, quite different from the plague of 1745, and not identical with the cattle distemper of Germany called *Rinderpest*, or, as it is known in France, the *typhus contagieux des bêtes à cornes*. It is necessary to convince such people of the absolute identity of these murrains, otherwise all the experience so dearly won by England in the last century will be lost to them, and that acquired by foreign States, who, unhappily for them, are more familiar with the disease than this country, cannot be brought to bear for the common advantage of the public. To remove such doubts, we insert descriptions of the symptoms of the plague at present in the country, of that in Poland by Professor Seifman, and of the old plague of 1745, by Dr. Layard, from his Essay of 1757. The official description used in the Orders of Council, and understood to be drawn up by Professor Simonds, is as follows:—

'The cattle show great depression of the vital powers, frequent shivering, staggering gait, cold extremities, quick and short breathing, drooping head, reddened eyes, with a discharge from them, and also from the nostrils, of a mucous nature, raw-looking places on the inner side of the lips, and roof of the mouth, diarrhœa or dysenteric purging.'

The Polish Professor's description of the symptoms, as displayed in pest-stricken beasts of his country, is similar, though differently expressed:—

'The beast eats little, stops its rumination, becomes nervous; the mucous membranes, gum, mouth, etc., throw out pimples; there is a running at the eyes and nose, and this running after a time gives out an offensive smell; an offensive diarrhœa ensues, the beast coughs, becomes thinner, sometimes grinds its teeth, lies down with its head at one side, and dies without effort.'

Layard, in his Essay *On the Contagious Distemper among Horned Cattle, anno* 1757, p. 24, says:—

'The first appearance of this infection is a decrease of appetite; a poking out of the neck, implying some difficulty in deglutition; a shaking of the head as if the ears were tickled, a hanging down of the ears, a dulness of the eyes. After that, a stupidity and unwillingness to move, great debility, total loss of appetite, a running at the eyes and nose. . . . A constant diarrhœa, roofs of their mouths and barbs ulcerated. They groan much, are worse in the evening, and mostly lie down.'

Of the three accounts, we prefer that of old Layard as being the best description of the disease as most frequently seen by us, although there are small variations; for example, the outward eruptions, which Layard states were not unfrequent along the limbs, are not so characteristic of the present attack. Layard, like Rammazini and Lancisi, draws especial attention to the pustular character of the disease. He says, in a letter to Sir Joseph Banks in 1780: 'It is an eruptive fever of the variolous kind, and, though the pustules may have been frequently overlooked, yet none ever recovered without more or less eruptions or critical abscesses. . . . Unlike other pestilential, putrid, or malignant fevers, it bears all the characteristic symptoms, progress, crises and event of the small-pox.' This eruptive character has recently been recognised distinctly by Mr. Ceely, one of the Royal Commissioners, who has observed several cases where the pustules were well marked; and Dr. Murchison has also satisfied himself that the present plague has distinct analogies to human small-pox. We might, beside symptoms, give anatomical descriptions by Bates, Mortimer, Layard, and Dossie, which would show the identity of the disease in the last century with that now prevalent in England and abroad, but these might be too much for the patience of the general reader. We refer with approbation to the description of the dissections given by Dr. Smart in the excellent and practical re-

port of the Edinburgh Committee, over which Dr. Andrew Wood presided. This committee worked with uncommon energy, and produced a report in about a week after they were appointed by the Lord Provost and Magistrates—a report which, in reality, contains one of the best descriptions of the morbid anatomy which have yet been published in this country. The disease is justly described as chiefly affecting the mucous membranes, there being a general congestive but non-inflammatory vascularity of these membranes, especially in the alimentary tract. The disease is not analogous either to typhoid or typhus fever, as has been often asserted, but far more resembles small-pox. The stomachs of the animal generally contain an enormous mass of dry undigested food, often amounting to one or two hundred pounds in weight, so that this acts as a sponge to absorb new liquid food or medicine, and resists their absorption into the system. The complete arrest of the digestive functions is one of the marked characteristics of the disease, and must be constantly borne in mind in the dieting of sick cattle.

The mode in which the distemper is communicated from sick to sound beasts is more interesting to us at present than either its diagnosis or pathology. No one, who has given to it a real study, can doubt for a moment that it is eminently contagious. By this we mean that there is a specific entity which causes the disease, and has the power of propagating its own species rapidly under favouring circumstances. Rather than give our own views on this head, we prefer to quote those very clearly expressed by Dr. Simon, the medical officer of health to the Privy Council:—

'The several zymotic diseases are ætiologically quite distinct from one another. How their respective first contagia arose is, as regards nearly all of them, quite unknown. This, in pathology, is just such a question as in physiology is "the origin of species." Indeed, it is hardly to be assumed as certain that these apparently two questions may not be only two phases of one. Hourly obser-

vation tells us that the contagium of small-pox will breed small-pox, that the contagium of typhus will breed typhus, that the contagium of syphilis will breed syphilis, and so forth; that the process is as regular as that by which dog breeds dog, and cat cat, as exclusive as that by which dog never breeds cat, nor cat dog; and, prospectively, we are able to predict the results of certain exposures to contagion as definitely as the results of any other chemical experiment. But, retrospectively, we have not the same sort of certainty, for we cannot always trace the parentage of a given case of small-pox or measles. And here, notwithstanding the obvious difficulties of proof either way, some persons will dogmatize that there must have been an overlooked inlet for contagium, while others will dogmatize that there must have been in the patient's body an independent origination of the specific chemical change. Presuming (as may pretty confidently be presumed) that in the history of mankind there was once upon a time a first small-pox case, a first typhus case, a first syphilis case, etc., and admitting our entire ignorance as to the combination of circumstances under which those first cases respectively came into existence, we have no scientific reasons for denying that new "spontaneous generations" of such contagia may take place. But as regards some of the diseases, there are conclusive reasons against supposing that this is of frequent occurrence. Where we can observe isolated populations (this applies just as much to measles as to small-pox), we find very long periods elapse without any new rise of certain "species" of disease (and 120 years have elapsed in the case of the murrain, and the same thing occurred with regard to the measles in the Faroe Islands). For instance, in 1846, the contagium of measles was imported by a sick sailor into one of the Faroe Islands, and led to an epidemic which attacked more than 6000 out of the 7782 inhabitants, sparing only the persons who previously had had the disease, and 1500 who were kept out of reach of contagion; but before that time there had not for sixty-five years been in those islands a single case of measles. It is the same thing in the steppe murrain.'

In fact, nothing can be more definite than the contagious virus of the cattle plague. It has been known from remote antiquity, for, whenever we have an accurate description of it, the characters of the pest are essentially the same; it reproduces itself with as much definiteness as one mushroom gives birth to another. The contagion is swift and subtle in the highest degree, and travels about with such stealthiness that its presence is often unsuspected, until it has passed into the

blood of its victims, and manifests itself by terribly destructive effects. At first there is no difficulty in tracking the course of the distemper, for it travels with animals, which have come from some known centre of infection, to other sound beasts which have sojourned with them. But, after a time, its spread cannot be clearly traced. Dogs and sheep which have been near infected cattle have been known to carry the contagion to great distances; even pigeons and hens, which have looked for grains in the excrements of diseased cattle, have become the unsuspected media to pass over the contagion to sound oxen. The attendants on sick beasts carry the contagious virus on their clothes, hands, and even their hair, to healthy cattle; the veterinary surgeon does not escape from being considered a dreaded vehicle of infection. Still waters and running streams, which have received the drainage of infected sheds or pastures, become channels for propagating the contagium; and the wind carries with it particles of virus from one farm to another, at least for a distance of two hundred yards. The public roads on which sick cattle have travelled become altogether infected for sound cattle which may be driven over them. This subtle poison enters into the body of a beast, and incubates for a fixed time. The period of incubation is usually from five to seven days, although occasionally it varies from three to nine days; during this time the animal enjoys nearly its usual health, and might readily be sold and transported as a sound beast. It is alleged that an animal in the incubative stage may communicate the disease. The virus chiefly attacks horned cattle, but can also fix itself on sheep. Fortunately they are less susceptible to its influence; for when it is once introduced into a flock its ravages are fatal. We have seen in the meat market, and also during life, sheep affected with the most virulent form of the disease.

We have not as yet indicated the amount of the mortality

of the plague, for it, in fact, varies much in different countries. One law has been made out with tolerable certainty,—that the more the bovine plague advances from the Russian steppes to the north or west, the more its malignity increases. This is only consonant with the experience of other diseases, such as small-pox, which proves fatal enough with us, but acts as the most malignant pest when it deserts its usual source, and sojourns among the South Sea islanders or American Indians. The rinderpest in its native steppes carries off about one-half, or 50 per cent., of the cattle which it attacks; when it reaches Hungary, the mortality rises to 65 per cent.; and in our own country it was on its first appearance upwards of 90 per cent.

Numerous attempts have been made to mitigate the severity of the disease by inoculation. This was extensively practised in the last century all over Europe, occasionally, as in Denmark, with considerable success, but on the whole with such bad results that it was forbidden by law in various countries. A sound animal may easily be inoculated by scarifying the skin, and rubbing into the wound some of the mucous matter which runs from the eyes or from the nose of a *convalescent* animal. It is usual to do this in the inside of the ear, but sometimes a hollow needle is introduced into the dewlap, the matter being passed in by this means. When a beast has been thus inoculated, the period of incubation is generally two days shorter than when it receives the poison by contagion. The symptoms are generally as severe, and the mortality is not lessened. But there is this advantage, that an infected herd may be made to pass through the disease in eight days, instead of having it lingering about the premises for a month or two, with increased chances of spreading the infection through the country. The inoculating matter, if protected from air, can, as we have already stated, be kept for several months unchanged.

Although our own experience in inoculation is discouraging, that of Russia is much more favourable, and holds out the hope that in time the pest may be as much repressed at its birthplace, as the small-pox has been by vaccination. Professor Jessen of Dorpat has described the results of Russian experiments; and other scientific investigators, such as Haller, Vicq d'Azyr, Abildgaard, Adami, Viborg, and Kausch have added considerably to our knowledge of this important subject. One of their main results is, that the intensity of the inoculating virus decreases, according as it passes through a succession of beasts, or, as it is technically termed, through successive 'generations.' Thus, at the Veterinary School of Charkow 50 per cent., or the normal number, of steppe oxen, died at the first inoculation, but after the inoculating matter had passed through six cows, the seventh generation, or running from the nose of the sixth inoculated cow, only produced one death in thirteen cases. In 1853 upwards of a thousand beasts were inoculated with matter of the seventh generation, and not more than sixty died. In 1854 it was determined to inoculate oxen in the steppes themselves, and a large number were so treated, with the astonishing success that not a single animal died. This was a peculiarly favourable year; but, notwithstanding the exceptional character of the result, it holds out hopes that means may be discovered to mitigate the intensity of the virus. Although none of these inoculated animals died in 1854, and few even sickened, they were all found to be efficiently protected against future attacks of the disease. Many of them were confined in the same sheds with beasts suffering from the rinderpest at intervals of several years, but none of them received the contagion. In 1857 the Grand-Duchess Helen founded an institution for inoculation on her property of Karlowka in Poltava, with such success that only 3 per cent. of the inoculated animals died. It must, however, be distinctly borne in mind that these favour-

able results have only been obtained with oxen of the steppe race. Cattle of other races are much more unfavourably disposed to inoculation. Before mitigation of the virus appears in their case, it must pass through from thirteen to fifteen generations. Drouyn de Lhuys, in his proposal for a Sanitary Congress at Constantinople, with the view of damming up cholera at its source, so that it may not reach Europe, has given us a hint which might be well applied to the cattle plague. Why should Central and Western Europe be periodically devasted by this murrain, when it might be prevented by the inoculation of the cattle in the steppes? We may mention, in conclusion of this part of our subject, that sheep and goats may readily be inoculated from cattle. Sometimes they resist the disease; but in several cases, tried under our own inspection, all the sheep took the distemper in its most virulent form, and died. Unfortunately, according to Professor Röll of Vienna, there is no mitigation of the disease, when the inoculating virus is taken from the sheep, and passed back again to cattle.[1]

Perhaps there is no disease, except small-pox and rinderpest, which can with certainty be transmitted from the sick to the healthy by inoculation. At all events, there is only one other disease, having no relationship to either, which may possibly be so passed. This fact alone would have drawn attention to the analogy of the two diseases, but when we add to this the descriptions of the old writers, who distinctly described the pustular character of the malady, the analogy becomes much more striking. This eruptive feature of the disease has also been lately observed in this country. Human small-pox, once a dire scourge, has ceased to have terrors for our race, not from any advance in curative resources, but by the preventive

[1] Dossie, and some other writers of the last century, believed that inoculated animals were still subject to the plague, but this is now supposed to be a mistake.

application of vaccination. Vaccine virus, the modified cow-pox matter, seems to attack and remove the constituent of the blood which is acted on by the fiercer ferment of small-pox, and it has also this great advantage, that it does not, except rarely, propagate itself by contagion. It is in the latter respect that vaccination is so immeasurably superior to inoculation, which, while diminishing the mortality of the disease, propagates it to persons coming under its influence. The question then naturally occurs, Can we, by vaccinating cattle, protect them from rinderpest? This would be a great return from man to the ox for the benefit which he received, through the hands of Jenner, from that animal. The answer to the question will soon be received, for vaccination of cattle is now being tried in hundreds of cases all over the country. The idea originated with the Royal Commissioners, one of whom, Mr. Ceely, has long devoted his attention to the study of vaccination. Much encouragement to the notion has already been elicited by the energetic action of Dr. Murchison. Cattle which have had the natural cow-pox have remained unaffected by the rinderpest, when those around them have been swept away. Vaccinated cattle have likewise had similar immunity from attack. But the subject is only under investigation, and is not yet made an established truth in science. Even should it be so, the deficiency in vaccine matter, often insufficient for man, will retard seriously the general adoption of this preventive measure. Cattle cannot be vaccinated with such certainty of success as men, and yet the failures in the case of the latter are far from uncommon. Actual cow-pox virus from the cow is found to be more sure than that from a human subject.

Under these circumstances, any ready way of converting common rinderpest virus into vaccine virus would be an enormous gain to farmers. This idea of mitigating its intensity is not so hopeless as might at first appear, for human small-pox

virus has been artificially converted into cow-pox or vaccine virus. Dr. Basil Thiele of Kasan, in Russia, mixed small-pox matter with warm cow's milk, and vaccinated 3000 persons with this mixture. The experiment was quite successful. The children so treated did not take small-pox, but merely a more decided form of cow-pox than usual. The matter from the vaccine pustule sometimes produced small-pox in a new child, unless it had also been diluted with milk. But when *there was no consecutive fever*, the inoculation was safely made from arm to arm without dilution of milk, with only the appearance of vaccination. After the fourth transmission, it became true cow-pox virus. Dr. Sanderson of Madras has lately confirmed this important observation. He took small-pox virus from both European and Indian patients, and, mixing one drop of the matter with three drops of warm milk, vaccinated children with the mixture. All of them which succeeded manifested the symptoms of vaccination, and not of inoculation; the disease had no eruptive variola, except in a single instance, and was not communicable by contagion. The virus taken from one child communicated a true vaccination to another child, without showing the degeneracy observed in the Russian experiments. Of the 128 cases experimented on, 101 were successful, 12 did not take the vaccination, and the remaining children did not return, so that the results in these cases were unknown.

The knowledge of these facts induced the author of this paper to recommend to several scientific bodies, in October last, that experiments should be made to mitigate the intensity of the virus of cattle plague, with milk and other substances, before using it for inoculation. Unfortunately, no facilities for making the experiments have existed till recently, and the investigation of the subject has just been begun. It may lead to a negative instead of to a positive result, but the information in the former case will not be worthless, and, in the

latter event, will be a great gain to our knowledge of the disease, and be a resource to the farmer.[1]

Having now become acquainted with an outline of the history of the pest and of its general characters, we are in a position to examine with advantage the irruption which it has made into our country this year, the best and speediest means of getting rid of it, and the precautions which ought to be adopted to prevent its recurrence.

The disease first appeared in this country at Lambeth, in the metropolis, on the 24th of June, and subsequently, on the 27th of June, in two other dairies in Islington and Hackney. But all of these dairies had, on the 19th of June, bought fresh cows in the metropolitan market, so that the source of contagion was clearly traceable to it, the usual variations in the period of incubation being allowed. But how came the seeds of the disease into the London market? The veterinary surgeons, led by Spooner, Simonds, and Gamgee, reply without hesitation that it was introduced by a cargo of Russian cattle which had been imported from Revel a short time before the plague was manifested; and it becomes important to examine this case closely, for doubtless this was the first cargo of Russian cattle which reached England, and one part of Russia, though a part far removed from Revel, is the seat of the distemper. Twenty-six days before the first outbreak, and eighteen before the cows had been bought in the metropolitan market, a portion of the Revel cargo had been exposed and sold, though none of them went to the infected dairies, as they were only fit for immediate slaughter. The cargo numbered originally 321 head of cattle, besides sheep. They were all bought in the province of Esthonia except thirteen, that province being quite free from the plague. These thirteen ani-

[1] Dilution with strong coffee might prove useful, as it contains casein like milk, besides an empyreumatic oil likely to subdue the action of the virus.

mals came from St. Petersburg, according to the agent, although his principal denies this statement. St. Petersburg is some distance from Revel, and notwithstanding that they came in four horse waggons, a week must have lapsed in their march, for the distance is 200 miles. The pest had been in the neighbourhood of the capital in November 1864, though not for several months previous to the transaction. The agent found four of the beasts not in a condition to travel with him, so they were sold at Revel to butchers: the nature of their illness does not appear. On the 23d of May the cargo started from Revel, and arrived at Hull upon the 28th. One beast sickened on the route, but recovered on the administration of brandy. On the arrival of the steamer, the cattle were specially examined by two veterinary surgeons, who passed them as sound and free from disease. At Hull 146 cattle were sold and sent to the Midland Counties, into none of which did they introduce the disease. The remaining 175 were sent to London, and sold on the 2d of June. We are already aware that the period of incubation of the contagion is eight days, but during the nine days of transit from Revel to London these oxen showed no plague. The Customs authorities were on the alert, and had sent special instructions to Hull for the examination of this particular cargo, so that the two highly intelligent veterinary inspectors who examined them could not have failed to have detected the plague had it been present in the herd. This cargo left no infection on its departure from Hull, and took none with those cattle which were transmitted to the Midland Counties. Nor is it till eighteen days after their sale in the London market that the disease appears. The whole story breaks down; its only support having been the statements of the agent, who fancied that the sick oxen at Revel, and the beast that showed signs of indisposition on board, *might* have had the plague. This man had never seen the disease, and his statement was an afterthought, made when he

had quarrelled with his employer. The name of Russia frightened our veterinary surgeons, who for some years had foreseen the possibility of the importation of the pest, and naturally connected its appearance with this cargo; indeed, it is unfortunate for us that the explanation is not so simple. But we might be put off our guard altogether if we accepted a false solution of the problem, for it is perhaps more probable, and certainly more to be feared, that the disease may have come to us in our traffic with Galicia and Hungary, both of which pest-infected countries send to the London market constant supplies of cattle. Her Majesty's Consul-General at Hamburg states that Hungarian cattle did introduce the plague to Utrecht, in Holland, last May, and suggests that it may have passed from that country to England. Whether this be true or not, it is certain that the first beasts which were found to be afflicted with it in London were newly bought Dutch cows. It will be obvious that for the future, with the increasing facilities of railway traffic, it must be difficult to prevent the importation of the pest into this country. At the same time, Professor Röll gives us a few grains of comfort by stating that, though often imported into Austria, the cases are sporadic in certain years, and that it only becomes generally diffused in years when contagious diseases among men show a severe type. Cholera has been hovering about Europe, and seems ready to take root in places favourable for its growth, so that we may hope, though only faintly, that this has been a year peculiarly favourable to the development of the murrain. We know that typhus fever propagates itself most extensively in dry seasons, and the dryness of the summer may have been one cause of the extension of the murrain throughout the country. The extent of the ravages of the plague is only imperfectly known, for it is the interest of cowkeepers to keep their losses concealed lest their credit should suffer. It is true that, under penalty, they must report to the Council Office when

plague attacks their sheds, but if the cowkeeper have fifty cattle he often allows forty-five to die or be slaughtered, and reports the remaining five to Government. If we are to believe the official reports, only 5086 cattle perished of the disease, or were slaughtered in consequence of it, in the metropolis up to the end of October; but competent authorities assert that this is considerably less than half the true number. In fact, of 15,000 head of cattle kept in London and its neighbourhood before the attack, it may be asserted without much misgiving that 12,000 have perished. Large establishments lost their whole stock, even when, as in the case of Lord Granville's and Miss Burdett Coutts' dairies, they were carefully tended.

Early in July the metropolitan market began to infect various parts of the country. All the first cases of the disease in the English counties were traceable to diseased beasts bought in London. One case must serve as an example: Mr. Leeds, of Whitwell, in Norfolk, bought twenty-six Dutch bullocks in the metropolitan market on the 1st of July; and Mr. Gooch, writing to Professor Simonds at the end of the month, says:—

'Mr. Leeds has lost thirteen out of the twenty-six Dutch beasts. When they first came home he divided them into two lots,—one at Whitwell of eighteen, and eight at Themblethorpe, about four miles distant. First, as regards the Whitwell lot, they have all had the disease, and eight are dead; the remaining ten appear to be recovering: some have been very bad. They were mixed with four others, which have all taken it, and one has died, one better, the other two suffering, and I do not think they will live. At Whitwell there is a common adjoining Mr. Leeds with about thirty cattle on it; two are attacked and are not likely to recover, the others showing symptoms of the disease. Out of the other lot five are dead, and the three are recovering. I have been called to two farms in that locality where the disease has broken out,—one dead and several others bad; and have heard of another farmer having it. I find at North Walsham a dealer bought thirty-eight Irish buds, about £5 each. Thirty-six are dead; and from this lot it has spread to several farms adjoining where these laid, and the stock

are dying fast. I have not at present heard about any more in Norfolk ; if I should, I will write and say how it goes on.'

Norfolk fought valiantly against the disease, stopped its markets, established an insurance society, and stamped the disease out wherever it could ; but about four thousand beasts have already been returned to the Government as attacked by the distemper ; how many more may have been without being included in the returns, we have no means of judging. The influence of the London market was not confined to the neighbourhood of the metropolis, but extended to great distances, even Scotland having first received its infection directly from some foreign cows bought in London and sent to Edinburgh. As the disease progressed, however, so many local centres were created that the influence of the London market became less perceptible. Up to the end of October, 18,000 cases of disease had been reported to Government throughout the country, although, for the reasons we have stated, this estimate is far under the truth. Of all the animals in the farms or sheds into which the distemper entered, 44 per cent. have been already attacked, and of this only a trifle above 4 per cent. have recovered, the rest having died from the disease, or having been slaughtered in anticipation of it, or being still under its influence, with a fate undetermined at the date of the return. Although these figures are ghastly enough, as representing the mere beginning of a murrain, which has not yet gathered headway in the country, they would not be alarming if they represented the finality of the plague, for little more than one in a thousand of the cattle in the kingdom have succumbed to the attack. But believing that we are only at the beginning of our troubles, the plague assumes to us an aspect of more than ordinary gravity.[1]

[1] This article was written in November, when many persons still disbelieved in the gravity of the disease, and rejoiced in the prospect of its arrest by the coming cold weather. The result has, however, been in accordance with the experience of the past. By the end of the first week

The number of horned cattle in this country is supposed to be between seven and eight millions, and their estimated value may be taken at £70,000,000. We can only conjecture our probable losses by the experience of other countries, when the plague has passed over their borders, and taken up its abode with them for several years. Austria is in this unhappy position at present, for the plague penetrated into it in 1861, was partially repressed in 1862, and broke out with increased virulence in 1863, during which year Hungary and its dependencies had the plague in 14 per cent. of all their cattle. Can we expect a more favourable result? Austria has excellently organized measures for the suppression of the pest, and this cannot be said of our country; her cattle are both less susceptible to its influence, and take it in a less malignant form than our cattle. England is deficient in organization to combat the invasion; has neither in number nor in quality an army of veterinary surgeons fitted to take the field against the invader, so that there is nothing to justify us in the expectation that we shall be dealt with less severely than Austria. Hence it is highly probable that, in the third year of the murrain, we also may have, like Austria, 14 per cent. of all our cattle attacked in a single year. This extension of the distemper, with a mortality of 90 per cent., would produce a money loss of upwards of £8,000,000. It may be argued that our comparison is unfair, because the plague is almost naturalized in Hungary. It is quite true that the plague is very frequently

in January 1866, 82,057 beasts were reported to be attacked by the disease since its commencement, of which 47,192 died, 14,519 were slaughtered, and 8268 recovered, the fate of upwards of 12,000 being still undetermined. Great as is this increase upon the previously reported cases, we still believe that it is far below the actual truth. Deducting the undetermined cases from the total number of reported attacks, the aggregate mortality has been 88 per cent. When an epidemic has prevailed for some time in a country, the rate of mortality usually decreases.

in Austria and but rarely in England, but this is simply owing to the proximity of the former country to the Russian nursery of the contagion. We have already shown that the history of the plague in 1865 is but a close repetition of its history in 1745, when it dwelt among us for twelve years. Then, as now, the people grumbled at the Government interference with cattle traffic, even a year after the plague broke out, but most bitterly did they in the end regret that they did not aid that Government to extirpate the murrain when its proportions rendered repressive measures possible.

This leads us to consider what the Government of the present day have already done, and what it is proposed they should do, to expel the murrain from our shores. We cannot give information on the first head more concisely than Mr. Arthur Helps, the Clerk of the Council, has done in the following passage :—

'The date of the first notice to me of the outbreak was the 10th of July. I immediately requested Professor Simonds to institute an inquiry into it. I received his report on the 14th of July. I was then directed by the Lords of the Council to ask the law-officers to draw up an Order in Council so as somewhat to embrace the views of Professor Simonds ; they were twofold : first, that all persons, cow-keepers and others, where there was disease, should give notice of it ; and, secondly, that a power should be given to inspectors to examine. The Lords of the Council had several meetings, and on the 24th of July they issued their first order ; that was the order which directed that all persons having any diseased animal should report the fact to the Clerk of the Privy Council, and that he should appoint inspectors, and that these inspectors should have power to enter the premises and examine. The disease increased, and went beyond the metropolitan district, upon which, on the 11th of August, the Lords of the Council issued another order, still applying only to the metropolitan district. In that order the chief additional provision was that no animal labouring under the disorder should be removed from the premises on which the disorder had broken out without the license of an inspector. The disease still kept spreading, and on the 11th of August an order was published which applied to the remaining parts of England and Wales, other than the Metropolitan Police district. In

this order the local authority was defined, and the principal local authority in the country were the Justices acting in and for the petty sessional division of the county. They were allowed, in cases where the disease had appeared within their jurisdiction, to appoint an inspector. Then certain rules were given for the inspector, similar to those which had existed in the metropolitan district, namely, that no person should remove, without the license of the said inspector, any animal labouring under the disease. There was, however, in this order a very important provision made with respect both to the burial and the disinfection of the premises. On the 18th of August the provisions which had been made for England and Wales were extended to Scotland. On the 25th of August there was an order passed affecting Ireland, namely, that no cattle (and it is stated that "the word cattle shall be interpreted to mean any cow, heifer, bull, bullock, ox, or calf") were to be removed "from any port or place within that part of the United Kingdom called Great Britain, to any port or place within that part of the United Kingdom called Ireland." On the 26th of August another order was passed, of which the important part was this, not only that the Justices should have power to name an inspector when the disease was absolutely in the district, but when they should "have reason to apprehend the approach of the said disease to the district." There was also in this order a power given to the inspector "to seize and slaughter, or cause to be slaughtered, any animal labouring under such disease." There were then minor orders passed, forbidding the importation of skins into Ireland. Lastly, on the 22d of September, an order was passed consolidating all the previous orders, modifying them in some small matters, and adding two important provisions, one affecting the metropolitan cattle market, and the other giving the local authority the power to prevent the animals defined, or some specified description thereof, from entering a market or a fair within the jurisdiction of that local authority. The disease was then supposed to extend to sheep and lambs, upon which an order was passed prohibiting sheep or lambs from being imported into Ireland from Great Britain. There was then a smaller order passed for the island and barony of Lewis in the county of Ross, protecting it from cattle of any kind coming into that island. Those were all the orders which were passed.'

It will be seen from the above passage that no cause of complaint on the ground of apathy can be laid to the charge of the Privy Council, or of its indefatigable clerk, Mr. Helps. Their action was prompt, and in advance of public opinion. The Council saw, from the outset, the difficulties which beset a

national compensation for animals perishing from the disease, but, with this conviction, were they justified in empowering inspectors to slaughter? Public massacre, even of beasts, is a strong measure, which could only be carried out to a useful conclusion by a prompt and vigorous action; and must necessarily fail, if prosecuted in a vacillating and timid manner. When the Council delegated this extreme power to the changing counsels and uncertain action of local authorities, its failure was certain, and its exercise became intolerable. Even Continental Governments, with their arbitrary powers, only slaughter when the number of affected cattle is limited, and then the owners are compensated either directly by the Government, or through a system of compulsory mutual insurance. Besides, such strong measures can only be intrusted to the administration of skilled and discreet men, and the supply of these in the country was not equal to the demand. Upon a failure of veterinary surgeons, butchers and shoemakers have been appointed inspectors. It is not wonderful that owners of pedigree stock, or even common farmers, should look with alarm on extensive powers vested in such irresponsible and ignorant men. When veterinary surgeons could be procured, were they always sufficient for the trust reposed in them? Our Veterinary Colleges have excellent men as professors, and have educated excellent pupils. This could not be otherwise with such men as Professors Spooner, Simonds, Dick, Varnell, and Gamgee in the English and Scotch colleges,—men who dignify their profession and obtain for it the respect of men of science. But the race of pupils which they are creating have not yet rendered extinct the cow-leech and horse-doctor, who, under the name of veterinary surgeons, are not unfrequently appointed inspectors by local authorities. It is not therefore surprising that the hardship to the farmer of slaughtering his cattle without compensation became unsupportable. The pole-axe is certainly the most radical of cures when a few cattle have been

seized for the first time in a new district; but it cannot be used over a whole country except in the face of a supreme emergency; for it must be borne in mind that it is already in forty-eight English and Welsh counties, and in about twenty Scotch counties. Science has hitherto shown such resources in preventing disease, that, until these are exhausted, farmers may well feel unwilling to resort to the barbarism of the pole-axe. When the disease first appears in a new district, or when its proportions become within bounds in an old infected one, the slaughter of cattle, whether diseased or suspected, is generally a public economy, but, in such cases, it would be right to treat it as such, either through the public purse, or preferably, by local rates. While there is much objection to a general system of compensation, it becomes an act of necessary justice to farmers whose stock is sacrificed for a specific public purpose. Such a responsible power might be confided to the local authorities, if not left optional with them, but it must arise from an imperial necessity, and be exercised with discretion under skilled advice. Compensation for a specific purpose does not involve a principle of general payment for the loss of property by disaster.[1]

[1] Since the period of writing this article the Privy Council have issued new Orders, some of which are important, and improvements upon their predecessors. The Order of 23d November withdraws the power of indiscriminate slaughter from the inspector, but continues it in cases where the owner of cattle refuses to obey proper hygienic regulations as to the isolation of diseased from sound stock. It also empowers inspectors to see that disinfecting means are used in premises which have been attacked by the disease. The order gives extensive powers to magistrates in Petty Sessions to regulate or stop altogether the traffic of cattle in their districts, and it holds out a threat that Government may take the matter into their own hands if the magistrates of any particular locality are remiss in the discharge of their duties. But while the Government thus confers extensive powers on local authorities, it does not apply any general measure to the whole country. In a subsequent Order it extends the local authorities to Quarter sessional, instead of Petty sessional divisions, and thus enlarges the area of local action,—an obvious improvement, so far as it goes. But

The Privy Council having failed in preventing the extension of the plague, found it advisable to recommend to the Queen that a Royal Commission should be issued to investigate into the origin and nature of the disease, and to frame regulations, with the view of preventing its spread and of averting any future outbreak of it. This commission was issued by Her Majesty on the 29th of September, and was addressed to certain members of both Houses of Parliament, and men of scientific and medical attainments.[1] The Commissioners did not allow the grass to grow under their feet; they sat daily for a month after their appointment, and on the 31st October issued their first report, unaccompanied, however, by the evidence which they have collected from all parts of the kingdom and from abroad, and which has since been published. Unfortunately the Commissioners have not been unanimous in their report, Lords Spencer and Cranborne, Mr. Read and Dr. Bence Jones, being dissentients from one important recommendation in it, while Mr. M'Clean holds aloof altogether, and makes a separate report to the effect that there is no reason for alarm, and therefore no cause for action. We will endeavour to indicate their general conclusions, with a running commentary upon them.

After referring to the history of the plague and its remarkably contagious nature, the Commissioners point out that the disease, widely extended as it now is, can only be arrested by stopping for a time the movements of cattle. The majority

we can no longer say that the Government Orders are in advance of public opinion, which now demands much more extensive measures than the Government seem inclined to concede.

[1] The names of Her Majesty's Commissioners are as follows:—Earl Spencer, K.G., Lord Cranborne, M.P., Right Hon. Robert Lowe, M.P., Lyon Playfair, C.B., C. S. Read, M.P., R. Quain, M.D., Bence Jones, M.D., E. A. Parkes, M.D., Thomas Wormald, President of College of Surgeons, Robert Ceely, Surgeon, Charles Spooner, Principal of Veterinary College, and J. R. M'Clean, President of Institution of Civil Engineers, with Mr. Montagu Bernard, Secretary.

of the Commissioners desire that this stoppage should be absolute; the minority are contented with preventing movement of lean or store stock, while they would permit fat cattle to go to fairs and markets for immediate slaughter. Both the majority and minority agree that the traffic in lean stock must be prevented for a period; they diverge only on the policy of applying these restrictions to cattle fit for the butcher. Let the majority of the Commissioners speak for themselves, even at some length:—

'To interfere with the circulation of fat stock is to interfere directly with the meat market; and to embarrass it is to raise, for a time at least, the price of meat. To require that every bullock sold for slaughter shall be slaughtered on the premises of the seller, will undoubtedly in a multitude of cases be inconvenient to both farmer and butcher. There will be difficulties about the actual slaughtering, about the disposal of hides and offal, about transport; and these difficulties appear still more serious when we consider the manner in which the live-meat trade is now carried on through salesmen and jobbers, and the vast quantities of fat cattle continually in motion to and from London, and from one market to another, throughout the midland and northern counties. A large system of trade and transport will have to be deranged, and many new arrangements to be made, and the cost of effecting these changes on the spur of the moment must fall to a considerable extent on the consumer of meat.

'If the distinction be admitted, however, many other questions arise. In the first place, how is it to be enforced? If a privilege is conceded to cattle destined for the butcher, how are we to make sure that a particular animal is really destined for the butcher, or that he will be slaughtered immediately, or slaughtered at all; or that he will not scatter infection on his road? May he be driven home by the nearest country butcher who will buy him, or must he be sent to market? May he go to any market, or only to one where conveniences for slaughtering and for careful inspection are or can be provided? May he, if unsold, be sent home again, or transported from one market to another, or, if not, what chance will the seller have, should the market be over-stocked, of making a fair bargain? In considering these points, it must be borne in mind that a butcher has, as some witnesses have remarked to us, facilities which a farmer has not for concealing infection; and that he has not the motives for being on his guard against it which the farmer has. A farmer who brings home a diseased animal may

probably lose his whole herd. But it is often the butcher's interest to ask no questions.

'Answers more or less complete may be furnished on all the points above enumerated, and precautions may be devised with a view to each of them. In general terms, it may be stated that such precautions must in the main rest on some or all of the following expedients :—On a modified adoption of the *Cordon* system ; on the imposition of new and peculiar legal obligations upon butchers, and probably upon drovers, railway companies, and the authorities in charge of markets ; lastly, on a system, more or less extensive, of permits, certificates, or declarations. We ought not, however, to shrink from distinctly saying that no answers can be given which, in our judgment, are perfectly satisfactory, and no precautions invented on which it is possible entirely to rely ; and that we believe it to be best for the country, and even for the interests which will suffer most in the first instance, that the prohibition against the circulation of cattle should be maintained in its integrity.

'We have stated frankly the difficulties and sacrifices for which the country must be prepared, should this proposition be carried into effect. Of these difficulties, the one which will probably be felt most strongly, relates to the supply of food to the great towns. Fears have been expressed that to close the metropolitan market, for instance, against the influx of cattle from the country, would create a famine. We have already seen that the attempt to close the markets of London and Westminster during the plague which raged here in the reign of George II. was given up on account of the clamour which it created ; and it may be argued that the same thing would happen now. Circumstances, however, have widely changed. In the days of George II., meat could only be transported to London alive ; even the roads along which the cattle travelled were what we should now think few and bad ; there was little or no importation from abroad, and some difficulty must have been often found in supplying the wants of the metropolis by the ordinary means of communication. Now, every place where fat cattle are fed in large numbers is approached by railways, which can transport dead as well as live meat ; and it seems no unreasonable demand to require that, for the sake of averting a calamity of almost incalculable magnitude, London should be content to be supplied with dead meat from the provinces, instead of constituting herself a hotbed of infection by receiving twice a week great throngs of living cattle. This change is indeed in itself economical and advantageous, and appears to be gradually taking place as a natural consequence of the extension of the railway system. There is obviously an immense waste of labour in bringing the live animal

to London, in order that certain portions of its carcass may be consumed as human food; dead meat is more easily carried than the living creature, and it seems quite as reasonable to carry the butcher to the ox as to bring the ox to the butcher. We are informed that, from Aberdeen alone, which is distant from London (by cattle-train) some thirty-six hours, upwards of 1000 carcasses are sent up weekly during eight months of the year, and 300 or 400 during the remaining four months, and special cattle-trains leave Aberdeen on this errand five days in the week. Nor is it to be forgotten that London is at present fed in a great measure with foreign cattle. From the 16th September to the 18th October last, both inclusive, the number of English beasts in the market was but 14,645 to 20,185 foreign. It must further be observed—and this is the most important point—that a general prohibition is capable of being thoroughly enforced. The mere presence of a beast on any highway will be sufficient to prove the infraction of the rule. Any plan which, while laying down the general prohibition, admits exceptions in favour of cattle removed to particular places or for particular purposes, must rest upon the ascertainment of facts more or less complicated, to be proved by certificates from local authorities, upon the accuracy of which, experience warns us, little reliance can be placed. The liberty to remove cattle for particular purposes is sure to be extended and abused for other purposes. A man has only to profess an intention in accordance with the law, in order, by a little dexterity, to obtain under such a system the utmost facility for violating the law. It will be a long time before the rules are understood, and the period in which they are violated through ignorance will be succeeded by the period in which they are evaded by design. England is probably the worst country in the world for the working of a system of certificates, permits, licenses, and passports; and the temptation to violate the rules will be very great, for the thought that naturally occurs to every one whose herd is attacked is to conceal the existence of the disease until he has got rid of those animals which do not yet show symptoms of its presence. To the objection, true as far as it goes, that the embarrassment thus thrown in the way of trade will probably tend to raise the price of meat, it may be answered, first, that such a rise in the price of meat will afford, at the expense of the community, the means of reimbursing the trade for the sacrifices it has made for the common benefit; and, secondly, that the immense destruction of cattle which such a measure alone is calculated to prevent is likely to raise the price of meat to a higher point, and for a longer time, than a regulation which really does little more than change the place of slaughter from large towns to grazing districts. In the period from 1745 to 1757, almost every

measure, short of the one which we are considering, was tried in vain. The disease at first advanced slowly, but it lasted twelve years, and then died out, apparently for want of animals susceptible of its influence, although the difficulty of communication from one part of England to another offered at that time the fairest chance for the success of palliative measures. England has now to contend with the plague under disadvantages never experienced by any other country. The density of her population, the large quantity of her horned stock, and, above all, the enormous facility of communication by railroad, make her peculiarly liable to the ravages of a contagious disorder, and render the prospect of eradicating it within any reasonable time, either by slaughter or by curative and disinfecting measures, almost hopeless. For these reasons we feel ourselves compelled to recommend to Your Majesty that such measures shall be taken as may be requisite to invest, with as little delay as possible, some high officer of Your Majesty's Government with the power of suspending for a limited time the movement of cattle from one place in Great Britain to another, for extending or shortening such period, and for renewing the prohibition as often as circumstances may render necessary.'

This case is excellently and tersely placed before us, and we should be at once in a position to deal with it, were it not necessary to describe the alternative propositions of the minority of the Commission. This minority has[1] the support of Earl Spencer, the chairman of the Commission, who conducted its inquiries with much skill and judgment. The dissentients admit that the temporary stoppage of all movement in cattle would be more effectual in extirpating the disease than any measure which could be proposed, but they do not believe it to be practicable, and contend that it would involve an interference with the course of trade at variance with our national habits, and would involve difficulties and dangers of the most formidable kind. They therefore support the alternative measures of the report, by which fat cattle markets are alone to be permitted. Cattle, however, are only to go to such markets from healthy districts, and therefore they must

[1] At least one member of the minority has, since the issue of the Report, publicly given in his adhesion to the views of the majority.

have passes, or clean bills of health, before markets or railways will be permitted to receive them. Unhealthy districts are to be put under ban by notice in the *Gazette*, and all egress of cattle from them is to be strictly prohibited.

We have now the two main recommendations of the report before us. The report of the minority relies wholly on the measures pursued from 1745 to 1757, and which were then found signally inoperative. Referring to that period, Youatt tells us that 'the restrictions with regard to the sale or removal of cattle, and communication between different districts, were so frequently evaded, that it was either impossible or impolitic to exact the penalties.' Certainly we are in no more favourable position now to enforce such measures. If they were found inoperative at a time when transit was comparatively difficult, how are they to be carried out now in a country intersected everywhere with highways and railroads, and coasted by steamers? The very system of passes is so obnoxious to the feelings of our population, that it could not be sufficiently explained within the next three months so as to make it understood, or, if understood, adopted, with the determination of local authorities that the passes should not be evaded. Such measures must degenerate, as they did in the years from 1750 to 1757, into petty wars between counties, one county proscribing another because it is infected. The local wars thus apprehended are rapidly being realized. Certain counties wholly exclude the stock of other counties, but the disease steals over their borders in spite of watchers. Aberdeen, on the whole, has been the most successful in its local war, for it has caught the invader on several occasions, and stopped his progress by indiscriminate slaughter. Nevertheless, as we revise this edition in the beginning of January, thirty-six out of thirty-eight English counties are infected, sixteen out of twenty-seven Scotch counties are in the same position, while as yet only two out of

the twelve Welsh counties harbour the disorder. In a great many instances the magistrates have shown the most commendable vigour in enforcing the powers intrusted to them, but their efforts have been greatly frustrated by the want of uniform action in neighbouring districts. Such local efforts will in the end be both irritating and useless, unless they are part of a general and well-conceived plan. Restraints on the usual business and traffic of a country must be of brief continuance if they are to be strictly enforced; but they must be large and sweeping if they are to be brief. Such are the restraints urged by the majority of the Commissioners, and we proceed to refer to them.

The total stoppage of movement of cattle is a simple idea, one readily understood, and only capable of evasion by palpable contumacy, but it must be accompanied by many difficulties and inconveniences which the Commissioners have foreseen, and by many more which cannot be foreseen. Is the sacrifice which the country is called upon to make not greater than the evil which is to be averted by it? An answer to this question depends upon the impression of the magnitude of the danger with which we are threatened. Those who point to the small number of animals which have hitherto perished, as a proof that the plague has terrified us beyond measure, will scout at the recommendation of the Commission, and consider it the presumptuous scheme of theoretical men, unacquainted with the realities and necessities of the world in which they live. Farmers, cattle-dealers, butchers, jobbers, drivers, and even the market committees of our corporations, will aid them in the cry against this despotic interference with business and traffic. This race of men have shown singular incredulity as to the reality of the plague, till it actually reached their own localities, and even then consoled themselves with the belief that it was a mere summer attack, which would leave the country as soon as the cold weather came. But the cold

weather has come, and the plague increases,—for this is one of its peculiarities, that it advances with equal strides, sometimes even at a greater rate, in cold as in warm weather. We, on the other hand, who consider that the distemper has scarcely got headway, and has not yet gathered itself up for its great raid through the country, welcome any measure which proposes to deal radically with the murrain, before its proportions become unmanageable. The object of the Commission is the same as that of a fire-brigade when brought on the scene of an extensive conflagration. They know how hopeless it is to extinguish the flames till the combustibles on fire are consumed, so they at once proceed to cut off all communication from surrounding parts, leaving the fire to burn itself out without extending the area of its mischief. Three months of stoppage of movement of cattle would do this effectually in the case of the plague. But these will be three months of suffering to some, of great inconvenience to many, and of high price of meat to all. Surely this would be more tolerable than an equally high price of meat for a long term of years. If the sacrifice be made, it must be begun at once, for it is only in cold weather that we can get a sufficient supply of dead meat from abroad to aid us in our deficiencies at home, and to enable our home supplies also to be conveyed from place to place. It is in winter too that the stoppage of movement will cause the least inconvenience to farmers, as there is comparatively little transit of store or lean cattle at this period of the year.

Isolation of the sick, so as to prevent their contact with the sound, is the general principle involved in the recommendation of the Commission. Success has attended the application of this principle wherever it has been rigidly carried out. Ireland, protected by Orders in Council which prevent the importation of cattle or hides, has hitherto escaped entirely. France, which has acted with great energy in preventing the

contact of her sound stock with any sources of disease, has lost less than fifty head of cattle, and Belgium, by energetic action, has confined her loss to less than one thousand. In both countries the disease has appeared at different times by imports from England or Holland, but absolute stoppage of traffic in the infected district, and slaughter of all suspected cattle, have prevented the spread of the disorder. In England and in Holland, where timid counsels prevailed, the loss already has been great, and the loss in prospect calculated to raise gloomy apprehension. If vaccination fail as a protection against the plague (and the question will be set at rest in a few weeks), then nothing remains for us to contemplate but a great St. Bartholomew's day of massacre throughout the country.

We must not forget, however, that the suspension of cattle traffic, or even their slaughter, is only the means to an end. To understand how that end is to be reached, it will be well to follow out the analogy of the fire somewhat more closely. It would be useless to cut off the communications from a conflagration, if, on the first cessation of the outburst of the flames, we proceed to build a new combustible house on the red-hot embers as a foundation, and have all our former dangers renewed. The Commissioners allude to this in the supplement to their report, but not in the report itself, so it may have been overlooked by many persons, and it certainly has not been brought forward by them with the prominence which it deserves :—

'Every one who has had the plague in his premises should feel the responsibility which rests upon him to destroy, by careful cleansing and disinfection, every trace of the disorder which may be left on his pastures or stalls, or on his cattle, their horns, hides, manure, and litter. Under favourable circumstances for its preservation, the contagious poison has been kept, with all its virulence unimpaired, for many months. Unless, therefore, each person uses his utmost effort to extinguish the seeds of the plague which lurk about his farm, they may become a centre of contagion, which will again spread it abroad through the country, and render unavailing

the sacrifice necessary for the speedy suppression of this terrible scourge.'

This in fact is the end to be attained, while the suspension of traffic is only the means of securing it. The whole of the first part of the report may be considered as a homily on the text, 'Put not your trust in local authorities.' We have shown that, in the reign of George II., the Privy Council then found that they did not respond in a prompt and energetic manner to the appeals of the Government. But if local authorities, even under the influence of public opinion, cannot be roused from their apathy, or quickened into intelligence, in the face of a great crisis, it is less likely that individual farmers throughout the country will be uniformly equal to the trust reposed in them. Observe what will be the consequence of a single case of neglect in destroying the seeds of contagion after death has reaped its harvest. We have seen that in all probability the disorder was introduced into this country by a single infected beast. Now if, on the liberation of cattle traffic, a single farm, nay, even a single cowshed, remain unpurified without disinfection, the country has been called upon for a great sacrifice in vain, for the foul place will become the new centre from which contagion will radiate. It was in fact from such infected localities that the disease sprang up so continually, after being subdued, during the last century. Let us read what Layard says on the subject, even in 1757, the twelfth year of the plague :—

'The disease, thank God, is considerably abated; and only breaks out now and then in such places where, for want of proper cleansing after the infection, or carelessness in burying the carcasses, the putrid *fomes* is still preserved, and is ready, at a proper constitution of the air, or upon being uncovered, to disperse such a quantity of effluvia, that all the cattle which have not had it will be liable to infection.'—LAYARD, *The Distemper among Horned Cattle*, p. xx.

It is quite clear that it will be useless for the Government to order a stoppage in the movement of cattle, until they are

provided with a proper organization to take advantage of the opportunity offered to them. Unquestionably they cannot do otherwise than trust largely to local authorities, but there must be, at the same time, a system of intelligent supervision on the part of Government, with the view of instructing localities as to their duties during the short period at their disposal, and there must be an efficient inspection to see that sanitary resources have been properly applied. Even at the present time, Government will have to deal with more than 10,000 distinct *foci* of infection, any one of which, neglected, may renew the national calamity. And when the country is liberated from the interdict as to traffic, there must be a keen eye to detect the spots which are sure to be found with the seeds of disease lurking in them, and a prompt hand to pluck them out at the moment of germination. For this purpose Government ought to possess the power to proclaim large districts, even whole counties, as infected, and to exclude them from liberation, should a single case of the distemper appear within a month of the general liberation of traffic; for by thus making a whole county responsible for the eradication of the murrain, a weight of public opinion will be brought to bear on supine districts and individuals. The disinfectants recommended have been very numerous, and among them charcoal, chloride of zinc, Condy's fluid, and ozone, made by floating phosphorus on a cork placed in water, are undoubtedly effective; but for simplicity and equal efficiency, we prefer the methods advised by the Commissioners :—

'1. When animals attacked with the plague have become convalescent, they ought to be kept apart from sound beasts for three weeks, and even then not to be permitted to associate with them till they have been thoroughly washed with (Macdougall's) disinfecting soap, or with a weak tepid solution of chloride of lime. The whole body, hoofs and horns, should be thoroughly washed, and the nostrils and mouth sponged out.

'2. During all the time that animals suffer from the disease, the litter fouled by them, with the dung and discharge on it, should be

burned, and not be allowed to mix with other manure. It contains the poison in a concentrated form, and it is questionable whether it can be disinfected efficiently.

'3. The sheds in which the diseased animals have been must be thoroughly purified and disinfected. The roof and walls should be washed with lime. The floor and wood-work, after being thoroughly washed with water containing washing soda, should be again washed all over with a solution of chloride of lime, containing 1 lb. to a pailful.

'4. The hides and horns of animals which have died of the disease ought to be buried with the animal, according to the Orders in Council. But the hides and horns of those which have been killed to escape the spread of the infection must be dipped in, or thoroughly mopped all over, and, in the case of the hides, on both sides, with water containing 4 lbs. of chloride of lime to three pailfuls of water. Unless this be done with care, a most fertile source of contagion will be preserved.

'5. The attendants upon diseased beasts should not be allowed to go near the sound animals in the same farm.'

In our previous remarks we have said very little as to the cure of diseased animals, and, in truth, we have little that we can say on this subject. Medicine has never shown great powers of cure in cases of great plagues. No curative means were ever found for the human plagues which formerly prevailed in Europe, and still linger in the East. Small-pox and cholera do not subject themselves to specific cures, although their attacks may be repelled by preventive agencies. Perhaps the small diminution of mortality in such diseases is owing more to careful nursing and dieting than to the use of medicinal agents. Nevertheless, we find striking differences in the rates of recoveries from cattle plague in different countries. Thus we see the following variations as to the recoveries even in different parts of this country—

England, recoveries,		9·1	per cent.
Wales,	,,	11·1	,,
Scotland,	,,	17·8	,,

The favourable position of Scotland in regard to recoveries we attribute chiefly to careful nursing and dieting. The Edin-

burgh Committee[1] of medical and scientific men, working on the part of the Royal Commission, issued extensively throughout Scotland a series of instructions for tending, dieting, and treating diseased cattle, and as this document is eminently practical, and has been extensively followed, we insert it at full length :—

'The Edinburgh Committee on the Cattle Plague having been commissioned by the Royal Cattle Plague Commission to make observations and experiments in reference to the prevention and treatment of the cattle plague, have considered it desirable, in addition to the experiments on treatment which they propose to institute themselves, to obtain a record of observations and experiments made by as large a number as possible of qualified veterinary practitioners throughout the country. With this view they have drawn out the following suggestions for methods of treatment of various kinds, prophylactic and curative, which they are anxious should be tested on an extensive scale. They have also drawn up a schedule for the purpose of rendering definite the record of the results of the methods of treatment suggested by them. These will be transmitted along with the suggestions themselves, and the Committee trust that practitioners who may make the experiments will have the goodness to fill them up and transmit them to the chairman of the Committee at 9, Darnaway Street, Edinburgh.

'The Committee, before specifying the various methods of treatment in detail, would premise a few general remarks, which they consider to be applicable to all cases :—

'*First, As to General Sanitary Measures, Disinfection, etc.*—The Committee content themselves with referring for full information on these matters to the Supplement of the Report of the Royal Cattle Plague Commission, which is in the hands of all veterinary inspectors.

'*Secondly, As to Food.*—The Committee deem it desirable to state it as their opinion that, as a general rule, at all stages of the disease, and whatever treatment is used, food should not be pressed on the affected animal. They believe that too much, even of the softest food, is hurtful, the powers of digestion being so greatly

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1 The Committee consisted of the following persons :—Dr. Andrew Wood, Chairman, Professor Dick, V.S., Dr. Hunter, jun., Dr. Littlejohn, Medical Officer of Health, Professor Maclagan, M.D., Professor Lyon Playfair, Mr. Romanes, V.S., Sir James Simpson, Bart., M.D., Professor Strangeways, V.S., J. Wilson, Professor of Agriculture.

impaired by the disease. During the earlier stages they believe that the safest articles of diet are oatmeal gruel, barleymeal gruel, with linseed tea, hay tea, or bran tea, and that little if any addition to these is needed. During convalescence it is also very necessary that the food should be both sparing and of easy digestion. The same diet as during the earlier stages may be continued, with the addition of mashes of well-boiled turnips or carrots, but in moderate quantity. When rumination commences to be re-established, a handful of sound hay, damped with salt and water, may then be given in addition.

'*Thirdly, As to the Maintenance of the Heat of the Animal.*—The tendency to chill of the surface is a marked feature of the disease, and it is very essential that the animal should be guarded against cold. The byre should be kept heated up to a temperature of 65 degrees. The animal should be thoroughly rubbed down from time to time, and be kept covered with an ample clean rug fastened on with a roller, or band of any kind.

'*Fourthly, As to the State of the Bowels.*—In the early stages they are apt to be *constipated*. To remove this condition mild laxatives may be required, but strong purgatives of all kinds are both unnecessary and unsafe. The best laxatives are either raw linseed oil, in the dose of a chopin-bottleful (an English quart), or from two to three ounces of flowers of sulphur mixed up with two pounds by weight of treacle and two chopin-bottlefuls of water. These doses may be repeated cautiously according to circumstances. Sometimes even in the early stages, but more frequently when the disease has continued for some days, *diarrhœa or scouring* is apt to come on, and to prove irritating and exhausting to the animal. The simplest and best treatment for this symptom is one ounce of laudanum mixed with a chopin-bottleful of lime-water, repeated twice or even thrice a day if necessary.

'Having thus premised these general recommendations, the Committee proceed to state in detail particular methods of treatment, classified under the heads of—

'A. Diaphoretic and Stimulant Treatment.
B. Acid Treatment.
C. Restorative Treatment without Drugs.
D. Prophylactic Treatment.

'A. Diaphoretic and Stimulant.

'The Committee are anxious to give a full trial to the method of exciting sweating by means of the *Vapour Bath*. The method of using this agent is as follows:—The animal is to be placed in a stall enclosed on all sides, the height of the enclosure being a few inches

more than that of the animal. Over the top of the box or enclosure thus formed is thrown a tarpaulin, which should cover it completely, with the exception that an opening is left in it sufficient for the animal's head to pass through. There is then to be placed on the floor of the enclosure, under the animal, a tub containing boiling water to the depth of half-a-foot. A continuous evolution of steam is to be maintained for half an hour by means of red-hot bricks thrown into the tub one after another. Under the use of this steam-bath, if properly managed, the animal may be expected to become warm and to perspire profusely. After each vapour bath the animal should be washed with tepid water containing M'Dougall's disinfecting soap, taking care to dry it well after the washing. It should then be covered with an ample rug, kept, as already stated, closely applied to its body by means of a roller, or band of any kind. The bath may be repeated either on the same day or following days, according to circumstances. During and after the bath the animal should be allowed a draught of cold water, which helps to promote perspiration. The objects chiefly aimed at by the use of the vapour bath are to promote the circulation at the surface, to relieve the congestion of the mucous membranes, and to eliminate the poison from the system.

'Combined with the vapour bath may be used various other remedies not incompatible with it, but calculated to aid its action.

'Several of these remedies the Committee now proceed to mention, it being, however, understood that only one of them is to be used along with the bath in each case where the experiment is made; they are not to be used together in the same case.

'A 1. *Oil of Turpentine.*—This may be administered in doses of four tablespoonfuls, well shaken up with a chopin-bottleful of gruel, and may be given twice a day. This remedy may be expected to act beneficially by its powers of stimulating, and of exciting perspiration. It may probably also, in most cases where it is used, supersede the necessity for giving any laxative medicine.

'A 2. *Infusion of Coffee.*—The method of preparing this remedy is by infusing two ounces of ground roasted coffee for a quarter of an hour in a chopin-bottleful of boiling water. It must, of course, be allowed to cool somewhat before being administered, and may be given in the above quantity every six hours. In addition to its stimulant and nutritive qualities, the coffee may act beneficially in consequence of the empyreumatic oil and caseine which it contains.

'A 3. *Carbonate of Ammonia.*—This medicine, which has been found in many cases to act beneficially as a powerful diffusible stimulant, may be administered three times a day, in doses of half-an-ounce, either alone, or, preferably, combined with three drachms of nitre dissolved in a chopin-bottleful of gruel.

'B. Acid Treatment.

'This treatment is suggested in consequence of the alkaline state of the virus which is found to exist uniformly in the cattle plague.

'B 1. *Diluted Muriatic Acid* is said to have been successful in Holland. It may be given twice a day in doses of three drachms mixed with a chopin-bottleful of gruel.

'B 2. *Vinegar.*—This may be used in doses of two ounces mixed with a chopin-bottleful of gruel, and may be given four times a day.

'C. Restorative Treatment without Drugs.

'This consists in carrying out the full sanitary instructions of the Royal Cattle Plague Commission, in regulating the diet according to the instructions already given—in keeping the animal warm—and in administering two chopin-bottlefuls of good Scotch sweet ale three or four times a day.

'It is desirable that this system should be carried out in a certain proportion of cases, all drugs being rigidly abstained from.

'D. Prophylactic Treatment.

'The Committee would further desire to draw attention to the importance of experiments being made as to the efficacy of Prophylactic (protective) treatment, either in preventing the development of the disease or modifying the intensity of the symptoms when the disease becomes developed in animals which have been exposed to the infection. In such cases, of course, all the sanitary measures of the Cattle Plague Commission should be strictly carried out. There may also be given at the earliest possible period *Prophylactic* drugs, of which those most deserving of trial seem to be—

'D 1. *Sulphite of Soda*,[1] given morning and evening, in doses of one ounce dissolved in a bucketful of water.

'D 2. *M'Dougall's Solution*, of which a wineglassful in a bucketful of water may be given twice a day.

'D 3. *A mixture of half-an-ounce of Sulphite of Soda, and two tablespoonfuls of M'Dougall's Solution* in a bucketful of water may be given twice a day.

'It would have been easy for the Committee to have given a much longer catalogue of methods of treatment, but this would only have been embarrassing to practitioners. In the suggestions made, they have sought to combine simplicity, safety, and economy. Whatever the result of the experiments may be, all of them may be easily

[1] The sulphite of soda is a prophylactic, and must not be confounded with sulphate of soda, (or Glauber salts,) which is a purgative, and not a prophylactic.

and cheaply carried out under almost any circumstances. It should be borne in mind, that the results of the experiments, whether *positive* or *negative*, will be important.'

In consequence of this document, much information was received by the Committee, which came to the conclusion that by far the greatest hope of success depends upon careful dieting and nursing, or what they term the 'restorative treatment.' The course now extensively pursued is, upon the appearance of the disorder, at once to remove all straw from the cow-house, so that the animal may not still more fill its already overcharged stomachs with its usual litter, which is substituted by sawdust, and this is constantly renewed. In fact, it is one of the early symptoms of the disease that cattle get an increased appetite for straw. The temperature of the house is kept at 65°, the animal being frequently cleaned, and covered with an ample warm rug. Food is very sparingly given, and then only in warm drinks, as described in the recommendations of the Committee,—experience having shown that starvation is much better than excess of food in the treatment of the disease. Linseed oil is administered all through its course, but not in quantities sufficient to purge. While it keeps the bowels open, it acts at the same time as a food. Diarrhœa, when it appears, is in general readily stopped by an ounce of laudanum in a strong infusion of coffee. The spirits and strength of the animals are sustained by stimulants, such as sound ale, whisky, or brandy. This mode of treatment depends on giving the least quantity of drugs and the greatest attention to nursing and dieting.[1]

The uselessness of drugs has been recorded from ancient

[1] After all, this is little more than Rammazini said a century and a half ago :—'The cattle must be kept in a warm place, and clothed to keep them from cold air. Their food must be gruel drinks, made with barley, or wheat flour or mashed bread. Above all, the food must be sparing, and the beasts must be kept clean by good rubbing and currying.'

times, and modern experience has given us no more faith in them than the ancients possessed. Bates, the physician to George I., says, in 1714, 'I think there is no method in practice but what was tried on this occasion, though I cannot say that any of them was attended with an appearance of success.' The disease, as Lancisi has remarked, yields to no remedy (*nulli cedunt medicamini*). Nostrums in his time were as numerous as at the present day, 'for there were plenty of persons who asserted that they had infallible cures for the disease;' but Lancisi goes on to remark, 'The truth is, that in the cattle pest, as in the human plague, not every one that takes the disease dies of it. Some recover, thanks to Nature rather than to the remedies given to them. . . . In our experience at Rome (1714) many remedies we found useless, many hurtful, and some few seemed useful.' No better words can give the experience acquired a century and a half later.

We have little doubt in our own minds that, though this disease is of foreign importation, its rapid growth and spread is owing to our gross neglect of sanitary laws as regards our cattle. They are looked upon by the farmer in the double light of flesh-making and manure-producing beasts. This is right and natural, but it is neither natural nor right that the stalls in which the beasts are fed should be made the store-house for this manure. Even when this is not done, it is heaped up in the yard in close proximity to the cattle. The animal economy is much the same in men and beasts. If men herd among the manure voided by themselves, we know how soon pestilence would ravage them. In the middle ages, when men were stalled like oxen on rush-covered floors, Black Death swept them away with its terrible scythe. This disease ceased to visit the country altogether when improvements in our social and civic habits removed the personal and public filth, which formed the soil, in which the seeds of plague were

sown and fructified from fifteen to seventeen times in one century. The seeds of this human pest are as plentiful now as ever, but the soil is wanting for their development. We no longer dread their importation even in the porous cotton which comes to us from plague-infected Egypt. These facts are certain, though there are still a very few medical men who contend that the disappearance of plague from this country is owing 'to large cycles of chemical changes in the atmosphere,' and not to our hygienic improvements. A fine-sounding phrase is this to drop like the veil of Isis between learned physicians and the vulgar, in order to persuade the latter that there is priestly mystery behind it. When an old plague reappears, as the diphtheria has done after the lapse of a hundred years, be assured that we are punished for the violation of some sanitary law, which we would do well to discover and obey, without waiting for 'cyclical changes' to unravel the mystery. There is much to be done, however, before cattle can be placed in a sanitary condition sufficient to resist even great plagues. Our cattle, besides being housed filthily, are made gluttons by their mode of fattening, and are thus rendered prone to disease. When the upper classes in the thirteenth century lived a gluttonous and unruly life, black death put on a disguise, and came to them in the garb of 'sweating sickness,' but with a scythe quite as keen for cutting down the well-conditioned members of society as it had used for the poorer classes. Here is our difficulty in impressing farmers with the necessity of improving the hygienic condition of their cattle. They point to the cattle-sheds of Lord Granville and Miss Burdett Coutts, or like examples, and say the plague attacks the well-kept cattle as well as those which are foully kept. The same arguments were used in the middle ages, when the poor beggar in the street and the alderman at his civic feast were struck down together. Set fire to a poor

man's house and that of his rich neighbour is likely to join in the conflagration. Introduce into this country an intensely contagious pest among cattle, and the force of the plague will extend to all sides presenting fuel to it. What we want to achieve is, to make our cattle incombustible to this fire, as we have already done with men in the case of human plague. Yet vast must be our hygienic improvements before we can look tranquilly at the murrain in its native steppes. We may proceed, however, to indicate some sanitary ameliorations in the words of the Commissioners :—

'1. As no successful plan of treatment has yet been proposed, the owners of cattle must, in the meantime, rely chiefly upon those hygienic measures which the experience acquired in other diseases shows to be important in preventing the spread of contagion, and in diminishing the intensity and area of an attack, when, in spite of such measures, they invade a locality hitherto uninfected. In the case of the cattle plague it is certain that no sanitary precautions can prevent the spread of the disease when it is actually introduced ; still, from analogy, we may draw the conclusion that some effect may be produced on the rapidity of the spread, or on the virulence of the disease, by placing cattle in the conditions most favourable to health.

'2. With this view it is important to secure strict cleanliness, good drainage, efficient ventilation, and to prevent overcrowding in all cattle-sheds and cowhouses. No accumulations of litter fouled by the voidings of animals should be permitted in, or even close to, the houses or sheds in which cattle are kept. Chloride of lime, carbolic acid, or the powder containing carbolate of lime, and sulphite of lime (in plain English, "Macdougall's Disinfecting Powder,") should be used. The latter is probably the best ; it contains a well-known disinfecting substance, which is formed when sulphur is burned, and also a strongly antiseptic material, kreasote, from coal tar. The sheds themselves should be swept and washed daily, and sprinkled with disinfectants. But such purification of the air of cattle-sheds or houses will be insufficient to preserve health if the cattle be overcrowded. Pure air and nourishing diet are of great importance in protecting animals from the attacks of disease. Pure water, derived from sources uncontaminated by drainage from surrounding dung-heaps, or from the absorption of vitiated air which hovers around them and in the sheds of cattle, is equally essential.

'Every farmer should look to the housing of his cattle in the present emergency, as he would look to the housing of his own family, if cholera or other formidable disease were in his neighbourhood. Thorough cleanliness of the houses, good drainage, freedom from evil smells, nourishing diet with pure air and water, cannot give immunity from the disease, but they may offer obstacles to its propagation.'

These are far from all the sanitary improvements necessary. The mode in which cattle are transported by railway and steamer to our great public markets is a disgrace to our civilized nation. Trucks of the rudest description are used on our railways, and into them the poor unwilling beasts are driven by savage force, being huddled together indiscriminately, and may remain in them thirty or forty hours, in some cases fifty hours, without fodder and without drink. When the poor, thirsty, bellowing beasts are driven into a siding in sight of water, they often become quite frantic in hopeless efforts to reach this necessary of life. A cabman in London is fined if he keep his horse too long without water, but railway directors escape with impunity for their inhumane treatment of the cattle intrusted to their charge. It is true that they try to throw the responsibility off their own shoulders, by offering to the owners of the cattle that the trains may stop at certain stations, where the cattle may be taken out to be fed and watered. At the same time, they are well aware that the inconvenience of loading and unloading the trucks is too great to permit of this resource. The real difficulty lies in the vile nature of the trucks themselves. Small ingenuity would be required to place cattle in trucks so that they might drink out of troughs attached to them, and which might be filled with water while the engine itself is taking in a fresh supply. But such a simple device is much beyond the humanity of railway officials, who, as long as they can obtain cattle according to the present rude system of transport,

choose to consider them as inanimate objects, to be treated with as little consideration as bales of merchandise. Nor is the system of transport by steamers much better, as regards comfort and accommodation, even should the weather remain favourable. Some steamers there are, wholly devoted to cattle traffic, in which fair accommodation is provided, but, as a rule, it is as wretched as can well be conceived. Even in the case of well-appointed ships, the beasts suffer severely in bad weather. Two vessels reached Lowestoft in 1863, having embarked 608 beasts and 800 sheep; on their arrival 300 beasts and 230 sheep were dead. These cattle broke loose on the long voyage and trampled each other to death.[1]

Urgent as are these sanitary questions, we are unable to pursue them further. We have shown that, both on the higher ground of humanity, and on the lower ground of self-interest, it is important that advantage should be taken of the calamity under which we suffer, by improving the hygienic conditions of the cattle which form so large a part of our daily food. Most reverently do we look upon this murrain among our flocks as a judgment, though not in the light of a fatalist, who would bow helplessly under it; or of a fanatic, who conceives it has been brought on in consequence of some irrelevant sin against which he has a personal abhorrence. The God of the human race, 'whose are the cattle on a thousand hills,' governs this world by wise and beneficent laws, which are sufficient, when obeyed, to insure the wellbeing of His creatures. The violation of these laws inflicts upon us the penalties attached to their transgression, and it is our duty to discover, understand, and obey them. By the public prayers

1 We have on more than one occasion seen animals in our public slaughter-houses so terribly mangled during their transit in railway trucks, that the carcasses had to be condemned as unfit for food. The sufferings of these crushed beasts must have been terrible.

which we now make that this plague may be removed from us, we hope to have our minds enlarged, so as in some measure to comprehend the wisdom of the Creator, and to follow His rules with simple obedience. By this means we may again place ourselves in harmony with the laws which govern the animal economy.

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