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Dendrouterina botauri n. sp., A Cestode Parasitic in Bitterns, With Remarks on Other Members of the Genus*

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A single cestode belonging to the genus *Dendrouterina* Fuhrmann, 1912, was taken from the small intestine of a least bittern, *Ixobrychus e. exilis* (Gmelin), collected by the writer on May 31, 1945, at Buckeye Lake, Ohio. Considerable difficulty was experienced in obtaining adequate material of this cestode, although bitterns were collected in Ohio, Michigan, Wisconsin, and Manitoba. A second infected bird, an American bittern, *Botaurus l. lentiginosus* (Monatgu), was collected on April 24, 1947, at Horicon Marsh, Wisconsin. Three specimens of *Dendrouterina* were obtained from this bird.

Unfortunately, since refrigeration was not available in the field, the scolices of all four specimens had degenerated by the time the autopsies were made. However, since this species is so obviously different from those previously described, the description is presented with this inadequacy.

Whole-mounts, stained with Semichon's acetic carmine, were made, and all observations were substantiated by observations on frontal and transverse serial sections, cut at 15 μ , and stained with haematoxylin-eosin.

Dendrouterina botauri n. sp.

Diagnosis.—Strobila about 150 mm long; maximum width, attained in gravid proglottids, about 2 mm. Strobila consists of about 140 proglottids. Margins of mature proglottids serrate, while margins of gravid proglottids are convex. Longitudinal muscle fibers numerous, arranged several deep in apparently a single layer. Transverse muscle fibers not seen. Scolex unknown.

Ventral excretory canals about 30 to 50 μ in diameter; their course somewhat undulating. Aporal ventral excretory canal situated dorsally, while poral canal is in usual ventral position. Transverse canals about 20 μ in diameter in central area of segment, and narrower near junction with longitudinal canals. Transverse canals situated just behind testes near posterior border of the proglottid; accessory canals, which transverse the proglottids in an irregular manner, may be present. The dorsal canals are about 2 μ in diameter in mature proglottids.

Genital ducts dorsal to longitudinal excretory vessels. Genital pores unilateral and dextral, situated near the anterior margin of the proglottid. Genital atrium deep; not lined with chitinous spines.

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Figs. 1-8. *Dendroterina botauri* n. sp.—1. Typical mature proglottid, from *Botaurus* (ventral view). 2. Frontal section of an early post-mature proglottid from *Botaurus* (ventral view). 3. Later post-mature proglottid, from *Ixobrychus* (dorsal view). 4. Gravid proglottid, from *Ixobrychus* (dorsal view). 5. Frontal section showing details of terminal part of vagina, from *Botaurus*. 6. Cross section showing position of ventral excretory canals from *Ixobrychus*. 7. Central area of gravid proglottid showing seminal receptacle and vitelline gland, from *Ixobrychus*. 8. Frontal section showing details of male reproductive organs, from *Botaurus*.

Cirrus sac dorsal and somewhat anterior to vagina; it measures from 254 to 380 μ in mature proglottids. Cirrus sac thick-walled, and may extend beyond ventral excretory canal nearly to mid-line in mature proglottids. Cirrus spined, and somewhat coiled within cirrus sac. There appears to be a very small internal seminal vesicle, but this was not always visible in sectioned material. External seminal vesicle absent. Vas deferens forms numerous coils medial to end of cirrus sac. Testes are ovoid, from 45 to 56 in number (average 49), and are situated posterior, lateral, and mostly dorsal to female reproductive organs. Testes measure from 23 to 36 μ long by 20 to 26 μ wide (average 31 by 22 μ) in mature proglottids. Testes enlarge in post-mature proglottids, before disappearing. On aporal side of proglottid, testes extend forward to level of genital pore; on poral side to level of anterior margin of the ovary. Testes lie mainly in same plane, not more than two deep, and concentrated more in the lateral fields. They do not extend laterally beyond the longitudinal excretory canals. Testes are connected by a network of vasa efferentia, which usually arise from the antero-dorsal surface of the organs.

Vagina is ventral and slightly posterior to cirrus sac; it is provided with a large sphincter, about 50 μ in diameter, at the genital atrium. Vagina runs medially toward the ovary, with few undulations, to join large seminal receptacle between ovary and vitelline gland, and ventral to the latter. The ovary consists of two ovoid lobes connected by a narrow band; the lobes become spherical and enlarged in the post-mature proglottids. Vitelline gland is large and spherical; situated immediately posterior to ovary on the mid-line.

Uterus is first visible as an ovoid to spherical sac anterior to the ovary, and gradually extending to anterior margin of the proglottid. The early uterus completely surrounds the ovary and vitelline gland, ventral to them. Three enlargements are seen in the early uterus; one anterior to the ovary, and two posterior. The post-mature proglottids, along with the uterus, elongate rapidly, and lateral branches appear on the latter. The hollow center of the uterus is retained, and, as the proglottids become older, the side branches elongate and subdivide. The poral edge of the gravid uterus is dorsal to the ventral excretory canal, while the aporal edge is ventral to the aporal ventral canal. The vitelline gland and seminal receptacle, along with the vagina and cirrus-sac, are retained in the fully gravid proglottids. Shape of gravid uterus is somewhat variable. Eggs are not densely packed.

The embryos measure 25 μ in diameter, with hooks about 8.4 μ in length. Outside diameter of egg about 33 μ . Shell unusually delicate and often not visible.

Host.—*Botaurus l. lentiginosus* (Montagu) (American bittern), and *Ixobrychus e. exilis* (Gmelin) (least bittern).

Habitat.—Small intestine.

Locality.—Buckeye Lake, Ohio (*Ixobrychus*), and Horicon Marsh, Wisconsin (*Botaurus*).

Type.—A total preparation from *Botaurus* has been deposited in the Helminthological Collection of the U. S. National Museum.

DISCUSSION

The genus *Dendrouterina* was erected by Fuhrmann (1912) for a cestode, *D. herodiae* Fuhrmann, 1912, from an egret, *Garzetta garzetta* (Lin.) as type. *Dendrouterina botauri* differs from *D. herodiae* in the formation and shape of the gravid uterus. In *D. herodiae* the gravid uterus is "hufeisenförmig," and not closed posteriorly. In *D. botauri* the uterus is completely closed posteriorly; it surrounds the female reproductive organs in the early mature proglottid (fig. 2), and encloses the seminal receptacle and vitelline gland in fully gravid proglottids (figs. 4 and 7).

Especially characteristic of *D. botauri* is the formation of the uterus, which, when first observed in post-mature proglottids, entirely surrounds the ovary and vitelline gland, with a single anterior enlargement, and two posterior ones (figs. 2 and 3). As seen in Fuhrmann's (1912) figure 5, the uterus in *D. herodiae* is net-like in its early stages of formation, while this is not true of that of *D. botauri*.

Dendrouterina botauri is larger than *D. herodiae*, and apparently has a greater number of testes. If each species is found to possess an armed rostellum, it is possible that there will be differences in the number and size of the hooks. According to Dr. J. G. Baer (personal communication) the genital atrium of *D. herodiae* "is very peculiar in that it is muscular and lined with long, thin, chitinous spines." The genital atrium of *D. botauri* is not lined with such spines, as disclosed by the examination of serial sections under oil immersion.

Three other species have been assigned to the genus *Dendrouterina*, but, for reasons pointed out below, their inclusion in this genus is not acceptable.

The diagnosis of the genus *Dendrouterina* was given by Fuhrmann (1912) as follows: "Skolex unbekannt. Die Geschlechtsgänge gehen zwischen den Wassergefäßen durch zur Genitalkloake, die Genitalöffnungen sind einseitig; die zahlreichen Hoden hinter den weiblichen Geschlechtsdrüsen; Uterus hufeisenförmig mit besonders zahlreichen seitlichen Verzweigungen, welche auf der poralen Seite über, auf der antiporalen Seite unter dem weiten Längsgefäß durch ins Rindenparenchym dringen. Das Wassergefäßsystem zeigt auf der antiporalen Seite das enge, sonst dorsale Längsgefäß ventral von weiten Exkretionsstammn."

It is evident from this that a highly-branched uterus and a dorsally-placed aporal ventral excretory canal are requisite characters of the genus.

According to Dr. J. G. Baer (personal communication), who has just examined Fuhrmann's original material, the genital ducts are *dorsal* to the longitudinal excretory canals in *D. herodiae*, and do not pass between them, as was originally stated.

Dendrouterina fovea Meggitt, 1933, was the second species to be assigned to the genus. Unfortunately, Meggitt's description is inadequate, so that many

details are not available. It was stated, however, that the uterus is "a branched sac, not extending laterally to the excretory vessels." The gravid uterus was not figured, and no mention was made of the typical arrangement of the ventral excretory canals; a feature which, if present, could hardly have been overlooked. *Dendrouterina fovea* was also parasitic in a passeriform bird, while both *D. herodiae* and *D. botaui* are parasites of ardeiforms.

Dendrouterina nycticoracis Olsen, 1937, and *D. lintoni* Olsen, 1937, were described from ardeiform birds. Through the kindness of Dr. E. W. Price, the writer had the opportunity of examining Olsen's original material. The great size difference is at once apparent; both *D. nycticoracis* and *D. lintoni* being relatively very small. The genital ducts in Olsen's species pass between the excretory canals, instead of dorsal to them, as is the case in the genus *Dendrouterina*. Serial sections of *D. nycticoracis* and *D. lintoni* were unfortunately not available to the writer, but there is no indication that the ventral excretory canals have the arrangement typical for the genus. According to Olsen (1937b), "in *Dendrouterina* the ventral duct on the poral side is large and the dorsal one minute, whereas the opposite condition obtains on the aporal side." Examination of whole mounts and serial sections of *D. botaui* reveals that Fuhrmann's original conclusion is correct in regard to the arrangement of these canals; he stated that "Das Wassergefäßssystem zeigt deutlich ein Paar sehr weiter Längsgefäße, welche ein ebenfalls weites, am Hinterrand der Glieder liegendes Quergefäß aufweisen." There can be no error in assuming this arrangement, since, in frontal serial sections of *D. botaui*, the large ventral canals were obviously connected by transverse canals, and the dorsal canals showed only the usual arrangement.

The gravid uteri of *D. lintoni* and *D. nycticoracis* do not resemble in the least that of *D. botaui*, nor, as far as can be determined from Fuhrmann's figure, that of *D. herodiae*. The gravid uteri of the former two species are typical, sac-like, somewhat lobed dilepidid uteri, without the central opening, and without the characteristic branchings. The gravid uterus in *D. botaui* is more comparable in appearance with that found in the genera *Taenia* and *Cladotaenia*. In the opinion of the writer, *D. lintoni* and *D. nycticoracis* belong in the genus *Dilepis* Weinland, 1858.

With only *D. herodiae* and *D. botaui* remaining in the genus, the type of scolex remains unknown. It is hoped that this will prove to be of some value in determining the relationships of *Dendrouterina*. Fuhrmann (1912) stated "Über die Stellung dieses Genus im System ist es schwer sich auszusprechen, da der Skolex leider unbekannt ist. Nach der Muskulatur zu urteilen, gehört das Genus vielleicht den Anoplocephaliden an, ich stelle aber dasselbe vorläufig in die Familie der Dilepiniden." The genus has been retained in the family Dilepididae, but it will probably be placed elsewhere after additional material has been studied.

SUMMARY

1. A new species of cestode, *Dendrouterina botaui*, is described from North American bitterns.

2. Three other species previously assigned to the genus *Dendrouterina* are discussed, and it is concluded that they belong elsewhere. The description of *D. fovea* Meggitt, 1933, is not adequate to allow its assignment to the proper genus, but *D. lintoni* Olsen, 1937, and *D. nycticoracis* Olsen, 1937, are considered as belonging in the genus *Dilepis* Weinland, 1858.
3. Two species are now known for the genus *Dendrouterina*; they are *D. herodiae* Fuhrmann, 1912, and *D. botauri* n. sp. The scolices are unknown for both.

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