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Some Further Observations on Pathological Changes Found in Horses Affected with "Shivering," and their Significance.*

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In a previous paper, I discussed the problem of shivering as met with in three old horses and expressed the opinion that an investigation of the condition in young horses might throw more light on its cause.

In the old horses which I examined, gross changes of an osteo-arthritis nature were the outstanding features, especially in the vertebral column, and I suspected that the signs of shivering might be due to pressure effects on the roots of the nerves going to form the lumbo-sacral plexus. Since then, I have been able to examine, *post-mortem*, three definite shiverers, aged 2, 4½ and 5 years respectively, and again osteo-arthritis has been a prominent feature, though there were no marked exostoses on the vertebræ which one could incriminate as possibly causing pressure on lumbar or sacral nerve roots.

In all I found synovitis of the costo-vertebral articulations with varying-sized erosions of the heads of ribs from the effects of synovial overgrowth in these joints.

The hip, stifle, shoulder, elbow and tibio-tarsal joints showed some degree of early arthritis, though the joints from the fetlocks downwards showed no appreciable change.

The erosion of joint surfaces occurs more especially in areas which anatomists have considered as normal excavations on joint surfaces, but in some joints, particularly the elbow joints, in addition to synovial congestion and overgrowth of villi, grooving of the articular cartilage was visible. In other joints, epi-articular ecchondroses, or merely a yellowish degenerate change of articular cartilage, may be observed.

The point I wish to stress is that I have yet to examine a shiverer, young or old, in which there is no osteo-arthritis.

The difference between old and young horses affected with shivering is, that in old horses there is marked evidence of nature's effort to repair joint damage by bony and cartilaginous hyperplasia seen so well as a lipping of the articular surfaces of many joints.

An extraordinary thing, to my mind, is the absence of lameness in all the shiverers I have seen, though gross pathological changes are to be found in many joints, and this holds for many horses other than shiverers.

Another feature closely allied to osteo-arthritis, which has been met with in the three young shiverers already mentioned, is the presence of well-marked sidebones, the

4½-year-old showing complete ossification of all cartilages. (Specimens exhibited.)

I think I can assert that a horse which is a shiverer will always show some evidence of osteo-arthritis, often clinically, but certainly on *post-mortem* examination.

Periosteal Separation.—In the case of the 5-year-old, while examining the right hip joint, I found there was a partial disintegration of the accessory ligament and, following its course in the groove on the ventral surface of the pubis, I was surprised to find that the periosteum over the ventral surface of the pubis was completely detached from the bone. There was no evidence of any hæmorrhage between the bone and the periosteum.

When I came to examine the sciatic nerves just behind the hip joints I found marked hæmorrhage and œdema around the nerves which were connected with similar fractures of both sciatic tubers. On boiling out the hip bones (specimens exhibited) a fine deposit of new bone can be seen over both dorsal and ventral surfaces of the pubis and ischia. You will see from the specimen that the fractured portions are only small similar detachments, as if the fractures were due to a pathological condition of the bones associated with excessive muscular action.

Hæmorrhage.—In such diverse situations as the loose connective tissue between the external and internal oblique abdominal muscles, and the fat-loaded connective tissues in the neighbourhood of the elbow and stifle joints, groups of petechial hæmorrhages have been noticed.

Diffuse hæmorrhagic areas are common in the retro-peritoneal fat, but these are always in the vicinity of encysted larval sclerostomes. A serous semi-coagulated exudate has frequently been seen in the sublumber muscles near the points of origin of the muscle fibres from the bodies and transverse processes of the lumbar vertebræ. It should be remembered that it is in the sublumber muscles that the marked hæmorrhagic infiltration is most frequently found in hæmoglobinuria in the horse and that this disease may merely be a very acute form of the disease under consideration.

Lymph Glands.—All the lymph glands are enlarged and have a slightly congested, pink appearance.

Stomach.—In shiverers and other osteo-arthritics the stomach frequently shows ulceration of the mucous membrane, producing in the pyloric portion a mottled appearance, apparently normal areas of mucous membrane being interspersed with irregular ulcerated areas. Ulceration is also present on the œsophageal portion of the mucous membrane, usually in the neighbourhood of the margo plicatus, sometimes as definite rounded ulcers about the size of a sixpence, but in other cases quite a large patch of mucous membrane may be absent.

Large Intestine.—Every shiverer I have examined, young or old, has had a fairly heavy infestation of sclerostomes and, in keeping with this, aneurysms of the mesenteric arteries or their branches, and in one case there was a series of small abscesses in the bowel wall each

* Paper presented to the West of Scotland Division, N.V.M.A., at Glasgow, on May 21st, 1930.

about the size of a hazelnut, probably due to infection gaining access at the time of entry of a larval form. An interesting fact noticed in one horse regarding these parasites was the accumulation of a large number in the loose connective tissue between the roof of the abdomen and the base of the cæcum, with slight œdema and appearance of hæmorrhage from the resulting irritation. Encysted larval forms are commonly seen in the parietal retro-peritoneal fat with an area of congestion around.

Other Organs.—Nothing gross has presented itself in the liver, spleen, kidneys, pancreas, bladder, adrenal, thyroid, hypophysis, salivary glands or lungs. The heart also has revealed no naked-eye lesion even in the 5-year-old shiverer which had a very irregular heart; this is in keeping with the contention I have often expressed that organic disease of the heart of the horse is rare and that in the great majority of horses heart disease is functional.

Larynx.—This has only been examined in the 2 and 5-year-old shiverers and in both cases there was atrophy of the intrinsic muscles on the left side supplied by the left recurrent laryngeal nerve; incidentally, both these horses were bad grunters, but no test was made to determine whether they were roarers during life. This atrophic change will appear significant when I have dealt with the changes in peripheral nerves. (Specimens exhibited.)

Nervous System.—As I was not satisfied that pressure upon nerve roots could account for clinical signs of shivering, it became obvious that a more careful examination of the nervous system was necessary. So far, I have found no gross change in the brain or spinal cord removed from the three young shiverers, but they have been retained for future investigation. In my previous series of cases I had already noticed a marked congestion, one might almost call it a definite hæmorrhage, involving the roots of some of the lumbar nerves. I have not seen any such change in the three young horses, but examination of the sciatic nerve has revealed a varying extent of slightly congested œdematous nerve trunk, in marked contrast to the pale portions immediately above and below the affected area. The lesion is a bilateral one. This area of the nerve varied from three to five inches in length and in all cases was situated just behind the level of the hip joint. In the 2 and 4½-year-old horses, in addition to this diffuse pink appearance, there were small petechial hæmorrhages scattered throughout the œdematous area. A similar bilateral change has also been seen in the median and radial nerves on the inside of the arm in the 4½-year-old, which during life showed inability to flex the fore limbs when backed, tending rather to slide the feet back along the ground. The 5-year-old had the gross hæmorrhage associated with the apparent fracture of the sciatic tubers which I have already described, extending to and involving the nerve trunks.

Microscopic Examination of Sciatic Nerves.—In the swollen œdematous area the nerve bundles, instead of consisting of closely packed nerve fibres, show partial or complete isolation of the individual fibres by clear spaces with, in recently affected bundles, an overgrowth of young connective tissue. In many of the bundles large numbers of the fibres have completely disappeared; these I take to be cases of longer standing and in their place is a definite felted mass of fully-formed connective tissue fibres. I have never seen a bundle in which all the nerve

fibres have disappeared. The nerve above and below a congested area may show very little interstitial change beyond a slight fragmentation of some of the bundles. For comparison with the affected sciatic nerve of the first horse I examined, I obtained what I thought would be a normal length of a sciatic nerve from a horse showing no signs of shivering, and to my surprise it showed in a number of bundles well-marked, old-standing fibrosis. Since then I have taken in all a similar portion of sciatic nerve from 13 horses with no signs of shivering and of these, six specimens have shown varying degrees of fibrosis (sections exhibited). The horse, therefore, appears to be very liable to an interstitial neuritis. My examination of peripheral nerves has so far been confined to the sciatic nerve, but from what I have described in connection with it and the gross changes seen in the median and radial nerves, it is very probable that other nerves may show similar changes. May not the atrophy of the laryngeal muscles in the two horses in which I am certain there is an interstitial neuritis of the sciatic be due to a similar neuritis of the left recurrent laryngeal, and may not the progressive nature of roaring be due to a gradual encroaching fibrosis compressing its fibres?

Microscopic Changes in other Tissues of the Body.—Examination of these is not sufficiently advanced to make any report in the meantime.

Provisional Conclusions Regarding Shivering.—Even at this stage of a very incomplete investigation, from the various pathological facts recorded, it appears to me that shivering is merely one of the many local manifestations of a general disease from which horses in general suffer. I leave it to you to picture to yourselves the numerous local manifestations likely to be due to a common etiological factor or factors which at present are diagnosed as definite clinical entities.

Much remains to be done, especially in the histo-pathology of the disease, in order to get back to the beginnings of the process, and if there are any in breeding districts who are able to get me young animals likely to be of interest, I will be greatly indebted to them.

ETIOLOGY.

All I have done so far is to place before you pathological evidence, but now I wish to direct your attention to a much more difficult problem—the cause of all these changes which can make a horse a veritable pathological museum. From the multiplicity of lesions met with, it seems obvious that there must be some factor of a toxæmic nature, using this term in the widest possible sense, which, if it can be tracked down and eliminated, might be the means not only of preventing shivering, but a whole host of other local manifestations to cure which generations of veterinary surgeons have devoted their energies in equine practice. I will limit myself to considering only a few of the possible causes, stressing more particularly the factor of diet. Heredity and concussion have long been considered important factors, causing, at any rate, the osteo-arthritis conditions in the limbs, so I will briefly say a word about them first.

Heredity.—I am prepared to believe that the lack of a disease-resisting factor may be of considerable importance in all the various conditions scheduled under the Horse Breeding Act, 1919, which, however, in my opinion, are mostly local manifestations of a general disease. The

same might still be said about tuberculosis, yet how many would now say that it is hereditary? It would be very unwise to ignore this hereditary disease-resisting factor, whatever it may be, until such time as it is possible to be certain about the factor or factors which initiate and maintain this insidious group of diseases and the likelihood of eliminating it or them.

Concussion.—I think this has been overrated as an exciting cause, even of the phalangeal affections, and this because I am certain, from numerous *post-mortem* examinations, that if a horse shows definite clinical signs of osteo-arthritis in the limbs, one is certain to find generalised inflammatory changes in other parts of the body, not only in the skeleton, but in other connective tissues and microscopically in various organs.

Diet.—I have already drawn attention, in the discussion on the paper already referred to, to the fact that the horse of all domesticated animals lives on the most restricted of diets, hay and oats, and I will briefly sketch the effect of deficient diets on experimental animals, as I think the results already obtained suggest possible lines of attack upon the etiology of the common diseases under consideration. Mellanby, M., has shown that food may contain protective and harmful elements and I would like to take the opportunity of paying a humble tribute to her for such a wonderful record of work recently published by the Medical Research Council,² which will benefit animals as much as man when its conclusions are fully realised and applied.

The protective substances are the so-called vitamins, for many years now a household word in dietary, but the term for the harmful substances, toxamins, has only recently been suggested by Mellanby. The foods in which these harmful substances are outstanding are the cereals and the most potent of these is oatmeal. So far, the presence of two different toxamins has been suggested.

1.—An Anti-calcifying Toxamin Antagonised by Vitamin D.

Working with dogs, it has been shown that cereals interfere with the deposition of calcifying salts in bones and teeth, and of all the cereals oatmeal is the worst, and that the embryo of grain has this harmful effect more developed than the endosperm. It is well-known that grain products are rich in calcium and phosphorus, yet it was found that, in spite of an abundant supply of these salts, if the diet was deficient in Vitamin D there was a smaller retention of these elements in the growing bones. This points to the importance of not being misled by chemical analyses indicating high mineral content in foodstuffs. So long as there is an efficient supply of Vitamin D, the anti-calcifying effect of cereal will be countered. Does the horse obtain an efficient supply of Vitamin D? The natural sources of this are by way of the diet or by the activation by sunlight of ergosterol in the skin. In the majority of horses the Vitamin D in the diet to counter the decalcifying effects of cereals must come from hay, but whether this is a good source or not does not appear to have been worked out. It is rather significant that cabbage rich in other vitamins is deficient in Vitamin D. The amount of Vitamin D derived from the skin, especially in the winter in this country, will not be great, and the conditions of stabling add still further to the deprivation; but, on the other hand, horses in Egypt and India suffer as much from osteo-arthritis as in this country, where there is no lack of sunlight. Gross rickets, such as we get in the dog and children, is unknown

in the horse. It is, therefore, very doubtful whether Vitamin D deficiency is of much importance in the horse.

2.—A Toxamin Causing Degenerative Lesions in the Spinal Cord Antagonised by Vitamin A.

Mellanby points out how cereals fed experimentally to dogs may produce severe inco-ordination of movement often associated with and followed by weakness of the hind legs, and that this appears to be due to a lack of Vitamin A. Again, oatmeal has been shown to contain this toxic substance acting on the nervous system. Timothy hay is said to contain Vitamin A in considerable amount,³ and I expect that other kinds of hay are equally efficient, but in a recent article⁴ by Professor Mellanby, Vitamin A is said to be a very unstable substance and apt to disappear rapidly, especially in high concentrations, so that the content in hay must be considered doubtful. Possibly some of the nervous signs seen in shivering may be associated with the Vitamin A deficiency allowing a toxamin of oats to exert its harmful influence.

Is the Horse a Victim of Scurvy?

The basic diet of the horse is essentially a dry one which is deficient in Vitamin C, the vitamin present in roots, green vegetables, grass and various fruits, the absence of which will quickly produce scurvy in experimental animals. The experiments of Meyer and McCormick⁵ on guinea-pigs are peculiarly interesting, for in them a natural basic diet of alfalfa hay, rolled barley and water in abundance, produces changes in cartilages, bones, teeth, muscles, many glandular organs, blood vessels, and also the central peripheral and sympathetic nervous systems. As far as I have gone in the examination of similar tissues in horses showing signs of shivering, the changes closely resemble these in many respects.

Sclerostomiasis.—The only obvious common factor seen in horses *post-mortem* has been sclerostome infection. In the light of the present want of knowledge of the life history of these parasites and the extraordinary general benefit to horses of treatment with vermicides, we cannot afford to neglect consideration of the rôle played by such parasites.

REFERENCES.

- (1) MITCHELL. *Veterinary Record*, February 1st, 1930, page 89.
- (2) MELLANBY, M. Med. Research Council, Special Report Series, No. 140. 1929.
- (3) Med. Research Council, Special Report Series, No. 38. 1927.
- (4) MELLANBY, E. *British Med. Journ.*, April 12th, 1930, p. 677.
- (5) MEYER and MCCORMICK. Studies on Scurvy, Stanford University Pubs., California. 1928.

Personal.

Will.—Mr. John Howatt, 2 Great James Street, Londonderry, veterinary surgeon, who died on December 30th, left personal estate in Great Britain and Northern Ireland valued at £20,918. He left:—

£1,000 Londonderry Corporation Three per cent. stock redeemable at par in 1957 in equal shares to the Young Men's Christian Association, East Wall, Londonderry, the Londonderry Presbyterian City Mission, the First Londonderry Presbyterian Church, and the Presbyterian Working Men's Institute, Diamond, Londonderry, in each case to be known as the "John Howatt Bequest."

The residue of the property in trust for his wife during widowhood, and then £650 Londonderry Harbour Stock to Londonderry County and County Borough Infirmary.