

Expanded description of *Dolops bidentata* (Bouvier, 1899) (Branchiura: Argulidae) based on specimens collected on *Pygocentrus nattereri* Kner, 1858 (Characiformes) from Poconé Wetland, MT, Brazil

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(With 3 figures)

Abstract

The current information on the branchiuran *Dolops bidentata*, a species described more one hundred years ago, is valid but incomplete; hence, an expanded description is given herein. Additional morphological information was obtained by light and scanning electron microscopy from specimens collected on *Pygocentrus nattereri* from the Poconé Wetland, MT, Brazil. Description of the appendages and other structures such as respiratory area, mouth, details and ornamentation of antennules and maxillae are provided for the first time.

Keywords: taxonomy, Crustacea, Serrasalmiinae, fish parasites, neotropics.

Descrição expandida de *Dolops bidentata* (Bouvier, 1899) (Branchiura: Argulidae) baseada em espécimes parasitos de *Pygocentrus nattereri* Kner, 1858 (Characiformes) do Pantanal de Poconé, MT, Brasil

Resumo

O branquiúro *Dolops bidentata* foi descrito há mais de 100 anos, e a descrição original é válida, mas incompleta. Uma descrição expandida é dada, então, aqui. Informação morfológica adicional foi obtida por microscopia de luz e eletrônica de varredura para espécimes coletados de *Pygocentrus nattereri* do Pantanal de Poconé, MT, Brasil. Descrição dos apêndices e de outras estruturas tais como áreas respiratórias, boca, detalhes e ornamentação das maxilas e da antênula são apresentadas pela primeira vez.

Palavras-chave: taxonomia, Crustacea, Serrasalmiinae, parasitas de peixe, neotrópico.

1. Introduction

The Branchiura of freshwater habitats, consisting of the valid genera *Argulus*, *Chonopeltis*, *Dipteropeltis*, and *Dolops*, presently contains 113 valid species and 12 undescribed species (Poly, 2008). The entire group is composed of ectoparasitic species that usually live on fishes. The highest diversity of genera and species occurs in the Afrotropical and Neotropical Regions (Poly, 2008). Also, these crustaceans can be pointed out as one of those which cause greater economic loss to fish farms (Pavanelli et al., 1999).

Bouvier (1899a) described the crustacean *Gyropeltis bidentata* from French Guiana, after Bouvier (1899b) transferred this species to the genus *Dolops*. In Brazil,

D. bidentata was recorded by Malta (1982) parasitising six species of fishes namely: *Schizodon fasciatus*, *Prochilodus nigricans*, *Astronotus ocellatus*, *Serrasalmus nattereri*, *Rhytiodus microlepis* and *Colossoma bidens*, but additional information about its morphology was not provided.

The main diagnostic character of *D. bidentata* is the maxilla, swollen at the base, and with two stout teeth. Despite the validity of the original description of *D. bidentata* by Bouvier (1899b), some structures were scarcely detailed. Characteristics such as the shape of the respiratory area on the ventral surface of lateral lobes, the mouth, the details and ornamentation of the maxillae and first antennae are lacking in Bouvier's illustrations. Thus, an expanded

description is provided on the basis of an evaluation of specimens collected from *Pygocentrus nattereri* Kner, 1858 from Brazil, with additional information on ultrastructure obtained by scanning electron microscopy and additional morphological details obtained by light microscopy.

2. Material and Methods

In June, 2006 fifty nine specimens of *Pygocentrus nattereri* were collected from Coqueiro Bay (16° 15' 12" S and 56° 22' 12" W), Pirizal district, Poconé Wetland, in the state of Mato Grosso, Brazil. The fishes were collected by using a fishing rod and cast nets and identified according to Britski et al. (2007). The crustaceans were removed from the body surface and fixed in 70% ethanol. In the laboratory, some specimens were transferred to lactic acid and used to be drawn. Other specimens were prepared for scanning electron microscopy using standard techniques

(Dedavid et al., 2007) and analysed with a FEI Quanta 200 scanning electron microscope in the Electron Microscopy and Microanalysis Laboratory of the Pró-reitoria de Pesquisa e Pós-graduação da Universidade Estadual de Londrina. Measurements are given in millimetres as the range followed by the arithmetic mean in parentheses and were made with the use of the software Motic Images Plus™ 2.0. The illustrations were made with the aid of a drawing tube mounted on a Hund Wetzlar H-600 phase contrast microscope. Voucher specimens are deposited in the Invertebrate Collection of the Instituto Nacional de Pesquisas da Amazônia (INPA), Manaus, AM, Brazil (INPA 1864).

3. Results

Dolops bidentata (Bouvier, 1899) (Figures 1, 2, 3)

Host: *Pygocentrus nattereri* Kner, 1858 (Characiformes: Serrasalminae)

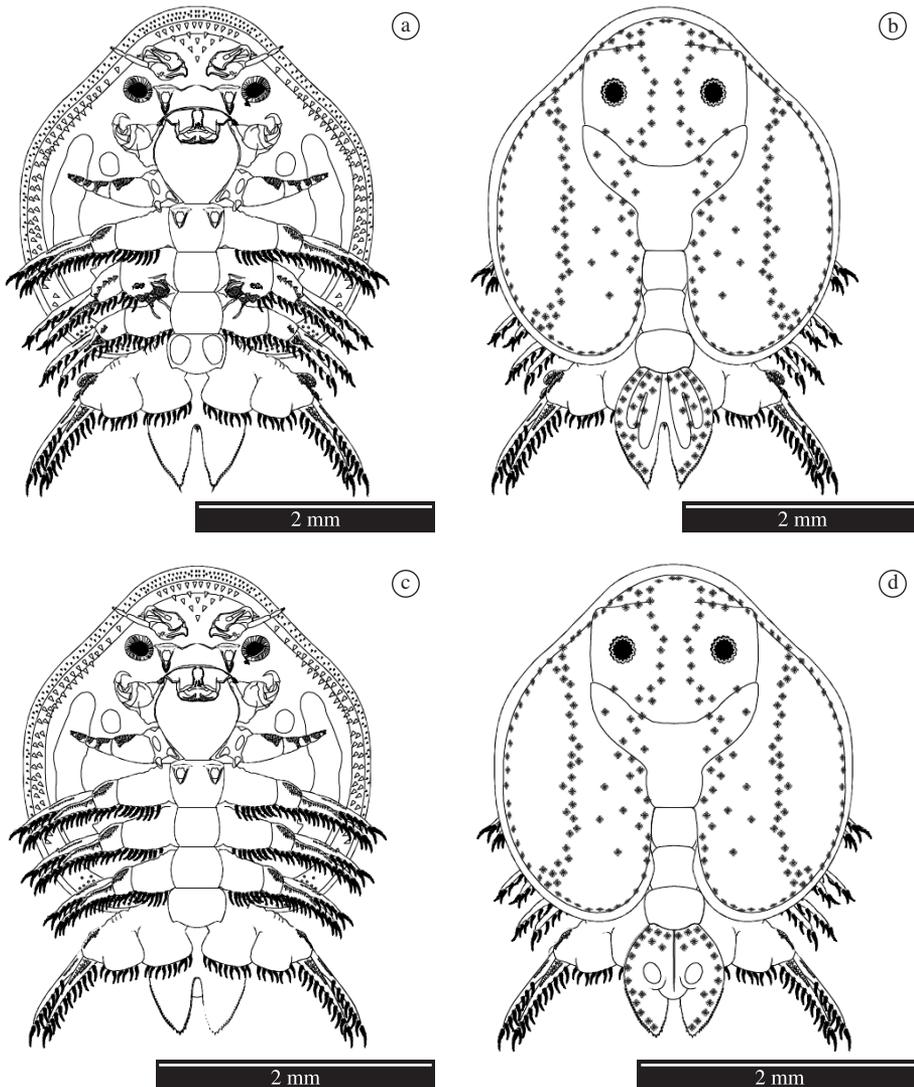


Figure 1. *Dolops bidentata* (Bouvier, 1899). a) Ventral view, male; b) dorsal view, male; c) ventral view, female; and d) dorsal view, female.

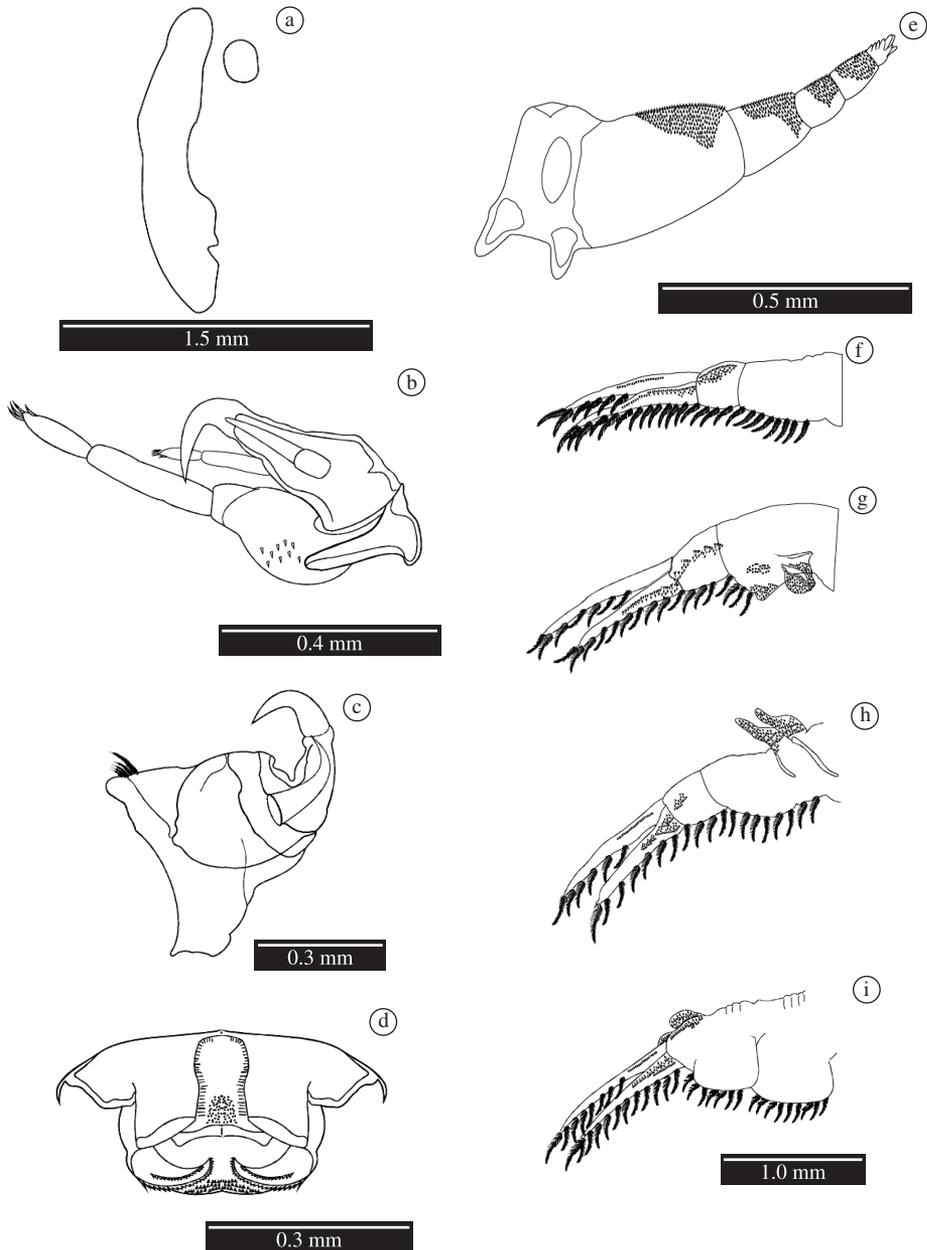


Figure 2. *Dolops bidentata* (Bouvier, 1899). a) Respiratory area; b) antennule and antenna; c) maxillule; d) mouth; e) antenna; f) 1st pair of legs, male; g) 2nd pair of legs, male; h) 3rd pair of legs, male; and i) 4th pair of legs, male.

Site of infection: Body surface

Locality: Coqueiro Bay (16° 15' 12" S and 56° 22' 12" W), Pirizal district, Poconé Wetland, State of Mato Grosso, Brazil.

Voucher specimens: 12 male specimens and nine female specimens, INPA.

Adult male (description based on 12 specimens)

Body sub-oval (Figure 1a, b), length 3.4-4.4 (3.9 mm); carapace oval, comprising 78.8% of total length. Ventral surface of frontal region and lateral lobes with numerous regularly arranged, sharply pointed, spines of dissimilar size along lateral lobes of carapace (Figure 1a). Eyes on dorsal surface, anterior to antero-lateral depressions.

Antero-lateral depressions slight. Lateral lobes of carapace tapering, slightly rounded terminally, extending as far back as 3rd pair of swimming legs; separated by broad sinus 1/4 length of carapace. Dorsal surface of carapace extensively spotted with dark dendriform markings (Figure 1b). Paired respiratory areas on ventral surface of lateral lobes; anterior respiratory area small and oval; posterior respiratory area with 1 indentation on medial margin (Figure 2a). Thorax distinctly 4-segmented. Abdomen sub-oval 0.9-1.3 (1.05 mm) comprising 21.2% of total length, abdominal lobes short, pointed terminally, abdominal margin serrated, separated by broad sinus 1/2 length of abdomen. Furcal rami small;

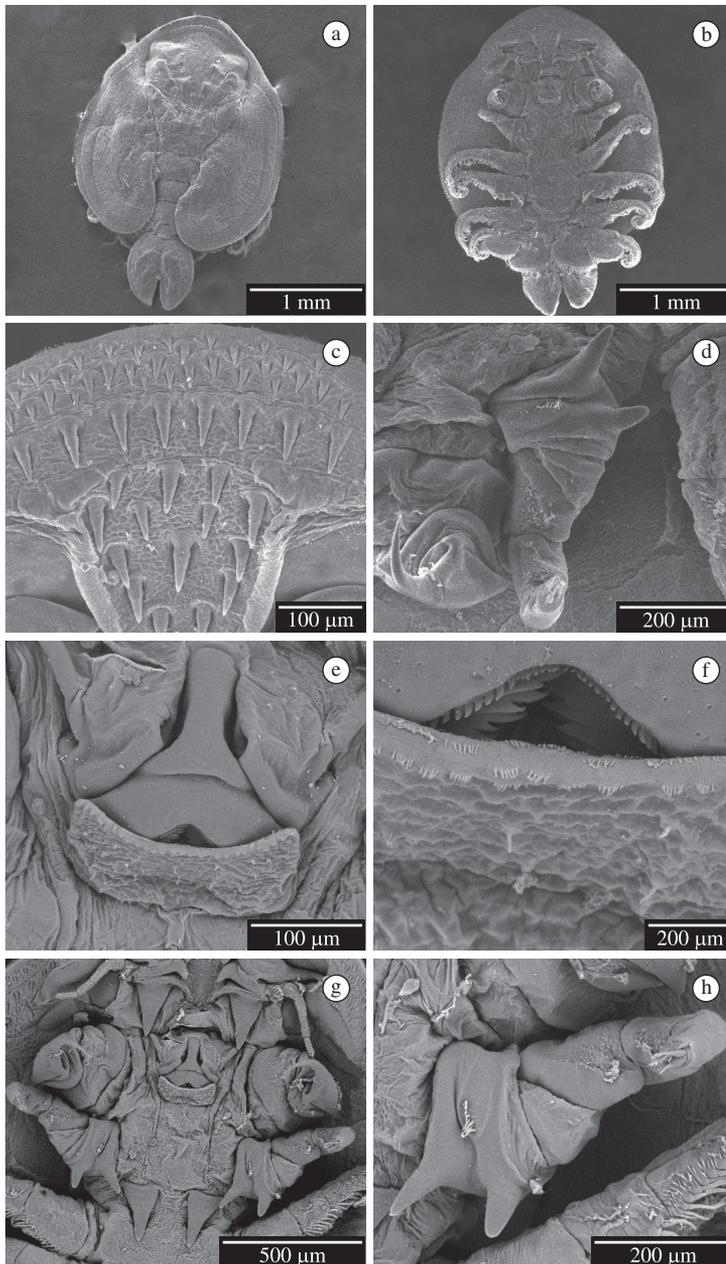


Figure 3. Scanning electron micrographs of *Dolops bidentata* (Bouvier, 1899). a) Ventral view, male; b) dorsal view, male; c) ventral view of anterior region with numerous spines; d) maxillule and maxilla; e) view of mouth; f) detail of small teeth of mandibles; g) detail of structures of region ventral; and h) detail of teeth of maxilla.

adjacent to midline at anal sinus base; paired testes elongate and bilobed. Antennule 2 sections; stout proximal section; slender distal section; both 2-segmented. First segment of proximal section bearing large, broadly rounded posterior spine; second segment with stout anterior spine and large straight robust lateral spine. Distal section of antennule with terminal segment with group of apical spines. Antenna 4-segmented; 1st carrying spines, 2nd and 3rd segments without ornamentation; 4th terminating in group of apical spines (Figure 2b). Maxillule swollen at base, tipped with stout

claws (Figure 2c). Mouth with mandibles covered with small teeth (Figure 2d). Maxilla 5-segmented (Figure 2e); basal segment with 2 teeth on each plate; oval area above spines unarmed; 2nd to 5th segments armed with simple, pectinate scales; terminal segment with cluster of stout setae. First to 4th pair of legs biramous, 1st to 3rd near equal size and 4th higher than the other; sympods 2-segmented; flagellum present on 1st and 2nd legs; extending medially from origin on dorsal surface at base of exopod. Small clusters of simple scales on swimming legs. Exopod only

slightly longer than endopod in all the legs. Endopod of legs 1 to 4 of one segment. Symphods of all legs and natatory lobes bearing plumose setae similar to those on exo- and endopods. Natatory lobes of leg 4 with round posterior margin. Second, 3rd and 4th legs highly modified by accessory copulatory structures; posterior margin of first segment of 2nd leg bearing large, unequal, 2 cup-shaped sockets; anterior margin of first segment of 3rd leg bearing large, 2 cup-shaped sockets and accessory copulatory cushion on anterior margin of second segment of 4th leg, all ornamented with specialised scales (Figure 2 f-i).

Adult female (description based on 9 specimens).

Body shape similar to the male (Figure 1c, d), length 2.5-5.5 (3.9 mm); carapace comprising 77.65% of total length. Abdomen sub-oval (0.7 mm), comprising 22.35% of total length, abdominal lobes short and less pointed than in male, separated by broad sinus 1/3 length of abdomen. Paired spermathecae oval, situated in fused part of abdomen. Cephalic appendages and first pair of legs similar to those of male. Second to 4th pairs of legs unmodified.

4. Discussion

Some structures described in Bouvier (1899a, b) were scarcely detailed. Bouvier's description of *D. bidentata* stated that the first antenna is devoid of basal teeth and its palp ends bear 5 short bristles, but in our specimens the first antenna comprises 2 sections, the first segment of proximal section has a broad posterior spine and the second segment has anterior spine and large robust lateral spine. The terminal segment of the distal section has four apical spines. Bouvier (1899a, b) described the mandible with 16 teeth, but in our work we observed 24 teeth.

Unlike that observed in our specimens, in Bouvier's description, the 4th pair of legs is smaller than the others. In the original description, the abdomen of the male is rounded and with a shallow slit in the back, but we observed in our specimens a sub-oval abdomen, pointed terminally, with the margin of the abdomen serrated, separated by broad sinus half the length of the abdomen. In the original description, the 2nd and 3rd pair of legs are modified by accessory copulatory structures, however in our specimens, as well as the 2nd and 3rd pair of legs, the 4th pair is also modified and all are ornamented with

specialised scales (not described by Bouvier). Furthermore, the respiratory areas located on the ventral surface of the lateral lobes, the mouth, the details of the maxillule and maxilla are absent in Bouvier's illustrations. All these morphological differences could be considered intraspecific variations as a result of ontogenetic changes or perhaps due to insufficient details of the appendages morphology given by Bouvier (1899a, b).

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References

- BOUVIER, MEL., 1899a. Sur les "Argulides" du genre *Gyropeltis*, recueillis récemment par M. Geay dans la Guyane. *Bulletin du Muséum d'Histoire Naturelle*, vol. 5, p. 39-41.
- , 1899b. Les crustacés parasites du genre *Dolops* Audoin. *Bulletin Société Philomatique de Paris*, Série 8, vol. 10, p. 53-81.
- BRITSKI, HA., SILIMON, KZS. and LOPES, BS., 2007. *Peixes do Pantanal: manual de identificação*. 2a. ed. Brasília, DF: Embrapa Informação Tecnológica. 227 p.
- DEDAVID, BA., GOMES, CI. and MACHADO, G., 2007. *Microscopia eletrônica de Varredura. Aplicações e preparação de amostras*. Porto Alegre: EDIPUCRS. 60 p.
- MALTA, JCO., 1982. Os argulídeos (Crustacea: Branchiura) da Amazônia brasileira. Aspectos da ecologia de *Dolops discoidales* Bouvier 1899 and *Dolops bidentata* Bouvier 1899. *Acta Amazonica*, vol. 12, no. 3, p. 521-528.
- POLY, WJ., 2008. Global diversity of fishlice (Crustacea: Branchiura: Argulidae) in freshwater. *Hydrobiologia*, vol. 595, no. 1, p. 209-212.
- PAVANELLI, GC., EIRAS, JC. and TAKEMOTO, RM., 1999. *Doenças de peixes: profilaxia, diagnóstico e tratamento*. Maringá: EDUEM. 264 p.