

***Ergasilus chelangulatus* sp. nov. (Copepoda: Ergasilidae) a branchial parasite of the freshwater catfish, *Pimelodus maculatus* from the upper São Francisco River, Brazil ¹**

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ABSTRACT. *Ergasilus chelangulatus* sp. nov. is described from the freshwater fish, *Pimelodus maculatus* Lacépède, 1803 (Siluriformes: Pimelodidae) of the upper São Francisco River, Minas Gerais State, Brazil. The new species is based on female specimens and the male is unknown. This species has a serrate seta on exopod one and a two-segmented first endopod, as do most Amazonian species of this genus. The body is elongate and produced anteriorly. The antennae are elongate and have prominent sensilla on segments two and three. *Ergasilus chelangulatus* sp. nov. can be distinguished from all known species of *Ergasilus* by the fourth antennal segment (claw) which is bent at nearly a right angle.

KEY WORDS. Catfish parasite; copepod parasite; freshwater fish; South America.

RESUMO. *Ergasilus chelangulatus* sp. nov. (Copepoda: Ergasilidae) parasito das brânquias do “mandi”, *Pimelodus maculatus* do alto rio São Francisco, Brasil. *Ergasilus chelangulatus* sp. nov. é descrita do peixe de água doce, *Pimelodus maculatus* Lacépède, 1803 (Siluriformes: Pimelodidae) do alto rio São Francisco, Minas Gerais, Brasil. A nova espécie está baseada em espécimes fêmeas e o macho é desconhecido. Esta espécie tem uma seta serrilhada no primeiro exopodito e tem o primeiro endopodito bi-segmentado, como a maioria das espécies amazônicas deste gênero. O corpo é alongado e projetado anteriormente. As antenas são alongadas com sensila proeminente no segundo e no terceiro segmentos. *Ergasilus chelangulatus* sp. nov. é distinta de todas as outras espécies conhecidas de *Ergasilus* por ter o quarto segmento antenal (garra) dobrado em ângulo quase reto.

PALAVRAS-CHAVE. América do Sul; copépodes parasitos; parasitos de siluriformes; peixes de água doce.

Species of *Ergasilus* are found world-wide and are considered to be one of the plagues of pisciculture. Only the females are found on fish hosts while the males are free-living in the zooplankton. Most species are found on freshwater fishes but a few infect marine fishes of the litoral. YAMAGUTI (1963) reported 69 species of this genus world-wide. HOFFMAN (1998) listed 32 species for North America and THATCHER (2006) cited 15 species of *Ergasilus* from South America (most from the Amazon region). The present paper describes the second species of the genus known from the São Francisco River of Minas Gerais State, Brazil.

MATERIAL AND METHODS

Fish hosts were captured with nets in the upper São Francisco River in the municipality of Três Marias, Minas Gerais State, Brazil. Copepod parasites were removed from the gill filaments with dissecting needles and fixed in 70% alcohol. They were transported to a laboratory of the Universidade Federal do Paraná, Curitiba, Paraná, where permanent slide preparations were made

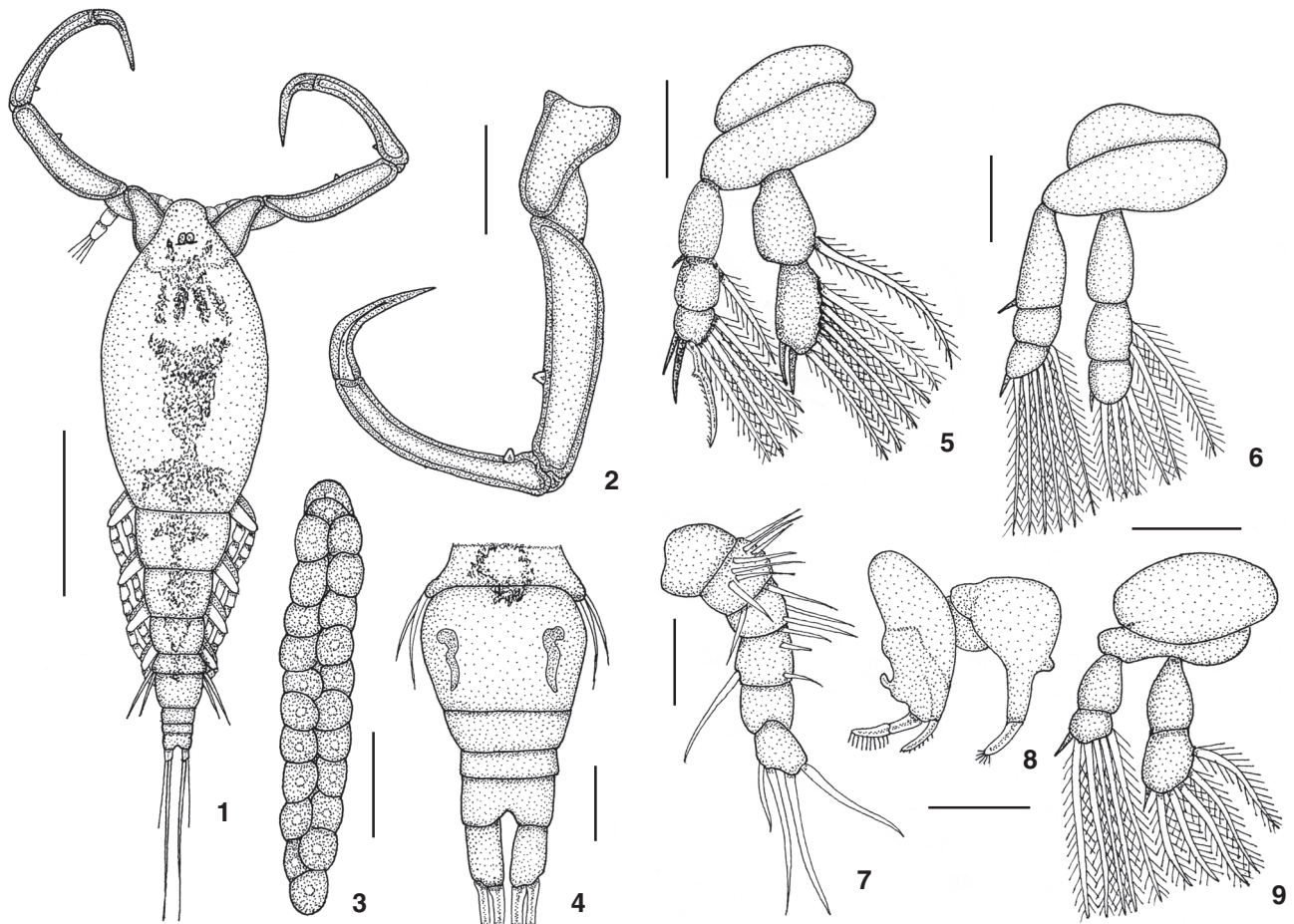
using the phenol-balsam method explained in THATCHER (2006). Digital photographs made through a light microscope were used to make the drawings. Measurements were made utilizing a measuring ocular and are expressed in micrometers.

RESULTS

***Ergasilus chelangulatus* sp. nov.**

Figs 1-9

Species diagnosis (based on 10 females studied and measured; measurements in tables I and II). Body elongate, tapered towards both extremities and projecting anteriorly; head incompletely fused to first thoracic segment; first and second thoracic segments completely fused (Fig. 1). Thorax of five free segments, including genital segment (Figs 1 and 4). Ventral pigment granules centrally located from eye to genital segment. Eye cobalt blue – color 168 of SMITHE (1975); body, indigo blue – color 173 of SMITHE (1975). Abdomen (Fig. 4) of three segments; segment two shortest of three. Uropod with two elongate caudal filaments.



Figures 1-9. *Ergasilus chelangulatus* sp. nov., female, from the catfish, *Pimelodus maculatus* from the upper São Francisco River: (1) entire, dorsal; (2) antenna; (3) egg sac; (4) genital segment and abdomen; (5) leg 1; (6) leg 2 = leg 3; (7) antennule; (8) mouthparts; (9) leg 4. Scales in micrometers: 1 = 200; 2 and 3 = 100, 5 = 50, 4 and 6-9 = 25, 5 = 50.

Antennule (Fig. 7) of six articles, provided with simple setae. Antenna (Fig. 2) of four segments (including claw); prominent sensilla on segments two and three; claw bent to nearly a right angle. Mouthparts (Fig. 8). Mandible with posteriorly directed terminal bristles; palp denticulate posteriorly. Maxilla terminally bristled; maxillule not observed. Legs (Figs 5, 6 and 9). Leg 1 (Fig. 5) endopod two-segmented, exopod three segmented; first endopodal segment with a single pinnate medial seta; terminal endopodal segment with two stout spines and five pinnate medial setae; first exopodal segment with a single postero-lateral spine; second exopodal segment with a single pinnate medial seta; terminal segment with four medial pinnate seta, one curved serate seta and two terminal spines. Leg 2 and leg 3 (Fig. 6) both rami three-segmented; first endopodal segment without spines and setae; second endopodal segment with two medial pinnate setae; terminal segment with four small pinnate setae and one small spine; first exopodal segment with one small lateral spine;

second segment without spines and setae; terminal segment with six pinnate setae and one small spine. Leg 4 (Fig. 9) both rami two-segmented; first endopodal segment without spines and setae; terminal segment with five pinnate setae and one spine; first exopodal segment without spines and setae; terminal segment with five pinnate setae and one spine. Egg sac elongate with few rows of eggs.

Type host: *Pimelodus maculatus* Lacépède, 1803.

Site of infestation: Gill filaments.

Male: Unknown

Type locality: São Francisco River, downstream from the Três Marias Dam (18°12'32"S, 45°15'41"W), State of Minas Gerais, Brazil.

Type specimens: Holotype female and nine paratype females on permanent slides were deposited in the Crustacea Collection of the Instituto Nacional de Pesquisas da Amazonia, Manaus, Amazonas, Brazil.

Table I. Measurements in micrometers (μm) of 10 adult females of *Ergasilus chelangulatus* sp. nov. from *Pimelodus maculatus* of the upper São Francisco river.

	Length		Width	
Body (less caudal filaments)	600 - 770	(651)	169 - 250	(195)
Cephalothorax	250 - 365	(320)	175 - 250	(200)
Free thoracic segments				
III	56 - 87	(69)	115 - 138	(131)
IV	48 - 62	(54)	87 - 112	(103)
V	40 - 50	(47)	40 - 88	(75)
VI	20 - 27	(24)	58 - 76	(66)
VII (genital)	50 - 62	(56)	56 - 69	(64)
Abdominal segments				
I	14 - 22	(17)	45 - 55	(50)
II	8 - 13	(11)	40 - 50	(45)
III	14 - 21	(17)	38 - 50	(42)
Uropod	27 - 35	(29)	14 - 17	(15)
Caudal filament	150 - 250	(213)		
Egg sac	300 - 490	(334)	50 - 70	(59)
Egg (diameter)	35 - 38	(38)		

Table II. Measurements in micrometers (μm) of the antennae of 10 adult females of *Ergasilus chelangulatus* sp. nov. of *Pimelodus maculatus* from the upper São Francisco river.

	Length		Width	
Antennule	87 - 135	(119)	19 - 30	(25)
Antenna				
Segment 1	65 - 112	(82)	50 - 62	(56)
2	180 - 205	(191)	41 - 55	(48)
3	150 - 180	(164)	28 - 40	(34)
4 (claw)	97 - 112	(102)	15 - 24	(19)

Etymology: The specific name is in reference to the bent claw (chel = claw and angulatus = angled).

DISCUSSION

Ergasilus chelangulatus sp. nov. is not closely similar to any known species. It has a curved, serrate seta on the first exopod and a two-segmented first endopod as do most known Amazonian species. The new species bears a superficial resemblance to *Ergasilus cerastes* Roberts, 1969, from North American catfishes, and to *Ergasilus pitalicus* Thatcher, 1984, from Colombian cichlids in that these have similar sensilla and two-segmented first endopods. Both of the latter have three-segmented fourth endopods, however, while the new species has only two segments in that structure. The other two species also lack a curved, serrate seta on the first exopod. *Ergasilus chelangulatus* sp. nov. can be distinguished at a glance from all other known species in the genus by the form of the fourth antennal segment (claw) which is bent into a nearly right angle.

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