Monobothrioides woodlandi sp. nov. (Cestoidea: Caryophyllidea) from Clarias mellandi Boulenger (Cypriniformes: Claridae) in Zambia, Africa

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According to Wardle and McLeod (1952) two species of Monobothrioides Fuhrmann and Baer, 1925 (Caryophyllidea: Lytocestidae) have been described from African silurid fish: M. cunningtoni Fuhrmann and Baer, 1925 from Auchenoglanis occidentalis Cuv. and Val. in Mtondwe Bay, Lake Tanganyika (Fuhrmann and Baer, 1925), and M. chalmersi (Woodland, 1924) Hunter, 1930 from Clarias anguillaris (Linn.) in the Nile River at Khartoum (Woodland, 1924). This paper is the report of a third species collected in 1961 by the junior author from the intestine of two Clarias mellandi Boulenger taken from Lake Chali in the Bangweulu Swamp complex in north Zambia (Northern Rhodesia), Africa. Lake Chali is formed by the Chambézi River and is approximately 8 km from the junction of the Chambézi and Luapula rivers. It lies approximately 50 km SE of Samfya, a small village on the east shore of Lake Bangweulu. Lake Bangweulu, the source of the Congo River, is located at latitude 11°S and longitude 30°E and is drained by the Luapula River.

The description is based on whole mounts of 3 gravid, 3 mature, and 38 immature worms and a posterior half of a gravid worm. Mid-sagittal and cross sections were made from different parts of a mature worm. Comparative material included the following from Woodland's collection in the British Museum: M. cunningtoni, slide numbers 1927.8.6.1 to 11 (whole mounts) and 1927.8.6.12 to 25 (sections), all of the slides were marked "Type"; and M. chalmersi, slide numbers 1961.3.14.42 to 46 (two with sections) and Lytocestus filiformis (Woodland, 1924) Hunter, 1930 slide numbers 1923.12.4.2, 1961.3.14.1 to 9 (32 whole mounts), and 1961.3.14.10 to 41 (sections), all of the slides of both species were marked "cotype." This material was examined by the senior author during tenure of an NIH postdoctoral research grant No. EF 11,462.

Measurements are in millimeters unless otherwise stated.

**Description**

Monobothrioides woodlandi sp. nov.

(Figs. 1–6)

**Diagnosis:** \(N = \) the sample observed or measured. With characters of the genus. Immature worms 1.6 to 4.3 long \(N = 14\). Gravid worms 4.5 to 4.6 long by 1.1 to 1.3 wide \(N = 3\). Scolex well defined, compressed, with longitudinal ridges. Outer longitudinal muscles poorly developed and consisting of small fascicles. Inner longitudinal muscles a prominent dorsal and ventral band of closely arranged fascicles and of two separate fascicles at ends of each band. Testes number from 177 to 203 \(N = 6\); mean 189), 0.056 to 0.096 in diameter \(N = 30, 10\) each from 3 gravid worms; mean 0.075). Testicular field extending from cirrus sac to approximately one-half way to tip of scolex. Cirrus sac pyriform. External seminal vesicle absent. Vitellaria in preovarian region, only, annularly arranged around testes and extending from ovary to base of scolex. Vitellaria 0.013 to 0.053 in diameter \(N = 30, 10\) each from 3 gravid worms; mean 0.032). Ovary distinctly follicular and extending to posterior tip of worm. Osmoregulatory canals diffuse with no definite number in sections from middle of body. Seminal receptacle absent. Ova 0.062 by 0.041, not embryonated when laid, shell smooth \(N = 3, 10\) each from distal part of uterus).

Host: Clarias mellandi Boulenger (Cypriniformes: Claridae).

**Site of infection:** Intestine.

**Holotype:** USNM Helm. Coll. No. 61727.

**Paratypes:** USNM Helm. Coll. No. 61728 (one whole mount); British Museum, Depart-

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Figures 1–6. *Monobothrioides woodlandi* sp. nov. 1, Whole mount. 2, Cross section through testes showing cortical vitellaria. 3, Variations in scolex shape. 4, Midsagittal section through cirrus sac and gonopores. 5, Posterior part of body. 6, Immature stages.

Supplementary material consists of ten slides (USNM Helm. Coll. No. 61729) with sections and 14 immature worms; and of three slides (British Museum, Department of Zoology, Helm. Coll. No. 1967.1.16.2 to 4) with eight immature worms. The remaining 16 worms are in the senior author's collection.

DISCUSSION

Despite differences in states of contraction (Fig. 6) all of the worms exhibited the same general body shape; none had any trace of a cercomer. The compressed scolex bearing longitudinal ridges can assume a variety of shapes but in each case the terminal glandular (?) portion remains as a darkly stained region (Fig. 3). Unlike other species in the genus and most other species in the order Caryophyllidea, the anterior vitellaria progressively become very small, up to one-fifth the size of those in the mid-body region (Fig. 1). The follicular ovary (Fig. 5) is similar to that of Crescentovitus biloculus Murhar, 1963. Anterior to the ovarian commissure the relatively short uterus is clothed with small uterine glands. The female gonopore opens a short distance posterior to that of the male (Fig. 4).

The arrangement of two bands of inner longitudinal muscles with two small fascicles at each end of each band appears to be a unique feature of this species. Two lateral nerve trunks can be seen between the medial two fascicles at the end of each band (Fig. 2). The outer longitudinal muscle development is more like that of M. cunningtoni than M. chalmersius. Neither the presence nor absence of an operculum could be positively established by study of the ova in utero.

Woodland (1937) is alone in including two additional species in the genus Monobothrioides: M. filiformis (Woodland, 1923) Woodland, 1937 from Africa, and M. indicus (Moghe, 1925) Woodland, 1937 from India. Fuhrmann and Baer (1925) removed Caryophyllaeus filiformis Woodland, 1923 to the genus Lytocestus Cohn, 1908 where it subsequently has been recognized by Hunter (1930), Wardle and McLeod (1952), Yamaguti (1959), Gupta (1961), Furtado (1963), and Murhar (1963). According to Moghe's redescriptions (1931) and illustrations furrows were sometimes absent on the scolex while on others they (p. 84), "... continue for some distance on the body"; a terminal introvert is not mentioned. In the absence of comparative material and of a more precise description of the scolex of Lytocestus indicus, it seems unwise to make the generic changes proposed by Woodland (1937).

The small size and distinct shape of M. woodlandi serves to distinguish this species from M. cunningtoni which may be up to 40 mm long and is distinctly filiform in shape. Unlike M. cunningtoni the longitudinal extent of the uterus of M. woodlandi is less than twice the length of the ovary and the vitellaria extend to the ovary. M. woodlandi and M. chalmersius are generally similar to each other except that the latter species is a larger, more robust worm lacking the distinct shape of M. woodlandi. Furthermore, the scolex of M. woodlandi is from one-third to one-fourth the length of the worm while in M. chalmersius it is from one-seventh to one-eighth. The most pronounced difference concerns the development of the outer longitudinal muscles. In M. woodlandi these muscles consist of small, widely spaced fascicles, quite different from the prominent bandlike layer of the inner longitudinal muscles. In M. chalmersius, the inner and outer longitudinal muscles are similar to each other. These differences, plus those of body size, distribution of the organs, and the different hosts serve to distinguish M. woodlandi from the other species. On a morphological basis, M. woodlandi is more closely related to M. chalmersius than to M. cunningtoni. The new species is named in honor of Dr. W. N. F. Woodland, British parasitologist.

Several hundred Clarias mossambicus Peters
examine by the junior author at the same time contained no caryophyllaeids. According to Corbet (1961: 74) C. mossambicus feed, "... mainly on ostracoda and aquatic insects until they reach the size of about 3 cm after which they feed progressively more on fishes." However, Graham (1929) has reported oligochaetes, the intermediate host in known caryophyllaeid life cycles, as a food item. Unfortunately, the food habits of C. mellandi are too poorly known to fully explain the apparent case of host-specificity between this species and C. mossambicus. However, the carnivorous food habits of C. mossambicus strongly suggest that it probably has an ecological rather than a physiological basis.

Acknowledgments

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