

# ***Ergasilus youngi* sp. nov. (Copepoda, Poecilostomatoida, Ergasilidae) parasitic on *Aspistor luniscutis* (Actinopterygii, Ariidae) from off the State of Rio de Janeiro, Brazil**

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## **Abstract**

A new species of *Ergasilus* von Nordmann, 1832 (Copepoda, Ergasilidae) parasitic on the gills of sea catfish, *Aspistor luniscutis* (Valenciennes, 1840) (Ariidae) from the coastal zone of the state of Rio de Janeiro, Brazil is described and illustrated. The new species is characterized by the presence of 2-segmented first endopod with rosette-like array of blunt spinules, 3-segmented fourth endopod, first antennular segment with single seta and not inflated cephalosome.

## **Key words**

Copepoda, Ergasilidae, *Ergasilus youngi* sp. nov., fish, *Aspistor luniscutis*, Brazil

## **Introduction**

Ergasilidae von Nordmann, 1832 is one of the major families of Poecilostomatoida (cf. Ho *et al.* 1992, Abdelhalim *et al.* 1993) and comprises 24 genera of parasitic copepods found in freshwater, brackish and coastal marine waters (Amado *et al.* 1995, El-Rashidi and Boxshall 1999). According to Amado *et al.* (1995) ergasilid adult females parasitize mainly teleosts with exception of species of *Teredophilus* Rancurel, 1954 that occur on annelids and bivalve molluscs. *Ergasilus* von Nordmann, 1832 includes species with high pathogenic potential, some of them responsible for great mortality among cultured fishes in freshwater and brackish environments (Lin and Ho 1998, Piasecki *et al.* 2004).

To date, 21 species of *Ergasilus* were described parasitic on gills of Brazilian fishes (Table I). Recently, *E. euripedesi* Montú, 1980 was redescribed and new combination *Gaucher-gasilus euripedesi* (Montú, 1980) proposed (Montú and Boxshall 2002). Another species, *E. foresti* Boxshall, Araújo et Montú, 2002, was recently collected from the zooplankton communities of Brazilian estuaries (Boxshall *et al.* 2002).

During a parasitological survey of Brazilian marine fishes, specimens of an undescribed species of *Ergasilus* were col-

lected from the gills of sea catfish, *Aspistor luniscutis* (Valenciennes, 1840). The new species is described, illustrated and compared with the related species of this genus.

## **Materials and methods**

Copepods studied are part of material collected from 69 specimens of *A. luniscutis* measuring  $35.4 \pm 2.2$  (30.8–42.0) cm, from Angra dos Reis, coastal zone of the State of Rio de Janeiro, Brazil (23°01'S, 44°19'W), between November 2002 and February 2003. Hosts were identified according to Figureiredo and Menezes (1978) and nomenclature follows Marce-niuk and Ferraris (2003). Copepods collected were fixed and stored in 70% ethanol. They were cleared in 85% lactic acid before making dissection on a wooden slide (Humes and Gooding 1964). In measurements ( $\mu\text{m}$ ), means are followed by range within parenthesis. Illustrations were made with the aid of a drawing tube mounted on a Hund Wetzlar H-600 phase contrast microscope. Copepod body terminology according to Boxshall and Montú (1997). The terms mean abundance, mean intensity and prevalence were used according to Bush *et al.* (1997). Type specimens were deposited in

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## Results

### *Ergasilus youngi* sp. nov. (Figs 1–10)

Female (Fig. 1): (based on 11 specimens). Total length 1,450.6 (1,401.1–1,494.5) (excluding antenna and caudal rami setae). Greatest width 407.44 (381.98–439.85). Cephalosome longer than wide, antennule and antenna visible in dorsal view, 488.47 (451.43–520.88) long, 407.44 (381.98–439.85) wide. First pedigerous somite 247.71 (231.5–266.23) long, 381.98 (358.83–416.7) wide. Second to fifth pedigerous somite narrowing posteriorly. Genital double-somite 189.14 (185.71–194.28) long, 183.42 (174.28–197.13) wide. Abdomen with 3 free somites; first free somite 46.37 (42.86–48.57) long, 113.07 (98.31–134.4) wide; second free somite 38.62 (36–39.4) long, 100.71 (88.57–120) wide; anal somite incised medially 31.84 (25.71–39.6) long, 88.67 (79.4–109.2) wide (Fig. 2a). All abdominal somites with row of spinules along posterior margin on ventral surface (Fig. 2b). Caudal rami longer than wide, 46.98 (45.6–51.43) long, 34.6 (28.57–41.4) wide, bearing 4 setae, longest seta 395.86 (373.82–414.07) long.

Antennule (Fig. 3): 6-segmented, setal formula from proximal to distal segments: 1, 11, 3, 3, 1 + 1 aesthete, 6 + 1 aesthete. Antenna (Fig. 4) long, slender, 4-segmented (coxobasis + 3-segmented endopod), coxobasis with minute inner proximal seta, proximal endopodal segment slightly curved, longer than medial and distal endopodal segments combined, armed with curved peg seta near mid-point of inner margin; medial endopodal segment with minute seta proximally and distally; distal endopodal segment short. Terminal claw strongly recurved. Mandible (Fig. 5a) anterior blade small with bristles on anterior margin; middle blade with large teeth on posterior margin; posterior blade with teeth on posterior margin. Maxillula (Fig. 5b) lobate, bearing 2 outer setae. Maxilla (Fig. 5c) consisting of large syncoxa, unarmed, tapering distally and small basis, armed distally with sharp teeth.

First to fourth leg biramous with rami 3-segmented, except first endopod and fourth exopod which are 2-segmented. Basis of all legs bearing outer naked seta on posterior surface near to exopod. First leg (Fig. 6) exopod proximal segment with patch of spinules and spine distally located on outer margin, inner margin with setules; medial segment with patch of spinules on outer margin, inner plumose seta; distal segment with 4 plumose setae, 1 medial spine with serrated margins, 2 short plumose setae on outer margin only; endopod proximal segment with outer patch of spinules and inner plumose seta; distal segment with patch of spinules on outer margin, prominent rosette-like array of blunt spinules on near lateral margin, 2 short plumose setae apically, 5 plumose setae on inner margin. Second leg (Fig. 7) exopod proximal segment with spinules and distally located spine on outer margin, inner margin

with setules; medial segment with spinules on outer margin, inner plumose seta; distal segment with spinules on outer margin, outer small plumose seta, 6 plumose setae; endopod proximal segment with setules and fine spinulation on outer margin, inner plumose seta; medial segment with few spinules on outer margin, 2 inner plumose setae; distal segment with very fine spinulation on outer margin, outer spine serrated on outer margin only, 4 plumose setae. Third leg (Fig. 8) similar to second leg. Fourth leg (Fig. 9) exopod proximal segment with few spinules on outer margin, inner margin with setules; distal segment with few spines on outer margin, outer short plumose seta, 5 plumose setae; endopod proximal segment with setules and fine spinulation on outer margin, inner plumose seta; medial segment with fine spinulation on outer margin, 2 inner plumose setae; distal segment with spinules on outer margin, outer spine serrated on outer margin only, 3 plumose setae. Fifth leg (Fig. 10) 2 papillate naked setae.

Male: Unknown.

Host: *Aspistor luniscutis* (Valenciennes, 1840) (Actinopterygii, Siluriformes, Ariidae).

Site of infection: Gills.

Type locality: Angra dos Reis, RJ, Brazil (23°01'S, 44°19'W).

Record of specimens: Holotype CHIOC No. 35393 (female); paratypes CHIOC No. 35394 (5 females); CHIOC No. 35392 (5 females).

Prevalence of infection: 88.4%.

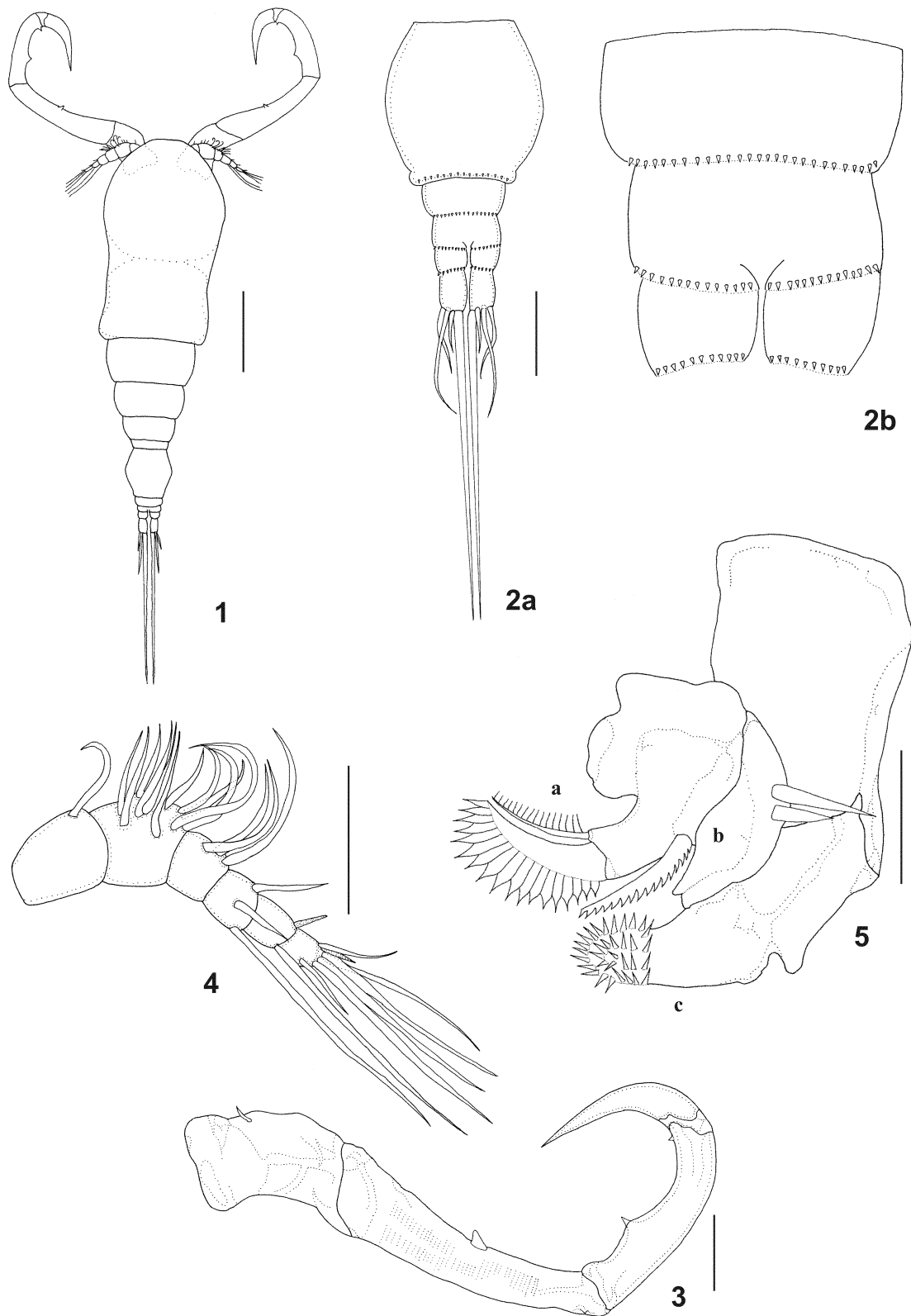
Mean abundance of infection:  $6.7 \pm 8.1$ .

Mean intensity of infection:  $7.6 \pm 8.2$ .

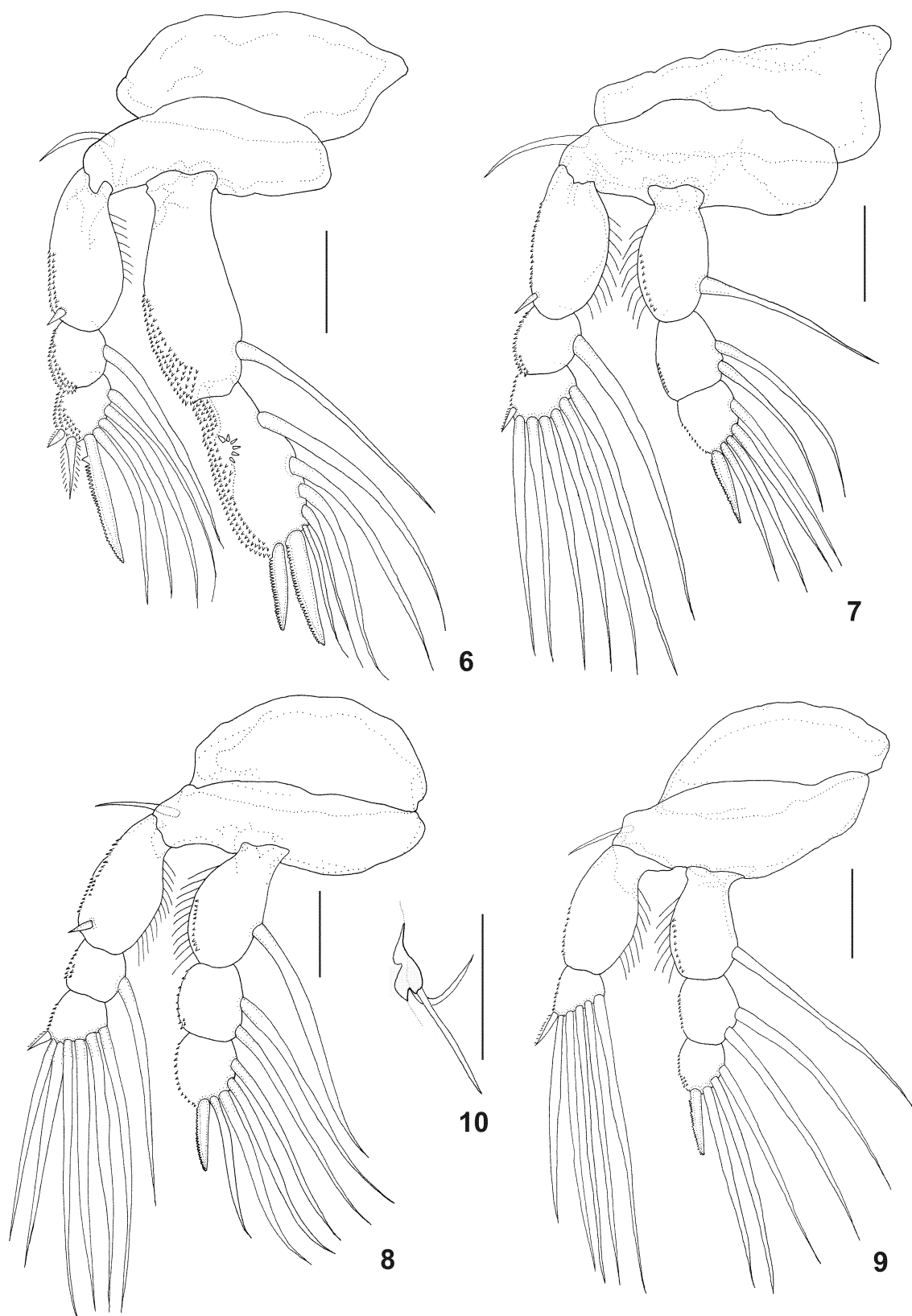
Etymology: This species is named in honor to Dr Paulo S. Young, in recognition of his contributions to the knowledge of Brazilian crustaceans.

Remarks: the new species shows 2-segmented first endopod, 3-segmented fourth endopod, and first antennular segment with single seta. Off 22 species described from Brazilian waters, five species shared 2-segmented first endopod and 3-segmented fourth endopod with the new species (Table I), but *E. youngi* sp. nov. can be separated from *E. callophysus*, *E. caraguatatubensis*, *E. colomesus*, and *E. cyanopictus*, by the presence of prominent rosette-like array of blunt spinules near lateral margin of first leg endopod distal segment. *Ergasilus foresti* also presents rosette-like array of blunt spinules near lateral margin of first leg endopod distal segment, although differs from new species in antennule setal formula 1, 11, 5, 4, 2 + ae., 7 + ae. (1, 11, 3, 3, 1 + 1 ae., 6 + 1 ae. in new species), mandible anterior blade with terminal slender teeth (with bristles on anterior margin on new species) and maxilla basis short, with array of sharp teeth distally, provided proximally with spinule near anterior margin and row of spinules near posterior margin (maxilla basis longer in comparison to *E. foresti* and without spinules proximally on new species) (Thatcher and Boeger 1983, 1984; Amado and Rocha 1995; Boxshall *et al.* 2002; El-Rashidy and Boxshall 2002).

Eight *Ergasilus* species originally described from other localities, *E. argulus* Cressey, 1970, *E. cerastes* Roberts, 1969, *E. chautauquensis* Fellows, 1887, *E. clupeidarum* John-



**Figs 1–5.** *Ergasilus youngi* sp. nov., female, holotype: **1** – dorsal view; **2a** – genital and abdominal somites and caudal rami, ventral; **2b** – abdominal somites; **3** – antennule; **4** – antenna; **5** – mouth parts: a – mandible, b – maxillula, c – maxilla. Scale bars = 300  $\mu$ m (1); 100  $\mu$ m (2a, 3, 4); 50  $\mu$ m (2b, 5)



**Figs 6–10.** *Ergasilus youngi* sp. nov., female, holotype: **6** – first leg; **7** – second leg; **8** – third leg; **9** – fourth leg; **10** – fifth leg. Scale bars = 50  $\mu$ m

**Table I.** *Ergasilus* species originally described from Brazil

| Species                                  | Hosts <sup>1</sup>  | Hosts' order and family              | Hosts' habitat | References                    |
|--|---|--------------------------------------|----------------|-------------------------------|
| <i>E. atafonensis</i> <sup>§</sup>       | <i>Mugil curema</i>   | Perciformes, Mugilidae               | brackish       | Amado and Rocha (1995)        |
| <i>E. bahiensis</i> <sup>§</sup>         | <i>M. curema</i> , <i>M. gaimardianus</i> ,<br><i>M. liza</i> , <i>M. platanus</i> ,<br><i>M. trichodon</i> | Perciformes, Mugilidae               | brackish       | Amado and Rocha (1995)        |
| <i>E. bryconis</i> <sup>†</sup>          | <i>Brycon melanopterus</i>  | Characiformes, Characidae            | freshwater     | Thatcher (1981a)              |
| <i>E. callophysus</i> <sup>*</sup>       | <i>Calophysus macropterus</i>   | Siluriformes, Pimelodidae            | freshwater     | Thatcher and Boeger (1984)    |
| <i>E. caraguatatubensis</i> <sup>*</sup> | <i>M. curema</i> , <i>M. gaimardianus</i> ,<br><i>M. liza</i>   | Perciformes, Mugilidae               | brackish       | Amado and Rocha (1995)        |
| <i>E. coatiarius</i> <sup>††</sup>       | <i>Cichla monoculus</i>   | Perciformes, Cichlidae               | freshwater     | Araújo and Varella (1998)     |
| <i>E. colomesus</i> <sup>*</sup>         | <i>Colomesus asellus</i>  | Tetraodontiformes,<br>Tetraodontidae | freshwater     | Thatcher and Boeger (1983)    |
| <i>E. cyanopictus</i> <sup>*</sup>       | <i>Mugil cephalus</i>   | Perciformes, Mugilidae               | brackish       | Carvalho (1962)               |
| <i>E. foresti</i> <sup>*</sup>           | —   | —                                    | brackish       | Boxshall <i>et al.</i> (2002) |
| <i>E. hydrolycus</i> <sup>†</sup>        | <i>Hydrolycus scomberoides</i>  | Characiformes, Cynodontidae          | freshwater     | Thatcher <i>et al.</i> (1984) |
| <i>E. holobryconis</i> <sup>†</sup>      | <i>Brycon pesu</i>  | Characiformes, Characidae            | freshwater     | Malta and Varella (1986)      |
| <i>E. hypophthalmi</i> <sup>†</sup>      | <i>Hypophthalmus edentatus</i> ,<br><i>H. fimbriatus</i>  | Siluriformes, Pimelodidae            | freshwater     | Boeger <i>et al.</i> (1993)   |
| <i>E. iheringi</i> <sup>††</sup>         | <i>Hoplias malabaricus</i>  | Characiformes, Erytrinae             | freshwater     | Tidd (1942)                   |
| <i>E. jaraquensis</i> <sup>†</sup>       | <i>Semaprochilodus insignis</i>   | Characiformes,<br>Prochilodontidae   | freshwater     | Thatcher and Robertson (1982) |
| <i>E. leporinidis</i> <sup>†</sup>       | <i>Leporinus fasciatus</i>  | Characiformes, Anostomidae           | freshwater     | Thatcher (1981b)              |
| <i>E. longimanus</i> <sup>§</sup>        | <i>Mugil</i> sp.  | Perciformes, Mugilidae               | brackish       | Boxshall and Montú (1997)     |
| <i>E. thatcheri</i> <sup>†</sup>         | <i>Rhamdia quelen</i>   | Siluriformes,<br>Heptapteridae       | freshwater     | Engers <i>et al.</i> (2000)   |
| <i>E. triangularis</i> <sup>†</sup>      | <i>Laemolyta taeniata</i>   | Characiformes, Anostomidae           | freshwater     | Malta (1994)                  |
| <i>E. turucuyus</i> <sup>†</sup>         | <i>Acestrorhynchus falcatus</i> ,<br><i>A. falcistrostris</i>   | Characiformes,<br>Acestrorhynchidae  | freshwater     | Malta and Varella (1996)      |
| <i>E. urupaensis</i> <sup>†</sup>        | <i>Prochilodus nigricans</i>  | Characiformes,<br>Prochilodontidae   | freshwater     | Malta (1993)                  |
| <i>E. xenomelanirisi</i> <sup>§</sup>    | <i>Atherinella brasiliensis</i>   | Atheriniformes,<br>Atherinopsidae    | brackish       | Carvalho (1955)               |
| <i>E. yumaricus</i> <sup>†</sup>         | <i>Pygocentrus natterii</i> ,<br><i>Serrasalmus eingenmani</i> ,<br><i>S. rhombeus</i>                      | Characidae, Characiformes            | freshwater     | Malta and Varella (1995)      |

<sup>1</sup>Hosts' nomenclature and taxonomy according to FishBase Online ([www.fishbase.org](http://www.fishbase.org)). \*Species that share 2-segmented first endopod and fourth exopod, 3-segmented fourth endopod. †Species that share 2-segmented first endopod and 2-segmented fourth exopod and endopod. ††Species that share 2-segmented first endopod, 1-segmented fourth exopod and 2-segmented fourth endopod. §Species that share 3-segmented first endopod, 2-segmented fourth exopod and 3-segmented fourth endopod.

son et Rogers, 1972, *E. ecuadorensis* El-Rashidy et Boxshall, 2002, *E. pitalicus* Thatcher, 1984, *E. megaceros* Wilson, 1914, and *E. versicolor* Wilson, 1911 also presented 2-segmented first endopod (Boxshall *et al.* 2002). Of these, the new species is particularly close to *E. cerastes*, parasitic on North American freshwater catfishes since they share armature of legs and the presence of prominent rosette-like array of blunt spinules on first endopod. Nevertheless, *E. cerastes* differs from new species in presence of 3 setae on first antennary segment, rather than one in new species, and in hook-like shape of the spines of first endopod distal segment, which is not curved in the new species (Roberts 1969).

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