SOME OBSERVATIONS ON ENTERITIS IN THE HORSE.

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To the practitioner of Veterinary Medicine, abnormalities associated with the bowels of the horse, which afford a considerable proportion of his cases, are matters of great importance. Occurrences of recent years have emphasised what must have been evident to any enquiring mind, that much has to be learned and much to be unlearned as to the nature and deferential diagnosis of bowel affections, before satisfactory application can be made of the means of prevention and relief which, with the power to deferentiate the several conditions during life, would be at our disposal. In order to facilitate diagnosis and to suggest rational measures of treatment, a proper appreciation of the causes of such conditions is essential, and though much information may be gathered from theoretical reasoning as to the effect of the action of the causal factor, the accumulated results of clinical experience and *post-mortem* examination cannot fail to be of great value. It is with the view of adding the outcome of one individual's experience and thought to the weight of evidence that the following remarks are made.

A review of our veterinary literature on the subject of enteritis or inflammation of the bowels will show that there is there little agreement as to the condition to which the term is applied. Percival[1] says, "Enteritis consists in an inflammation of the middle or muscular coat, that which forms the principal substance of the gut."

Williams'[2], referring to this definition says, "It is evidently a mistake. Of course when such extreme congestion of the mucous membrane exists, all the coats are more or less implicated, but the primary and gravest condition is limited to the mucous membrane."

Youatt[3] speaks of two varieties, one affecting the external coat (peritoneum), and another, usually the result of an overdose of physic, affecting the internal or mucous coat.

Robertson[4] defines enteritis as "inflammation of the bowels generally or any portion of them."

Friedberger and Fröhner[5] describe the affection under the head of "Gastro-entérite," and "Catarrh, Gastro-intestinal."

Captain Fred. Smith[6] says, "Pure uncomplicated enteritis is inflammation of the mucous membrane of the intestines and of the mucous lining only."

Of late years, owing to differentiation of affections under the head of typhlitis, colitis, etc., there has been a tendency to limit the term enteritis to inflammation of the small intestines. Though it would appear to be most commonly applied by veterinary surgeons in the present day to deep-seated inflammations, it is obvious from the origin of the word that it would be unwise to restrict its meaning to inflammation of any special coat or locality of the intestine. It is

1 "Hippopathology," Part II., Vol. II., p. 32.
2 "Principles and Practice of Veterinary Medicine," 4th Edition, p. 669.
3 "The Horse," p. 207.
4 "Equine Medicine," 2nd Edition, p. 648.
5 "Pathology and Therapeutics," etc.
6 Proceedings, National Veterinary Association, 1887, p. 89.

well recognised that mucous membranes in any part of the body may be inflamed without appreciable change in adjacent structures, and that the observable effects of the causal factor may be limited to the superficial parts and the discharge from its surface, or that deeper parts of the mucous membrane may be affected and infiltrated with inflammatory products which do not find their way to the surface. Both these conditions properly come under the head of *muco-enteritis*, and the former is frequently spoken of as *enteric catarrh* or *catarrhal enteritis*. When the deeper structures of the intestinal mucous membrane or the middle coat of the bowel are affected, the term *phlegmonous enteritis* is often applied to the disease.

The intestines of the horse are undoubtedly liable to varieties of inflammation as to the parts affected, the severity, and the duration. Perusual of the literature of the subject, however, cannot fail to show that there has been, and to some extent is at present, in existence. the impression that *enteritis* of the horse affects the whole of the coats and is a rapidly fatal affection. In his veterinary medicine Williams'[1] says "Enteritis or inflammation of the bowels may safely be stated to be the most rapidly fatal disease to which the horse is liable, destroying life in course of a few hours;" and, further on, "It is doubtful if the condition usually regarded as inflammation of the bowels is other than apoplexy." Percival[2] observes that enteritis is often fatal in from twelve to twenty-four hours.

The further description of inflammation of the bowels by these and other writers conveys to me, at least, the idea that the conditions referred to most commonly are, properly speaking, not enteritis, but twist, or strangulation of vessels brought about in other ways. From my own experience and analysis of the recorded observations of others I am disposed to the view that rapidly fatal cases of enteritis, in which the whole substance of the wall of the gut is implicated, are by no means common, indeed are of comparatively rare occurrence. By this it is not intended to convey the idea that such a circumstance may not occur, for we recognise it in such affections as intestinal anthrax and others. There can, however, be little room for disputing the assertion, that the vast majority of cases of inflammation of the bowels or enteritis commence in the mucous membrane, are limited to it, and terminate fatally.

Concerning the causes which produce inflammation of the bowels, the views very commonly expressed appear to me to be at variance with the facts. We find most prominently mentioned, "Over-fatigue,[3] cold from exposure or from washing with very cold water whilst the animal is heated and then after inadequately clothed." "Colic,[4] constipation, hardened fæces, indigestible food, strangulation, intussusception, over-fatigue, cold, exposure." Youatt, refers to "sudden exposure to cold; or washing, after being heated, with cold water; being drenched with rain; stones; overdose of physic." Friedberger and Fröhner[5] enumerate "Cooling down, cold foods, violent work, irritating foods and drinks, drugs, large quantities of food, epizootics, great heat, and low atmospheric pressure." Robertson[6] brings forward "Indigestion, colic, feeding, especially after exhaustion, often no sufficient cause observable, parasites."

[1] Williams' *loc. cit.* [2] Percival, *loc. cit.* [3] Williams', *loc. cit.* [4] Percival, *loc. cit.*
[5] Friedberger and Frohner, *loc. cit.* [6] Robertson, *loc. cit.*

It will be observed that exposure to cold in different ways is most commonly accepted as a cause of enteritis. Without desiring to imply that, in rare instances in susceptible animals, cold may not predispose to the affection, I would state that I have never observed or been able to gather any evidence of enteritis thus produced.

It is not easy on theoretical grounds to escape the conviction that muco-enteritis is the result of direct irritation of the intestinal mucous membrane, and that although, as in the case of some well-known poisons, the irritant may be carried independent of its port of entrance into the system by the blood-stream, the point of attack is most commonly the surface of the membrane. Of the irritants credited with being most frequently in action are—undigested food, poisons, calculi, hard fæces, bacteria and their products, and helminths (worms).

Among the predisposing causes deficiency of bile is thought by some observers important, as favouring decomposition, bacterial activity, accumulation, and colic.

Analysis of the record of 120 cases of enteritis of the horse coming under my own notice, shows that eighty-eight were due to the irritation of worms; five to concretions or intussusception; seven proved or suspected irritant poison; nine, anthrax; three, tuberculosis; eight, cause not recognised. In the major portion of these cases the large intestine was the seat of inflammation. I think it will be generally conceded that enteritis in the horse is most generally found in the cæcum or colon. It is remarkable that these viscera are the natural habitats of the intestinal parasites known to be most injurious, and, I fear, in many neighbourhoods very profusely distributed.

The fact of having paid some special attention to intestinal helminthiasis may possibly have had the effect of bringing an undue share of such cases under my observation, but, adding the experience of several other observers, I am inclined to the view that by far the most common cause of enteritis of the horse is the intestinal parasite.

Reference to such an important work as Neumann's "Parasites and Parasitic Diseases," with the addition of editorial notes by Dr Fleming, however, does not produce on my mind the impression that the intestinal worms of the horse are commonly the cause of serious results. *Tænia perfoliata*, the commonest tapeworm, we are told, "generally remains unperceived during life, though sometimes it coincides with the general symtoms of intestinal helminthiasis. *Ascaris megalocephala* does not usually affect the health of the host, though in young animals they may give rise to various troubles in digestion." Referring to *Sclerostoma equinum* (Strongylus armatus) we find, "notwithstanding their sometimes considerable numbers and the irritation they should produce in the mucous membrane, their presence in the horse is rarely betrayed by any appreciable symptom; they have sometimes been accused of causing death by anæmia, diarrhœa, colic, etc." And, writing of the Sclerostoma tetracanthus, "they are generally considered inoffensive, but some observations show that by their great numbers they may be capable of producing a hæmorrhagic enteritis and fatal colics."

I think it necessary to draw special attention to the foregoing, as the work is the most important in our literature, and thus likely to

create a widespread impression of the slight importance of a class of irritants which, according to my own observations, are of the utmost significance.

The enteritis induced by the intestinal worms is by no means confined to horses in the country, four fatal cases have come within my own notice among our College infirmary patients during the present month.

While it is not desired to deny that other causes besides worms may be in action, I am convinced that these frequently escape observation. It is important to remember that a few intestinal worms may be observed unassociated with inflammatory change or without giving rise to symptoms. It is equally necessary to remember that when the sclerostomes are the cause of enteritis close observation and sometimes considerable magnification are necessary to detect their presence, even when they exist in myriads and are really most dangerous.

The effect of parasites in damaging the intestinal mucous membrane and thereby providing the means of entry of bacteria and other irritants, must not be lost sight of, and though the topical irritation of large numbers of worms usually first induces intestinal catarrh and its symptoms, and afterwards phlegmonous and fatal enteritis, a few worms may induce no evidence of catarrh, but allow inflammation-producing matters to enter and set up phlegmonous inflammation and other morbid states primarily.

Of the parasites inducing intestinal inflammation in the horse, the more common are the *Strongylus tetracanthus*, *Strongylus armatus*, *Ascaris megalocephala*, and *Tænia perfoliata*. The first named is by far most frequently observed, and to my mind the cause of the majority of cases of verminous enteritis. These worms, in their full grown state, are usually from half to two-thirds of an inch long, sometimes white or whitish grey, at others blood-red coloured. They may be found curled up in the substance of or underneath the mucous membrane which they have penetrated, and many feet of the walls of the colon or cæcum may be infested with them in varying degrees. By holding the intestine between the light and the eye these are readily observed, and I have counted as many as sixty in a superficial inch. Adult worms may also be seen holding on by their cephalic extremities to the mucous membrane, their bodies being in the lumen of the intestine. In some cases the worms are so numerous in this position as to convey the idea of dark red velvet-pile. They may too be found of microscopic size, in myriads, on the surface of the membrane, and it is probable that in this state their presence has very often not been suspected or realised. Strongylus armatus, the well-known palisade worm, I have never found alone producing serious inflammation of the intestines, though frequently I have observed it in conjunction with the foregoing. The cruel armature of the cephalic extremity of the adult palisade worm certainly is suggestive of great capability for injuring any structure attacked by it, and, without having been able to differentiate the two parasites in the minute immature state, I am disposed to the view that some of the small worms observed in scrapings of the surface of the mucous membrane may be of each variety. The Tænia perfoliata I have most commonly seen in large numbers, causing enteritis in the

cæcum. In some instances coming under my notice 3 or 4 gallons of these tapeworms have been found in the cæcum and colon. The Ascaris megalocephala is found in similar situations, and probably only gives rise to inflammation when in very large numbers.

Among the symptoms mentioned by Percival, as indicative of enteritis, are, "pawing, striking ground, striking belly, cringing his body, makes feints to lie down; lies down, rolls, and perhaps upon his back; rises again, casts a dolorous look at his flank, pants and blows, and sweats from pain. His belly is tense and painful to pressure, towards the flanks drawn up, and nothing is voided, save a few hard angular, dark-coloured dung balls, and they commonly at the commencement of the attack." The whole of the symptoms are continuous. "The continuance of his torturing pains drives the animal to a state not merely of extreme restlessness, but of real distress; he is either pawing, or repeatedly lying down and rising again; or else he is walking around his box, breathing hard, sighing, and, perhaps, occasionally snorting, etc." The last stage borders on delirium, which is vividly delineated.

Youatt's account is very similar, and Williams' substantially the same, particularly as to the violence of the symptoms, and the alteration which takes place when gangrene, which may result in eight or ten hours, has set in. Reference to the pathological conditions associated with the affections as described under the head of "Enteritis," I think, support the view that cases of volvulus have been included. Witness the following quotations:—

[1] "The small intestines, in particular the ileum and jejunum, are the common seats of the inflammation when it has arisen without obstruction, or has followed spasm.

"The affected parts exhibit various patchy shades of redness, from the pink or scarlet to the purple and even black hue, the last indicating that the part has mortified. This portion of the gut commonly contains air, and now and then when cut into exhibits masses of dark-coloured congealed blood. At the same time it is common to see effusion of water into the abdominal cavity.

"Mortification may ensue in eight or ten hours.

"[2] In the great majority of cases mortification results, or the animal dies from the debilitating effects of hæmorrhage into the intestinal canal. Gangrene may result in eight or ten hours."

The diagnosis of intestinal inflammation remains difficult, and in many cases unsatisfactory, while a study of the symptoms cannot very well be separated from a study of the etiology. Irritation of the intestinal mucous membranes is usually associated with pain and spasm, and if the irritant be constant in action the evidence of pain will probably be continuous. If the action of the cause be gradual and progressive the pain will likely be less acute and the spasm less severe. If the cause of the irritation come into operation suddenly the resulting spasm and pain will probably be more acute, and the symptoms of colic more severe. If the action of the cause be suspended there will probably be a remission of the more marked symptoms of spasm and pain. There are, however, many circumstances which may modify these physiological effects, and no definite rules

[1] Percival, "Hippopathology," *loc. cit.*
[2] Williams' "Principles and Practice of Veterinary Medicine."

exist on which we may build up a positive diagnosis of the cause. Individual temperament is responsible for varied manifestation of the same sensory states, while conditions giving rise to tympany and its effects, which may or may not be associated with enteritis arising from any cause, cannot be determined. Symptoms, too, will be modified by the extent and severity of the inflammation. If the irritation be confined to the superficial parts of extensive areas of the mucous membrane, diarrhœa and debility will probably be prominent features, and the evidence of abdominal pain less marked. If the deeper structures be affected suppression of fæces is commonly noticed, while symptoms of intense continued pain and consequent exhaustion are evident. If large areas of the highly vascular intestinal membrane be gorged with blood the temperature of the external parts of the body will probably be low, the pulse small, and the urine suppressed, and containing some matters usually disposed of by the intestines, and which tend to render its reaction acid. With these must be considered the effect of limited or extensive inflammation, and its intensity, etc., on the temperature, the effects of inflammatory products, abdominal pain, etc., on the several parts of the system, and complications, such as rupture of the intestinal walls, etc.

It is not pretended for this article that it is exhaustive, and space will not permit reference to the symptoms which are associated with each of the several causes before-mentioned as giving rise to the 120 cases. I hope to refer to these in a future contribution on the subject. As, however, nearly three-quarters of these cases were caused by strongyles, it may be permitted to remark here that I have observed that in young animals the irritation appears in many cases to act for a long time on the superficial parts of the membrane, and to induce intestinal catarrh and diarrhœa, which often persist for weeks and months, and are accompanied by the dependent debility, emaciation, and anæmia. In older horses these symptoms are often not at all prominent. The effect of the parasite, however, is usually gradual, and the rule, in my experience, has been that violent evidence of abdominal pain has been absent. The following case is somewhat typical, though the temperature was perhaps a little lower than usual so near the end.

The subject, a roan mare, seven years old, was admitted to the infirmary on 11th February 1896. The history was that she had been noticed to be rather dull and weak for some weeks, but had worked up to within a few days of her admission, when the dulness became more marked, appetite was lost, there was diarrhœa, and occasionally evidence of light colicky pain. On being examined, temperature was 101·4°, pulse 40, respirations 10, mucous membranes yellow, great dulness, extremities cold, food refused. The animal was warmly rugged and bandaged, and received 2 ounces of tincture of opium.

12th February. Temperature 102·6°, pulse 36, respirations 9, no fæces passed, no evidence of pain, visible mucous membranes yellow, food refused. Four ounces of sulphate of magnesia administered.

13th February. Temperature 101·8°, pulse 38, respirations 11, no fæces passed. Animal lies down, and manifests abdominal pain by looking to flanks. Half-ounce doses of chlorodyne given five times during the day.

14th February. Temperature 103°, pulse 40, respirations 10, small

quantity of soft fæces passed. Same evidence of abdominal pain continued. Conjunctival mucous membranes injected. Chlorodyne as before.

15th February. Temperature 101°, pulse 46, respirations 12. Animal frequently lies down and rises, evidence of rather more severe, though not violent, pain ; small quantity of fæces passed. Chlorodyne continued, and morphia injected subcutaneously.

16th February. Temperature 102°, pulse 48, respirations 18. Condition same as on 15th. Treatment repeated.

17th February. Temperature 103°, pulse 89, respirations 24. Evidence of abdominal pain more marked but not violent ; some tenesmus ; vessels of conjunction intensely congested. Seven grains of morphia subcutaneously three times.

18th February. Temperature 102·6°, pulse 99, respirations 24. Depression very marked, heart-beats feeble, no fæces passed, a small quantity of thick urine, tenesmus, and evidence of abdominal pain, less marked towards evening. Treatment continued.

19th February. Died early in the morning.

The autopsy revealed intense muco-enteritis of large areas of the cæcum and colon. Other visceras healthy. Myriads of minute strongyles on the inflamed mucous membrane. No parasites were noticed before death, as frequently may be done in the fæces or on the arm after rectal exploration.

INTESTINAL PSOROSPERMOSIS IN LAMBS.

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THE term psorospermosis is applied to diseased conditions caused by the so-called psorosperms, which are animal parasites, most of them microscopic in size, and all of them comparatively simple in structure. The best known of these parasites is the coccidium oviforme, which is parasitic in the bile ducts of the rabbit—wild and domesticated, and which is a not infrequent cause of serious mortality in that species. In a former article[1] I described this parasite, and the lesions which are set up by its presence in the rabbit's liver ; and at the same time I recorded some observations that I had made regarding an identical or nearly related coccidium which was responsible for a very heavy mortality in young pheasants. The pheasant coccidia inhabited the intestinal epithelium, which, in consequence of their presence, was in a large measure destroyed.

Since the above-mentioned article was published, I have discovered the same parasite in other outbreaks of disease, both among young pheasants and adult domestic fowls ; but the object of the present note is not to record any new observations made regarding this avian psorospermosis, but to describe a recently encountered form of this disease, which is of greater interest owing to the species attacked, and the nature of the lesions excited.

In the month of April last, in making a *post-mortem* examination of a lamb which had been forwarded to me after death for that purpose, I discovered in the small intestine a considerable number of reddish

[1] Vol. VII., p. 131, of this Journal.