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New discoveries for the subfamily Phtisicinae Vassilenko, 1968 (Crustacea: Senticaudata) from the Brazilian coast

Fábio da Motta MAURO [1,*], Priscila Soares do NASCIMENTO [2] & Cristiana Silveira SEREJO [3]

[1,2,3] Programa de Pós-Graduação em Ciências Biológicas (Zoologia), Museu Nacional/Universidade Federal do Rio de Janeiro, RJ, 20940-040, Brazil.
[1,2,3] Museu Nacional, Universidade Federal do Rio de Janeiro, Laboratório de Carcinologia, RJ, 20940-040, Brazil.

[*] Corresponding author: fabiologia87@gmail.com
[2] Email: nascimentops23@gmail.com
[3] Email: csserejo@acd.ufrj.br

[1] urn:lsid:zoobank.org:author:EA6D510C-FCB8-424C-B05F-86A60A3C0C4
[2] urn:lsid:zoobank.org:author:2B1ADA77-D153-4C76-A258-1F67B11D2C85
[3] urn:lsid:zoobank.org:author:A86225AE-51C8-4D01-9D3E-60FB5B1FE85C

Abstract. Amphipod material collected from Brazil on Ilha do Arvoredo, (Santa Catarina), Campos Basin, (Rio de Janeiro) and Espírito Santo Basin (Espírito Santo) in the southwestern Atlantic Ocean yielded new taxonomic findings for the subfamily Phtisicinae Vassilenko, 1968. *Hemiproto wigleyi* McCain, 1968, previously recorded from the Gulf of Mexico to the Caribbean Sea, is herein redescribed and recorded for the first time from the Brazilian coast. The type material of *Phtisica verae* Quitete, 1979, a poorly described species recorded from Brazil and based only on its original description, was examined and considered herein as a junior synonym of *P. marina* Slabber, 1769, a well-known and widely distributed species from the Atlantic Ocean and the Mediterranean Sea. In this paper, *Phtisica marina* is redescribed, with its two morphotypes of male gnathopod two, and compared with previous descriptions. The geographic distribution of both *H. wigleyi* and *P. marina* is provided.

Keywords. Crustacea, taxonomy, redescription, Caprellidae, Atlantic.

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Introduction

Caprellids are one of the frequently groups of Crustacea inhabiting mainly shallow water ecosystems, especially in tropical to temperate regions (Takeuchi & Lowry 2015). They are part of an amphipod group that exhibits degenerated abdomens and pereopods 3–4 variously reduced (Barnard & Karaman 1991; Laubitz 1993; Ito *et al.* 2008). However, their classification has changed over the last 30 years

as a result of some controversial evolutionary scenarios (Laubitz 1976, 1993; Takeuchi 1993; Ito *et al.* 2008). The former suborder Caprellidea Leach, 1814 comprised seven families: Caprellidae Leach, 1814, Caprellinoididae Laubitz, 1993, Caprogammaridae Kudrjaschov & Vassilenko, 1966, Paracercopidae Vassilenko, 1968, Pariambidae Laubitz, 1993, Phtisicidae Vassilenko, 1968 and Protellidae McCain, 1970. Laubitz (1993) proposed an evolutionary scenario based on a combination of character states of the mouthparts, pereopods 3–4 and degrees of abdomen reduction, treating the Caprellidea as a polyphyletic group that branched into two distinct lineages, thus forming two groups. Group one consists of Paracercopidae, Caprellinoididae, Cyamidae Rafinesque, 1815 and Phtisicidae whereas group two consists of Caprogammaridae, Caprellidae, Protellidae and Pariambidae. Later, Laubitz (1993) suggested that phtisicids must have split before the paracercopids were established due to unique characters, such as multiarticulate flagellum of antenna two, accessory cutting plates on the mandible, chisel-like teeth on the maxilliped inner plate and fully-developed 6–articulate pereopods 3–4. The fully-developed and functional pereopods 3–4 of the Phtisicidae are a unique character state among the caprellids and, therefore, imply the reacquisition or multiple losses of pereopods 3–4 within caprellid lineages (Ito *et al.* 2011). Myers & Lowry (2003) reestablished the relationship of the caprellids within the corophioids and treated them within the suborder Corophioidea Leach, 1814, which includes the superfamily Caprelloidea Leach, 1814 with five families, namely Caprellidae (including subfamilies Caprellinae Leach, 1814, Paracercopinae Vassilenko, 1972 and Phtisicinae Vassilenko, 1968), Caprogammaridae, Cyamidae, Dulichiidae Dana, 1849 and Podoceridae Leach, 1814. More recently, the family Caprellidae was accepted as part of the recently erected suborder Senticaudata Lowry & Myers, 2013, infraorder Corophiida, superfamily Caprelloidea, including the same five families assigned previously (Lowry & Myers 2013, 2017). This classification is followed in the present study, although many arguments regarding molecular and morphological aspects have been presented against the validity of the suborder Senticaudata, which remains controversial. (Verheye *et al.* 2015; d'Udekem d'Acoz & Verheye 2017).

The family Caprellidae Leach, 1814 has nearly 430 described species, distributed in 90 genera and three subfamilies, namely Caprellinae Leach, 1814 (58 genera), Paracercopinae Vassilenko, 1972 (three genera), and Phtisicinae Vassilenko, 1968 (29 genera) (Horton *et al.* 2018).

Along the Brazilian coast, 25 Caprellidae species have been recorded to date, including two species of the subfamily Phtisicinae: *Phtisica marina* Slabber, 1769, widely distributed in the Atlantic Ocean and the Mediterranean Sea, and *Phtisica verae* Quitete, 1979, a poorly described species, with records based only on its original description from Angra dos Reis, RJ and Ubatuba, SP (Quitete 1979; Mauro & Serejo 2015; Serejo & Siqueira 2018). In the present study, we examined the type material of *P. verae* and concluded that it is a junior synonym of *P. marina*. Furthermore, *Hemiproto wigleyi* McCain, 1968, previously from Florida, Gulf of Mexico, and the Caribbean Sea (LeCroy *et al.* 2009; Martin *et al.* 2013) is redescribed and recorded from the first time for the Brazilian coast, in the Espírito Santo Basin.

Material and methods

Samples of *Phtisica marina* and *Hemiproto wigleyi* were provided from two projects coordinated by CENPES/PETROBRAS: 1. Project HABITATS (Environmental Heterogeneity of the Campos Basin) with samples collected from the Campos Basin (25–150 m) from 2008 to 2009, using a Van Veen grab 92 × 80 × 40 cm (Ribeiro-Ferreira *et al.* 2017); 2. Project AMBES (Marine environmental characterization of the Espírito Santo Basin and north of the Campos Basin portion) with samples collected from the Espírito Santo Basin and north of the Campos Basin portion (12–150 m) from 2010 to 2013, using a Van Veen grab 92 × 80 × 40 cm and Box Corer 50 × 50 × 50 cm. Additionally, the type material of *P. verae* was loaned from the collection of the Department of Zoology / Instituto de Biologia / UFRJ (CDZRJ) and examined for comparison. In addition, some samples from Ilha do Arvoredo, Santa Catarina, were examined and included in the present analysis.

All material was preserved in 70% ethanol and deposited in the Crustacean Collection of the Museu Nacional (MNRJ). Due to the brittleness of the caprellidean body, the posterior legs (pereopods 5–7) often drop off during the sampling process and they were missing in most samples. The specimens were examined using notes on their most informative and well-preserved features. The most suitable specimens were selected for drawing and dissection. Specimens were dissected under a stereo microscope. Appendages and mouthparts were mounted on glass slides with gelatin-glycerol and illustrated with camera lucida using the optic microscope ZEISS Axioscope. The setal formula used for the last article of the mandibular palp complies with the formula proposed by McCain (1968). For general caprellid morphological nomenclature, see Guerra-García (2006).

List of abbreviations used in the figures*:*

abd	=	abdomen
gn	=	gnathopod
h	=	head
lb	=	labium
lbr	=	labrum
mdb(l)	=	left mandible
mdb(r)	=	right mandible
mdb(p)	=	mandible palp
mx	=	maxilla
mxp	=	maxilliped
p	=	pereopod
pl	=	pleopod
pln	=	pleon
pn	=	pereonite

Results

Systematics

Class Malacostraca Latreille, 1802
Order Amphipoda Latreille, 1816
Suborder Senticaudata Lowry & Myers, 2013
Family Caprellidae Leach, 1814
Subfamily Phtisicinae Vassilenko, 1968

Diagnosis

Antenna flagellum with up to 14 articles, with swimming setae present only on last 2–3 articles; molar absent, incisor 6-toothed, gill plates present on pereonites 2–4; pereopods 3–4 6-articulate; pereopod 5–6-articulate (adapted from Myers & Lowry 2003).

Genus ***Hemiproto*** McCain, 1968

Included species: *Hemiproto wigleyi* McCain, 1968 (type species by monotypy).

Diagnosis

Flagellum of antenna 2 2–4-articulate; swimming setae absent; mandibular palp 3–articulate; setal formula for terminal articles 1–x–1 or 1–1; outer plate of maxilliped equal to inner plate; pereopods 3–4 6-articulate, pereopod 5 5-articulate; male abdomen with two pairs of small 1-articulate appendages, female abdomen with one pair of small 1-articulate appendages (adapted from McCain 1968).

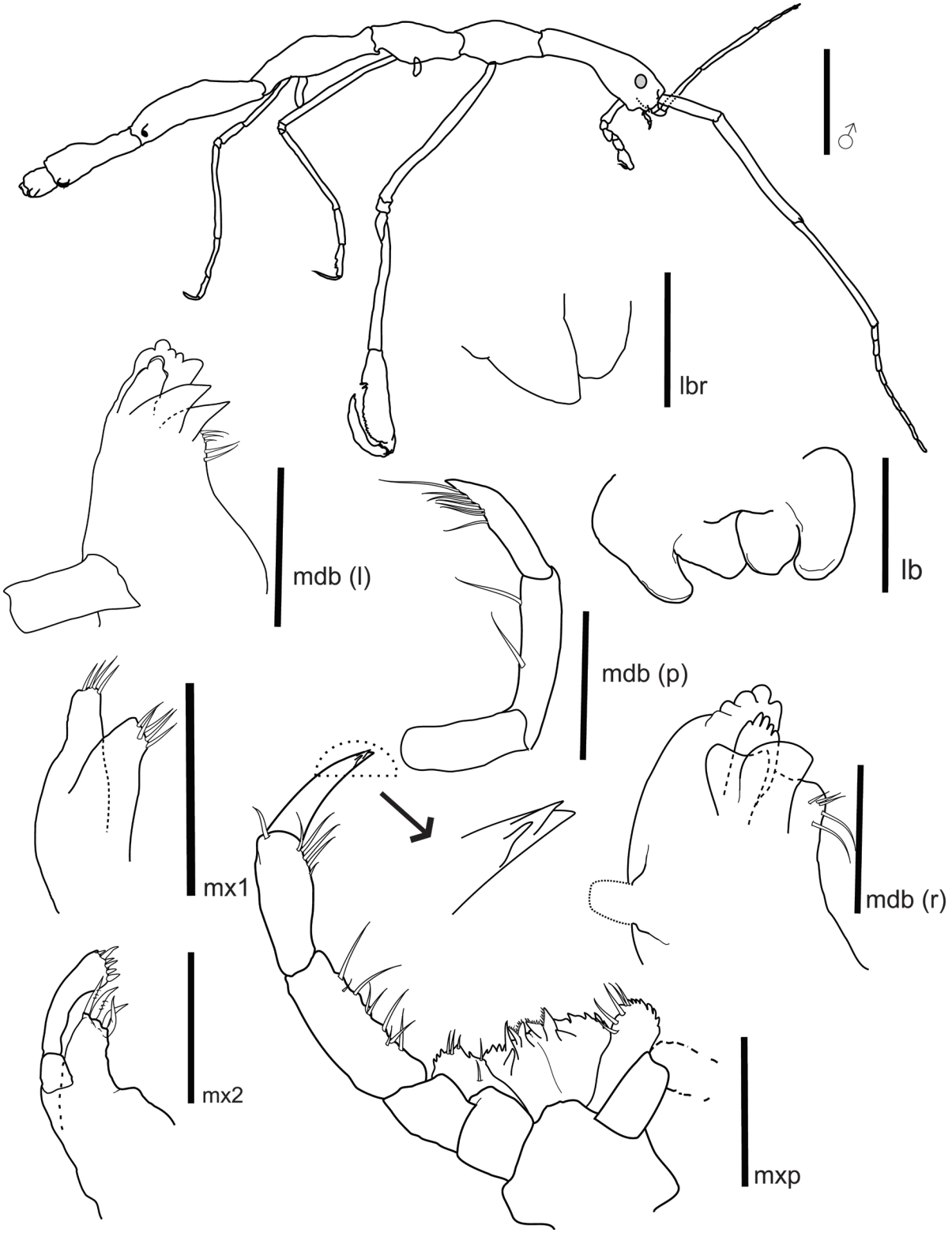

Fig. 1. *Hemiproto wigleyi* (McCain, 1968). Male, 8.36 mm, Campos Basin, RJ (MNRJ 25515). Scale bars: habitus = 0.5 mm; lb, lbr, mx1, mx2, mdb(l), mdb(r), mxp = 0.1 mm.

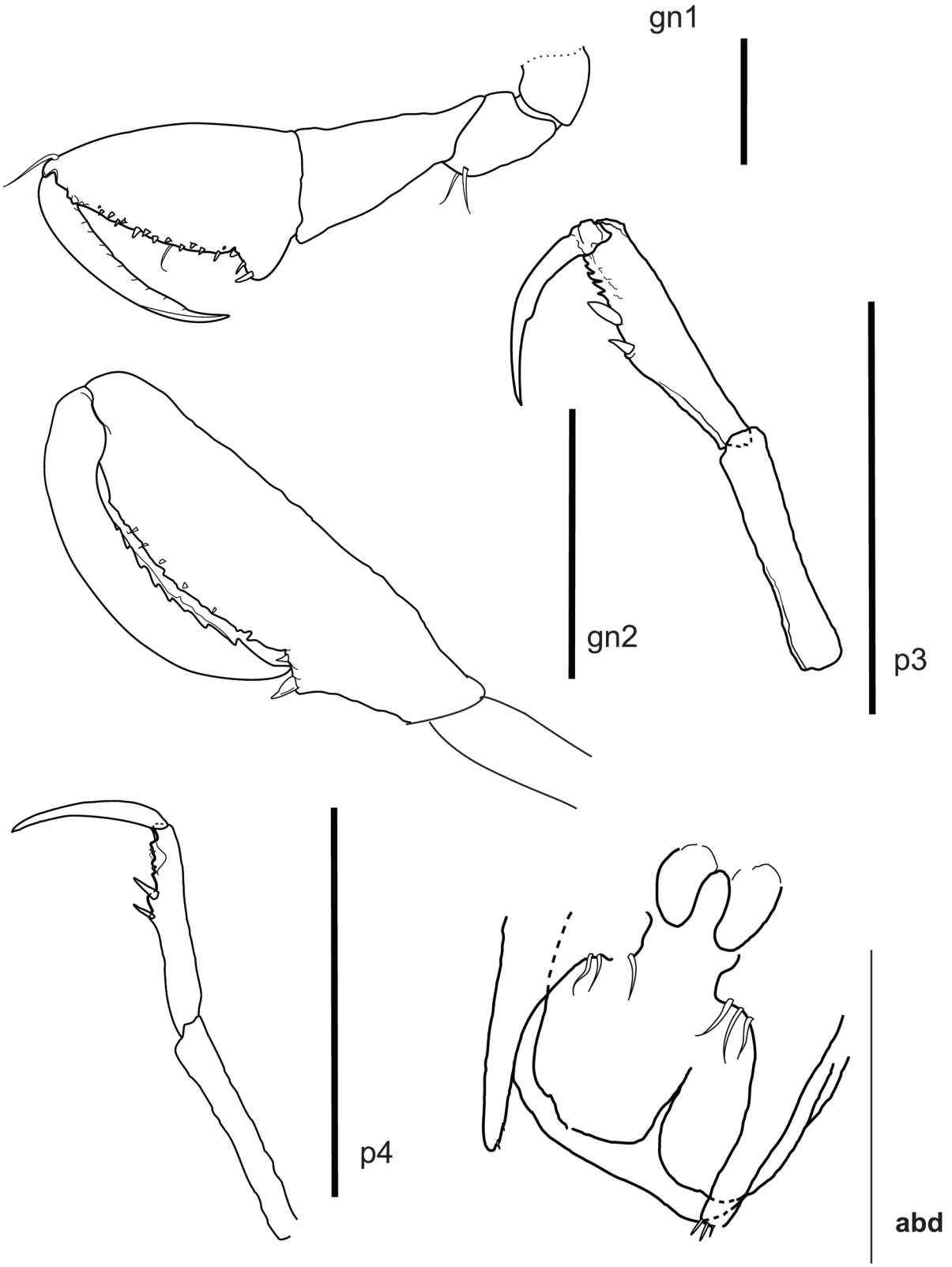

Fig. 2. *Hemiproto wigleyi* (McCain, 1968). Male, 8.5 mm, Campos Basin, RJ (MNRJ 25515). Scale bars: gn1, abd = 0.1mm; gn2, p3, p4 = 0.1 mm.

Hemiproto wigleyi McCain, 1968
Figs 1–2

Hemiproto wigleyi McCain, 1968: 65, figs 31, 32C–E, 50.

Hemiproto wigleyi – McCain & Steinberg 1970: 51. — Díaz *et al.* 2005: 24, fig. 15. — Winfield *et al.* 2006: 102. — LeCroy *et al.* 2009: 965. — Ortíz & Lalana 2010: 87. — Martin *et al.* 2013: 1703. — Winfield & Ortiz 2013: 167.

Diagnosis

Antenna 1 slightly smaller than body length, flagellum with nine articles, articles 2–3 much longer than article 1. Antenna 2 flagellum with four articles. Gill pairs on pereonites 2–4.

Material examined

BRAZIL – **Espírito Santo Basin, ES** • 1 ♂ (used for description); 21°2′45.42″ S, 40°32′28.74″ W; 105 m; 6.26 mm; MNRJ 25515 • 1 juvenile; 18°52′31.22″ S, 39°8′42.51″ W; 34 m; MNRJ 25512 • 8 ♂♂; 21°2′45.42″ S, 40°32′28.74″ W; 105 m; MNRJ 25513 • 5 ♂♂; 20º11′25.35″ S, 40º2′16.02″ W; 39 m; MNRJ 25514 • 3 ♂♂; 20°12′19.99″ S, 39°57′59.47″ W; 34 m; MNRJ 25516.

Redescription

Head. Left mandible with 5-toothed incisor, 5-toothed *lacinia mobilis*, and two accessory plates, row of eight lateral setae; palp 3-articulate, last article setal formula 1–5–1. Right mandible with 5-toothed incisor, *lacinia mobilis* smooth, two accessory plates and a row of five slender setae; labium outer lobe wing-shaped, inner lobe small. Labrum apically acute. Maxilla 1 outer lobe with four robust apical setae, palp with six robust apical setae. Maxilliped palp second article with six lateral setae and two very small setae inserted at medium-lateral part, article 3 with distal row of five setae; distal article with three tooth-like apical projections; outer plate serrate, four setae at top and one inserted at middle border; inner plate strongly serrate with pair of two pectinate acute projections at medial-distal apex, pair of robust setae on ventral-medial part.

Thorax. Gnathopod 1 carpus much longer than ischium and merus, expanding from middle, largest width at distal part; propodus with three proximal grasping setae, palm with about 12 small and robust setae, dactylus smooth. Gnathopod 2 carpus strongly elongate, propodus with two proximal grasping setae, proximal subquadrate indent, palm irregularly serrate, three times as long as wide; dactylus strongly serrate. Pereopods 3–4 merus longer than following articles, with two proximal robust setae, and serrate projections distally; dactylus smooth. Pereopods 5–7 missing.

Abdomen. One pair of small anterior pyriform, appendages; pair of lobes smooth and pair of very elongate posterior appendages, 1-articulate, with three proximal and three distal setae.

Distribution (Figs 6–7)

Type locality: Hancock Atlantic Expedition sta. A32-39, 3 miles N. Coche Island, Nueva Sparta, Venezuela, 35–60 m (McCain 1968). Other localities: **Atlantic Ocean:** Fort Lauderdale, Florida; California (McCain 1968); Santa Maria Basin region, Florida (Watling 1997), Falcón, Venezuela (Díaz *et al.* 2005), Gulf of Mexico (LeCroy *et al.* 2009; Winfield *et al.* 2006, Winfield & Ortiz 2013), Caribbean Sea (Ortíz & Lalana 2010; Martin *et al.* 2013). **Brazil**: Espírito Santo Basin, Brazil (present study). Depth range: 32–105 m (Díaz *et al.* 2005; Ortíz & Lalana 2010; present study).

Genus ***Phtisica*** Slabber, 1769

Included species: *Phtisica antillensis* (Mayer, 1903); *Phtisica marina* Slabber, 1769.

Diagnosis

Antenna 2 flagellum 2–5 articulate. Swimming setae absent. Mandible palp 3-articulate, setal formula 1–x–y–1, molar absent. Maxilliped external plate equal to or little larger than outer plate. Pereopods 3–4 6-articulate, pereopod 5 5-articulate. Male abdomen with two lobes, three pair of appendages. Female abdomen with two appendages and pair of lobes (modified from McCain 1968).

Phtisica marina Slabber, 1769
Figs 3–5

Phtisica marina Slabber, 1769: 79, figs 1–3; type locality: Zeeland.

Proto elongatus Dana, 1853: 810, pl. 54, fig. 1.
Phtisica verae Quitete, 1979: 6–7; figs 1, 2.

Phtisica marina – Sars 1895: 646–648, figs 233. — McCain 1968: 91, figs 46–47 (see extensive synonymy). — Krapp-Schickel 1993: 806, figs 549–550. — Conradi *et al.* 1997: 98–110. — Serejo 1998a: 381. — Wakabara & Serejo 1998: 582. — Winfield *et al*. 2006: 102. — LeCroy *et al.* 2009: 965. — Lacerda & Masunari 2011: 372, figs 3c; 10. — Martin *et al.* 2013: 1703. — Mauro & Serejo 2015: 124 (key).
Proto ventricosa — Oliveira 1940: 140.
Phtisica verae — Wakabara & Serejo 1998: 582. — Lacerda & Massunari 2011: 366.

Diagnosis

Body smooth, head about same as long as pereonite 2 length. Antenna 1 variable in length, from 0.5 times body length to equal. Pereonites 2–4 with pairs of gills, first pair smaller. Pereopods 3–4 propodus with 4–5 robust setae. Morphotype I gnathopod 2 merus and carpus not expanded, palm slightly membranous, lobes absent; pereopod 3 dactylus with single setae row. Morphotype II gnathopod 2 merus and carpus slightly expanded, propodus with 3–4 membranous lobes. Male abdomen with pair of 2-articulate appendages and one pair of pyriform appendages.

Material examined

BRAZIL – **Rio de Janeiro** • 1 ♂ (used for description of morphotype II); Angra dos Reis; 24 m; 12.2 mm; CDZRJ 1014 • 1 ♂ (used for description of morphotype I); Campos Basin; 22º19′27.06″S, 40º37′25.12″W, 75m; 11.7mm; MNRJ29413 • 15 ♂♂; Campos Basin; 22º19′27.06″ S, 40º37′25.12″ W; 75 m; MNRJ 23483 • 18 ♂♂, 8 ♀♀; Campos Basin; 23º36′14.903″ S, 41º21′29.953″ W; 99 m; MNRJ 23488 • 5 ♂♂, 7 ♀♀; Campos Basin; 22º12′33.09″ S, 40º13′24.96″ W; 30 m; MNRJ 23485. – **São Paulo** • 1 ♀ (*P. verae* allotype); Ubatuba, Enseada do Flamengo; 20 m; 9.8 mm; CDZRJ 1012 – **Santa Catarina** • 1 ♂, 1 ♀; Ilha do Arvoredo; 3 m; MNRJ 19421

Redescription

Head. Labrum outer and inner lobes well demarcated, inner lobe rounded and solid, with row of minute setae. Maxilla 1 outer lobe with five setae and two minute, robust setae; palp 2-articulate with three distal-lateral setae and row of six apical setae. Maxilla 2 external lobe with six apical setae; inner lobe with five apical setae. Left mandible incisor 5-toothed, *lacinia mobilis* 5-toothed and two accessory plates, row of 12 lateral setae, palp 3-articulate, first article with two distal setae, setal formula of last article 1–2–1–1; right mandible with incisor 5-toothed, *lacinia mobilis* 5-toothed with two accessory

plates. Maxilliped inner plate with one subdistal robust seta and two robust setae on center-distal portion, outer lobe longer than inner lobe, with row of five lateral setae, palp article two enlarged with row of about 14 setae, article 3 with distal crown of setae.

Thorax. Gnathopod 1, ischium subquadrate, merus with lateral and ventral setae, carpus about two times as long as merus, propodus upper border rectilinear, ventral border with acute projection enclosing four robust proximal setae, palm with line of robust setae, dactylus smooth. *Male morphotype I*: gnathopod 2 merus about as long as carpus, propodus with small proximal indent with two robust setae, palm armed with scarce, small setae, slightly membranous, lobes absent. Pereopod 3, propodus not recurved at center, with 4–5 robust setae. Pereopod 4 propodus subequal in shape to pereopod 3, with 4–5 setae. *Male morphotype II:* gnathopod 2 merus two times as long as carpus, propodus 'bulked'; proximal indent with three robust setae; palm with 3–4 large visible membranous lobes, dactylus smooth and strongly recurved. Pereopod 3 propodus slightly recurved at center (Fig. 4) with 4–5 robust setae in two rows, occasionally with single, robust seta located at center. Pereopod 4 propodus less strong than pereopod three with 4–5 setae. Pereopods 5–7 missing in examined adults.

Abdomen. Proximal part slightly projected with one pair of 1–articulate pyriform appendages, two pairs of 2–articulate appendages and one pair of lobes. Abdomen tip smooth.

Female. 9.8 mm. Body smooth. Gill plates present on pereonites 2–4. Oostegites reaching end of pereopods 3–4 basis. Gnathopod 1 merus and carpus slightly setose, propodus ventral-lateral margin with fringe of slender setae. Proximal projection with two robust and one slender seta, propodus palm with row of small robust setae and small projections, dactylus serrate. Gnathopod 2 carpus minute, much smaller than merus, propodus nearly elliptical, more than two times as long as wide, with acute ventral projection and three robust setae, palm of gnathopod two membranous lobes absent, dactylus smooth. Pereopod 3 propodus with three robust setae at center, row of minute distal setae, sometimes not visible. Pereopod 4 similar to 3. Pereopods 5–7 not present in any of adult individuals examined.

Distribution (Figs 6–7)

Type locality: North Atlantic, Zeeland (Krapp-Schickel 1993). **Atlantic Ocean**: Norway, Canary Islands, Azores, West Africa, South Africa (McCain 1968). Gulf of Mexico (Winfield *et al.* 2006, LeCroy *et al.* 2009); Florida, West Coast to Panama, Caribbean Sea, Cuba (Ortíz & Lalana 2010, Martin *et al.* 2013), Venezuela (Díaz *et al.* 2005), Colombia (McCain 1968), Southern Iberian Peninsula (Conradi *et al.* 1997); North Africa (McCain 1968). **Brazil**: Bahia – Abrolhos Bank (Young & Serejo 2005); Rio de Janeiro – Angra dos Reis (Quitete 1979 as *P verae*), Arraial do Cabo (Serejo 1998), Campos Basin (Mauro & Serejo, 2015, present study); São Paulo – Enseada do Flamengo, Ubatuba (Quitete 1979 as *P.verae*); Santa Catarina – Ilha do Arvoredo (present study), Barra do Sul, Florianópolis (Lacerda & Masunari 2011). **Mediterranean Sea**: France, Monaco, Sardinia, Italy (Thyrrhenian Sea), Sicily, Malta, Italy-Ionian Sea, Yugoslavia, Israel (Krapp-Schickel 1993). Depth range: 3 to 1470 m (see Winfield *et al.* 2006 for slope records).

Ecological notes

Phtisica marina has been collected in plankton and benthos samples (McCain 1968) on soft bottom (Winfield *et al.* 2006), but all material herein examined is from benthos samples. *Phtisica marina* is associated with a diverse type of substrates, e.g., sponge *Dysidea* (Wakabara & Serejo 1998), algae *Amphiroa beauvoissi* (Lacerda & Masunari 2011), *Posidonia* (with hydroids and Bryozoa), *Aterias* (Asteroidea) (Krapp-Schickel 1993).

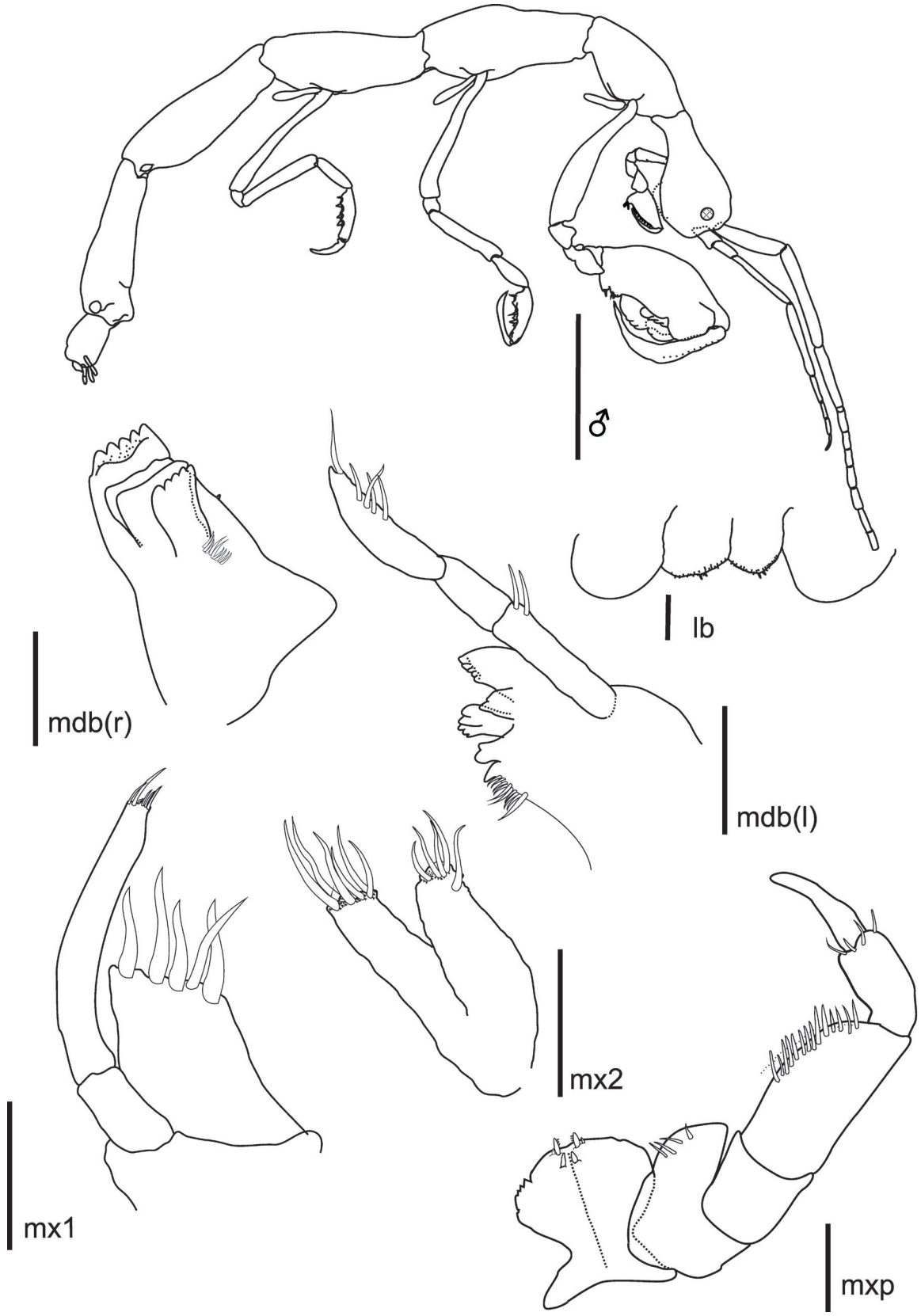

Fig. 3. *Phtisica marina* Slabber, 1769. Male morphotype II, 12.2 mm, Angra dos Reis, RJ (CDZRJ 1014). Scale bars: habitus = 0.5 mm; lb, mx1, mx2, mdb(l), mdb(r), mxp = 0.1 mm.

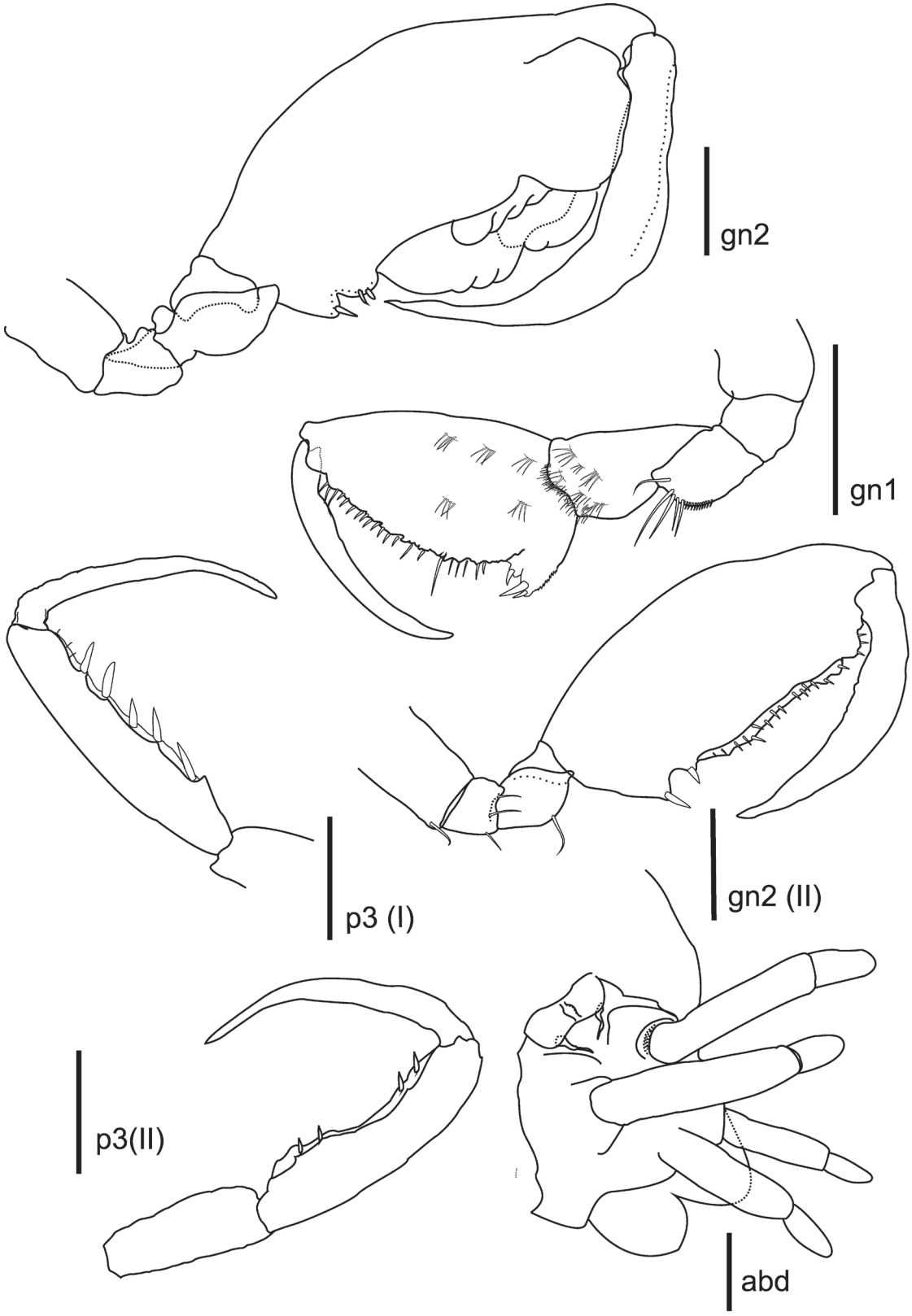

Fig. 4. *Phtisica marina* Slabber, 1769, 12.2 mm, Angra dos Reis, RJ (CDZRJ 1014). Adult male morphotype I, 11.7 mm, Campos Basin (MNRJ23483). Scale bars: gn2 = 0.3 mm; gn1, p3, p4, abd = 0.1 mm.

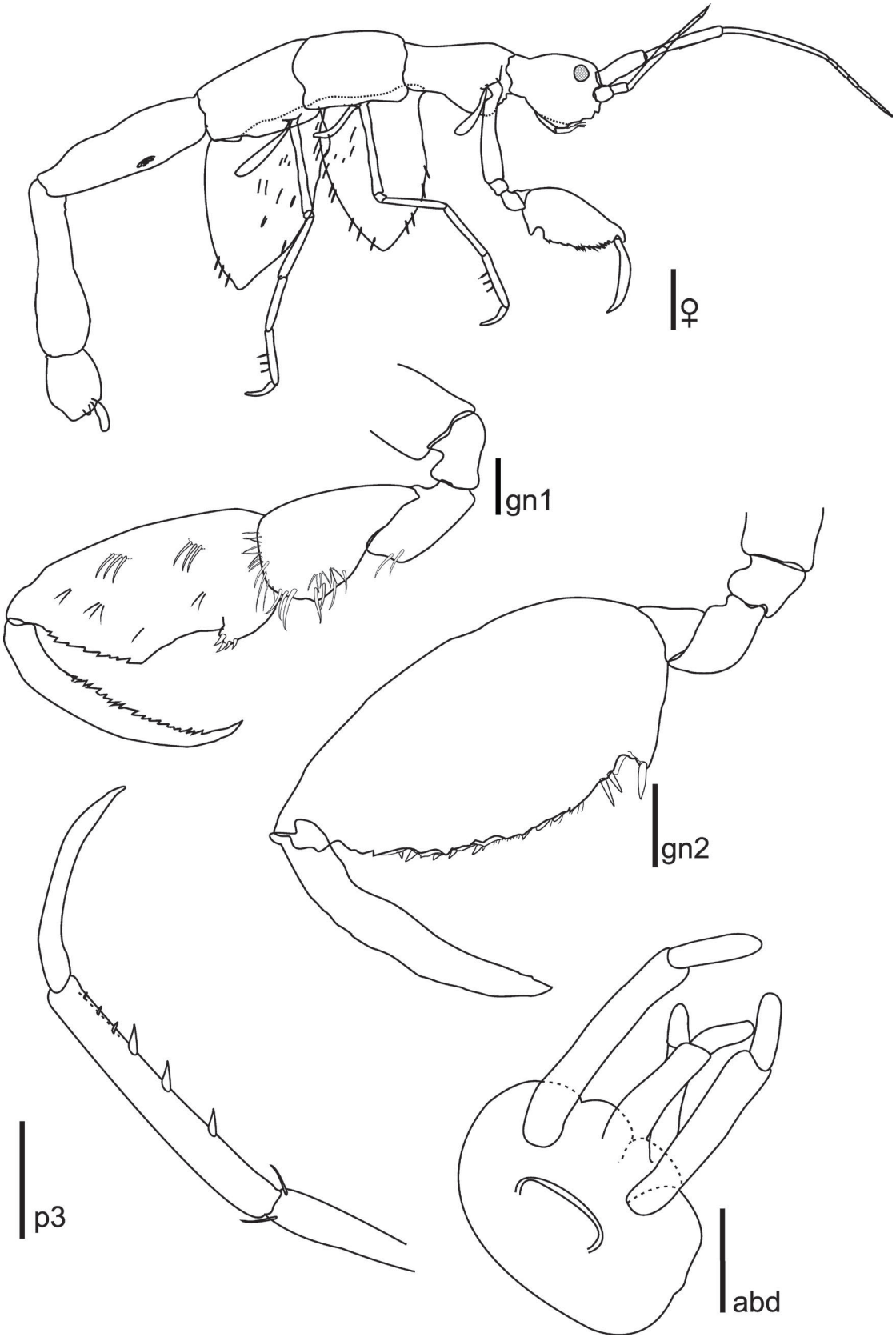

Fig. 5. *Phtisica marina* Slabber, 1769. Female, 7.9 mm, Angra dos Reis, RJ (CDZRJ 1012). Scale bars: habitus = 1.0 mm; gn1, gn2, p3, abd = 0.1 mm.

Discussion

Hemiproto wigleyi was first described by McCain (1968) who stated that the mandible setal formula is very similar to that of *Phtisica*, which is confirmed in the present study, regarding mandible setal formula (1–5–1 pattern for both *Phtisica* and *Hemiproto*). Despite the resemblances, *Hemiproto* differs from *Phtisica* in the maxilliped plates armed (versus unarmed), gnathopod 2 basis more than three times as long as pereonite 2 (versus up to 1.5 times) and male abdomen with two pairs of 1-articulate appendages (versus two pairs of 2–articulate + 1 rudimentary).

The present species matches the original description in the following characters: antenna 1 approximately equal to body length, antenna 2 reaching slightly beyond antenna 1 article 2, outer lobe of maxilla 2 with four strongly toothed setae, gnathopod 1 palm finely serrate and dactylus smooth, gnathopod 2 carpus length subequal to basis, pereopods 3–4 with two robust distal setae and male with two abdominal appendages 1-articulate. Small variations, regarding the original species description of McCain (1968), were observed such as: mandibular palp setal formula varying from 1–2–4–1 to 1–2–3–1 (versus 1–2–1).

This work presents the first record of *H. wigleyi* for the southwestern Atlantic Ocean (Figs 6–7).

Phtisica verae was originally described by Quitete (1979) from Angra dos Reis, Rio de Janeiro and Enseada do Flamengo, Ubatuba, São Paulo and has since then not been recorded from the Brazilian coast. The type material was accessed and compared with the material of *Phtisica* from Brazil deposited in the Crustacean Collection of the Museu Nacional/UFRJ. The present study acknowledges the existence of two male morphotypes of *P. marina* that were overlooked in Quitete's original description. Quitete (1979) described the following diagnostic characters for *P. verae* gnathopod 2, "carpus shorter than merus, propodus with greatest width at mid-length, presenting an irregular membrane at male's palm margin, with proximal spines". When observing the type material, we noticed that the carpus of the male gnathopod 2 is not considerably smaller in all specimens, only in the holotype *P. verae*

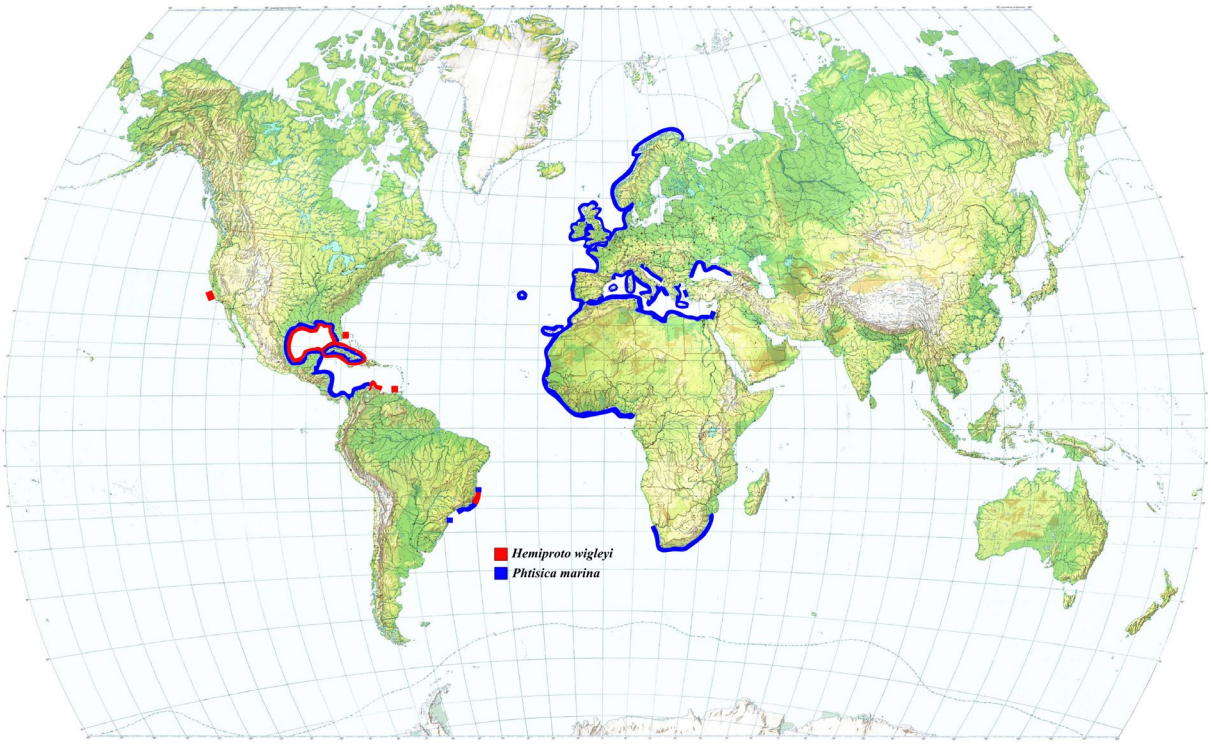

Fig. 6. World distribution of *Phtisica marina* Slabber, 1769 and *Hemiproto wigleyi* McCain, 1968.

(0.5 times length of merus), but also in other material of *Phtisica*. Quitete (1979) pointed out some differences between *P. verae* and *P. marina*: 1) male antenna 2 longer than antenna 1 peduncle; 2) mandible setae not serrate (versus serrate); 3) maxilliped inner plate smaller than outer plate (versus subequal or longer); 4) male gnathopod 1 propodus with 3 robust proximal setae (versus four robust setae and dactylus smooth); 5) male gnathopod 2 propodus with one robust seta, two proximal minute setae and an irregular membrane (versus two proximal robust setae, without membrane); 6) pereopods 3–4 with four grasping setae (versus three grasping setae). Examining the type material of *P. verae* and additional comparative material, we concluded that these differences are inconsistent to establish a new species based on the following observations 1) antenna 1 is considerably longer than antenna 2, varying according to size and development of individuals of *P. verae* (Figs 3, 5), which were also observed in *P. marina*, with antenna 2 varying from half-length or up to ¾ of antenna 1 peduncle; 2) morphology of mandible setae was essentially the same, all of them naked (not pectinate) as in the samples of *P. marina*. The setal formula showed a variation already observed by McCain (1968) (1–2–1 to 1–6–1), having a setal formula of individuals with 1–2–1 or 1–3–1 ; 3) maxilliped inner plate is subequal in length to outer plate, including Quitete's material, differing only from *P. antillensis*; 4) male gnathopod 1 propodus has four robust proximal setae as described for *P. marina*. McCain (1968) suggests a range from 4–5 setae while Krapp-Schickel (1993) reported five proximal setae; 5) gnathopod 2 (morphotype II), propodus with three robust proximal setae and three membranous lobes; 6) adult males of *P. marina* showed five

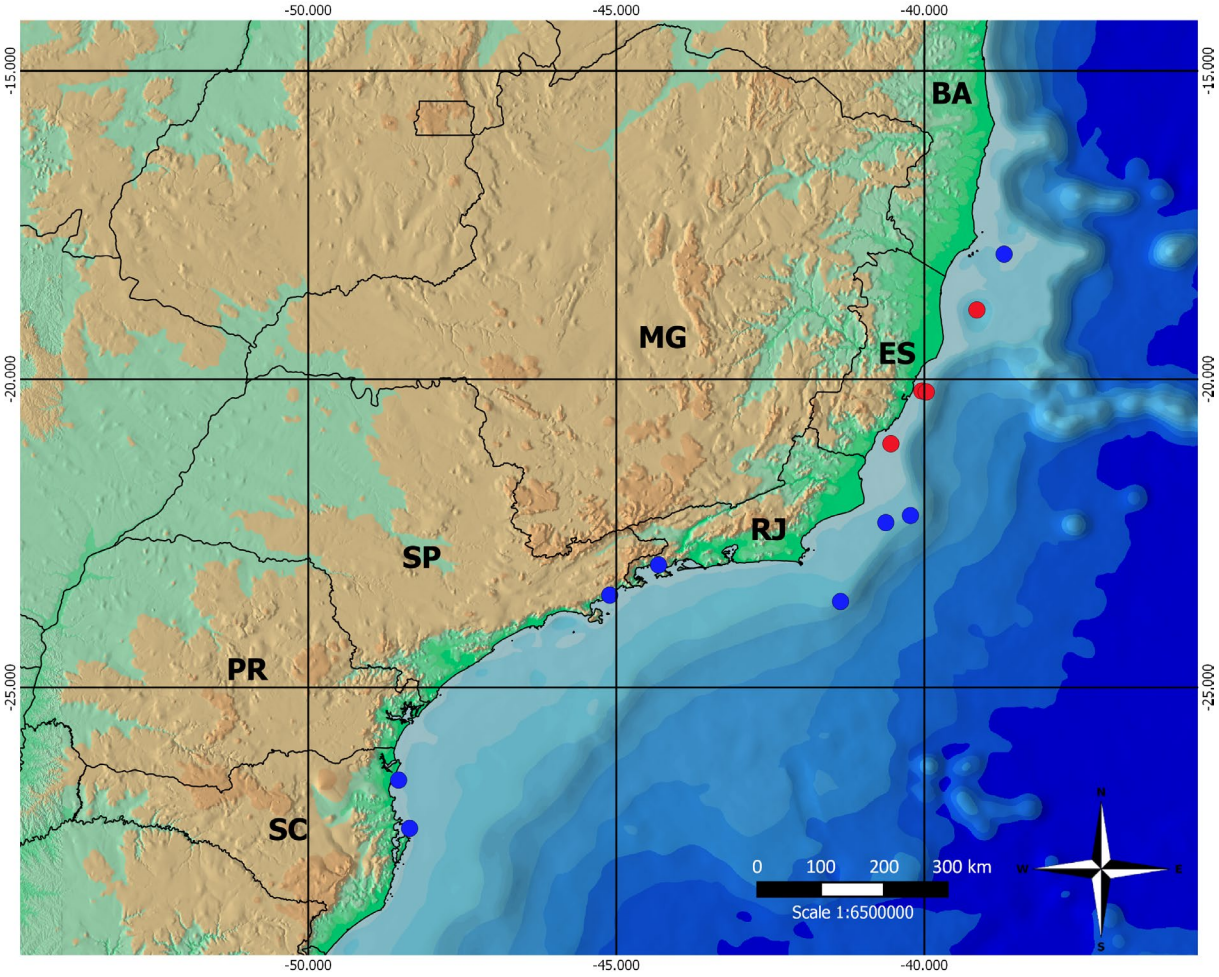

Fig. 7. Distribution of *Phtisica marina* Slabber, 1769 (blue dots) and *Hemiproto wigleyi* McCain, 1968 (red dots) along the Brazilian coast. Abbreviations: BA = Bahia; ES = Espírito Santo; RJ = Rio de Janeiro; SP = São Paulo; PR = Paraná; SC = Santa Catarina.

to six robust setae on pereopods 3 and 4, while younger specimens showed three to four setae, therefore we noticed that this character is age dependent and should be used with caution. Moreover, adult males (morphotype II) show a unique recurved shape of pereopod 3 propodus.

In conclusion, Quitete (1979) described the morphotype II as a new species, but she overlooked some intraspecific variation and characters of morphotype II already observed by Sars (1895) and later on by Krapp-Schickel (1993) for *P. marina*. Based on these observations, the authors propose that *P. verae* is a junior synonym of *P. marina* and the genus now includes only two species, *P. marina* and *P. antillensis*.

Phtisica marina differs from *P. antillensis* by male gnathopod 2 carpus 0.5 times as long as than merus (versus two times longer), palm indent located at proximal part of propodus (versus medial) and pereopods 3 and 4 propodus with 4–5 setae in both sexes (versus lacking setae).

Phtisica marina was first described by Slabber (1769) with simple illustrations. The setal formula postulated by McCain (1968), ranging from 1–1–1 to 1–6–1 is in accordance to all specimens observed. Male gnathopod 1 with 4–5 setae grasping setae is in accordance to McCain (1968) and Krapp-Schickel (1993). The present material presents male gnathopod 2 with two morphotypes (Fig. 4). Sars (1895) also described male gnathopod 2 with two morphotypes, being 'type I' with three membranous lobes as the present material. McCain (1968) described only male 'type II', whereas Krapp-Schickel (1993) also illustrated male gnathopod 2 with two morphotypes, with no morphotype designations. Regarding pereopods 3–4, McCain (1968) and Krapp-Schickel (1993) pointed out three small setae on the propodus and Sars (1895) described four robust setae. Nevertheless, the present material shows 3–5 setae, which suggests that this variation range should be added to the species diagnosis. None of afore-mentioned taxonomic works correlates variations in *Phtisica marina* morphology to its geographical distribution.

Variations in male amphipods behavior and morphology have been observed in *Jassa* Leach, 1814 (Corophiida: Ischyroceridae), a mate-guarding amphipod genus, known to dissociate sexual activity from physiological maturity and to have dimorphic secondary sex characters in the male (Clark 1997). It is suggested that delay in sexual activity and dimorphism at maturity are responses to competition among males, thus creating different 'male types'. However, further studies on the ontogenetics of *Phtisica marina* are necessary to address such questions, as whether morphotypes correspond to late life-stages or constitute different individuals, which underlying events are involved, or how such variations may occur.

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