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On the Presence

.....OF.....

Distoma Westermanni

.....IN THE.....

United States.

...BY...

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ON THE PRESENCE OF *DISTOMA WESTERMANNI* IN THE UNITED STATES.

Last June a piece of the lung of a cat was brought me for examination, as it contained some foreign bodies which were unknown to the finder. A cursory examination showed them to be *Distomidæ*, and more careful study seemed to confirm the first impression that, in spite of a few slight differences, they were specimens of the Asiatic *Distoma Westermanni*. Being somewhat in doubt and not having the literature at hand, I sent several to Dr. C. W. Stiles, helminthologist of the Bureau of Animal Industry at Washington, D. C., who wrote that there was no doubt in his mind of the identity of the two. For his kindness in this and in sending me the synonymy of the species, I desire to express to him my sincere thanks. I am likewise much indebted to Mr. W. A. Kickland, assistant in the Zoological Laboratory of the University of Michigan, for his kindness in turning over to me the specimens which he found.

The cat, from which the worms were taken, was obtained in Ann Arbor, Mich., and had lain some time in 50 per cent alcohol, while being dissected. In consequence the worms were badly macerated, but, after hardening in alcohol, proved to be sufficient for the determination of almost every organ. Some were mounted whole, and one, after being sectioned, was graphically reconstructed so that the gross anatomy of the form was very clear.

In the small portion of the lung, which was preserved, about a dozen specimens were found. They appeared to be embedded in the tissue which had been partly dissected away. Owing to the poor condition of the organ, it was impossible to determine the exact position of the parasites, but it can be asserted positively that they were not at the surface. The alcoholic specimen of the worm was a dark steel gray at the edges, with a lighter band down the centre; the black dendritic processes of the vitellaria (brown by transmitted light) were distinctly seen with a hand-lens at the margin of the darker area. In

form the worms were naturally very irregular, but were distinctly flattened, not oval, the cross section being an elongated ellipse. In size the seven measured varied from 11.2 x 4.8 mm. to 15.7 x 7.3 mm., averaging 13.6 x 5.8 mm. I think that the five sent Dr. Stiles were somewhat smaller.¹ The average size, however, considerably surpasses the extreme given by Leuckart² for *Distoma Westermanni*. The oral sucker was so distorted that measurements were only approximate; it varied from 1 to 1.4 mm. in diameter. The ventral sucker varied from 0.75 to 1 mm. in diameter, being on the average 0.84 mm. It will be noticed not only that the average here also surpasses the extreme given by Leuckart (p. 405) "höchstens 0.75 mm," which may be explained on the basis of the greater total size of the worm, but also that the oral sucker is appreciably larger than the ventral, which is the direct contrary of the conditions in *Distoma Westermanni* (Leuckart, p. 409). Too much weight should not be laid on these points in view of the condition of the material and still more in the light of the exact correspondence in internal anatomy to be described.

No spines were found on the cuticula, which is not strange after the long maceration. The pharynx, the very short œsophagus and the forked intestine agree exactly with the description given for these organs in *Distoma Westermanni*. The prominent excretory pore and the large sinus show also striking similarity. It is the sinus which is the cause of the light band along the centre of the alcoholic specimen already noted.

In the reproductive organs the agreement is equally striking. The two lobate testes, in the posterior third of the body, the straight vasa deferentia, the absence of a cirrus, the location of the sexual pore on the ventral surface a little behind the acetabulum, the enormous vitellaria, which lie just under the surface over almost the entire body, the prominent vitelline ducts and ovary, the condensed coil of the uterus and the well-developed Laurer's canal rising obliquely to the dorsal surface, are all points which agree in detail with the structure of *Distoma Westermanni*. The eggs vary from 96 x 48 μ to 118 x 50 μ with an average size of 102 x 53 μ . This again shows a slight variation from the

¹ These are now in the collection of the Bureau at Washington.

² R. Leuckart, *Parasiten des Menschen*, 2. Aufl., Bd. 1, p. 404-8.

figures given by Leuckart (p. 436), for the eggs of *Distoma Westermanni*, i. e. $80 \times 56 \mu$. The eggs of the two agree, however, in that in both a cover is present.

In spite of the considerable differences in size already noted, the exact agreement in internal anatomy compels one to recognize the identity of this form with the Asiatic *Distoma* for which the name *Distoma Westermanni*, Kerbert (1878), has evidently the prior right.

Several important questions suggest themselves in this connection, and first of all as to the source of the infection. The cat was a wanderer; of its antecedents nothing could be ascertained, and nothing was known of its ante-mortem conduct. That it was imported into America by some Chinaman is of course possible, since cats are highly esteemed as pets by that race; and the large number of Chinese in the United States render this not so remote a possibility as appears at first glance. In that case infection undoubtedly took place before the animal left the East. Even if this be true, the discovery is a matter of moment because it is evident that, if a secondary host can be found in this country, a dangerous parasite may become fixed in our land as the result of such importations. If, on the other hand, the infection did not take place in the East, it must be that a secondary host has been found here already and that the parasite has gained a foothold in this country. The manner of its introduction is then a matter of conjecture merely. Among the numerous Chinese on our shores, there have been no doubt some who, in the light of the prevalence of the disease in the East, have brought the parasite with them. The eggs distributed in their travels have served to introduce the embryos, which in some place have found the conditions necessary for development. There is no need of emphasizing the importance of obtaining accurate knowledge as to the extent of the infection among animals, and even man, where confusion in diagnosing the complaint is probable unless the sputa be subjected to microscopic examination. It is hoped that by directing attention of scientific men to this find, further evidence on the subject may be obtained; but it is clear that this single case cannot be accepted as proof of the *establishment* of the parasite in this country.

SUPPLEMENTARY NOTE BY DR. C. W. STILES.—The above article appeared in German in the C. J. B. v. P., vol. XV., Nos. 10-11, pp. 362-364, but as the author did not have an opportunity to read proof several typographical errors in the measurements unavoidably crept into the journal. On this account, and on account of the extreme importance of this find by Dr. Ward, I have requested him to furnish an English copy of his article to be published in one of the American journals. As the worm appears now for the first time in American literature, I take the liberty of adding a short note to Dr. Ward's very suggestive communication.

This parasite was found in the Japanese, by Bälz in 1878, who however did not recognize its true nature, but believing that the eggs which he found in the sputa were protozoa, named (1880) the structures *Gregarina pulmonalis* s. *fusca*. Manson also found the eggs of the parasite in Amoy, and afterwards obtained a specimen of the worm which Ringer had found in *Formosa*. Cobbold then obtained this specimen and described it as *D. Ringeri*. The parasite was afterward studied by several authors, notably by Leuckart, who discovered to his astonishment that the form was identical with one which Kerbert had found in the lungs of a tiger (*Felis tigris*) in Amsterdam.

Now that Ward has found this same worm in an American cat, it may be well to give a short zoological description of the worm, with synonymy, etc., at this time in order to place American physicians and veterinarians on their guard for its possible occurrence in the lungs of their patients.

Most zoologists classify the worm in the genus *Distoma* but Monticelli (1888) has created a new genus *Mesogonimus* in which it must be placed, should this genus prove to be well established—a point upon which helminthologists are not yet united. The genus *Mesogonimus* is based upon the position of the genital pore, which is *posterior* to the acetabulum. The synonymy and specific diagnosis of the worm are as follows :

Distoma (Mesogonimus) Westermanni.

- 1878. *Distoma Westermanni* Kerbert.
- 1880. *Gregarina pulmonalis* s. *fusca*.
- 1880. *Distoma Ringeri* Cobbold.
- 1881. *Distoma pulmonis* K. S. and Y.
- 1883. *Distoma pulmonale* Bälz.
- 1890. *Mesogonimus Westermanni* Rail.

Length eight to ten millimetres, breadth four to six millimetres; body thick, plump, reddish brown (fresh) to slate (preserved) in color, oval to elongate in form, rounded anteriorly, somewhat more attenuated posteriorly. Oral sucker small (0.75 millimetres), subterminal; ventral acetabulum slightly larger and situated slightly anterior to the middle of the body. Cuticle covered with broad, scale-like spines. Genital pore immediately posterior to acetabulum, near the median line. Oesophagus very short, so that the bifurcation of the intestine is considerably anterior to acetabulum; intestinal cæca run irregularly some distance from each other to the posterior extremity.

Male organs: Cirrus and cirrus-pouch absent; ductus ejaculatorius straight; testicles tubular, ramified, nearly symmetrical, situated in the posterior portion of body.

Female organs: Ovary ramified, lateral, somewhat posterior to acetabulum: on the opposite side of the median line at about the same height is situated a lobate shell-gland and a rather short, massed uterus, the folds of which extend ventrally of the shell-gland; vitellogene glands lateral, well developed, extending from the anterior to the posterior extremity; vitelline reservoir large; Lauer's canal present.

Eggs oval, (0.08 to 0.118 millimetres long by 0.048 to 0.053 broad,) yellow and with thin shell. Miracidium, ciliated, develops after eggs escape from their host. Sporocyst, redia and cercaria not known.

Hab.—Lungs of man, cats, tigers and dogs.

For details of pathology, symptoms, etc., the reader must be referred to the special literature on the subject, but the following brief summary taken from Railliet's new *Traité de Zoologie Médicale et Agricole* (1893-94) may be interesting to those who have not access to these works.

“This worm is found in the small bronchi or in cysts situated at their periphery. The cysts in question attain the size of a nut; they contain a reddish material formed of mucus, blood-corpuscles, débris of lung tissue, and the distomes; their wall is indurated and they communicate with the bronchi only through small orifices by means of which the eggs escape.

“Individuals infested with these parasites show certain symptoms which may be summarized as follows: cough light or absent; sputa bloody, and slightly yellowish on account of

the presence of the brown egg-shells; occasionally hæmorrhages which continue irregularly during several years. This affection, known as 'parasitic hæmoptysie,' or simply pulmonary distomentosis, seems to be quite common, especially in Formosa—where fifteen per cent of the population are affected with it—and in Japan. It does not appear to be incurable, but seems to be serious only in exceptional cases."

A microscopic examination of the sputa will reveal the presence of the fluke-eggs and thus give a positive diagnosis.

Washington, D. C.