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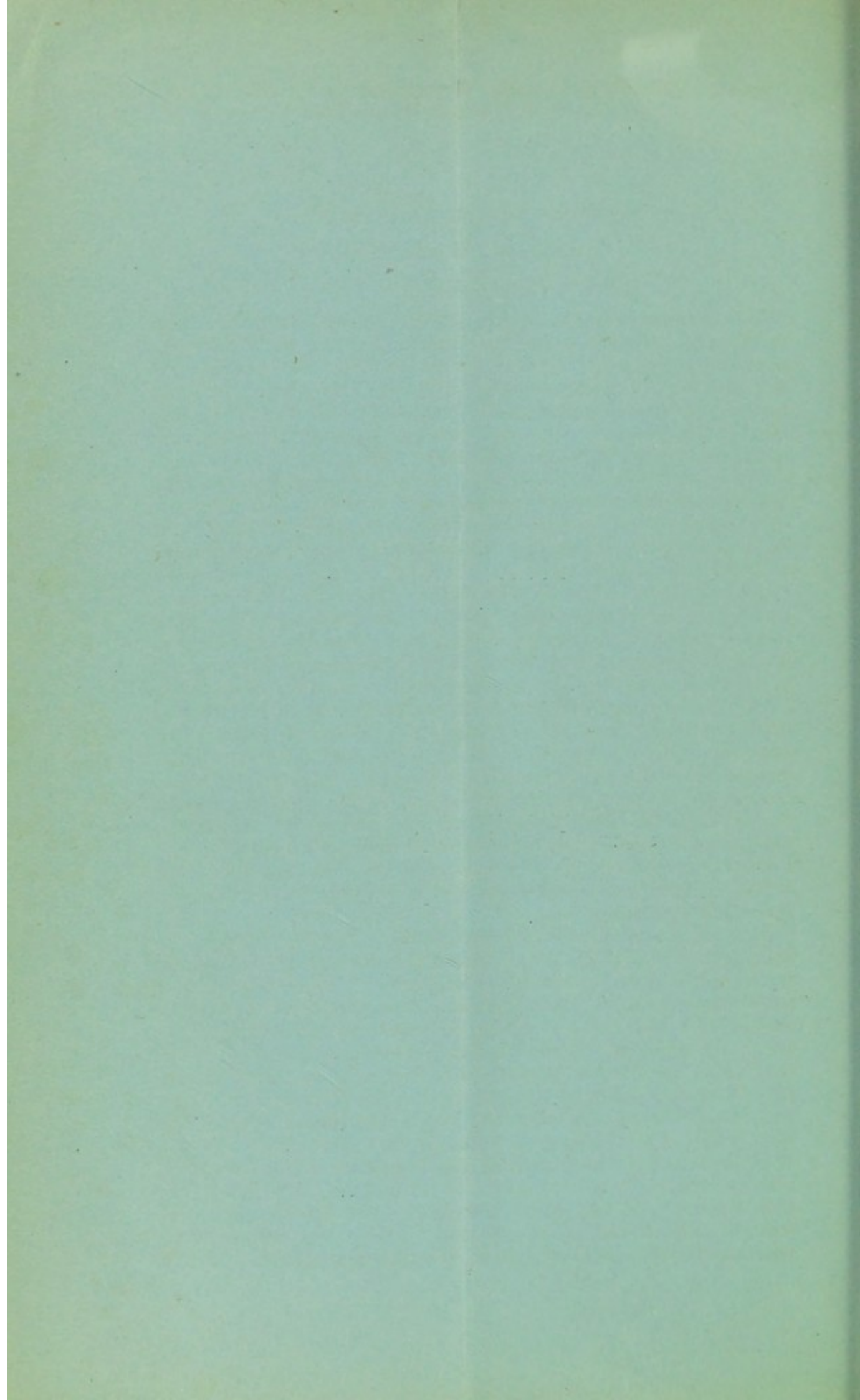


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NOTES ON THE FLUKE IN SHEEP.

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NOTES ON THE FLUKE IN SHEEP.

By ALFRED T. BRETT, M.D.

Read at Watford, 20th April, 1880.

THE metamorphoses of insects is a subject that has much charm and fascination about it, and the metamorphoses of the Entozoa, or parasitic worms, are not less remarkable, nor are they less interesting than the metamorphoses of insects. It seems that many parasites require to go through the bodies of two animals to acquire their perfect growth. But it is not my intention to detain you with an account of the natural history of parasites in general or of flukes in particular, for the family of flukes is a numerous one, and has been estimated by some naturalists at from 400 to 500 species, all of which are supposed to pass through allied metamorphoses. I shall only briefly direct your attention to a few facts connected with fluke in sheep.

The subject is of great importance. The 'Times' says, in a leading article, on April 13th, 1880: "An insidious and protean creature, called the fluke, is causing losses actually exceeding, in the aggregate, the cost of many of the wars which have figured in the indictment against the Ministry." In 1861 there were 3,556,050 sheep in Ireland. Professor Fergusson, in reporting on the disease to the Irish Government, says: "It is my opinion that more than 60 per cent. of the sheep on the island are at present unsound, although not all to a fatal extent." A correspondent in the 'Echo' says: "The losses of sheep in the three counties of Somerset, Devon, and Cornwall may be counted by thousands; hundreds of farms in these counties are virtually denuded of sheep." I am informed that one farmer in Watford has lost 400 sheep at Pinner; and sheep have been sold in Watford Market for from three to four shillings each.

The fluke is called *Distoma hepaticum* or *Fasciola hepatica*. It belongs to the order Trematoda, which denotes that it is a suckorial worm. It is a matter of minor importance whether we speak of this entozoon as a liver-fluke, trematoid worm, *Distoma*, or *Fasciola*. *Distoma hepaticum* varies in size in the same animal according to the age of the entozoon. Although this is the case, it is a singular circumstance, hereafter to be explained, that none are found in long existing cases of rot so small as to warrant the belief that they have been hatched from ova deposited within the biliary ducts. The form is that of an oblong oval, flattened from side to side. It will often attain a length of an inch and a quarter, and a breadth of half an inch in its widest part. It reminds one of a flounder or some flat fish. It will live a few hours after the liver has been removed, and it can be seen to move about. The colour varies according to the amount of bile in the digestive system. If full,

after a good meal, it is dark brown or brownish black; if nearly empty, yellowish brown. If taken from the liver, it turns pale and almost white. It has been calculated that the uterus of the fluke may contain 40,000 eggs, and some sheep may have 1,000 flukes, so that there may be 40,000,000 fluke's eggs in one sheep. The fluke is hermaphrodite. It seems that the eggs have a good deal of vitality; some have been kept for two years, and yet they retained their vitality. They are the one hundred and eightieth of an inch long, and three hundredths broad. It is thought that the eggs having passed from the sheep on the ground give rise to ciliated embryos. Each egg may contain five or six embryos, so that a sheep may contain two hundred millions of possible flukes. These embryos are ciliated and free swimming, and they exhibit the figure of an inverted cone. After the lapse of a few days the cilia fall off, the embryo then assuming the character of creeping larva (*Planula*—Cobbold).

Flukes are parasitic to mammals, birds, fishes, reptiles, and even to invertebrate animals. They have been found in the horse, more often the ass, the ox, and in some twenty instances in man. It is supposed that after a time the embryos of the fluke become encysted, in which state they have been called *Cercaria*, and that they may enter the bodies of some kinds of snails, or remain on the herbage, and be eaten by sheep; and as they do not in ruminants go into the true stomach at once, they have time to become developed, and then they go into the liver and become flukes. It seems to me that all the possible changes and metamorphoses that flukes may undergo are not fully known; and it is possible that there may be changed forms yet to be discovered.

If the microscopic object which has been seen in the muscle of rotten sheep proves to be a fluke in one of its forms, the knowledge of this fact will greatly add to our knowledge of the natural history of the *Distoma hepaticum*. My attention was first called to it by Dr. Mason, Medical Officer of Health for Pontypool, and perhaps I had better quote his words. He says: "It so happened that I heard that a lot of sheep had been bought in Monmouth market for 2s. 6d. and 3s. 6d. each, and that many would find their way to our town (Pontypool). I asked my inspector to watch the slaughter-houses, and give me word if he saw any suspicious-looking sheep. He informed me that forty 'dicky' sheep were to be found in one slaughter-house, and not one liver. (The livers had been removed by the butcher.) I visited the slaughter-house, and there saw the worst lot of mutton I had ever beheld. I ordered my inspector to seize the lot pending my investigation. I ordered each sheep to be numbered and a sample to be cut out of each, and to be numbered also. I then proceeded to find out if the microscope could not reveal to me something reliable and tangible to warrant me in condemning these sheep. After many specimens had been examined, I was astonished to find a peculiar-looking parasite in the muscular fibre, always having the same appearance, the worst-looking meat always having the most parasites, the

best-looking having few or none. Out of thirty-two sheep examined I condemned eighteen, which were ordered by the magistrates to be destroyed. The parasite always lies in the sarcolemma of the muscular fibre, longitudinal with it, sometimes straight, sometimes curved. It has the appearance of being alternately segmented, and each segment cellular. I have examined much meat, and I have always found the parasite if fluke is found in the liver; consequently I associate the two. My opinion is that meat infested with this particular parasite is unfit for human food." Dr. Mason then adds a sketch of the parasite, and he mounted a specimen, which he has given to me; I have it here for you to inspect presently under the microscope. He obtained the specimen in this way. He took a small piece of the meat from the flank of the sheep, and with a penknife he cut a very small piece from it in the longitudinal direction of its fibres, and then placed it between two glasses, and looked at it with a quarter-of-an-inch object-glass. In appearance it very much resembles the parasite figured by Huxley, and called *Cercaria ephemera*,* only Mason's parasite is straight or wavy, and Huxley's is curled round in a sac like an ammonite.

The liver-fluke being called *Distoma hepaticum*, I propose provisionally to call Dr. Mason's parasite *Distoma musculum*.

Dr. Harley, in a letter to the 'Times' of April 20, 1880, refers to a letter from a "Dartmoor Farmer," who stated that small flukes had been discovered in a lamb only four weeks old. I am told that lambs only begin to eat at two to three weeks old, and it seems strange that the flukes should have been developed in such a short time. It seems probable that they may be developed in more ways than one.† Can it be possible that the ova of flukes can be developed in the muscle of the sheep, and that the parasite I have called *Distoma musculum* may be a fluke in one of its stages?

I fear I have taken up too much time, but before I conclude allow me to make a few practical remarks.

1st.—It seems possible to produce the rot in sheep at pleasure. "The late Mr. Bakewell was of opinion that after May-day he could communicate the rot at pleasure, by flooding and afterwards stocking his closes, while they were drenched and saturated with moisture."‡ I am informed that Mr. Bakewell constantly put this into practice, for two reasons. He had a valuable breed of sheep which he did not want to become too common. He therefore allowed some of his sheep which he wished to sell to acquire the

* Simonds' 'Rot in Sheep,' p. 57.

† I have been favoured by our President with the following remarks on this point:—"I quite agree with you that flukes may be developed (or, I should prefer saying, introduced into the sheep) in more ways than one. I do not believe that any species of *Limnæa* or pond-snail, much less slugs, which inhabit watery places and are the reputed nurses of the *Cercaria* or encysted flukes, would be eaten by sheep, because these molluscs live altogether on the ground and not on grass or plants of any kind. It is more probable that the embryo of the fluke may find its way into the sheep through the muscles of the sheep's foot or through its skin when it lies down.—*J. Gwyn Jeffreys.*"

‡ Harrison 'On Rot,' p. 36.

rot, well knowing that their death-warrant was then signed, and that in a few months they must either die of the butcher or of disease. Secondly, sheep which have the rot get fat five to six weeks earlier than other sheep. Perhaps the fluke at first makes them hungry and they eat more; but it is rather a dangerous experiment, because after a time the fluke causes disease of the liver, and of other parts, and the sheep will become lean.

2nd.—If it is possible to give the rot to sheep, it is equally possible to prevent the disease by following the opposite plan of treatment.

3rd.—The disease when once established in the liver of the sheep is incurable; no drug will get to the large vessels inside the liver of the sheep so as to destroy the flukes. The best remedy is the butcher.

4th.—The meat has not been known to produce any disease in man. If we were to eat the fluke in an early stage, our gastric juice would most likely destroy it. It must be remembered that our stomach differs widely from that of ruminant animals. The 'Lancet' says that the meat of a sheep that has fluke is not unwholesome. The fact is that rot in sheep is a disease that has been known for a great many years, and the meat of such sheep has been habitually taken, and no harm has been seen to result from it. But the question is only one of degree. In the early stages of the disease the muscles have not been diseased, and the meat may be eaten. When disease has advanced and produced general or constitutional symptoms, the meat must be refused. It is customary to eat the livers of sheep that have fluke in them. This in my opinion is wrong; such livers should be burnt; for as one sheep may have two hundred millions of possible flukes in it, the sooner the livers are destroyed the better for all. The meat of flukey sheep has been eaten in Watford by all classes, and such meat by good judges and epicures has been pronounced to be excellent.

This very imperfect sketch shows that there is still much to be learnt, and I strongly advise our members to study entozoic diseases.* Hitherto it has been too much the custom to look upon entozoa as an effect rather than as a cause of disease. Are they so in that condition of the flesh of the pig vulgarly called measled (mizzled) pork, or in gid in sheep, or in dyspnoea in calves and lambs, or in the gapes in chickens? If not, why should they be so considered in rot?

* Those who wish to study the subject would derive help from Dr. Cobbold's 'Entozoa,' Simmonds' 'Rot in Sheep, its Nature, Cause, Treatment, and Prevention,' and an article in the 'Pharmaceutical Journal' for April, 1880.