Sciadocephalus megalodiscus Diesing, 1850 (Cestoda: Corallobothriinae), a Parasite of Cichla monoculus Spix, 1831 (Cichlidae), in the Paraná River, State of Paraná, Brazil

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ABSTRACT: Sciadocephalus megalodiscus Diesing, gen. et sp. inquirenda, is redescribed from the tucunaré, Cichla monoculus Spix, collected in the Paraná River, Brazil. The position of the reproductive system of the parasite is clarified, thus revalidating the genus and species. Sciadocephalus megalodiscus is recorded from the Paraná River for the first time.

KEY WORDS: Cestoda, Proteocephalidae, Sciadocephalus megalodiscus, Cichla monoculus, Cichlidae, Teleostei, Paraná River, Brazil.

The basis of the taxonomy of the South American cestodes of the Order Proteocephalidea Mola, 1928, parasitizing freshwater fishes was established by W. N. F. Woodland, who, in a series of studies published in the 1930’s, described numerous proteocephalid parasites of fishes of the Amazon basin. Some older species were described by Diesing (1850, 1855). Interest in these helminths has increased recently, and new cestodes are frequently being added to the South American species list (Rego et al., 1999).

Some of the older species were placed as species inquirenda, as is the case with Sciadocephalus megalodiscus Diesing, 1850, which Diesing (1850) described from the tucunaré, Cichla monoculus Spix, 1831, collected in the state of Mato Grosso, Brazil. This parasite was later found by Woodland (1933) in Amazonia from the same fish species. Because there were doubts as to the subfamily to which this species belonged, because the position of the reproductive organs (a fundamental character in classification of the taxon) was unclear, Wardle and McLeod (1952) and Rego (1994) preferred to treat it as genus and species inquirenda.

Sciadocephalus megalodiscus had not previously been found in the Paraná River. It is important to note that C. monoculus is not native to the Paraná River, where it was introduced some years ago. Recently, one of us (P.M.M.) had the opportunity to collect several specimens of this parasite, and with the present description, the genus and species are revalidated.

MATERIALS AND METHODS
A total of 136 C. monoculus were caught in the Paraná River from July 1996 through October 1997. After removal from the intestine, the cestodes were fixed in 4% hot formalin. Cestodes were stained with alcoholic carmine or Delafield’s hematoxylin, dehydrated in an alcohol series, cleared in Eugenol® or in beech creosote, and mounted in Canada balsam. Cestodes for histological sections were embedded in paraffin, cut in 8 µm cross-sections, and stained with hematoxylin and eosin. Illustrations were made with the aid of a drawing tube. Measurements are in millimeters (mm). Photomicrographs were made with a scanning electron microscope (SEM). The terms “prevalence” and “mean intensity of infection” are used according to Bush et al. (1997). Representative specimens were deposited in the Helminthological Collection of the Fundação Instituto Oswaldo Cruz (FIOCRUZ), Rio de Janeiro, state of Rio de Janeiro, Brazil, under accession numbers 33951, 33952, and 33953a–c.

RESULTS
Proteocephalidae La Rue, 1911
Corallobothriinae Freze, 1965
Sciadocephalus megalodiscus Diesing, 1850 (Figs. 1–7)

DESCRIPTION

GENERAL (based on 11 specimens): Strobila 6.1–9.3 (7.9) long × 1.1–1.7 (1.3) wide. Strobila comprised of 17–22 proglottids, including 6–8 (7) immature proglottids, 4–6 (5) mature proglottids, 8–12 (10) gravid proglottids. All proglottids several times wider than long. Scolex

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Figure 1, 2. SEM photomicrographs of Sciadocephalus megalodiscus Diesing, 1850. 1. Small specimen (entire). 2. Scolex and metascole. Apical view.

Figure 3. SEM photomicrograph of the scolex, detail of a sucker and apical sucker of Sciadocephalus megalodiscus Diesing, 1850.

wider than strobila, with umbrella-shaped metascole with borders turned upwards. Scolex enveloped by these borders, comprised of 4 muscular suckers and 1 apical sucker (Figs. 1–3). Scolex and metascole 1.4–2.2 (1.9) long \( \times \) 2.8–2.9 (2.8) wide; suckers 0.385–0.515 (0.454) in diameter and apical sucker 0.115 in diameter. Neck inconspicuous. Immature proglottids wider than long, 0.1 \( \times \) 1.8 to 0.2 \( \times \) 1.4 (0.2 \( \times \) 1.6). Gravid proglottids wider than long, 0.3 \( \times \) 1.8 to 0.9 \( \times \) 1.4 (0.6 \( \times \) 1.7). Last few proglottids more or less rectangular. Genital opening in anterior \( \frac{1}{2} \) of proglottid, alternating irregularly. Vagina opening anterior or posterior to cirrus pouch. Vaginal sphincter inconspicuous. Cirrus pouch long and narrow, 0.3 \( \times \) 0.1 to 0.4 \( \times \) 0.1 (0.4 \( \times \) 0.1). Cirrus pouch about 0.2 times width of proglottid. Testes about 26, medullar, 0.07 in diameter, arranged in 2 distinct fields, separated by ovary. Ovary medullar, compact, indistinctly bilobate, central, 0.415–0.465 (0.442) in width. Vitellaria medullar, diffuse, not forming follicles, occupying lateral body region. Uterus medullar, rapidly resolving into capsules containing varying numbers of eggs. In last segments, some capsules not containing eggs and modified in form (Figs. 4, 7). Some capsules passing from medulla to cortex, opening through tegument. Eggs not containing developed embryos. Hexacanth hooks not observed. Musculature with numerous isolated longitudinal fibers, distributed throughout entire proglottid. Demarcation between medulla and cortex indicated by delicate transverse fibers situated next to longitudinal fibers (Fig. 6). Tegument of strobila with 2–4 longitudinal sulci (Fig. 5).

Taxonomic summary

HOST: Cichla monoculus Spix, 1831 (Cichlidae), “tucunaré.”

LOCALITY: Paraná River, region of Porto Rico, State of Paraná, Brazil.

SITE OF INFECTION: Intestine.
Figures 4–7. *Sciadocephalus megalodiscus* Diesing, 1850. Scales in millimeters (mm). 4. Entire specimen; note that most proglottids are gravid. 5. Small specimen; note small sulci present on tegument (tc). 6. Cross-section of gravid proglottid, showing vitellaria (Vit), excretory canal (ex), testes (t), transverse fibers (tf), uterus (u), ovary (ov), longitudinal fibers (lf). 7. Gravid proglottid; note some ovigerous capsules with eggs and others without eggs and modified; empty ovigerous capsule (eoc), cirrus pouch (cp).
PREVALENCE: 13.2%.
MEAN INTENSITY OF INFECTION: 8.6.

Discussion

This is the third report of *S. megalodiscus*. The species was initially described by Diesing (1850) from *C. monocus* in the state of Mato Grosso, Brazil. Woodland (1933) redescribed it from the same fish species in Brazilian Amazonia. The latter author’s description of the arrangement of the reproductive system was incomplete in that he did not note whether this system is medullar or cortical. Woodland (1933, p. 193) stated that “It is important to note that a definite band of longitudinal muscle fibres is entirely absent, though individual fibres may be scattered in the parenchyma. There is no question as to organs being medullary or cortical in position.” The classification system for proteocephalids (sensu Freze, 1965) defined 2 families, Proteocephalidae and Monticelliidae, according to whether the gonads are located in the medullar or cortical parenchyma. For this reason, some authors (Wardle and McLeod, 1952; Rego, 1994) considered the genus and species as inquired.

*Sciadocephalus megalodiscus* have no groups of longitudinal fibres separating the cortex from the medulla (Woodland, 1933). However, as described in the present work (Fig. 6), the isolated fibres, together with the transverse fibres, sufficiently delimit the medulla from the cortex. We can therefore determine that the gonads and the vitelline glands are entirely medullar. Vitellaria do not form true follicles as in the majority of the proteocephalids, but appear as diffuse bodies, arranged laterally in the proglottids.

The metascolex is the most interesting characteristic of this species. Its umbrella form is different from typical “collar-type” metascolices found in genera of proteocephalids such as Amphoteromorphus Woodland, 1935; Gozeella Fuhrmann, 1916; and Spatulifer Woodland, 1934. Rego (1999) defined the metascolex as “any development of folds and wrinkles in the posterior part of the scolex or on the surface of the scolex proper, encircling the suckers or not.” There are several types of metascolex, as many as the number of described species with metascolices. The scolex of *Sciadocephalus* has some resemblances to that of Corallotaenia Freze, 1965. Brooks and Deardorff (1980) reported an unidentified Corallotaenia sp. from the flatnose catfish, Ageneiosus caucanus Steindachner, 1880, in Colombia. Unfortunately, the authors did not provide a formal description of the worms. *Sciadocephalus* differs from Corallo-Taenia by the umbrella-shaped metascolex, the disposition of the ovary, the nonfolliculate vitellaria, and the uterus resolving into ovigerous capsules. It is important to emphasize that the other South American genera that possess a metascolex have the reproductive systems arranged variously, but partly or entirely located in the cortical parenchyma. *Sciadocephalus megalodiscus* is an exception; the gonads and vitellaria are entirely medullar.

Brooks and Rasmussen (1984) stated the importance of the metascolex to eliminate cases of parallel evolution in a cladogram. However, subsequent authors did not attribute much importance to these structures, probably because of difficulties in characterizing the metascolex types. Rego et al. (1999) produced a phylogenetic analysis of the subfamilies of Proteocephalidea, but in regard to the character metascolex, they stated: “only two states (presence versus absence) were considered until such time as the various forms of metascolices are clearly defined and distinguished.” The preliminary results of a phylogenetic analysis of South American genera (Rego et al., unpubl.) indicate a closer phylogenetic relationship between Sciadocephalus and Megathylocus Woodland, 1935. It therefore becomes necessary to present a new generic diagnosis in order to revalidate the genus.

*Sciadocephalus* Diesing, 1850

Cortex/medulla separation best characterized by presence of transverse fibers.

Acknowledgments

We are grateful to Dr. Alain de Chambrier, Geneva, Switzerland, for preparing the SEM micrographs, and to Dr. Ricardo Massato Takemoto, State University of Maringá, for assistance in preparing drawings and sectioning proglottid material. The editors, Drs. Janet W. Reid and Willis A. Reid, Jr., assisted in translating the text into English.

Literature Cited


Obituary Notice

FRANCIS G. TROMBA
1920–1999

Elected to Membership in 1951;
Recording Secretary, 1957;
Vice President, 1962 President, 1963;
Editor, 1967–1970; Life Member, 1983;
Anniversary Award, 1991