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Cyclustra ardeae n. sp. and the status of
Dendrouterina Fuhrmann, 1912 (Cestoda: Dilepididae).

ROBERT RAUSCH

Three cestodes representing a species of the genus Cyclustra Fuhrmann, 1901, were obtained by the writer from a great blue heron, Ardea herodias L., collected at Neville, Rock County, Wisconsin, on April 14, 1947. The bird was an adult male, weighing 2630 grams. Two other great blue herons from this locality were also autopsied, but were negative for this cestode. Two species of Cyclustra are known, both from ardeiform birds. The Wisconsin material differs from these in morphological details, and is described herein as new.

The cestodes were stained with Semichon's acetic carmine, and mounted entire. The strobila of this form is thin and nonmuscular, so that morphological details can be easily studied. Serial sections, stained with hematoxylin-eosin, were also prepared.

*Cyclustra ardeae* n. sp.
(Figs. 1-3)

**Diagnosis:** Strobila length about 100 mm.; much attenuated anteriorly; greatest width, attained in gravid segments, 2 mm. All segments wider than long; strobilar margins serrate. Scolex about 300 μ in diameter, distinctly set off from well-developed neck; rostellum armed with about 30 hooks ranged in two rows. Large hooks measure about 33 μ, and small hooks measure about 33 μ in length. Ventral longitudinal excretory canals prominent; about 70 μ wide in mature segments. Ventral canals in usual ventral position on oral side, but in dorsal position on aporal side. Genital ducts dorsal to longitudinal excretory canals. Genital pores unilateral, situated in first 1/3 of segment margin; genital atrium prominent and relatively deep. Ovoid to piriform cirrus sac dorsal and somewhat anterior to vagina; it measures 130 to 145 μ long by about
60 μ wide. Internal seminal vesicle apparently absent; external seminal vesicle absent. Vas deferens much coiled near anterior margin of segment, just aporal to end of cirrus sac. Spherical testes measure about 40 μ in diameter, with 40 to 65 per segment. Greater number of testes distributed uniformly in posterior half of segment, behind female genital organs; 8 to 15 testes situated in anterior half of segment, aporal to coiled vas deferens; latter form completely isolated group anterior to female genital organs. Vagina ventral and partly posterior to cirrus sac; its course mediad is undulating; vagina enlarges between ovary and vitelline gland, forming spherical seminal receptacle. Vitelline gland usually reniform, situated near middle of segment directly behind ovary. Lobulated ovary consists of two lobes of equal size; long axis transverse, connected by narrow isthmus. Uterus first seen as transverse, arched tube about 20 μ in diameter, situated near anterior margin of ovary, and ventral to it. At all stages of development poral end of uterus passes over ventral longitudinal excretory canal, but aporal end of uterus is ventral to this canal. Curve of uterus increases with age; posterior and anterior margins develop indentations. Gravid uterus fills segment almost completely. Eggs, somewhat distorted in available material, about 40 μ in diameter. Hooks of onchosphere measure 10 and 14 μ in length.

HOST: Great blue heron, Ardea herodias L.

HABITAT: Small intestine.

TYPE LOCALITY: Neville, in Rock County, Wisconsin.

TYPE: A slide bearing an entire specimen has been deposited in the Helminthological Collection of the U. S. National Museum, No. 49358.

DISCUSSION: Two species of the genus Cyclustra are known. C. capito (Rudolphi, 1819) was originally described from Platalea lenocorodia (L.), and has been recorded by Krabbe (1869, p. 281) from Ayaja ajaja (L.), and by Fuhrmann (1909, p. 29) from Pseudotantalus isis L. C. fuhrmanni Clerc, 1906, was described from Botaurus stellaris L. and, to the writer's knowledge, has not been reported since the original publication

C. ardeae n. sp. differs from C. capito in unilateral position of genital pores, size of hooks, smaller number of testes (80 in C. capito), and in shape of uterus (forming a complete circle in C. capito).

Although the original material of C. fuhrmanni consisted of fragmentary specimens, C. ardeae n. sp. can be distinguished on the basis of shape of the uterus (a complete ring in C. fuhrmanni). According to Clerc (1906, p. 728), the testes are "... très nombreux et répartis dans tout le champ dorsal du proglottis" of C. fuhrmanni. The two species may also differ in number and distribution of testes. Since the scolex is unknown for C. fuhrmanni, shape and size of rostellar hooks cannot be compared.

STATUS OF THE GENUS Dendrouteriora Fuhrmann, 1912

During this study, it was noted that the genus Cyclustra has important characters in common with the genus Dendrouteriora Fuhrmann, 1912. Two species of the latter, D. heroidae Fuhrmann, 1912, and D. botausi Rausch, 1948, are known. They are also parasites of ardeiform birds, and have been reported, respectively, in Garzetta garzetta (L.) and Botaurus lentiginosus (Montagu). A detailed comparison of these genera seems justified, in view of the fact that they are closely related and occur in the same host-group.

After study of Rudolphi's original material, Fuhrmann (1909, p. 31) defined the genus Cyclustra as follows:

"Dilepiniiden mit einem Rostellum das mit doppeltem Hakenkranz bewaff-
Fig. 1. Cyclustra ardeae n. sp. Mature segment; dorsal view.

Fig. 2. Cyclustra ardeae n. sp. Rostell hooks.

Fig. 3. Cyclustra ardeae n. sp. Early gravid segment; dorsal view, showing early development of uterus.
Wardle and McLeod (1952, p. 491) incorrectly stated that the genital pores may alternate irregularly in Cyclustra.

The scolex of *D. herodiae* is unknown, and the generic diagnosis of *Debdorometes* was completed by Rausch (1939, p. 76) as follows:

"Scolex well developed; restellum armed with 2 rows of hooks. Genital ducts dorsal to longitudinal excretory canals. Genital pores unilateral. Testes numerous, situated posterior to female genital organs. Uterus highly branched, with lateral branches passing dorsal to ventral longitudinal excretory canals on aporal side, and ventral to it on aporal side. Parasitic in birds."

This diagnosis is inaccurate in one detail. It was stated that the testes are posterior to the female genital organs. This is true in the case of *D. herodiae*, but in *D. botauri* a few testes are situated anterior to the ovary on the aporal side of the segment, as figured by Rausch (1948, p. 452, fig. 1). This point is important in connection with the following discussion.

The species of the two genera have the following characteristics in common: Two rows of restellar hooks, of similar shape where known (*C. capito*, *C. ardeae* n. sp., and *D. botauri*); unilateral genital pores (*C. fuhrmanni*, *C. ardeae* n. sp., *D. botauri*, and *D. herodiae*); highly coiled vas deferens and absence of external seminal vesicle (all 5 species), more or less identical arrangement of female genital organs.

There are actually only two characters which need further consideration; these are distribution of the testes and the shape and relationships of the uterus.

**Testes:** The testes are situated dorsally in all five species. In *C. capito* and in *C. ardeae* n. sp., the testes fall into two isolated fields—one anterior and aporal, and one posterior. In both of these most of the testes are distributed across the posterior half of the segment. The testes show a similar distribution in *D. botauri*, but the anterior group of testes is not separated from the larger posterior group. There is no anterior group of testes in *D. herodiae*; rather, the testes are relatively few and all are situated posterior to the ovary and vitelline gland. Information on the distribution of testes in *D. fuhrmanni* is incomplete, so this species cannot be considered here.

It may be seen from the foregoing that the pattern of testicular distribution grades from that seen in *D. herodiae* through *D. botauri* to the extreme seen in *C. capito* and *C. ardeae* n. sp.

**Uterus:** The dissimilarities in uterus shape among the five species seem rather great at first glance. However, all are essentially alike. The uterus of *C. ardeae* n. sp. is arc-shaped, and branches develop progressively as the segment becomes older. In *D. herodiae*, the uterus is at first arc-shaped and eventually assumes the shape of an inverted U, designated by Fuhrmann as "hufeisenförmig." The uterus of *D. botauri* is closed at the back, forming a complete circle, but it is otherwise similar to that of *D. herodiae*. In both *C. capito* and *C. fuhrmanni*, the uterus forms a complete ring, and the development of lateral branches is not as advanced.

The placement of the uterus in relation to the ventral longitudinal excretory canals in *C. ardeae* n. sp. seems particularly significant, since it is identical with that of *D. herodiae* and *D. botauri*. No information is available on these relationships in *C. capito* and *C. fuhrmanni*.

It is evident that *C. ardeae* n. sp., *D. herodiae*, and *D. botauri* are very closely related, and differ from one another only in minor details. *C. capito* falls into this group, but may be unique in position of the uterus relative to the ventral longitudinal excretory canals. Presumably *C. fuhrmanni* likewise is morphologically very similar to the four better-known species.
The writer has studied only specimens of *C. ardeae* n. sp. and *D. botauri*, but this, combined with information in the literature on the other three species, has led to the conclusion that these cestodes are congeneric. *Cyclustra* Fuhrmann, 1901, has priority over *Dendrouterina* Fuhrmann, 1912, and must be retained. The diagnosis of the genus *Cyclustra* is emended to include the two additional species.

*Cyclustra* Fuhrmann, 1901, emend.

(Syn. *Dendrouterina* Fuhrmann, 1912)

**Diagnosis:** Dilepididae. Rostellum armed with double row of hooks. Genital pores unilaterial or regularly alternating. Testes numerous, dorsal; situated mainly posterior to female genital organs, but also anterior to latter in some species. External seminal vesicle absent. Uterus of variable shape, ranging from arc-shaped to ring-shaped, and usually enclosing female genital organs; having numerous branches or extensions when gravid. Uterus dorsal to ventral longitudinal excretory canal porally, and ventral to it aporally. Parasites of ardeiform birds.

Five species are assigned to the genus *Cyclustra* as emended: *C. capito* (Rudolphi, 1819), *C. fuhrmanni* (Clerc, 1906), *C. herodiae* (Fuhrmann, 1912) n. comb., *C. botauri* (Rausch, 1948) n. comb., and *C. ardeae* n. sp.

These cestodes are readily differentiated on the basis of host-species occurrence, form of gravid uterun, and other details, so that a key would at present serve little purpose.

**Literature Cited**


