CERTAIN DISEASES OF THE COW AND THEIR INTEREST TO THE PHYSICIAN.*

BY

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THE necessity for the medical man to be in touch with his veterinary colleague over the question of cattle disease is well illustrated by the fact that certain illnesses, some of which are fatal and all of which are troublesome, can be contracted from bovine animals, and occasions of this kind, where members of the two professions meet, cannot but lead to profitable discussions and interchanges of knowledge for mutual benefit. Foot-and-mouth disease, cow-pox, and ringworm are all of local interest to the practising physician, but have not the vital importance of tuberculosis and anthrax, the two diseases to which I propose particularly to divert attention to-night. Not that the others are not troublesome, but they are curable and only in rare instances cause death.

Foot-and-Mouth Disease.

That foot-and-mouth disease is contagious to man has been demonstrated many times, but with proper precautions in connexion with the disposal of the milk the risk is comparatively slight. It is, however, one of the diseases in which the members of the veterinary profession occupy the front trench, and the risk of spread to man depends upon the efficiency of their organization.

Man can contract it by drinking infected milk or even by eating cheese or butter made from such sources. That those who handle the mouths and feet of the infected animals do not always escape is well illustrated by the following account, which is published¹ by Mr. Vincent Boyle, M.R.C.V.S., one of the Ministry of Agriculture veterinary inspectors.

A veterinary inspector was sent to deal with an outbreak of foot-and-mouth disease on a farm in Suffolk in November, 1920. His duty was to examine each animal, and he was in contact with diseased animals on four consecutive days, November 21st to 24th, 1920. On December 5th he fell ill, complained of headache and general malaise, and showed elevated temperature (101.4°). On December 8th vesicles appeared on the inner surface of the lips, and on the gums above and below the incisor teeth, and during the following three days up to December 11th further vesicles formed on the hard palate and tongue. His general condition became worse, elevated temperature persisted, there were periods of delirium and semi-consciousness, and the heart had by this time become affected with endocarditis, involving the valves, especially the aortic. By December 25th an improvement had set in, and the lesions in the mouth healed gradually. Improvement continued, though convalescence was prolonged.

The exact method of infection is not clear, but probably it was through particles of saliva, shed epithelium, etc., contaminated with virus, reaching the face and lips of the examiner during the examination of the mouth lesions of the affected sheep.

In England foot-and-mouth disease has not troubled the human practitioner very much, as immediately an outbreak amongst cattle is notified the Veterinary Department of the Ministry of Agriculture takes the animals and the premises in hand and imposes rigid quarantine precautions until all the affected and in contact animals are slaughtered; thus are prevented the sale of milk and the spread of the disease to man and other animals.

On the Continent, however, where the law is not so drastic, its contagiousness is well recognized, and during an outbreak in Oldenburg in 1920 an inquiry by the medical profession resulted in the establishment of some sixty definite cases in mankind. Again, on the authority of Hutyrá and Marek² we are told that Bussenius and Siegel report sixteen outbreaks occurring in man between 1878 and 1896, in the course of which entire families became affected, and that a number of cases ended fatally. This is enough to prove that the veterinary surgeon has his duty to perform and share in warding off this disease from man, and thus being of service to the medical practitioner.

Cow-pox.

That cow-pox is contagious to man is well known to every owner of a dairy herd, and occasionally it causes severe constitutional as well as local symptoms necessitating cessation from work.

There is plenty of literature to prove its transmissibility, and a recent well illustrated article by Dr. R. J. Reece, C.B., read before the Royal Society of Medicine, "On the circumstances associated with an outbreak of disease amongst milch cows, horses, and their attendants, believed to be of the nature of cow-pox, in the county of Somersetshire in the year 1909," brought the subject recently to the fore again. The great interest which has recently been taken in the question of the communicability of disease from animals to man has brought a number of excellent clinical articles to the *Veterinary Journal*; as, for example:

Captain Sparrow, M.R.C.V.S., of Rochford, Essex, reported³ an instance in which a dairy herd of 40 cows all had cow-pox, and "most of the milkers caught cow-pox, with lesions on their arms and hands, and had to be medically treated."

Mr. Hugh Begg, F.R.C.V.S., the chief veterinary inspector to the county of Lanark, reported cow-pox in a herd of 30 milking cows; the four milkers employed all developed typical pox lesions between the fingers and on the backs of the hands. The symptoms were sufficiently severe to keep them from duty for several days, and the sores did not heal for about three weeks.

Mr. E. J. Thorburn, M.R.C.V.S., of Crewkerne, Somerset, a very large dairy district, reported several outbreaks amongst the milch cows, and in one particular dairy, consisting of 60 cows (of which 20 became affected), three of the milkers became very badly inoculated. In two cases the men were very ill, and were under medical treatment for a considerable time. Starting between the fingers, the disease spread up the arm to the lymphatic glands and axilla, thence through the system to the glands in the lower extremities. Several weeks elapsed before the men became completely convalescent.

Ringworm.

Ringworm, especially of the calf, is very readily transmissible and at some time or other bound to come under the notice of the practitioner in an agricultural district. Common in many districts, especially at certain seasons of the year, it is quite easy for the herdman who dresses the infected skins to contract the ailment. The veterinary practitioner is often himself a victim, and ringworm infection obtained from a calf is not so easily got rid of as the ordinary human variety. The head of a calf may be covered with the ringworm crusts, and one does not need to be more than slightly careless when handling calves with ringworm in order to find within a few days a practical proof of its contagiousness on one's own hands and arms.

That, too, it may be passed on is also a fact, and to illustrate that I cannot do better than quote a short clinical note Dr. Alfred Eddowes recently contributed to the *Veterinary Journal*:

"Thirty years ago, when I was practising in the country, a young woman consulted me one evening for what was obviously ringworm on her cheek. A number of questions were put to her as to how she had caught it. She was a parlourmaid and 'had nothing to do with children, ponies, cats, or calves.' I begged her to lock round on going home and send me word if she noticed anything like it. Next morning a man stepped into my consulting room. Seeing a ringworm on the centre of his forehead I merely asked his name and told him I could guess all the rest. He was cowman to Mr. C. of S—Park; that he had not been at the job long—was, in fact, quite a novice—otherwise he would have had a cap ready to wear while milking. Further, that he was in love with the pretty parlourmaid, and no wonder. 'Doctor, you know too much, but it's all true,' was his reply, and I almost fancied myself a Sherlock Holmes!"

Anthrax.

The diseases to which I wish to draw special attention are anthrax and tuberculosis, and it is here that the collaboration of the medical and veterinary professions is so urgently desirable. Stamp out anthrax from the animal (especially the cow tribe) and from animal products, and it is eradicated from man, for its origin is always one or other of these sources. Stamp out tuberculosis from cattle and you do away with the deaths from bovine infection, caused mainly by the milk supply, which form quite a big proportion of the total, especially of the deaths of children. As illustrating this, and at the same time illustrating the value of collaboration, I will quote an extract from a clinical article which has just reached me, for publication in the *Veterinary Journal*, from Major Rabagliati, O.B.E., B.Sc., F.R.C.V.S., the Director of the Serum Institute for the Ministry of Agriculture in Egypt. He writes:

"Some years ago an outbreak of anthrax in some of the inhabitants in a certain village assumed considerable proportions. These cases came under the notice of the medical authorities, who instituted preventive isolation and quarantine, with the necessary treatment, amongst the affected people. It was noticed that most of the fatal cases occurred amongst the old women of the village,

* An address given to the South Essex Division of the British Medical Association, December 6th, 1922.

and that they suffered from the pulmonary form of the disease. A few cases occurred in children, who had malignant pustules on the arms and legs, or even other parts of their bodies. The explanation of this difference of situation was not at once apparent. Although no cases in animals had been reported in this neighbourhood a Government veterinary inspector was sent to make inquiries. He found that both cattle and sheep had been dying, and also that a number of sick animals had been slaughtered illicitly, and was soon able to diagnose anthrax as the cause of the illness and deaths amongst the cattle and sheep.

"The cause of the symptoms was then clear, and was as follows: It is the custom of the villagers to collect cattle dung for fuel, and to make it into round cakes by drying it in the sun. This is usually done by the children. When dry it is used for cooking purposes, this being done by the older women.

"The children employed in collecting the dung, a lot of which was from the sick cattle, were not so much exposed, owing to the moisture, but occasionally contracted malignant pustules through abrasions; but the old women of the village, who broke up the sun-dried 'cakes,' talking as is usual all the time, inhaled the dust, rich in spores, and so fell ready victims to the pulmonary form of anthrax."

Anthrax has been very much to the front lately, and it has been rare for a week to pass without some notice in the public press either of a death in man or animal, or else drawing attention to the danger of infection. The Japanese shaving-brush scare did much to familiarize the man in the street with the risks he ran from non-disinfected goat hair and wool, and recently deaths have been reported from the wool-sorters' area. An International Advisory Committee has been formed, consisting of delegates from various parts of the world, to inquire into the disinfection of wool, hair, and skins infected with anthrax spores, and also into the practice and effective methods of preventing infection amongst flocks. The Committee is to report to the International Labour Conference in 1923, and there is no doubt that it will examine a large number of expert witnesses. Its preliminary meeting took place yesterday, and one of its first duties will be to inspect the new anthrax disinfecting station at Liverpool. This disinfecting station cost just over £110,000, and started operations in July, 1921. It is capable of disinfecting about 8 million pounds of wool annually, and it is estimated that by the expenditure of another £15,000 this output could be doubled.

Wool and hair are the chief carriers, and the workers in the Bradford district of Yorkshire, know the first signs of woolsorters' disease quite well. It is estimated that by compulsory disinfection of all imported wool and hair the danger of anthrax infection to human beings will drop at once by 50 per cent.; and it is to be hoped that the talk which has arisen in regard to closing it down, on the ground that it has not paid its expenses during its first year, will not be allowed to materialize, as the mere expenditure of £5,700 should not be allowed to be considered when human lives are at stake. I am glad to be able to say that Dr. Hope, M.O.H. Liverpool, informs me that this excellent work is to continue.

Hides and skins are as important as the hair and wool, for they too may come off infected beasts, and all should be submitted to a disinfecting process, whether on arrival in England or at the port of embarkation. The latter is, of course, the more ideal as doing away with the chance of contamination of the ship, etc., by its cargo. Between July, 1921, and September 30th, 1922, about 1,290,000 lb. of material has been dealt with at the disinfecting station, and the wool-workers may reasonably look forward to the risk of their trade now being reduced to a minimum.

Bones and bone manure, imported from infected countries must also receive attention, as also the question of cattle feeding cake, for in this we have a not uncommon source of trouble.

The killing of a dying beast and the subsequent risk of infection to the man who dresses the carcass can only be dealt with as the law directs. It is here that our two professions are likely to come in contact, and the medical practitioner should know when the danger exists in his neighbourhood. As regards the treatment, the medical profession has the advantage over the veterinary, in that anthrax in man is not so rapidly fatal as in cattle, and that Sclavo's serum is so valuable in man if injected in the early stages of infection.

With us, although we occasionally get reports of spontaneous recovery in the dog and pig, the disease in cattle and horses is generally fatal and comparatively rapid. Statistics of the Ministry of Agriculture show that the number of outbreaks of anthrax in animals in 1922 up to the week ending November 25th was 456, with a total number of 527 deaths—quite a considerable number when we remember that every one was

a possible centre of infection for a human being. This, added to the risk of infection from imported hair, hides, bone manure, feeding cakes, etc., all animal products, adds another disease danger to be grappled with and one in which the veterinarian again stands hand in hand with his medical colleague—for once get the animal aspect of the question clear the human side must automatically follow, and anthrax will be relegated to join glanders and rabies in the list of diseases with which the next generation will only be acquainted by hearsay.

Tuberculosis.

In the prevention of tuberculosis much good can be done by collaboration. Until the law is altered so as to compel the milk vendor to guarantee tubercle-free milk, so long shall we have the human deaths from bovine tubercle infection. Most things are sold as guaranteed free from adulteration, and why not that most essential of things—milk free from this contamination? Here one has a food, necessary to infants and invalids, and yet it may contain living cultures of the most insidious and terrible poison in the world.

Dr. Howarth, the medical officer of health for London, tells us that out of fifty consecutive samples of milk purchased in the city no less than one in four proved to be tuberculous; and Dr. Bigger, at the last meeting of the Statistical Society of Ireland, asserted that 6 per cent. of all deaths from tuberculosis were due to drinking tuberculous milk. When we know it is preventable we cannot understand why no move is made.

At the recent National Milk Conference, Dr. Stanley Griffith, in a paper on bovine tuberculosis and its relation to man, gave some statistics which went to prove more than ever the necessity for the medical and veterinary branches of medicine to pull together.

In an investigation on 1,200 cases of human tuberculosis, "out of 116 cases of cervical gland tuberculosis it was found that 87.5 per cent. of those under 5 years were bovine, 61.3 per cent. of those between 5 and 10 years, 37.9 of those between 10 and 16, and 25 per cent. of those 16 years or over. Of 476 cases of bone and joint tuberculosis, 28.7 per cent. of those under 5 years were bovine, 23.1 per cent. of those between 5 and 10, 9.5 per cent. of those between 10 and 16, and 6.4 per cent. of those over 16. Of 126 cases of lupus, 69 per cent. of those under 5 years were bovine, 42.5 per cent. of those between 5 and 10, 60 per cent. of those between 10 and 16, and 17.6 per cent. of those over 16. Of 52 cases of scrofuloderma 58 per cent. of those under 5 were bovine, 44 per cent. of those between 5 and 16, and 7.7 per cent. of those over 16. Of 17 cases of genito-urinary tuberculosis, 3 were found to be bovine in origin. Of 113 post-mortem examinations conducted for the Local Government Board, it was found that in 21.3 per cent. of those under 5 years at death the infecting bacilli were bovine, and in 13.4 per cent. of those where death occurred between 5 and 12 years. From these and similar data it was estimated that bovine tuberculosis caused 6.44 per cent. of all the deaths from tuberculosis in England and Wales, or approximately 3,000 deaths every year. Both types of bacillus were equally virulent for man, the mode of entry being an important factor in determining the severity of the disease. Thus the effects of alimentary infection are, as a rule, less severe than those of respiratory infection. The age incidence and anatomical distribution of the primary lesions clearly point to cow's milk as the source of infection with the bovine type. Cows with tuberculous udders are the most dangerous, but cows with advanced tuberculosis may yield tuberculous milk or infect the milk through infected faeces or uterine discharges."

Why is not the 1914 Cattle Tuberculosis Order reimposed? Why are we not compelled to test the milking cows and segregate or eventually fatten or destroy the reactors, marking them in such a way that it cannot be deleted or passed by? This would at the least do away with a big proportion of the risk of infection, and probably indirectly abolish many other ailments which gain their foothold when the powers of resistance are depleted.

It is true that the scheme needs to be financed in order to pay the necessary compensation, but it seems incredible that money should be allowed to stand in the way of human lives and health.

Dr. Nathan Raw's scheme of vaccine immunization is being tried in various pedigree herds. Unfortunately it takes time to get results, but if this proves successful it will be a boon beyond price to the bovine race, and indirectly through the cattle to man, and a still further link in the chain of collaboration between the two professions.

REFERENCES.

- ¹ *Veterinary Journal*, November, 1922.
- ² Huttya and Marek: *Special Pathology and Therapeutics of the Diseases of the Domestic Animals*.
- ³ *Veterinary Journal*, November, 1922.
- ⁴ *Lancet*.

DISCUSSION.

Lieut.-Colonel T. D. YOUNG stated that the City of London Public Health Department presented a good example of the collaboration between the medical and veterinary officers. Dr. Collingridge, with keen foresight, recommended some years ago that the officer in charge of meat inspection should be a veterinary surgeon, and the City Corporation adopted his suggestion. The appointment was followed by the issue of by-laws to regulate the hours of slaughter; any killing proposed to be carried out after regulation hours was to be notified by the butchers, and no carcass or offal was to be removed until inspected. Statistics showed the marked results as to efficiency. Following the improvement of slaughterhouses came the more scientific inspection of pig carcasses, whereby £50,000 was saved in 1915 in the central markets, and the Departmental Committee on Meat Inspection recommended the adoption by local authorities of similar by-laws and the same system of examining pig carcasses as to their fitness for human food. Colonel Young gave instances of the finding of dead animals in lairages, the rapid examination of the blood, and the diagnosis of anthrax, whereby danger to slaughtermen and drovers was prevented. Dr. W. J. Howarth, the medical officer of the City, was not less anxious that progress should be made in all matters relating to the purity of meat and milk supply. In the speaker's opinion no public health department was complete without a veterinary officer collaborating with the medical officer in controlling and supervising meat inspection, inspection of cows and cowsheds, contagious diseases of animals, and the care of the authorities' horses. The salary (paid by the various committees) would be well spent in the interests of the public; he urged the reintroduction of the Cattle Tuberculosis Order and the sterilization of all milk or milk products to calves and pigs, as is done in Holland and some other countries. Figures were given showing the splendid results obtained.

THE SCIENTIFIC BASIS FOR NON-SPECIFIC PROTEIN THERAPY.*

BY

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THE clinical successes obtained with non-specific protein therapy have attracted great attention, particularly in America and Germany. Unfortunately the scientific foundations for this method of treatment are very uncertain. The present paper is an attempt to collect the available scientific evidence showing the nature of the effects produced by non-specific protein therapy. It is important to remember that this method of treatment developed along purely empirical lines from specific treatment with serums and vaccines. The minds of clinical workers were strongly prejudiced in favour of the view that such treatment to be effective must be specific; nevertheless, in spite of this preconception, it was established that in many cases non-specific vaccines and serums were as active as specific, and it was discovered that a large assortment of proteins and products of protein breakdown produced the same effects as vaccines; intravenous administration, moreover, was found to be a particularly effective method of administration.

Non-specific protein therapy has been recommended for the majority of known diseases, but there is fairly satisfactory evidence that it is of benefit in the following classes of cases.

1. *Acute general infections*—for example, typhoid fever; here, after an initial exacerbation of the fever, it frequently causes it to terminate abruptly by crisis.

2. *Chronic infections* with local lesions; in this case the injection causes a febrile reaction, which is followed by a secondary phase in which there is a feeling of bodily well-being. The local lesions during the febrile reaction show acute inflammation, and subsequently healing is accelerated in many cases.

Non-specific protein therapy has been particularly successful in the treatment of arthritis, both acute and chronic, in gonorrhoea, in typhoid fever, and in anthrax.

The reaction obtained in non-specific protein therapy depends upon the agent administered and the manner in which it is administered; the general characters of the febrile reaction appear to be essentially the same whatever agent is employed. The effects following the hypodermic adminis-

tration of typhoid vaccine are familiar to all, and may be taken as a type.

The intravenous injection of vaccines produces a more rapid and more severe response than the hypodermic administration. Peptone administration produces a less violent reaction than vaccines, and it is much easier to get peptones of standard activity than vaccines of standard activity. Purified proteins are usually given by intramuscular injection; they produce a mild reaction after a delay of some hours.

Reagents Used in Non-specific Protein Therapy.

- (a) Proteins—for example, purified casein (caseosan, aolan).
- (b) Mixtures containing proteins—for example, milk, normal serum.
- (c) Products of protein breakdown—for example, purified proteoses, commercial peptones.
- (d) Other preparations containing products of protein breakdown—for example, some commercial preparations of colloidal metals, polyglandular extracts, etc.

A febrile reaction similar to that produced by protein therapy often follows a large number of other therapeutic measures, and Bier¹ is of opinion that any measure which causes breakdown of body proteins produces therapeutic results similar to the injection of proteins. According to this view the following procedures may be classed under the same heading:

- (a) Intravenous injections which produce alterations in the blood proteins—for example, hypertonic and hypotonic solutions, protein precipitants such as mercury perchloride, and many other disinfectants.
- (b) Radium, x rays, and the cautery and other procedures which lead to the destruction of body cells.

The Action of Non-specific Protein Therapy on Infections.

It may be stated at once that there is very little evidence that protein therapy has any effect upon the course of infection in laboratory animals. As a whole the laboratory evidence fails to confirm the clinical evidence.

For example, Bingel² treated 471 cases of diphtheria with diphtheria antitoxin and treated an equal number of alternating cases with normal horse serum, and found that there was no difference in the mortality rates. Meyer³ found that normal horse serum only saved 33 per cent. of guinea-pigs from a minimal lethal dose of diphtheria toxin, and Cowie and his co-workers⁴ showed that the mild protective effect produced by horse serum was due to its containing traces of diphtheria antitoxin, and that other serums had no such effect. This, therefore, is not a case of non-specific protein therapy.

Normal ox serum has been used extensively in anthrax, and Kraus⁵ found that it protected laboratory animals from anthrax, but other workers⁶ have had negative results. Weichardt⁷ obtained favourable results by treating mice infected with pneumococci with non-specific proteins, but Kross⁸ had completely negative results with this treatment in rats infected with mouse typhoid.

One common criticism may be made of most of the above-mentioned results—namely, that the protein reaction varies greatly in different species, and that since rabbits, rats, and mice are peculiarly insensitive to protein shock they are unsuitable material upon which to test the results of protein therapy.

The Substance Producing the Protein Reaction.

Since injections both of proteins and of products of protein breakdown and the destruction of body cells all produce a similar reaction, it appears probable that the common active principle is a product of protein decomposition.

Vaughan has shown⁹ that the heating of protein with alkali in alcohol produces an intensely toxic product of which 0.5 mg. is sufficient to kill a guinea-pig. This substance appears to be a proteose; it gives the biuret reaction, it diffuses slowly through collodion membranes, and it is freely soluble in absolute alcohol, although insoluble in ether. When proteins are hydrolysed the higher cleavage products are toxic. The toxic effects produced by such preparations as Witte's peptone are well known, but it is important to note that so-called peptone poisoning is produced by proteoses and albumoses, and that proteins, when broken down completely to peptones, have very little toxicity.

Commercial peptones contain various bodies soluble in alcohol which have interesting pharmacological actions on isolated organs, but these substances are not highly toxic; heating with acid or alkaline alcohol produces, however, a strong poison which has all the characters of Vaughan's soluble protein poison. This substance was named "vasodilatin" by Popielski.¹⁰ I measured the toxicity of peptones

* A paper read before the Section of Therapeutics and Pharmacology of the Royal Society of Medicine.