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Monte A. Mayes
University of Pennsylvania

Daniel R. Brooks
University of Toronto, dnlbrooks@gmail.com

Thomas B. Thorson
University of Nebraska-Lincoln

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TWO NEW SPECIES OF ACANTHOBOTHRIMUM VAN BENEDEN 1849 (CESTOIDEA: TETRAPHYLLIDEA) FROM FRESHWATER STINGRAYS IN SOUTH AMERICA*

Monte A. Mayes,† Daniel R. Brooks,‡ and Thomas B. Thorson§

ABSTRACT: Two new species of *Acanthobothrium* are reported from freshwater stingrays in northern South America. *Acanthobothrium quinonesi* sp. n. is described from *Potamotrygon magdalenae* Dumeril collected from the Magdalena River in northern Colombia and *A. amazonensis* sp. n. from *P. circularis* Garman collected in the Itacuai River of northwestern Brazil. *Acanthobothrium quinonesi* differs from *A. amazonensis* by having a smaller and anteriorly-curved cirrus sac, 43-60 rather than 50-72 testes, and bothridial hooks 100-142 μ m long rather than 145-184 μ m long. Characters used in the taxonomy of *Acanthobothrium* species are listed to show that the new species resemble each other and *A. terezae*, also from a South American freshwater stingray, more than they do any other members of the genus.

Species of *Acanthobothrium* van Beneden 1849 parasitize a variety of marine and estuarine elasmobranchs (Goldstein, 1967; Williams, 1969). Collections from the freshwater stingrays *Potamotrygon magdalenae* Dumeril in the Magdalena River of Colombia and from *P. circularis* Garman in the Itacuai River of Brazil, contained specimens of two new species of *Acanthobothrium* which resemble each other more than they do any other known species. Worms were removed from host spiral valves, examined alive and fixed with warm AFA, or fixed in situ with 10% formalin; all were stored in 70% ethanol. Study included examination of whole mounts stained with Mayer's hematoxylin and mounted in Canada balsam as well as study of serial cross sections cut at 8 μ m and stained with hematoxylin-eosin. Measurements are in μ m unless otherwise stated with number of measurements (N) and mean values (\bar{x}) indicated for certain characteristics. Figures were drawn with the aid of a drawing tube.

Acanthobothrium quinonesi sp. n.

(Figs. 1-3)

Description (based on 15 specimens): Strobila acraspedote, apolytic, up to 25 mm long; composed

of 55-75 segments (N = 15). Scolex 508-620 (\bar{x} = 550, N = 15) wide, composed of 4 sessile, triseptate bothridia; each bothridium with apical sucker and pad, armed with pair of bifid hooks. Bothridia 367-479 (\bar{x} = 425, N = 25) long by 282-310 (\bar{x} = 300) wide; anterior loculus 158-226 (\bar{x} = 190) long, middle loculus 56-68 (\bar{x} = 59) long, posterior loculus 68-85 (\bar{x} = 75) long. Ratio of loculi lengths 1 : 0.3 : 0.4. Apical suckers 53-66 (\bar{x} = 60, N = 25) in diameter, pads 118-156 (\bar{x} = 135) wide. Hook formula (modified from that of Euzet, 1956) for 32 hooks:

$$\frac{41 \pm 9 (34-53) \quad 87 \pm 21 (66-108) \quad 60 \pm (53-74)}{118 \pm 21 (100-142)}$$

Cephalic peduncle unspined, 134-237 long, 400-500 wide at insertion to scolex. Immature proglottids wider than long; mature proglottids 885-1,575 long by 330-390 wide. Testes in anterior $\frac{3}{4}$ of proglottid, 43-60 (\bar{x} = 52, N = 25) in number, 21-40 in diameter; 14-23 preporally, 3-7 postporally, 21-35 antiporally. Cirrus sac near mid-proglottid, 137-237 long by 66-92 wide, curved anteriorly, containing spined eversible cirrus. Genital atrium indistinct. Genital pore 52-59% (\bar{x} = 55%, N = 25) of total proglottid length from anterior end, irregularly alternating. Vagina anterior to cirrus sac; vaginal sphincter present. Ovary near posterior end of proglottid, H-shaped in frontal view, X-shaped in cross section, 175-330 long by 113-141 wide at isthmus; ovarian lobes equal in length, not reaching level of posterior margin of cirrus sac. Vitelline follicles extending from level of ovarian isthmus to near anterior end of proglottid; follicles 5-8 in diameter.

Host: *Potomotrygon magdalenae* Dumeril.

Locality: Magdalena River, Cienaga Jobo, vicinity of San Cristóbal, Bolivar, Colombia.

Site of infection: Middle third of spiral valve.

Holotype: USNM Helm. Coll. No. 74804.

Paratypes: USNM Helm. Coll. No. 74805; Univ. Nebraska State Museum, Manter Lab. No. 74806.

Etymology: The species is named in honor of Dr. Guillermo Quiñones Gonzalez, director of the INDERENA laboratory at San Cristóbal.

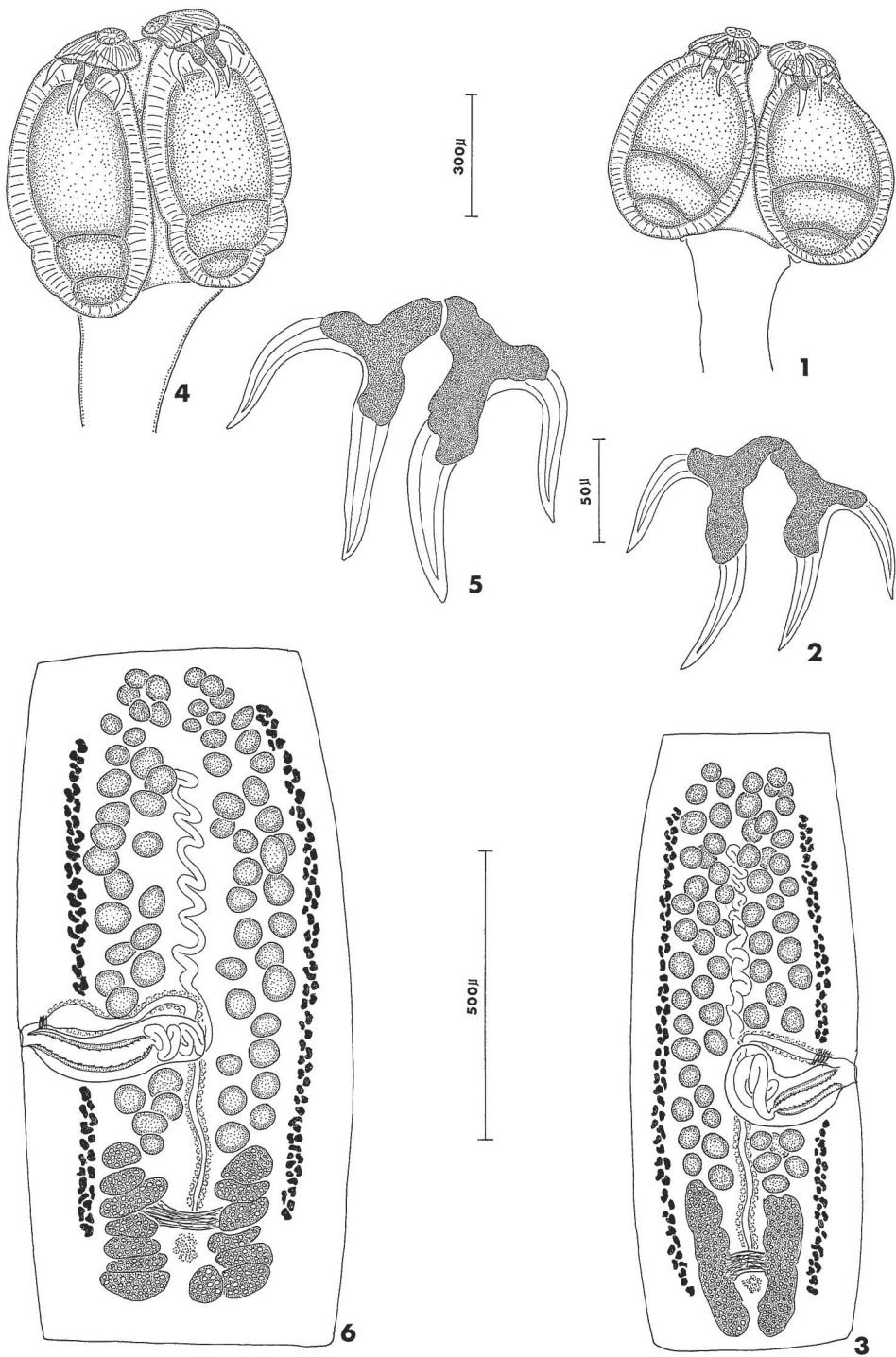
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† Department of Pathobiology, School of Veterinary Medicine, University of Pennsylvania, Philadelphia, Pennsylvania 19104.

‡ Department of Biology, University of Mississippi, University, Mississippi 38677.

§ School of Life Sciences, University of Nebraska-Lincoln, Lincoln, Nebraska 68588.



FIGURES 1-3. *Acanthobothrium quinonesi*. 1. Scolex. 2. Bothridial hooks. 3. Mature proglottid.

FIGURES 4-6. *Acanthobothrium amazonensis*. 4. Scolex. 5. Bothridial hooks. 6. Mature proglottid.

Remarks

Acanthobothrium quinonesi and the second new species described in this report most closely resemble *A. terezae* Rego and Dias 1977, the only other species known to infect freshwater stingrays. *Acanthobothrium quinonesi* differs from *A. terezae* by having a smaller scolex (maximum width 620 μm rather than 3.0 mm) and bothridia (maximum length of 479 μm rather than 1.59 mm), by possessing 55–75 rather than 200–260 proglottids per strobila, and by exhibiting 43–60 rather than 120–140 testes per proglottid. The bothridial hooks of *A. terezae*, *A. quinonesi*, and the second new species described herein all exhibit the same dimorphism (see Figs. 2 and 5 of this paper as well as Figs. 6 and 7 of Rego and Dias, 1977) wherein one of the inner prongs of each pair of hooks is longer and more robust than the other; hooks of *A. terezae* may reach 326 μm in total length whereas those of *A. quinonesi* reach only 142 μm in total length, however.

***Acanthobothrium amazonensis* sp. n.**

(Figs. 4–6)

Description (based on 10 specimens): Strobila acraspedote, apolytic, up to 35 mm long; composed of 75–100 proglottids. Scolex 612–790 (\bar{x} = 700, N = 10) wide, composed of 4 sessile, trisepate bothridia; each bothridium with apical sucker and pad, armed with pair of bifid hooks. Bothridia 508–620 (\bar{x} = 560, N = 25) long by 300–423 (\bar{x} = 360) wide; anterior loculus 282–378 (\bar{x} = 325) long, middle loculus 56–113 (\bar{x} = 85) long, posterior loculus 45–96 (\bar{x} = 70) long. Ratio of loculi length 1 : 0.25 : 0.20. Apical suckers 85–107 (\bar{x} = 100) in diameter, pads 158–197 (\bar{x} = 180) wide. Hook formula (modified from that of Euzet, 1956) for 40 hooks:

$$\frac{53 \pm 9 (47-62) \quad 105 \pm 17 (74-136) \quad 112 \pm 15 (87-137)}{168 \pm 12 (145-184)}$$

Cephalic peduncle unspined, 423–677 long, 550–725 wide at insertion to scolex. Immature proglottids wider than long; mature ones 738–2,100 long by 390–975 wide. Testes in anterior $\frac{3}{4}$ of proglottid, 50–72 (\bar{x} = 62, N = 25) in number, 45–113 long by 36–113 wide; 17–30 preporally, 3–7 postporally, 25–37 antiporally. Cirrus sac near mid-proglottid, 243–293 long by 96–152 wide, not curved anteriorly, containing spined eversible cirrus. Genital atrium small. Genital pore 41–56% (\bar{x} = 49%, N = 25) of proglottid length from anterior end, alternating irregularly. Vagina anterior to

cirrus sac; vaginal sphincter present. Ovary near posterior end of proglottid, H-shaped in frontal view, X-shaped in cross section, 141–564 long by 181–451 wide at isthmus; ovarian lobes follicular, equal in length, not reaching level of posterior margin of cirrus sac. Vitelline follicles extending from level of ovarian isthmus to near anterior end of proglottid; follicles 11–45 long by 6–45 wide.

Host: *Potamotrygon circularis* Garman.

Locality: Itacuai River, 5 km south Atalaia do Norte, Brazil.

Site of infection: Spiral valve.

Holotype: USNM Helm. Coll. No. 74806.

Paratypes: USNM Helm. Coll. No. 74807; Manter Lab. No. 20562.

Etymology: The species is named for the Amazon Region where its host resides.

Remarks

Acanthobothrium amazonensis most closely resembles *A. quinonesi* but differs by possessing highly lobate ovarian lobes, more testes (\bar{x} = 62 rather than 52), smaller bothridial hooks (maximum total length = 184 rather than 142 μm) and by having a cirrus sac which is not curved anteriorly.

The taxonomy of species of *Acanthobothrium* has been based primarily on comparison of 17 characters: shape of bothridial hooks (1); size of bothridial hooks (2); number of testes (3); distribution of testes (4); location of genital pore (5); number of accessory suckers (6); shape of ovary (7); relative length of ovarian lobes (8); number of proglottids per strobila (9); presence or absence of prominent genital atrium (10); relative neck width (11); relative bothridial width (12); size of cirrus sac (13); shape of cirrus sac (14); presence or absence of strobilar spination (15); size of scolex and strobila (16); and relative length of cephalic peduncle (17). *Acanthobothrium quinonesi* and *A. amazonensis* resemble each other by sharing identical characters 1, 4, 6, 8, 9, 10, 11, 12, 15, and 17. Among the seven other characters, there is overlap in variation between the two species in genital pore location, testes number, and scolex size, and near overlap in bothridial hook size and cirrus sac size. The follicular nature of the ovarian lobes of *A. amazonensis* and the anteriorly curved cirrus sac of *A. quinonesi* constitute characteristic differences. *Acanthobothrium terezae*, also from a neotropical freshwater stingray, agrees

with *A. quinonesi* and *A. amazonensis* in features of characters 1, 6, 8, 10, 11, 12, 15, and 17. We therefore consider the three species from freshwater stingrays in South America distinct but more similar to each other than to any other known species.

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