SURFACE MORPHOLOGY OF SOME AMPHISTOMES (TREMATODA) OF AMAZONIAN FISHES AND THE DESCRIPTION OF A NEW GENUS AND SPECIES

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ABSTRACT — The surface morphology of specimens from ten different genera of amphistomes (Trematoda, Cladorchiidae) from Amazonian fishes is described and illustrated. The importance of body shape as a generic character is considered. Morphological changes as a result of growth are shown and explained in relation to the species *Dadaytrema oxycephala*. Additionally, *Doradamphistoma bacuensis* gen. et sp. n. is described from the catfish, *Megalodoras irwini Eigenmann, 1925*. The new genus and species is elongate and flattened, with external pharyngeal pouches, an esophageal bulb, a spherical cirrus sac, a post-bifurcal genital pore and pre-equatorial testes.

Key-words: fish parasite, trematode, amphistome, Amazonia, Brazil.

A Morfologia Superficial de Alguns Anfistomídeos (Trematoda) de Peixes Amazônicos e a Descrição de um Novo Gênero e Espécie

RESUMO — A morfologia superficial de espécimens representando dez gêneros diferentes de anfistomos (Trematoda, Cladorchiidae) de peixes amazônicos é descrita e ilustrada. A importância da forma do corpo como caracter genêrico é considerada. Modificações morfológicas, como resultado do crescimento, são mostradas e explicadas em relação à espécie *Dadaytrema oxycephala*. Adicionalmente, *Doradamphistoma bacuensis* gen. et sp. n. é descrito de um bagre amazônico, *Megalodoras irwini*. A espécie nova é alongada e achatada, com sacos faringiais externos, um bulbo esofageano, uma bolsa de cirro esférica, um poro genital pós-bifurcal e testículos pré-equatoriais.

Palavras-chaves: parasita de peixes, trematódeo, anfistomídeo, Amazônia, Brasil.

INTRODUCTION

Body shape in trematodes has frequently been ignored. In fact, some specialists have recommended artificially flattening specimens so that internal organs may be more easily seen. Sey (1991), in his extensive monograph on amphistomes, has pointed out that body shape can be used to characterize genera and even families if the specimens have been killed in a relaxed position. In a series of studies on amphistomes of Amazonian fishes (Thatcher, 1979; 1992a; 1992b; Thatcher & Jégu, 1996; Thatcher *et al.*, 1996) it has been shown that internal anatomy is often less useful than external shape for distinguishing genera. The present paper explains and illustrates some of these differences in shape. Additionally, morphological changes resulting from growth are considered in *Dadaytrema oxycephala*, and a new genus and species from a catfish is described.

MATERIALS AND METHODS

Fish hosts were netted, identified and eviscerated. The intestinal tracts were fixed in 10% formalin solution

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and later transferred to 70% alcohol. The fixed digestive tracts were opened and washed in tap water. Trematodes were recovered in finger bowls by hand sedimentation. Permanent slides were made by the phenol-balsam method described in Thatcher (1993). Drawings were made with the aid of a camera lucida and sizes were taken with a measuring ocular. Measurements are in micrometers (μm) unless indicated as millimeters (mm) and the means are followed by the extremes.

RESULTS

Cladorchiidae Southwell & Kirshner, 1937

Dadaytrematinae Yamaguti, 1958

Doradamphistoma gen. n.

Generic diagnosis: With the characters of the family. Body elongate, flattened, sides nearly parallel, extremities bluntly rounded. Pharynx large, with prominent external diverticula; esophagus long, bulb present; ceca reaching to near acetabulum. Acetabulum small, subterminal. Testes diagonal, equatorial or pre-equatorial; cirrus sac small, subspherical; genital pore postbifurcal. Ovary ovoid, post-equatorial; vitellaria consisting of few large follicles lateral to ovary and extracecal; uterus extensive, with descending and ascending loops; eggs numerous; ovoviviparous. Excretory vesicle saccular; pore dorsal. Intestinal parasites of Amazonian catfishes.

Type species: *Doradamphistoma bacuensis* sp. n.

***Doradamphistoma bacuensis* sp. n.**

(Figs. 1 & 8)

Host: *Megalodoras irwini Eigenmann, 1925*; Doradidae.

Site: Intestinal lumen.

Locality: Manaus, Amazonas, Brazil. (Colector: J.C. Malta. 11/28/1984)

Holotype (INPA 371) and 5 paratypes (INPA 372 a-e): Invertebrate Collection of the Instituto Nacional de Pesquisas da Amazônia - Platyhelminthes. Manaus, Amazonas, Brazil.

Etymology: The generic name incorporates the family name of the host fish and the specific name comes from the common name (bacu) of the host.

Species diagnosis (6 specimens measured): With the characters of the genus. Body 7.6 (6.0-9.6) mm long and 2.4 (1.8-3.1) mm wide. Pharynx 1,081 (832-1,330) long and 763 (624-832) wide; esophagus 1,402 (1,248-1,560) long and 255 (130-416) wide; esophageal bulb 349 (261-470) long by 302 (261-348) wide. Anterior testis 513 (435-609) long by 563 (609-783) wide; posterior testis 472 (416-522) long by 801 (522-1,305) wide; cirrus sac 244 (200-261) long and 244 (200-261) in diameter. Ovary 435 (348-522) long and 653 (539-811) wide; vitelline follicles 88-174; proximal eggs 96 x 53 (88-104 x 52-55); distal eggs containing miracidia 167 x 100 (132-191 x 88-110).

Remarks

Doradamphistoma bacuensis gen. et sp. n. somewhat resembles *Pacudistoma turgida* Thatcher, 1992, in size and organ distribution. However, the new form is much more flattened,

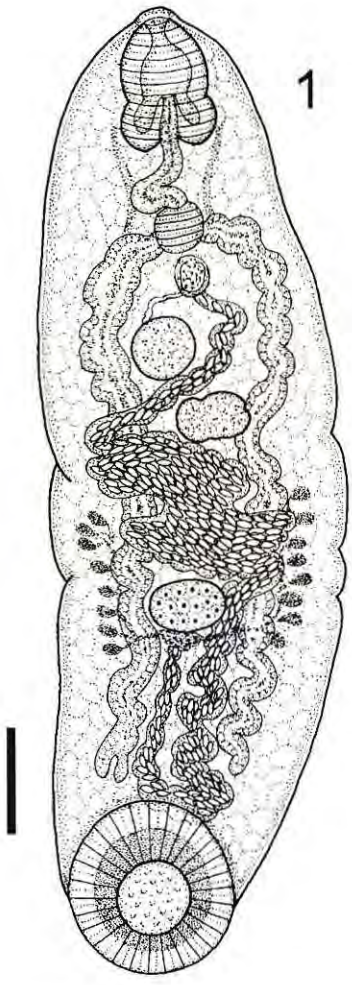


Figure 1. *Doradamphistoma bacuensis* gen. et sp. n. (ventral aspect). Scale = 1 mm

lacks a genital sucker, has a postbifurcal genital pore, a subspherical cirrus sac and an esophageal bulb.

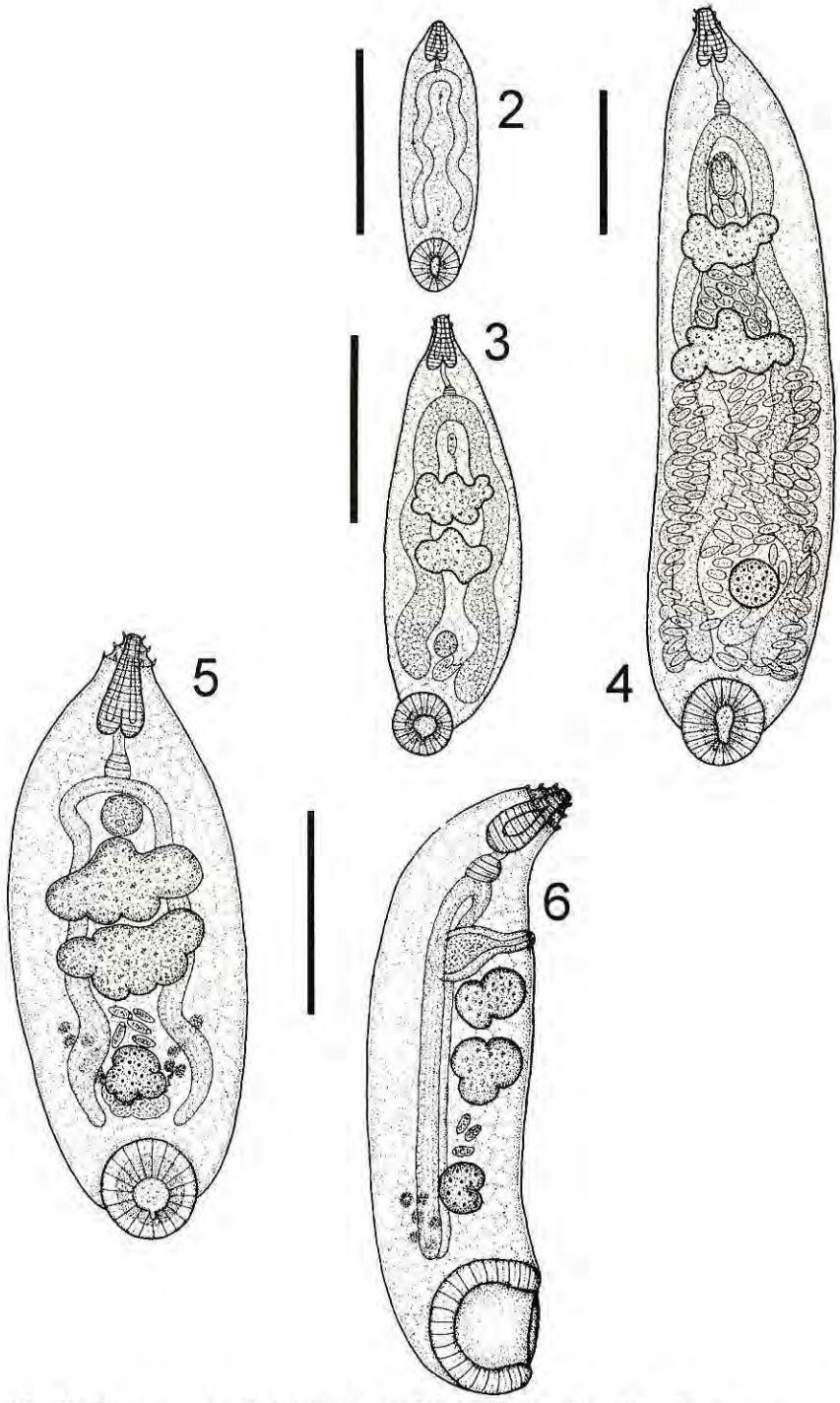
Morphological Variation with Growth

Dadaytrema oxycephala (Diesing, 1836) Travassos, 1931, was redescribed from Amazonian material by Thatcher (1979). Figures 2-6 show some of the morphological changes that result from growth in this species. *D. oxycephala* has been reported from several different host species and is widely distributed in Brazil. In Amazonia, it is a common parasite of the "pirapitinga", *Piaractus brachypomus* (Cuvier), and of certain catfishes, especially *Pterodoras granulosus* (Valenciennes).

Young specimens measuring slightly more than one millimeter in length (Fig. 2) show little or no development of internal organs. The body is cylindrical like that of adults but the pharynx and acetabulum are relatively larger. Specimens around two millimeters in length (Fig. 3) have the testes and ovary developed but the cirrus sac and uterus are rudimentary. In such young trematodes the testes are nearly equatorial. After reaching about three millimeters in length (Figs. 5, 6), the worms have well developed cirrus sacs and a few eggs appear in the uterus. In worms of this size, the testes are still equatorial. Fully mature worms measuring more than four millimeters (Fig. 4) have numerous uterine eggs and the testes are pre-equatorial. In these adult worms, the pharynx and acetabulum are relatively smaller.

Variations in External Shape

Figures 7-16 demonstrate some of the body shapes found in fish parasitic amphistomes in Amazonia. Some of these forms are unique and have not been reported from other hosts in other



Figures 2-6. *Dadaytrema oxycephala* (Diesing, 1836). Growth series. All scales = 1 mm.

areas of the world.

Figure 7 represents *Micramphistoma ministoma* Thatcher, 1992, from the intestinal tract of *Hypopomus* sp., a gymnotiform fish caught in the Guaporé River of Rondônia State, Brazil. In addition to having a flattened body, the acetabulum is extremely small. Internally, the pharynx is also small and lacks diverticula.

Figure 8 is an external view of *Doradamphistoma bacuensis* gen. et sp. n., which is described herein. This species has an elongate and flattened body in contrast to the cylindrical body of *Pacudistoma turgida* Thatcher, 1992, (Fig. 9) described from the "pacu", *Myleus pacu* Cuvier, from the Jamari River of Rondônia State, Brazil.

Figure 10 is an external view of *Zetamphistoma compacta* Thatcher & Jégu, 1996, from *Mylesinus paraschomburgkii* Jégu, Santos & Ferreira, taken in the Araguari River, Amapá State, Brazil. This species has a broad, flattened body which is thicker centrally and thins towards the perifery. The acetabulum is relatively large and the circlets of papillae around the mouth are pronounced.

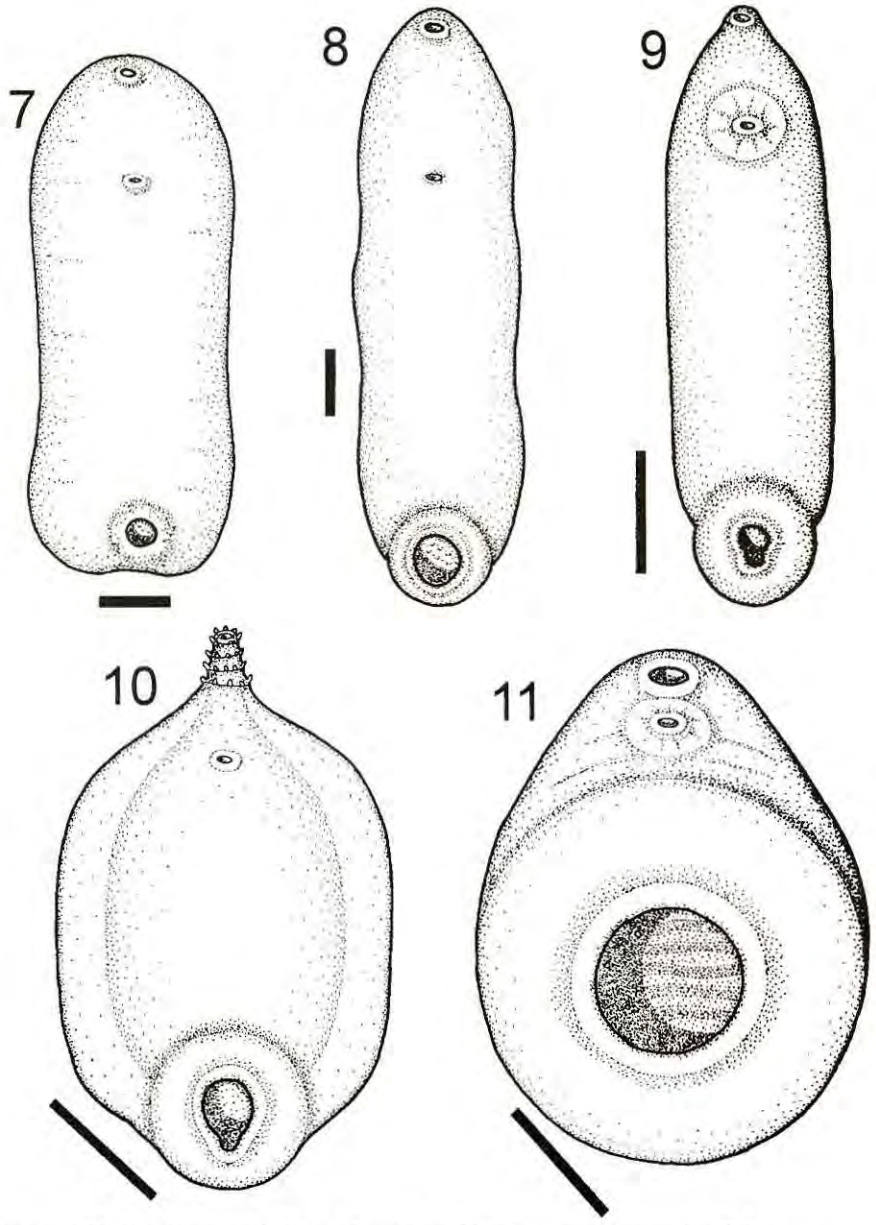
Figure 11 is an externo-ventral view of *Dadayius pacuensis* Thatcher, Sey & Jégu, 1996, described from *Myleus (Myloplus) asterias* Cuvier from both Amazonas and Rondônia States. This species has a pyramidal or conical body with a massive acetabulum and a genital sucker. There are horizontal corrugations in the inner wall of the acetabulum.

Figures 12 & 13 show two genera that are nearly cylindrical and each has a collar-like anterior expansion, although they are probably not closely related. Figure 12 is an external view of *Pronamphistoma cichlasomae* Thatcher, 1992, which was described from *Cichlasoma severum* (Steindachner) taken in the Guaporé River of Rondônia. This is a very small species measuring only about one millimeter long and it has a relatively large acetabulum. Figure 13 is a view of *Anavilhanatrema robusta* Thatcher, 1992, from the "piranha", *Pristobrycon striolatus* Kner, from the Negro River of Amazonas State. This species is much larger and can reach more than 12 millimeters in length.

Figure 14 shows an externo-ventral view of *Dadaytrema oxycephala* (Diesing, 1836) from the catfish, *Pterodoras granulosus,* taken in the Amazon River near Manaus. This species is cylindrical with a tapered anterior extremity bearing four or five circles of papillae. The acetabulum has a prominent posterior notch in the opening.

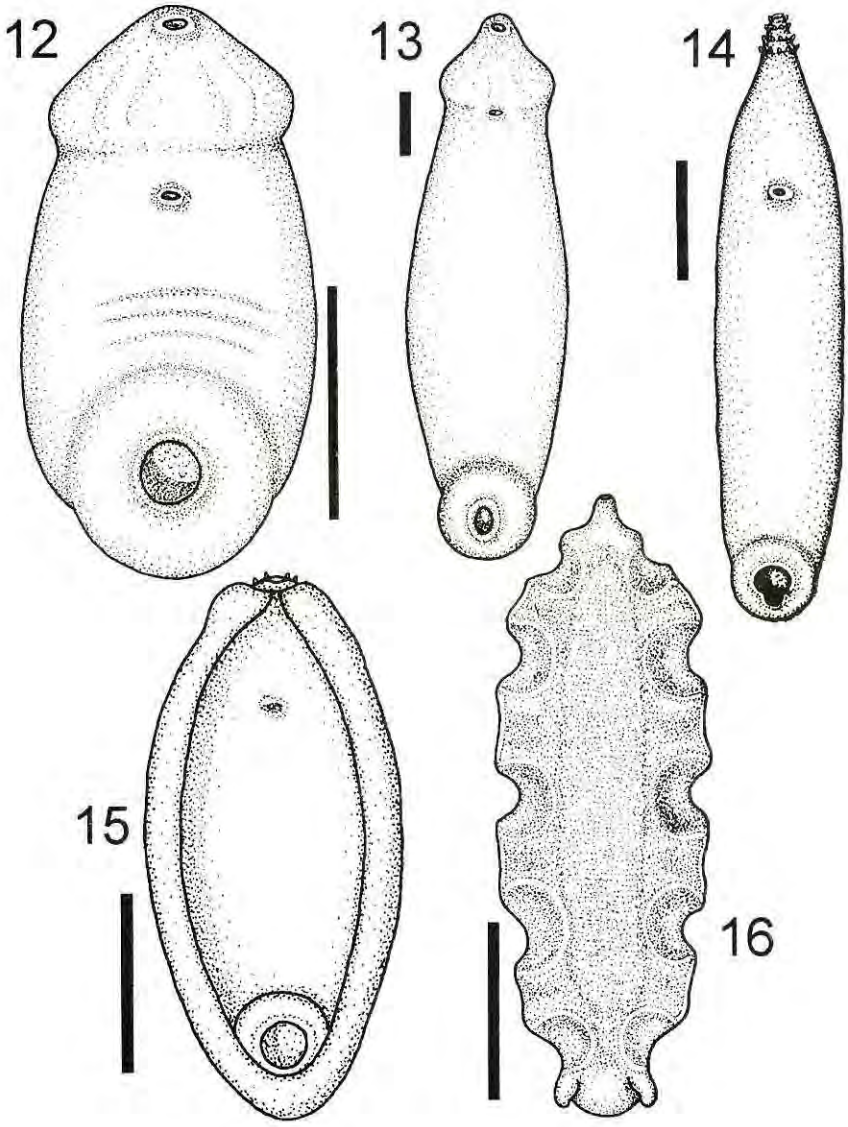
Figure 15 is an externo-ventral view of *Alphamphistoma canoeforma* Thatcher & Jegu, 1996, from *Mylesinus paraschomburgkii.* This species is as widely distributed as its host in the Northern tributaries of the Amazon River. It is extremely concave ventrally and the sides of the body fold in to give it a canoe-like appearance. These worms probably use the entire ventral surface as a sucker to adhere to the intestinal wall of the fish host.

Figure 16 is a externo-dorsal view of *Annelamphistoma elegans* Thatcher, Sey & Jégu, 1996, taken from *Myleus*



Figures 7-11. Surface morphology of some amphistomes from Amazonian fishes. Ventral views; all scales = 1 mm, except for figures 7 & 11 = 0.5 mm.

7. *Micramphistoma ministoma* Thatcher, 1992.
8. *Doradamphistoma bacuensis* gen. et sp. n.
9. *Pacudistoma turgida* Thatcher, 1992.
10. *Zetamphistoma compacta* Thatcher & Jégu, 1996.
11. *Dadayius pacuensis* Thatcher, Sey & Jégu, 1996.



Figures 12-16. Surface morphology of some amphistomes from Amazonian fishes.
Figs. 12-15. ventral views; 16. dorsal view; all scales = 1 mm, except for figure 13 = 0.5 mm.
12. *Pronamphistoma cichlasomae* Thatcher, 1992.
13. *Anavilhanatrema robusta* Thatcher, 1992.
14. *Dadaytrema oxycephala* (Diesing, 1836).
15. *Alphamphistoma canoeforma* Thatcher & Jégu, 1996.
16. *Annelamphistoma elegans* Thatcher, Sey & Jégu, 1996.

(Myloplus) spp. Apparently, the species is widely spread in Amazonia. It has a very unusual shape in that it is convex ventrally and concave dorsally. Also, these worms have five muscular or tegumental puckers on either side and the ventral surface is entirely covered with small papillae.

It can be concluded that there are amphistomes of many shapes and sizes infecting Amazonian fishes. These different body shapes should be taken into consideration when describing genera. Body form constitutes an important character which can be used at the generic and possibly the family levels.

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