

A new species of *Pseudharpinia* (Amphipoda: Haustorioidea: Phoxocephalidae) from Southeastern Brazilian continental shelf

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Abstract

A new species of the amphipod family Phoxocephalidae Sars, 1895, *Pseudharpinia tupinamba* sp. nov., is described from southeastern Brazilian continental shelf. The new species is closely related to the type-species of the genus, *P. dentata* Schellenberg, 1931 described from Magellan Province, and was misidentified as the latter species by some authors in the past. *Pseudharpinia tupinamba* sp. nov. differs from *P. dentata* by the number of articles in the accessory flagellum of antenna 1, ratio of length and width of the propodus of pereopod 6, size of the posteroventral lobe of the basis of pereopod 7, presence of slender setae in posterior margin of epimeral plate 3, presence of a corona of cuticular spines in dorsodistal margin of peduncle of uropod 2, ratio of length of the inner ramus and the first article of outer ramus of uropod 3, ratio of length and width of the telson, and presence of slender setae on the lateral margins of telson. The new described species is the unique of this genus known from the Brazilian continental shelf.

Key words: Taxonomy, Gammaridea, ECOSAN, Ilha Grande Bay, Brazil.

Introduction

The genus *Pseudharpinia* Schellenberg, 1931 has a cosmopolitan distribution and it is widely distributed bathymetrically, with a range from subtidal to abyssal regions, being most commonly known in cold waters and the deep sea. This genus is characterized by anophthalmy, antenna 2 ensiform with facial stout setae on its fourth article, and uropod 3 with article 2 of the outer ramus short. *Pseudharpinia* was grouped into the

subfamily Harpiniinae (sensu Barnard and Drumond, 1978) by presenting the basis of pereopod 5 thin. However, this classification was not based in cladistic analyses and does not support to monophyly of any subfamily of Phoxocephalidae (Taylor and Poore, 2001; Alonso de Pina et al., 2008). *Pseudharpinia* is closely related to *Heterophoxus*, but differs from it by the loss of eyes. It is also closely related to *Harpiniopsis*, being differentiated from the later by having at least one ramus with dorsal robust setae on uropods 1 and 2 continuously

to apex, and stronger ensiform antenna 2 (Barnard and Drumond, 1978; Barnard and Karaman, 1991).

Hitherto, *Pseudharpinia* includes 17 species, three of them recorded from Brazilian waters, two of them from the deep sea (*P. berardo* Senna, 2010 and *P. ovata* Senna, 2010), and another one, *P. dentata* Schellenberg, 1931, from the southeastern continental shelf. The latest, is the type species of the genus, described from Lagotowia, Magellan Province, collected from clay bottoms, has been recorded to the north continental shelf of São Paulo State, in muddy sand (Wakabara *et al.*, 1991; Wakabara and Serejo, 1998; Valério-Berardo *et al.*, 2000). This record was considered an extralimital distribution by Alonso de Pina *et al.* (2008).

After new evaluation of material from the same locality, and additional material from the Yoko Wakabara's collection, collected from Ilha Grande Bay, southern region of Rio de Janeiro State, we observed some important differences that lead us to consider that one as a new species closely related to *P. dentata*. The two other species of *Pseudharpinia* known from Brazilian waters are both exclusively recorded from deep sea.

Material and Methods

The specimens examined in this study were collected by dredge, during the ECOSAN Project, in the campaign of February 2006, aboard of the N/Oc. Prof. W. Besnard. This project was coordinated by the Instituto Oceanográfico da Universidade de São Paulo (IO-USP) and had the aim of evaluating the environmental influences of the estuarine complex of Santos, north coast of São Paulo State, on the ecosystem of the adjacent continental shelf. A single female specimen collected in December 1965 from the Ilha Grande Bay, south coast of Rio de Janeiro State, was also analyzed.

The specimens were dissected under a stereoscopic microscope and mounted in

glycerine gel slides. The illustrations were produced under an optical microscope with a *camera lucida* and digitally prepared according to Coleman (2003). All the material is housed in the Crustacea collection of the Museu Nacional, Universidade Federal do Rio de Janeiro (MNRJ) and preserved in 70% ethanol or glycerine gel slides. The setal classification adopted follows Watling (1989). Nomenclature of gnathopod palm is based on Poore and Lowry (1997).

List of abbreviations used in figures

Hd: Head; A1-2: Antennae 1-2; LL: Lower Lip; Mx1-2: Maxillae 1-2; Md: Mandible; Mp: Maxilliped; Gn1-2: Gnathopods 1-2; P3-7: Pereopods 3-7; Ep1-3: Epimeral plates 1-3; U1-3: Uropods 1-3; T: Telson; d: dorsal; oost: oostegite.

Systematics

Order Amphipoda Latreille, 1816

Suborder Gammaridea Latreille, 1802

Superfamily Haustorioidea Stebbing, 1906

Family Phoxocephalidae Sars, 1895

Genus *Pseudharpinia* Schellenberg, 1931

Genus Diagnosis: Eyes absent. Cephalic dorsal keel present. Flagella of antennae 1 and 2 unreduced in female. Article 2 of antenna 1 shortened, ventral setae widely spread. Article 1 of antenna 2 strongly ensiform; article 4 with one main row of facial stout setae; article 5 thin and short. Mandible, molar not triturative, pillow-shaped, bearing splayed, semiarticulate stout setae; hump of palp small. Maxilla 1, palp 2-articulate. Maxilla 2 weakly setose. Maxilliped, apex of palp article 3 not protuberant, dactyl weakly elongated, apical nail distinct, elongated. Gnathopods 1 and 2 small, similar, carpus short, free, with weak eusirid attachment, palm acute, propodus ovato-rectangular, weakly elongated, poorly setose anteriorly; gnathopod 2 slightly larger than gnathopod 1. Pereopods 3 and 4, carpus, posterior margin setose. Pereopod 5, basis narrow. Pereopods 5 and 6, merus and carpus narrow. Pereopod 7, basis strongly setose anterodistally, posteroventral lobe serrate; ischium enlarged. Epimeral plates 1

and 2 lacking long posterior setae. Urosomite 1 naked; urosomite 3 smooth. Uropod 1, peduncle elongated, without ventroapical spike, without enlarged lateroapical stout seta; rami continuously spinose to apex. Uropod 3, outer ramus article 2 small, with one or two long apical setae. Telson with one to four apical or subapical setae on each lobe, often with dorsolateral setae.

Type species: Pseudharpinia dentata Schellenberg, 1931.

Composition of the genus: The genus *Pseudharpinia* groups 18 species: *P. abyssalis* (Pirlot, 1932); *P. antarctica* Ren, 1991; *P. ayutlanta* (Barnard JL, 1964); *P. berardo* Senna, 2010; *P. birjulini* (Gurjanova, 1953); *P. brevisrostris* (Chevreux, 1920); *P. calcariaria* Bushueva, 1982; *P. cariniceps* (Barnard KH, 1932); *P. cinca* Barnard JL, 1961; *P. dentata* Schellenberg, 1931; *P. excavata* (Chevreux, 1887); *P. inexpectata* Jarrett and Bousfield, 1994; *P. latipes* (Norman, 1900); *P. macrospinosa* Valério-Berardo and Piera, 2006; *P. obtusifrons* (Stebbing, 1888); *P. ovata* Senna, 2010; *P. tupinamba* sp. nov.; and *P. vallini* (Dahl, 1954).

Pseudharpinia tupinamba sp. nov.
(Figs. 1-3)

Pseudharpinia dentata – Wakabara *et al.*, 1991: 74. Wakabara and Serejo, 1998: 579. Valério-Berardo *et al.*, 2000: 63.

Pseudharpinia sic dentata – Alonso de Pina *et al.*, 2008: 29.

Pseudharpinia affinis dentata – Senna, 2010: 2077.

Not *Pseudharpinia dentata* Schellenberg, 1931: 82, fig. 42. – Barnard JL, 1960: 342, pl. 75. Barnard and Drummond, 1978: 534. Alonso de Pina *et al.*, 2008: 29.

Material examined: Holotype: 1 female, 5.5 mm of total length, dissected and drawn, ECOSAN Benthos, *N/Oc. Prof. W. Besnard*, dredge, #7941(3), 24°10'32"S -45°29'10"W, 58 m depth, February 2006, MNRJ 22531. Paratypes: 3 females and 1 juvenile, ECOSAN

Benthos, *N/Oc. Prof. W. Besnard*, dredge, #7941(3), 24°10'32"S -45°29'10"W, 58 m depth, February 2006, MNRJ 22532; 1 female, Y. Wakabara col., without sampling method information, Ilha Grande Bay, without depth information, December 1965, MNRJ 22533.

Etymology: This species is dedicated to the Brazilian native tribe *Tupinambá* that occupied the southeastern Brazilian coast, along the states of Rio de Janeiro and São Paulo, in the vicinity of the type locality of the new species.

Diagnosis: Antenna 1, article 1 dorsally smooth; article 2, anteroventral corner with five long plumose setae. Antenna 2 article 4, facial row of setae with eight simple setae and a displaced papose stout seta, ventral margin with seven long plumose setae and three papose stout seta. Mandible, incisors with six apical spines, accessory setal row with six pectinate setae; right *lacinia mobilis* apically multi-cuspidate. Maxilla 1, inner plate with four small plumose apical setae. Maxilla 2, inner plate with seven apical plumose setae. Gnathopod 1, coxa ventral margin with 14 plumose setae; propodus about 2.5 times longer than wide, palm about 1.5 times longer than posterior margin. Gnathopod 2, coxa ventral margin with nine plumose setae; propodus about 2.5 times longer than wide, palm about 1.5 times longer than posterior margin. Pereopod 3 carpus, posterior margin with seven long curved stout setae. Pereopod 6 basis, anteriorly with a facial row of long plumose setae and four small stout setae, posterior margin slightly concave, proximally with three blunt lobes and four plumose slender setae; carpus, anterior margin with three stout setae. Pereopod 7, posteroventral lobe reaching the distal margin of merus; dactyl strong, about 1.1 times longer than propodus. Epimeral plate 2, ventral margin with five small plumose setae. Epimeral plate 3, ventral margin with three small and two long plumose setae, posterior margin with two small simple setae. Uropod 1, peduncle with dorsoapical corner bearing three stout setae. Uropod 2, dorsodistal margin of peduncle with corona

of cuticular spines, rami continuously bearing trifid stout setae. Uropod 3, inner ramus about 1.1 times longer than peduncle; outer ramus article 2 about 0.1 times as long as article 1, bearing two apical long slender seta. Telson with two apicolateral stout setae on each lobe.

Description: Head, rostrum well developed, unstricted; dorsal keel present; eyes absent. Antenna 1, article 1 dorsally smooth, anterodorsal corner with one slender seta, anteroventral corner with five plumose setae, 1.3 times longer than wide; article 2 about 1.25 times longer than wide, anteroventral corner with five long plumose setae; article 3 shortened, about as long as wide, without setae; flagellum 6-articulated; accessory flagellum 4-articulated. Antenna 2, article 1 strongly ensiform; article 2 short; article 3, anteroventral corner with one stout seta; article 4, facial row of setae with eight simple setae and a displaced papose stout seta, ventral margin with seven long plumose setae and three papose stout seta; article 5 slender, ventrally setose; flagellum 7-articulated. Mandible, incisors with six apical spines, molar not-tritulative, with one slender and one pectinate apical setae, accessory setal row with six pectinate setae, right *lacinia mobilis* apically multi-cuspidate, hump of palp small, palp 3-articulated, article 1 small, slightly wider than long, article 2 elongated, about 5 times longer than wide, 1.2 times longer than article 3, ventroapical corner with two long slender setae, article 3 about 5 times longer than wide, apically and ventrodistally setose. Maxilla 1, inner plate with four small plumose apical setae; outer plate, with two rows of stout setae; palp 2-articulated, article 2 apically setose. Maxilla 2, inner plate about as long as outer plate, apical margin with seven plumose setae, inner and outer margins setulose; outer plate, apical margin with ten slender setae, plus three slender setae extending down the outer margin. Maxilliped, inner plate small, with four apical small plumose setae; outer plate well developed, apical, inner, and outer margins armed with curved blunt setae; palp 4-articulated, article 2 about 2 times longer than wide, and 1.25 times longer than article

3, inner margin armed with simple setae, article 3, inner margin with four slender setae; article 4 slender, slightly elongated, without setae, apical nail present.

Gnathopod 1, coxa slightly expanded anteriorly, anterior and posterior margins somewhat divergent, almost straight, without setae, ventral margin with 14 plumose setae; basis, about 2.4 times longer than wide, posterior margin with three long slender setae; merus, posterior margin with three plumose setae distally; carpus short, free, with weak eusirid attachment; propodus ovato-rectangular, weakly elongated, about 2.5 times longer than wide, anterior margin without setae, anterodistal corner with five slender setae, palm acute, sinuous, about 1.5 times longer than posterior margin, defined by a lateral stout seta; dactyl curved, reaching the palmar corner. Gnathopod 2 slightly larger than gnathopod 1, coxa sub-rectangular, about 1.7 times longer than wide, anterior margin almost straight, without setae, posterior margin straight, without setae, ventral margin with nine plumose setae; basis, about 3.5 times longer than wide, posterior margin with two long slender setae, posteroventral corner with two long plumose setae; merus, posterodistal corner produced, posterior margin with five plumose setae; carpus short, free, with weak eusirid attachment; propodus ovato-rectangular, weakly elongated, about 2.5 times longer than wide, anterior margin without setae, anterodistal corner with three long slender setae, palm acute, sinuous, about 1.5 times longer than posterior margin, defined by a lateral stout seta; dactyl curved, reaching the palmar corner. Pereopod 3, coxa sub-rectangular, about 1.5 times longer than wide, anterior margin almost straight, without setae, posterior margin almost straight, without setae, ventral margin with seven slender setae, increasing in length posteriorly; basis, about 2.9 times longer than wide, anterior margin with simple setae, posterior margin with six long setae distally; ischium with one row of five simple setae posterodistally; merus, carpus, and propodus, length ratio = 16:10:11; merus, posterior margin with six sets of simple setae (1-3-4-3-3-5); carpus, posterior margin with seven long stout setae and one lateral row of

three slender setae; propodus with four lateral slender setae distally; dactyl about 0.6 times as long as propodus. Pereopod 4, coxa 1.3 times wider than long, anterior margin slightly convex, posterior margin broadly rounded, ventral margin with eight slender setae, posterodorsal margin excavate; basis, about 2.6 times longer than wide, anterior margin with one slender setae, posterior margin with six long slender setae, posteroventral corner with three plumose setae; merus, carpus, and propodus, length ratio = 17:11:10; merus, posterior margin with long simple setae; carpus, posterior margin with ten long setae, and a lateral row of six slender setae; propodus with a lateral row of nine long slender setae; dactyl about 0.8 times as long as propodus. Pereopod 5, coxa bilobate, anteroventral lobe with three plumose setae and two setules; basis slender, about 2.7 times longer than wide, posterior margin with one long plumose seta, posteroventral corner with two long plumose setae; ischium with three plumose setae posterodistally; merus, carpus, and propodus, length ratio = 10:10:11; merus, anterior margin with five plumose setae, anteroventral corner with a row of four stout setae, posterior margin with five sets of plumose setae (2-2-3-3-3), lateral face with a row of six stout setae posteroventrally; carpus, anterior margin setose, posterior margin with five sets of plumose setae (2-3-3-5-3); propodus, anterior margin densely setose, posterior margin densely setose; dactyl about 0.7 times as long as propodus. Pereopod 6, coxa small, slightly expanded posteroventrally, without setae; basis without posterior expansion, about 1.7 times longer than wide, anteriorly with a facial row of long plumose setae and four small stout setae, anterior margin broadly convex, posterior margin slightly concave, proximally with three blunt lobes and four plumose slender setae, distally densely setulose; merus, carpus, and propodus, length ratio = 5:5:6; merus, about 2.5 times longer than wide, anterior margin with small stout setae distally, posterior margin without setae, posteroventral corner with two stout setae; carpus, about 3 times longer than wide, anterior margin with three small stout setae, posterior margin without setae; propodus thin, about 8 times

longer than wide, anterior margin with seven long slender setae, posterior margin without setae; dactyl thin, about half long as propodus, with one apical setule. Pereopod 7, coxa slightly expanded posteroventrally; basis, strongly expanded posteriorly, anterior margin with one small stout seta distally, anteroventral corner with three long plumose setae, posterior margin strongly serrate, with one plumose seta on each notch, posteroventral lobe reaching the distal margin of merus; ischium enlarged, anterior margin with four long plumose setae; merus, carpus, and propodus, length ratio = 8:5:5; merus, about 1.9 times longer than wide, anterior margin with two slender setae, posteroventral corner produced with one slender seta; carpus, about twice longer than wide, anterior margin with two slender setae, anteroventral corner with two slender setae, posteroventral corner with two slender setae; propodus, about 2.7 times longer than wide, anteroventral corner with one slender seta, posteroventral corner with one slender seta; dactyl strong, about 1.1 times longer than propodus. Oostegites fully developed, elongate, slender, marginally setose, present on coxae 2-5.

Epimeral plate 1 subrectangular, without setae. Epimeral plate 2, ventral margin with five small plumose setae, posterior margin without setae. Epimeral plate 3, ventral margin with three small and two long plumose setae, posterior margin with two small simple setae, posteroventral corner produced in a curved upwards acute process. Uropod 1, peduncle elongated, about 3 times longer than wide, dorsal margin without setae, dorsoapical corner bearing three stout setae; outer ramus about 0.8 times as long as peduncle, dorsal margin with eight stout setae and three slender setae continuously to apex; inner ramus slightly shorter than outer, dorsal margin with eight stout setae continuously to apex. Uropod 2, peduncle about 2.3 times longer than wide, dorsodistal margin of peduncle with corona of cuticular spines, dorsal margin with five slender setae, ventroapical corner with two slender setae; outer ramus, slightly longer than peduncle, dorsal margin bearing seven trifid stout setae continuously to apex,

ventral margin bearing six trifold stout setae continuously to apex; inner ramus slightly shorter than peduncle, ventral margin bearing six trifold stout setae continuously to apex. Uropod 3, peduncle short, about 1.7 times longer than wide, dorsal and ventral margins without setae, distal margin continuously setose; inner ramus about 2.5 times longer than wide, and slightly longer than peduncle, bearing two long slender setae apically; outer ramus 2-articulated, about 1.5 times longer than peduncle and 1.4 times longer than inner ramus, article 1 about 1.2 times longer than inner ramus, dorsal margin with seven slender setae, dorsoapical corner with one long slender seta, ventroapical corner with one slender seta, article 2 about 0.15 times as long as article 1, bearing two apical long slender setae. Telson slightly wider than long, deeply cleft, about 80% of its length, apical margin slightly rounded, with two apicolateral stout setae on each lobe.

Remarks: *Pseudharpinia tupinamba* sp. nov. shares all the diagnostic character states of the genus. However, it presents two exclusive characters that differentiate it from all the other species in the genus, the basis of pereopod 6 with three blunt lobes in the posterior margin and the uropod 2 peduncle with a corona of cuticular spines. The new species is closely related to *P. dentata* but it can be distinguished from the latter by a few of morphological features. *Pseudharpinia dentata* is characterized by the head about twice longer than wide in dorsal view; maxilla 2, inner plate with inner and outer margins without setules; gnathopods 1-2, ventral margin of coxa beset by simple setae, with plumose setae only posteriorly; pereopod 5, only merus a posterodistal row of stout setae, carpus without distal rows of stout setae; pereopod 6, basis, anterior margin continuously beset by long slender setae, posterior margin beset by slender setae, but without blunt lobes and not densely setulose distally, merus and carpus, anterior margin continuously with sets of setae, propodus 10 times longer than wide; pereopod 7, basis with posteroventral lobe reaching the distal margin of ischium; epimeral plate 1, ventral margin with slender setae; epimeral plate 3, ventral margin continuously beset by slender

setae, posterior margin without setae; uropod 2, dorsodistal margin of peduncle without corona of spines or setae, rami without trifold stout setae; uropod 3, inner ramus subequal in length to the first article of the outer ramus; and telson with lateral and apical setae. On the other hand, the new Brazilian species is characterized by presenting head about as long as wide in dorsal view; maxilla 2, inner plate with inner and outer margins beset by setules; gnathopods 1-2, ventral margin of coxa beset by plumose setae; pereopod 5, merus and carpus, both with an anterodistal and a posterodistal row of stout setae; pereopod 6, basis, anteriorly with a facial row of long plumose setae and four small stout setae, posterior margin proximally with three blunt lobes and four plumose setae, distally densely setulose, merus and carpus, anterior margin with sparse small stout setae, propodus 8 times longer than wide; pereopod 7, basis with posteroventral lobe reaching the distal margin of merus; epimeral plate 1 without setae; epimeral plate 3, ventral margin with five plumose setae and posterior margin with two small setae; uropod 2, dorsodistal margin of peduncle with corona of cuticular spines, rami bearing trifold stout setae continuously to apex; uropod 3, inner ramus shorter than the first article of the outer ramus; and telson only with apicolateral setae.

The other two species of *Pseudharpinia* recorded to Brazilian waters, are known only from the Campos Basin deep sea, off the Northern Rio de Janeiro State coast. *Pseudharpinia tupinamba* sp. nov. is the unique species of this genus known from the Brazilian continental shelf. That is remarkable because show us the lack of knowledge about the Brazilian marine biodiversity in times of the world taxonomy crises.

Additional comment: Barnard (1960) describes the dorsal keel of the head being striated. However, we observed that the dorsal keel in *P. tupinamba* sp. nov. presents in fact a great sequence of pores followed by thin canals, probably of nervous origin, indicating a sensory function to this keel.

Geographic distribution: Known from the type locality (24°10'32"S - 45°29'10"W, off the estuarine complex of Santos, north coast of São Paulo State) and Ilha Grande Bay,

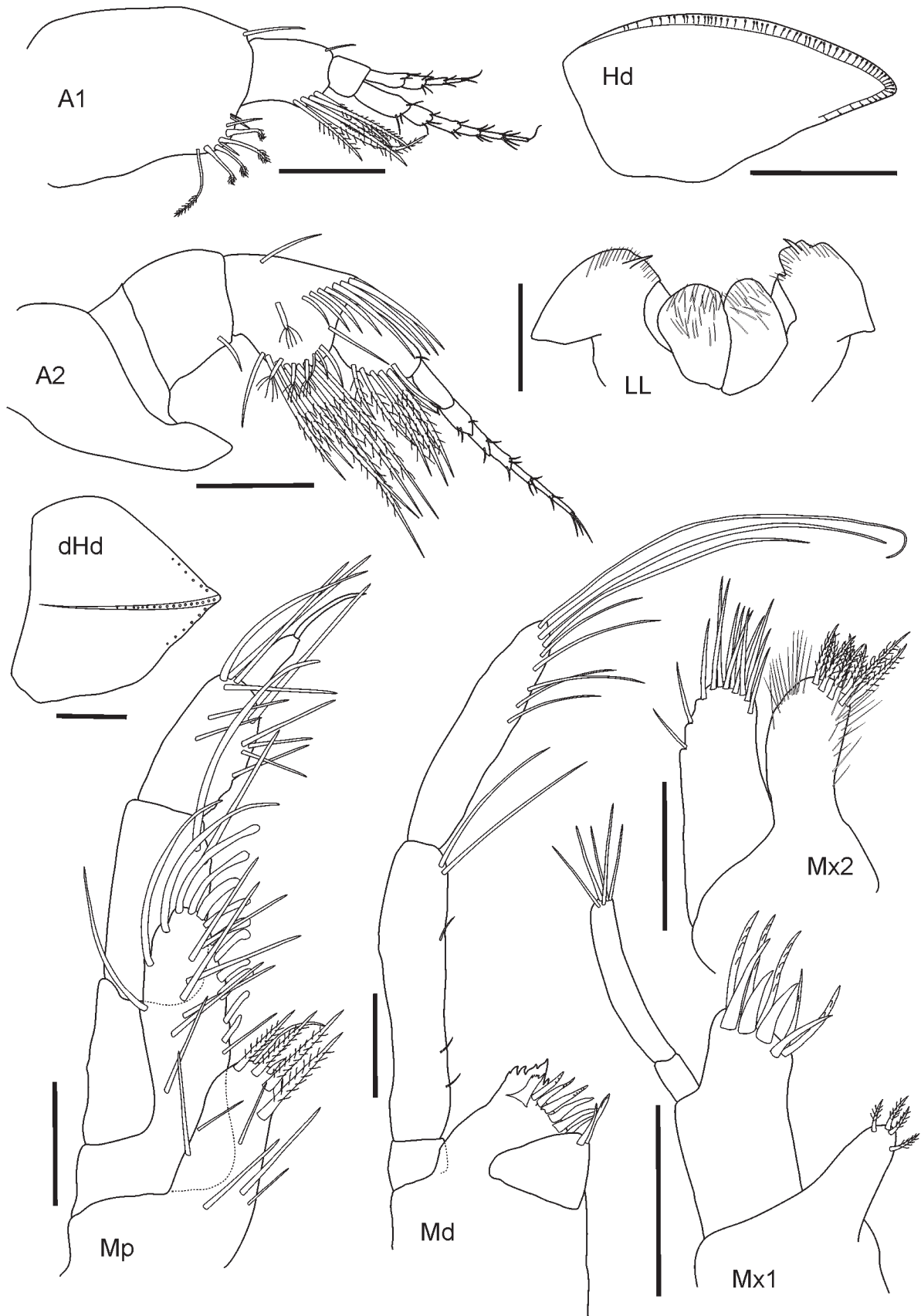


Figure 1. *Pseudharpinia tupinamba* sp. nov., female, 5.5 mm, ECOSAN Benthos, 24°10'32"S - 45°29'10"W, 58 m depth, February 2006, MNRJ 22531. Scale bars: 0.5 mm for (d)Hd; 0.2 mm for A1-2; 0.1 mm for the remains.

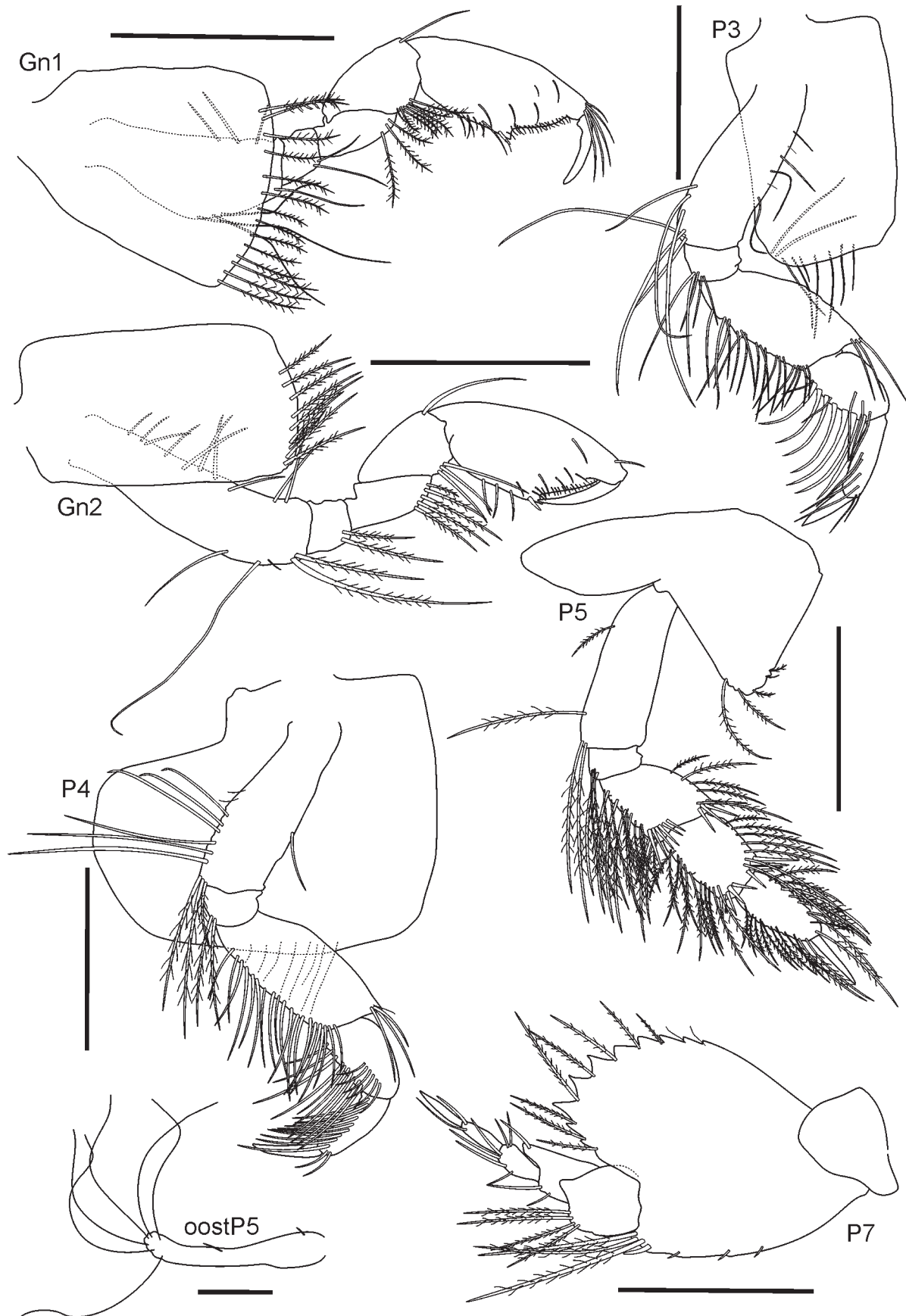


Figure 2. *Pseudharpinia tupinamba* sp. nov., female, 5.5 mm, ECOSAN Benthos, 24°10'32"S - 45°29'10"W, 58 m depth, February 2006, MNRJ 22531. Scale bars: 0.2 mm for oostP5; 0.5 mm for the remains.

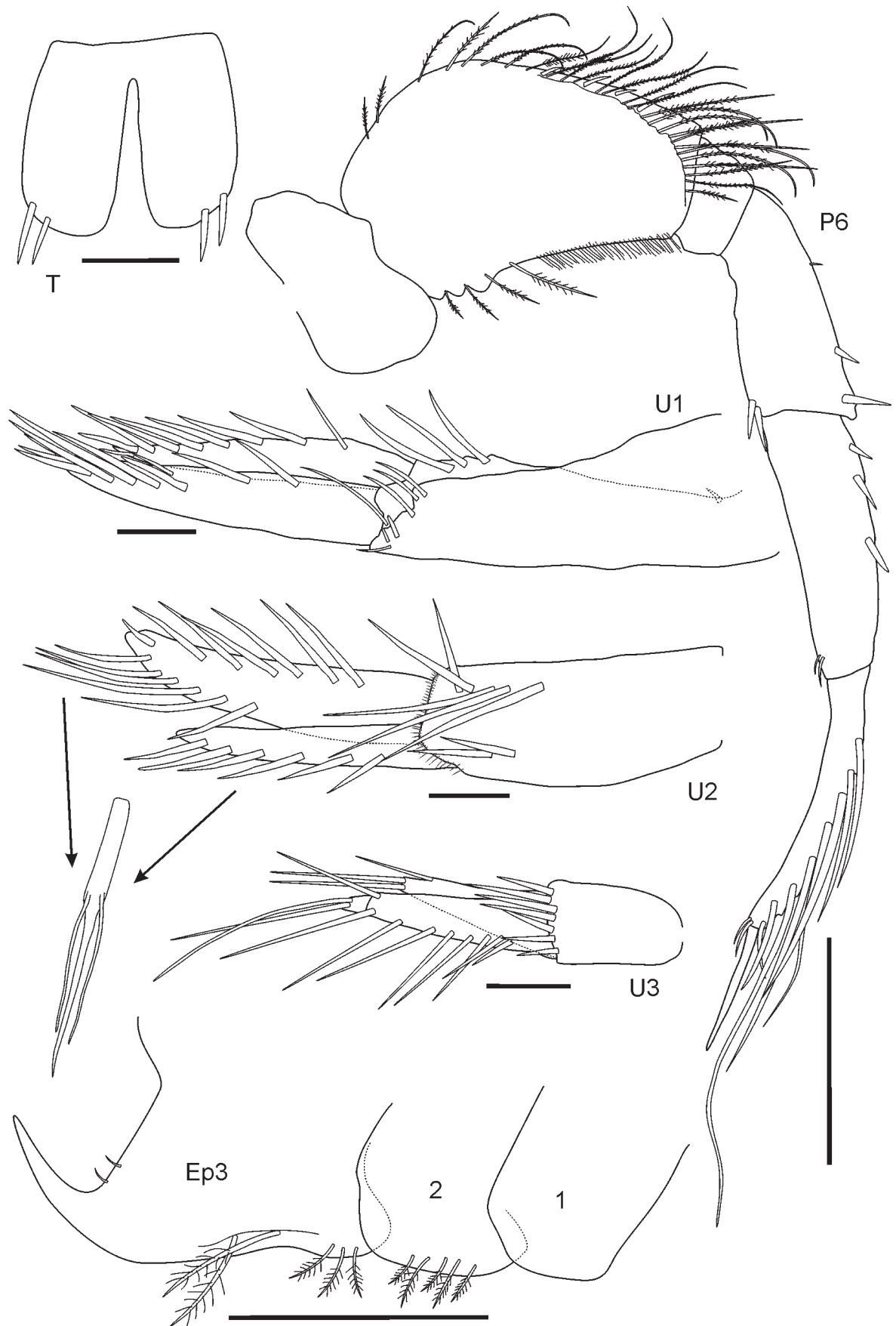


Figure 3. *Pseudharpinia tupinamba* sp. nov., female, 5.5 mm, ECOSAN Benthos, 24°10'32"S - 45°29'10"W, 58 m depth, February 2006, MNRJ 22531. Scale bars: 0.5 mm for P6 and Ep1-3; 0.1 mm for the remains.

southern Rio de Janeiro State.

Bathymetric range: Collected at 58 m depth in the type locality. There is no depth information for the sample of Ilha Grande Bay.

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