



# Distribution extension of *Acanthobothrium cartagenensis* Brooks & Mayes, 1980 (Tetracophyllidae: Onchobothriidae) in *Urobatis jamaicensis* (Cuvier, 1816) (Myliobatiformes: Urotrygonidae) from Quintana Roo, México

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**Abstract:** The collection of eight specimens of *Acanthobothrium cartagenensis* on the coast of Quintana Roo, México extends the geographic distribution of the species from the original locality (Cartagena, Colombia) to at least the northeastern limit of the Mexican coast of the Caribbean Sea. The species is a parasite of *Urobatis jamaicensis*, a common stingray of the tropical western Atlantic. This species has not been reported since the original description in 1980.

**Key words:** geographic distribution, range extension, Caribbean, Yellow Stingray, Cestoda, stingray

*Urobatis jamaicensis* (Cuvier, 1816) (Yellow Stingray; *Raja* redonda de estero) (Urotrygonidae), host of *Acanthobothrium cartagenensis* Brooks & Mayes, 1980 inhabits sandy, muddy, or seagrass bottoms in shallow in-shore waters, commonly near coral reefs. Adults grow to a maximum of 36 cm across the disk-like body and a short tail with a well-developed caudal fin. Its color is variable but distinctive, dorsally either light-on-dark or dark-on-light reticulations forming spots and blotches, and can rapidly change the tonality of this coloration to improve its camouflage (Froese and Pauly 2011). Helminths are an important component of our biodiversity, even though their hosts are the principle focus of most conservation efforts, as discussed by Zaragosa-Tapia et al. (2013). This report is a part of the process of documenting the rediscovery of little-known species of helminths before they become extinct (Brooks et al. 2002).

Eight specimens of *Urobatis jamaicensis* were collected by local fishermen and examined for intestinal helminths as part of a study of the parasites of stingrays of the Yucatán Peninsula, México (Pulido-Flores and Monks 2005); one from Ría Lagartos, Yucatán (21°36' N, 088°14'

W) (collected February 1999), four from Isla Contoy, Quintana Roo (20°48' N, 086°47' W) (February 1999), one from Isla Cozumel, El Paso de los Cedros, Quintana Roo (20°31' N, 086°57' W) (February 1999), and two from Xcalak, Quintana Roo (18°16'16" N, 087°50'07" W) (October 1998) (see Pulido-Flores and Monks 2005 for a detailed map). Individual stingrays were maintained on ice until necropsied, when the intestinal tract was removed and examined according to Monks et al. (1996). All ecto- and endohelminths were fixed in AFA (Alcohol-Formalin-Acetic Acid) and then transferred to 70% ethyl alcohol. The Monogenea (ectohelminths) were reported by Pulido-Flores and Monks (2005), but the endohelminths remained unprocessed until this present study. One of the eight stingrays (a female) from Xcalak, was infected with specimens later identified as *Acanthobothrium cartagenensis*. Worms were stained using Mayer's carmalum, cleared in Methyl Salicylate, and mounted in Canada balsam for examination as whole mounts. Voucher specimens were deposited in the Colección Nacional de Helmintos, Instituto de Biología, Universidad Nacional Autónoma de México, México (CNHE-9706), the Harold W. Manter Laboratory, University of Nebraska-Lincoln, U.S.A (HWML-101020), and the Colección de Helmintos, Universidad Autónoma del Estado de Hidalgo, México (CHE-P00061).

Brooks and Mayes (1980) described *A. cartagenensis* from a single specimen taken from a stingray (*U. jamaicensis*) collected near Cartagena, Colombia. This specimen was characterized as being relatively small, with 13 proglottids, a short spinose peduncle, a V-shaped ovary, 21–26 testes, and the genital pore pre-equatorial, as well as having the general characteristics of the genus *Acanthobothrium*. The specimens that we collected (Figure 1) conform to this description in these and the other features included in their description.



**Figure 1.** *Acanthobothrium cartagenensis* Brooks & Mayes, 1980 from *Urobatis jamaicensis* (Cuvier, 1816), in Quintana Roo, México. **A.** Scolex; **B.** Terminal proglottid. AS = apical suckers; GP = genital pore; H = Hooks; \* marks isthmus of ovary; arrows mark septa that divide anterior, middle, and posterior loculi. Bar = 200 µm.

Until the present account, there has not been a second report of the species.

Based on four characteristics (length, number of segments, number of testes, and symmetry of the ovarian lobes), Ghoshroy and Caira (2001) proposed 10 categories as an aid in the identification of species of *Acanthobothrium*. A category 9 species is longer than 15 mm, has less than 50 proglottids, less than 80 testes, and the left and right lobes of the ovary are symmetrical; characteristics of *A. cartagenensis*. Of the species of *Acanthobothrium* reported from the Caribbean, only *A. cartagenensis*, *A. colombianum* Brooks & Mayes, 1980 (in *U. jamaicensis*), and *A. electricolum* Brooks & Mayes, 1978 [in *Narcine brasiliensis* (Olfers, 1831)] (see Brooks and Mayes, 1978 and Brooks and Mayes, 1980 for original descriptions of each species), are category 9 species (Ghoshroy and Caira 2001). Thus, for purposes of identification, comparison with the above-mentioned species is most useful.

For identification, even in unprocessed material, *A. cartagenensis* and *A. colombianum* have more delicate bothridia (Figure 1A), which are unattached at the

posterior ends and the hooks are longer and thinner; the bothridia of *A. electricolum* are strongly developed, sessile (attached with a velum to the scolex at the posterior ends), and the hooks are short, stout, and robust (Brooks and Mayes 1978). *Acanthobothrium cartagenensis* and *A. colombianum* have hooks that are more similar in form (Figure 1A), but the scolex of *A. cartagenensis* is smaller than that of *A. colombianum*, and the bothridia of the former species are more tear-drop shaped (wider near posterior end) and those of the latter are more oval (wider in the middle). In processed material, each species can be distinguished easily using the information in the original descriptions (Brooks and Mayes 1980); i.e., such characters as the size of the apical suckers, shape and size of hooks, ratio of length of bothridial loculi, the number of testes and the shape of the ovary (Figure 1A and B).

*Urobatis jamaicensis* is distributed from throughout the Grand Caribbean from Florida, U.S.A. to the Bahamas, Yucatan and to northern South America, but it has been reported from as far north as North Carolina, U.S.A. (Froese and Pauly 2011), although migration patterns have not been investigated. Its food consists of crustaceans, other benthic organisms, and small bony fishes (McEachran and Fechhelm 1998); it is likely that one of these groups serve as intermediate host for these cestodes. The Caribbean Current directly connects the waters off Colombia with those of the Caribbean coast of México (Carton and Chao 1999), so even if the stingrays do not migrate any great distance, the currents could carry infected intermediate hosts from Colombia to Mexico, but only in that direction. The report of this cestode in México is particularly important because it is the first species of *Acanthobothrium* reported from the Caribbean coast and the second species of cestode reported in stingrays from the eastern coast of México (Pulido-Flores and Monks 2014).

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## LITERATURE CITED

- Brooks, D.R. and M.A. Mayes. 1978. *Acanthobothrium electricolum* sp. n. and *A. lintoni* Goldstein, Henson, and Schlicht, 1969 (Cestoda: Tetracanthidae) from *Narcine brasiliensis* (Olfers) (Chondrichthyes: Torpedinidae) in Colombia. *Journal of Parasitology* 64(4): 617–619. doi: [10.2307/3279945](https://doi.org/10.2307/3279945)
- Brooks, D.R. and M.A. Mayes. 1980. Cestodes in four species of euryhaline stingrays from Colombia. *Proceedings of the Helminthological Society of Washington* 47(1): 22–29.
- Brooks, T.M., R.A. Mittermeier, C.G. Mittermeier, G.A.B. da Fonseca, A.B. Rylands, W.R. Konstant, P. Flick, J. Pilgrim, S. Oldfield, G. Magin and C. Hilton-Taylor. 2002. Habitat loss and extinction in the hotspots of biodiversity. *Conservation Biology* 16(4): 909–923. doi: [10.1046/j.1523-1739.2002.00530.x](https://doi.org/10.1046/j.1523-1739.2002.00530.x)
- Carton, J.A. and Y. Chao. 1999. Caribbean Sea eddies inferred from TOPEX/POSEIDON altimetry and a 1/6° Atlantic Ocean model simulation. *Journal of Geophysical Research* 104(C4): 7743–7752. doi: [10.1029/1998JC900081](https://doi.org/10.1029/1998JC900081)
- Froese, R. and D. Pauly, (eds.). 2011. Fishbase. Accessed at <http://www.fishbase.org>, 15 November 2013.
- Ghoshroy, S. and J.N. Caira. 2001. Four new species of *Acanthobothrium* (Cestoda: Tetracanthidae) from the whiptail stingray *Dasyatis brevis* in the Gulf of California, Mexico. *Journal of Parasitology* 87(2): 354–372. doi: [10.1645/0022-3395\(2001\)087\[0354:FNSOAC\]2.0.CO;2](https://doi.org/10.1645/0022-3395(2001)087[0354:FNSOAC]2.0.CO;2)
- McEachran, J.D. and J.D. Fechhelm. 1998. *Fishes of the Gulf of Mexico*. Volume 1: Myxiniiformes to Gasterosteiformes. Austin, Texas: University of Texas Press. 1112 pp.
- Monks, S., D.R. Brooks and G. Pérez-Ponce de León. 1996. A new species of *Acanthobothrium* Van Beneden, 1849 (Eucestoda: Tetracanthidae: Onchobothriidae) in *Dasyatis longus* Garman (Chondrichthyes: Myliobatiformes: Dasyatidae) from Chamela Bay, Jalisco, Mexico. *Journal of Parasitology* 82(3): 484–488. doi: [10.2307/3284090](https://doi.org/10.2307/3284090)
- Pulido-Flores, G. and S. Monks. 2005. Monogenean parasites of some elasmobranchs (Chondrichthyes) from the Yucatán Peninsula, México. *Comparative Parasitology* 72(1): 69–74. doi: [10.1654/4049](https://doi.org/10.1654/4049)
- Pulido-Flores, G. and S. Monks. 2014. Distribution extension of *Glyphobothrium zwernerii* Williams and Campbell, 1977 (Tetracanthidae: Serendipidae) from the cownose ray *Rhinoptera bonasus* (Mitchill, 1815) (Myliobatiformes: Myliobatidae) from Campeche, México. *Check List* 10(1): 211–212. doi: [10.15560/2.1.211](https://doi.org/10.15560/2.1.211)
- Zaragoza-Tapia, F., S. Monks, G. Pulido-Flores and J. Violante-González. 2013. Distribution extension of *Escherbothrium molinae* Berman and Brooks, 1994 (Cestoda: Tetracanthidae: Triloculariidae) in *Urotrygon* sp. from the Pacific Coast of Mexico. *Check List* 9(5): 1126–1128. <http://www.checklist.org.br/getpdf?NGDo78-13>

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