

# Three new paramunnids (Isopoda: Asellota: Paramunnidae) from the Argentine Sea, South-west Atlantic

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*Three new species of paramunnid isopods are described: Pentaceration pleonarietis sp. nov., Neasellus argentinensis sp. nov. and N. bicarinatus sp. nov. The three species were collected off Buenos Aires province, the last one was also collected off Chubut province, Argentine Sea. The species belonging to Pentaceration represents the first record of this genus in the Argentine Sea. The diagnostic characters of the genus Neasellus are revised and besides the inclusion of the two new species herein described, a new combination for the species Pelagogonium oculatum Schultz, 1977 is proposed.*

**Keywords:** taxonomy, *Pentaceration*, *Neasellus*, new species, South-west Atlantic

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## INTRODUCTION

The family Paramunnidae has a global distribution but its diversity is remarkably high in the temperate cold waters of the southern hemisphere (Wilson, 1980). A systematic revision of this family was carried out by Just & Wilson (2004, 2006, 2007); these authors established new genera and redefined the previous ones. More recently, additional genera within Paramunnidae were erected by Just (2009a, b), Shimomura (2009) and Doti *et al.* (2009).

In the South-west Atlantic, between 35°–56°S and 53°–72°W, paramunnids have proved to be the most diverse family among asellotes (Doti *et al.*, 2014). These authors recognized a total of 42 species of Paramunnidae (including some undescribed species), distributed in 16 genera. Of these species, only six have been recorded off Buenos Aires Province (35°–41°S); the southern part of the Argentine Sea being much more diverse than the northern part.

In this study, three new species of Paramunnidae are described: *Pentaceration pleonarietis* sp. nov., *Neasellus argentinensis* sp. nov. and *N. bicarinatus* sp. nov., all of them collected off Buenos Aires Province (37°–39°S), the last one also collected off Chubut Province (around 45°S). *Pentaceration pleonarietis* sp. nov. represents the first record of this genus from the Argentine Sea. *Neasellus argentinensis* sp. nov. and *N. bicarinatus* sp. nov. represent the first report of this genus after its erection by Beddard (1886); therefore, the diagnostic characters of the genus are revised.

## MATERIALS AND METHODS

The material studied was collected in three surveys on board the RV 'Puerto Deseado'. Specimens of *Pentaceration pleonarietis* sp. nov. and *Neasellus bicarinatus* sp. nov. were obtained off Buenos Aires province, during the 'Mejillón II' expedition, in September 2009. Specimens of *N. bicarinatus* sp. nov. were also collected off Chubut province, during the 'COPLA II' expedition, in June 2010. In both surveys the material was collected using a Rauschert sledge, equipped with a net of 1 mm mesh size. Specimens of *Neasellus argentinensis* sp. nov. were taken at the Mar del Plata submarine canyon (off Buenos Aires province), during the 'Talud Continental 2012' expedition, in August 2012. This material was obtained using an epibenthic sledge, equipped with a net of 1 mm mesh size. Additional specimens of *N. argentinensis* sp. nov. were collected on board the Uruguayan fishing vessel 'Maxal II' (Leg. Fabrizio Scarabino, Museo Nacional de Historia Natural Montevideo, MNHNM).

In all cases, the specimens were sieved with a 250 µm mesh, fixed with 10% seawater buffered formalin and transferred to 70% ethanol. Some specimens of *Neasellus argentinensis* sp. nov. were also fixed directly in ethanol 96%, for later DNA analysis.

The described specimens were stained with Chlorazole black E<sup>®</sup>, the appendages were dissected and temporarily mounted in glycerin. Drawings of the whole animal and dissected appendages were prepared using a Carl Zeiss (Axioskop) compound microscope equipped with a camera lucida. Line drawings were rendered in digital format using a Wacom tablet and the Adobe Illustrator program after Coleman (2003). For SEM photographs, the specimens were cleaned with 0.5% non-ionic detergent Triton<sup>®</sup> X100 and ultrasound. After that, they were dehydrated through a graded series of ethanol ending in 100%, critical point dried, gold-palladium sputter coated, and examined with a Philips XL30 TMP microscope.

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The total length of the body, the width and length of the head, and the length of the pereonites, free pleonite and pleotelson, were measured according to Just & Wilson (2004, 2006); measurements of the *Pentaceration* specimens follow Just (2009a, 2011). The descriptions were prepared using the DELTA database (Dallwitz, 1980; Dallwitz *et al.*, 2000a, b). The 'Implicit Attributes' herein considered are those listed by Just & Wilson (2007).

The material collected by the RV 'Puerto Deseado' has been deposited in the invertebrate collection of the Museo Argentino de Ciencias Naturales 'Bernardino Rivadavia' (MACN-In). The specimens collected by the Uruguayan fishing vessel 'Maxal II' belong to the Museo Nacional de Historia Natural Montevideo (MNHNM).

#### SYSTEMATICS

Order ISOPODA Latreille, 1817

Suborder ASELOTA Latreille, 1802

Family PARAMUNNIDAE Vanhoeffen, 1914

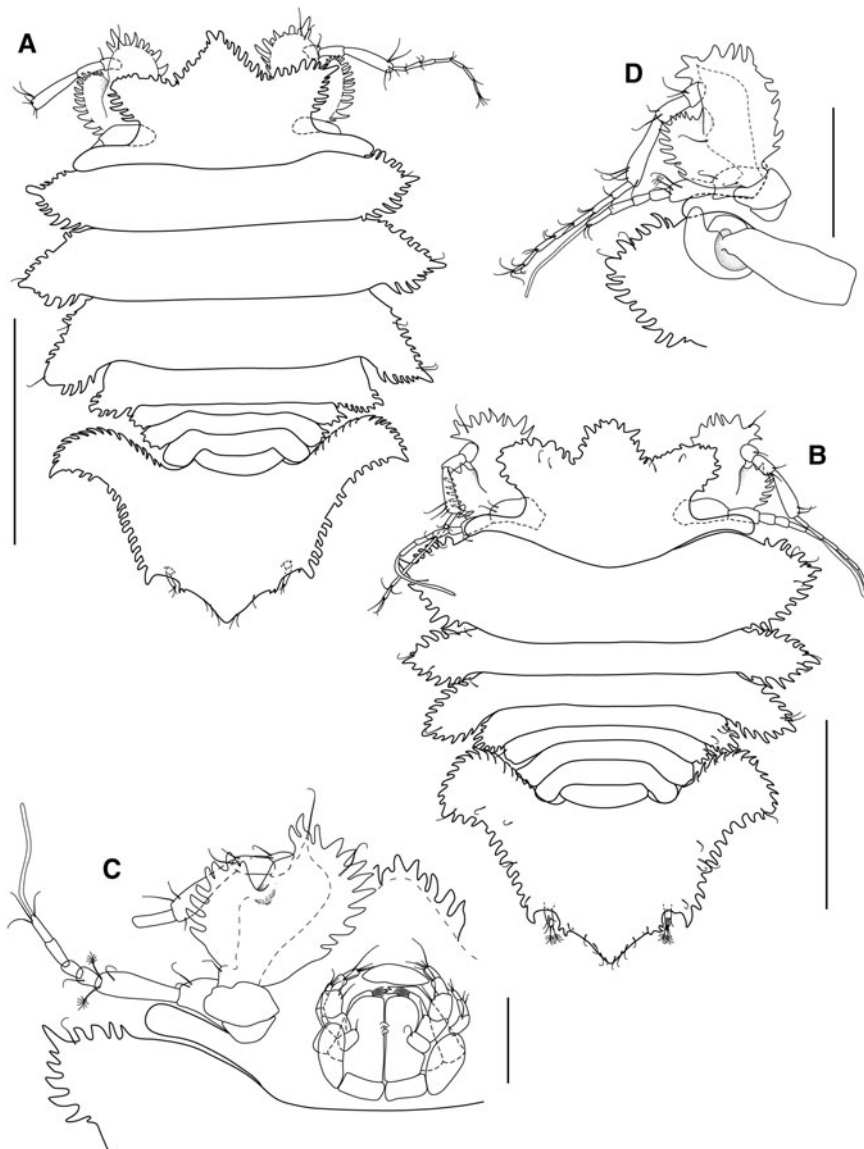
Genus *Pentaceration* Just, 2009

*Pentaceration* Just, 2009. — Just, 2009a: 37; 2011: 2. Kaiser & Marner, 2012: 173.

*Janirella?* sp. – Gamó, 1987: 44.

Type species: *Pentaceration bassiana* Just, 2009 (original designation).

Species included: *P. bassiana* Just, 2009, *P. bifficyro* Kaiser & Marner, 2012, *P. bifida* Just, 2011, *P. bovicornis* Just, 2011, *P. curvicornis* Just, 2011, *P. denticornis* Just, 2011, *P. dentifera* Just, 2011, *P. epipedos* Just, 2011, *P. globopleonis* Just, 2011, *P. kermadecia* Just, 2011, *P. lancifera* Just, 2011, *P. magna* Just, 2011, *P. megalomos* Just, 2011, *P. novaezealandia* Just, 2011, *P. omalos* Just, 2011, *P. pleonarietis* sp. nov., *P. rihothermalassa* Just, 2011, *P. serrata* Just, 2011, *P. setosa* Just, 2011, *P. simplex* Just, 2011, *P. spinosissima* Just, 2009, *P. tasmaniensis* Just, 2011.



**Fig. 1.** *Pentaceration pleonarietis* sp. nov. Holotype female, MACN-In 40405: (A) habitus in dorsal view. Paratype male, MACN-In 40406-a: (B) habitus in dorsal view; (D) detail of the insertion of antennae and pereopod I in ventral view. Paratype female, MACN-In 40406-b: (C) head in ventral view. Scale bars: A, 0.5 mm; B and D 0.2 mm; C, 0.1 mm.

## DIAGNOSIS (EMENDED AFTER JUST, 2009)

Head frontal margin between antennulae with 1 median forward pointing spine and 2 lateral spines pointing forward-outward at  $\sim 60^\circ$  angle to the head midline. Eyestalks elongate, spine-like or distally rounded, with or without ommatidia. Coxae not visible in dorsal view. Pereonites with lateral spines of varying length, pereonite 1 often rounded laterally; width of pereonite 4 reduced compared with 3 and 5. Pleotelson lateral margins serrate. Mandible palp present, stubby with bean-shaped article 3, molar process triturative, distally flared. Pereopod I carpus with 2 straight robust setae on posterior margin; propodus with robust and simple setae on margin opposing carpus. Uropods inserted dorsally just inside pleotelson margin, uniramous or biramous, protopod recessed.

## DISTRIBUTION

The genus is distributed exclusively in the southern hemisphere, from the equatorial tropic to the cold temperate waters. Of the 22 species described to date, 20 were found around Australia and New Zealand; *Pentaceration pleonarietis* sp. nov. is the

first described species of the genus from the South-west Atlantic, although an undescribed species from the deep waters off Brazil has been previously found (personal communication). Another undescribed species identified as *Janirella* sp.? by Gamô (1987) was collected from the Flores Sea (Tropical West Pacific). *Pentaceration* also displays a broad vertical distribution, from shallow waters to the edge of the hadal zone.

## REMARKS

According to Just (2011) the species included in *Pentaceration* exhibit a considerable morphological variation, especially in the presence or absence of slender upright dorsal spines and in the shape of the pleotelson. For this latter feature three different morphs have been observed, viz: 1, pleotelson with lateral margins diverging distally with distolateral corners curved inward in acute hook-like denticle (*P. rihotalassa* Just, 2011 and *P. bassiana* Just, 2009); 2, pleotelson with an elongate distal projection, length 0.5 or longer than the entire pleotelson (*P. spinosissima* Just, 2009, *P. omalos* Just, 2011, *P. denticornis* Just, 2011, *P. lancifera* Just 2011, *P. bifficyro* Kaiser & Marnier, 2012); 3, pleotelson with distal projection short, less than 0.5 pleotelson length (all the remaining species of the genus).

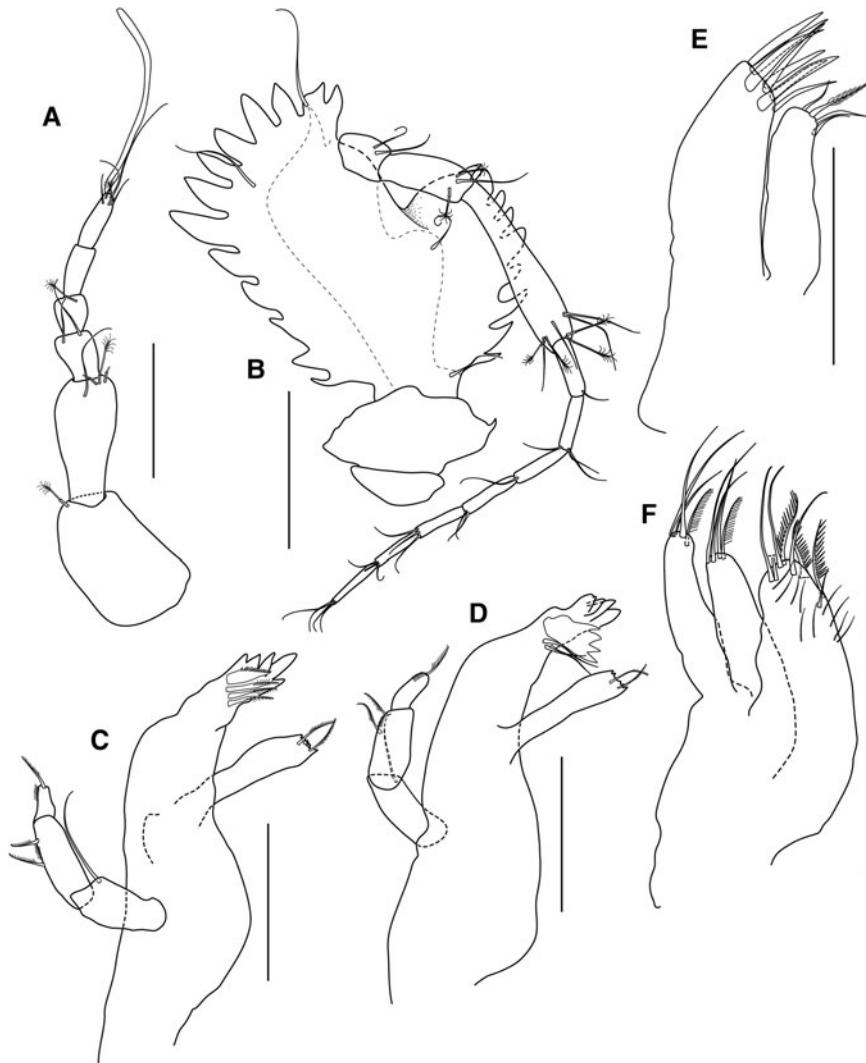


Fig. 2. *Pentaceration pleonarietis* sp. nov. Paratype female, MACN-In 40406-b: (A) antennula; (B) antenna; (C) right mandible; (D) left mandible; (E) maxillula; (F) maxilla. Scale bars: A and B, 0.1 mm; C–F, 0.05 mm.

The new species described below, *P. pleonarietis*, exhibits a fourth pleotelson morph, which is with 2 antero-lateral processes curved backwards. This kind of pleotelson is unique even among paramunnids, thus this species may require a new genus. However, taking into account that *P. pleonarietis* shows the typical three frontal spines of *Pentaceration*, and considering the morphological variation present among the pleotelsons of the species included in the genus, I have decided not to make such a decision.

*Pentaceration pleonarietis* sp. nov.  
(Figures 1–5)

TYPE MATERIAL

Holotype: ovigerous female, 1.3 mm, Mejillón II Expedition, RV 'Puerto Deseado', Station 10(2), coordinates: 39°04.33'S 58°02.76'W, water depth: 75 m; coll. Ignacio Chiesa, 12 September 2009 (MACN-In 40405).

Paratypes: 66 ovigerous females, 70 females, 84 males, 5 juveniles and 32 individuals broken, same data as holotype (MACN-In 40406).

ETYMOLOGY

The epithet is derived from the Latin 'arietis' (=ram), and refers to the antero-lateral processes of the pleotelson that resemble the horns of a ram.

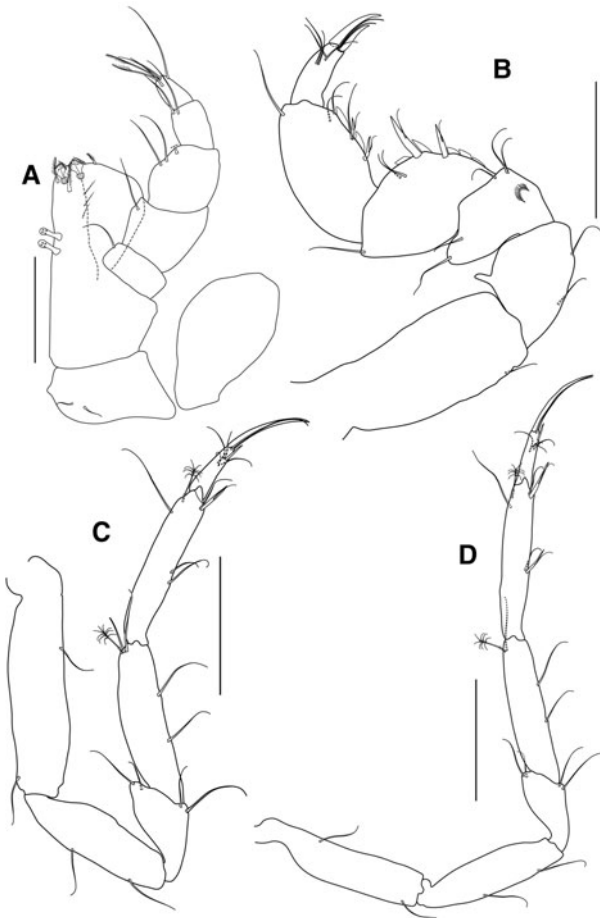


Fig. 3. *Pentaceration pleonarietis* sp. nov. Paratype female, MACN-In 40406-b: (A) maxilliped; (B–D) pereopods I, II and VII, respectively. Scale bars: A, 0.05 mm; B–D, 0.1 mm.

DIAGNOSIS

Head, frontal margin mid-spine and lateral spines subequal in size and shape, lateral spines diverging at  $110^\circ$ , all three spines with denticulate margins. Eyestalks not surpassing the lateral margins of pereonite 1, pointing laterad, distally rounded, without ommatidia. Pereonites 1–4 laterally pointed and projecting, pereonites 5–7 laterally rounded; lateral margins of all pereonites denticulate. Pleotelson with 2 antero-lateral processes curved backwards, lateral margins denticulate, apex pointed. Antenna article 3 flat and rounded, with large denticles all along the margin, distolateral margin with a concavity beside the insertion of article 4.

DESCRIPTION

Body tapering posteriorly; width 0.46 length in female (0.49 in male), widest between pereonites 2 and 3 in female (between pereonites 1 and 2 in male).

Head length 0.28 width; length posterior to eyestalks 0.17 anterior length in female (0.65 in male). Frontal margin with single middle spine projecting anteriorly and two lateral spines; all spines subequal in size, straight and triangular with broad base. Lateral spines diverging at  $\sim 110^\circ$ . Frontal margin with denticles. Eyes absent, without structures in eye region. Eyestalks length 2.8 width in female (3.6 in male), lateral apex rounded with few denticles, pointing laterad.

Pereonites 1–4 lateral margins angular and distinctly projecting, 5–7 rounded, not projecting; all pereonites marginally denticulate; coxae not visible in dorsal view. Pereonites 2–3 lateral spines diverging from each other at  $\sim 40\text{--}45^\circ$ . Pereonite 1 sagittal length 1.21 midline length in female (1.34 in male).

Pleon length 0.46 width in female (0.54 in male). Pleonite 1 width 0.7 distance between uropods, length 0.2 width. Pleotelson with 2 antero-lateral processes curved backwards; lateral margins concave and denticulate, with 25–31 denticles per side; dorsal surface smooth. In ventral view pleotelson anterior length 0.14 total pleotelson length. Posterior margin apex pointed, forming  $90^\circ$  angle from vertex to uropod insertions, set apart from lateral margins by concavity at level of uropods, with few denticles laterally, 2–3 denticles on each side, none on posterior apex.

Antennula articles 1–2 combined extending beyond eyestalk apex; article 1 tubular, length subequal to 2, broader than 2; article 2 distal margin with 1 simple and 3 broom setae; articles 5–6 of subequal length, longer than article 3; article 4 slightly shorter than 3.

Antenna article 2 lateral margin with single spine; article 3 flat and rounded, marginally denticulate, distolateral margin with a concavity beside the insertion of article 4, width 0.76 length; article 5 only slightly longer than article 4; flagellum with 7 articles, proximal article subequal to more distal articles.

Mandible molar process distally truncate, triturative surface cylindrical.

Pereopod I, basis anterior margin smooth, length 2.36 width; ischium anterior margin with 1 blunt spine; carpus triangular, distal width 0.68 posterior margin length, posterior margin with translucent flanges proximal to robust setae, in between and posterior to them; propodus narrowing distally to insertion of dactylus, with 2 robust setae and translucent flanges. In male, pereopod I coxa with short straight anteriorly directed spine visible in ventral view. Pereopod II carpus posterior margin with simple setae only; propodus posterior margin with 1

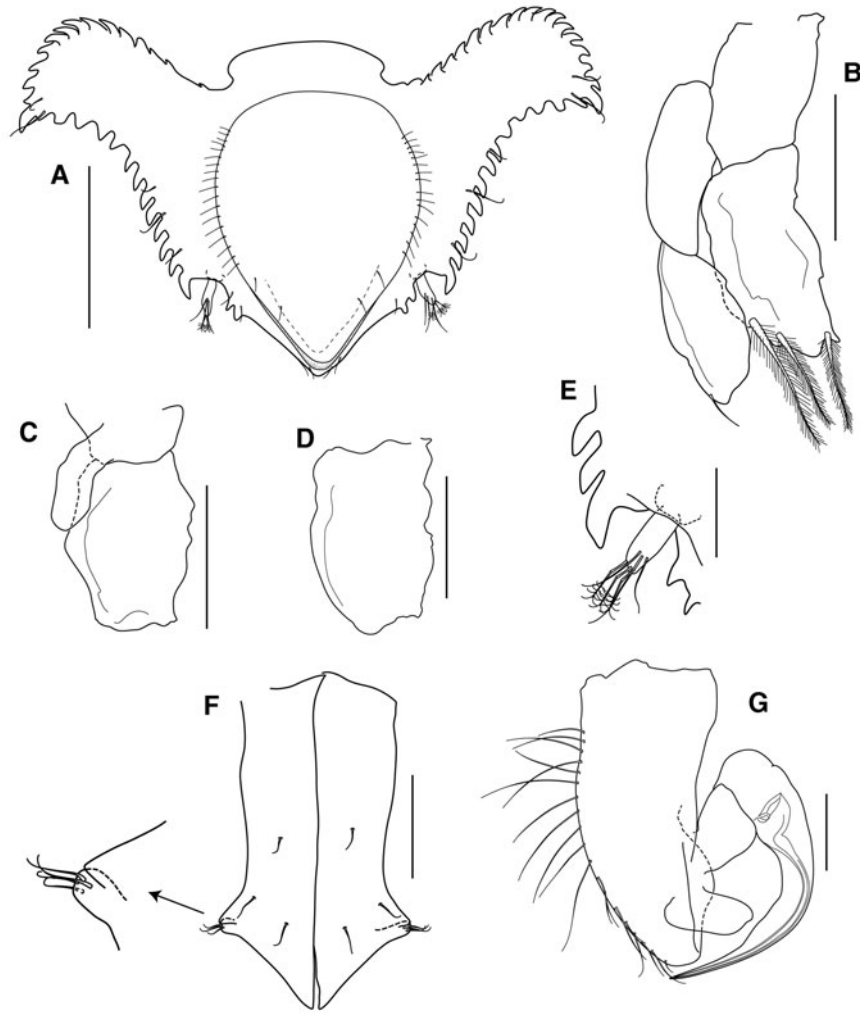


Fig. 4. *Pentaceration pleonarietis* sp. nov. Paratype female, MACN-In 40406-b: (A) pleotelson in ventral view; (B–D) pleopods III–V, respectively; (E) uropod. Paratype male, MACN-In 40406-c: (F) pleopod I with detail of the lateral lobe; (G) pleopod II. Scale bars: A, 0.2 mm; B–D and F, 0.1 mm; E and G, 0.05 mm.

distal robust seta; dactylus dorsal claw thin, longer than dactylus; ventral claw much shorter than dorsal claw.

Male pleopod I lateral lobes only moderately projecting from midlateral margin, width 0.3 distance to midline, with a bluntly triangular sublobe, distal sublobe partly overlapped by proximal sublobe; distal projection length 0.26 pleopod total length, forming obtuse angle, with bluntly pointed apices. Female operculum ovoid, width 0.75 length.

Uropods dorsal and directly adjacent to lateral margin of pleotelson, recessed into simple cuticle fold; protopod hidden; exopod absent.

#### SIZE RANGE

Ovigerous females 1.1–1.3 mm, females 0.9–1.2 mm, males 0.9–1.2, juveniles 0.8–0.9 mm.

#### DISTRIBUTION

Only known from type locality (39°04.33'S 58°02.76'W, 75 m), off Buenos Aires province.

#### REMARKS

*Pentaceration pleonarietis* sp. nov. can be distinguished from all the remaining species of the genus by the antero-lateral processes of the pleotelson and by the flat and rounded

article 3 of the antenna, marginally denticulate. These two characters are unique not only among the members of the genus, but also within the family.

#### Genus *Neasellus* Beddard, 1886

*Neasellus* Beddard, 1886. – Beddard, 1886: p. 33; Wilson, 1980: 220–221, 231–232; Just, 2009a: p. 46.

Type species: *Neasellus kerguelensis* Beddard, 1886 (by monotypy).

Species included: *Neasellus argentinensis* sp. nov.; *N. bicarinatus* sp. nov.; *N. kerguelensis* Beddard, 1886; *N. oculatus* (Schultz, 1977) comb. nov.

#### DIAGNOSIS

Head, frontal margin sinuous (with 2 dorsolaterally projecting rectangular lobes in *N. bicarinatus* sp. nov.). Eyestalks not surpassing lateral margins of pereonite 1, club-shaped, curved backwards in distal half, with or without ommatidia. Coxae not visible in dorsal view. Lateral margins of pereonites 1–3, 5 and 6 projecting into rounded spatulate processes. Pereonite 4 lateral margins recessed from lateral margins of pereonites 3 and 5, pereonite 7 lateral margins recessed from lateral margins of pereonite 6. Pleotelson, posterior margin broadly rounded (pointed in *N. bicarinatus* sp.

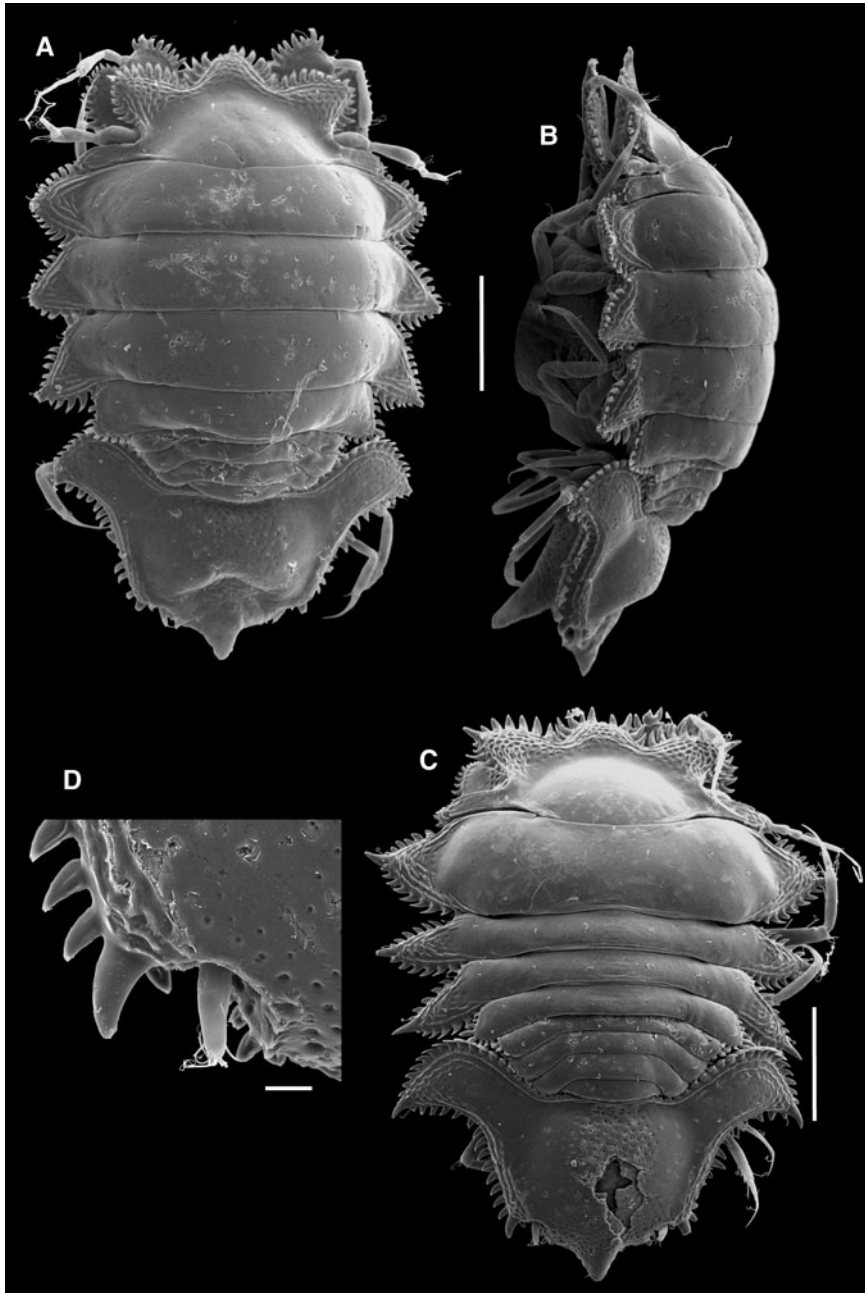


Fig. 5. *Pentaceration pleonarietis* sp. nov. SEM photos. Paratype female, MACN-In 40406-d: (A and B) habitus in dorsal and lateral views, respectively. Paratype male, MACN-In 40406-e: (C) habitus in dorsal view; (D) uropod. Scales bar: A–C, 200 µm; D, 20 µm.

nov.). Mandible palp present (elongate in *N. oculatus* comb. nov.), molar process triturative distally flared. Pereopod I, carpus triangular with 2–3 robust setae. Uropods inserted in a deep notch between lateral and posterior margins, biramous, protopod recessed or absent.

#### DISTRIBUTION

The genus *Neasellus* has been found in the cold temperate waters of the southern hemisphere, in a depth range from 110 to 1373 m.

#### REMARKS

The genus *Neasellus* was established by Beddard (1886) to include *N. kerguelensis*, a species collected in the Kerguelen

Island; this species, however, was also reported from off Buenos Aires Province by the same author (Station 320, Challenger Expedition). According to Beddard (1886) the specimens obtained at this latter station, were found upon two species of sponges *Mycale* (*Mycale*) *lapidiformis* (Ridley & Dendy, 1886) and *Haliclona* (*Gellius*) *carduus* (Ridley & Dendy, 1886). Moreover, regarding the material from off Buenos Aires, Beddard (1886) stated that ‘The specimens agreed very closely with the type described above [*N. kerguelensis*], the only difference being that in one individual there were traces of eyes in the shape of two crystalline cones, together with the corresponding pigmented retinal cell’. The extremely wide distribution reported for *N. kerguelensis* by Beddard (1886) and the difference he observed in the

absence or presence of eyes between the specimens from Kerguelen and those from off Buenos Aires, suggest that he was probably dealing with two different species very similar morphologically, the latter specimens most likely being conspecific with the new species described below as *N. argentinensis*. It is worth noticing, that the specimens collected by the fishing vessel *Maxal II* (see Additional material) were also found attached to sponges (Fabrizio Scarabino, personal communication).

Until now the genus *Neasellus* was monotypic, although Wilson (1980) stated that '*Pelagonium oculatum* Schultz (1977), recently described from a single individual taken in a midwater trawl, should be placed in *Neasellus*'. Moreover, the diagnosis of the monotypic genus *Pelagonium* presented by Schultz (1977) does not include any character that allows a

differentiation with the genus *Neasellus*. Therefore, considering that the shape of the head and the pleotelson, and the arrangement of the pereonites present in *Pelagonium oculatum* are as those present in the genus *Neasellus*, a new combination for this species is proposed.

*Neasellus argentinensis* sp. nov.  
(Figures 6–10)

#### TYPE MATERIAL

Holotype: terminal male, 1.8 mm, Talud Continental 2012 Expedition, RV 'Puerto Deseado', Station 12, coordinates: 37°57.91'S 54°31.92'W, water depth: 1140 m; coll. Ignacio Chiesa, 11 August 2012 (MACN-In 40407).

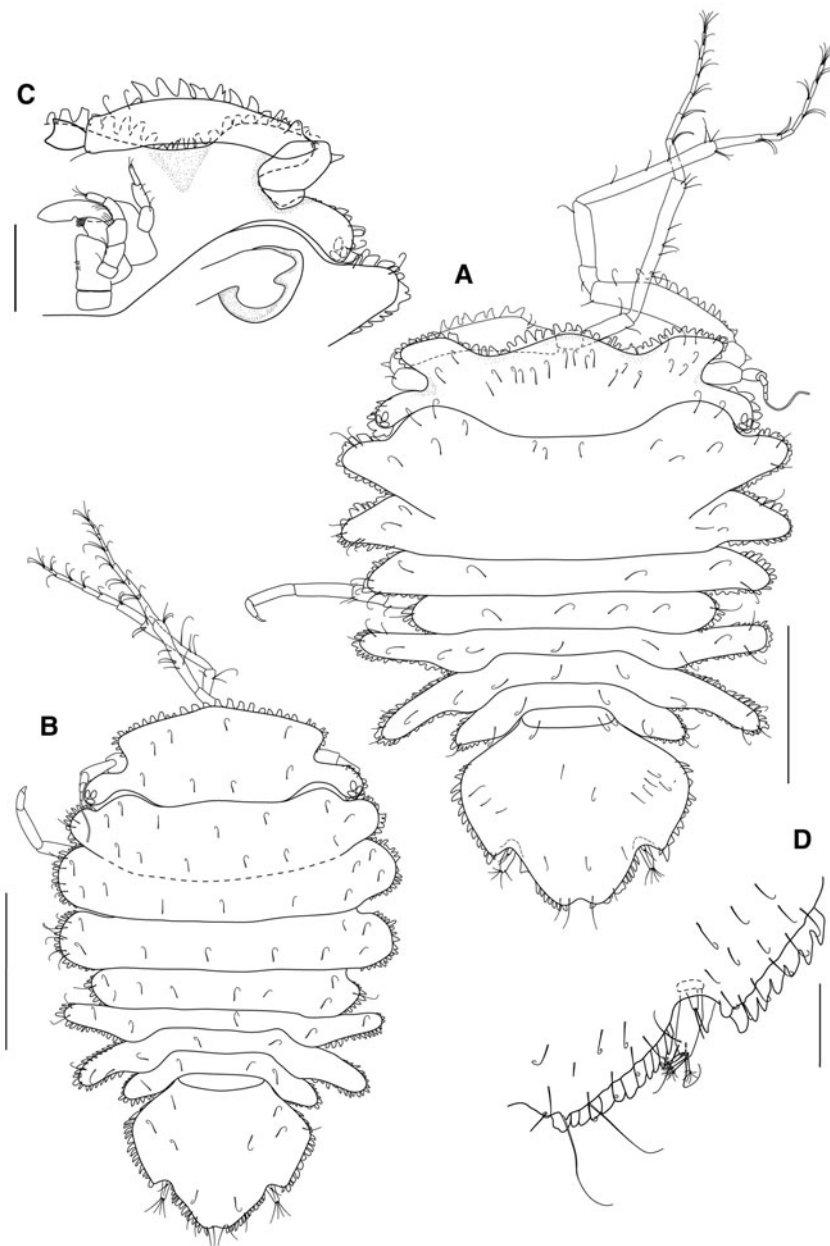
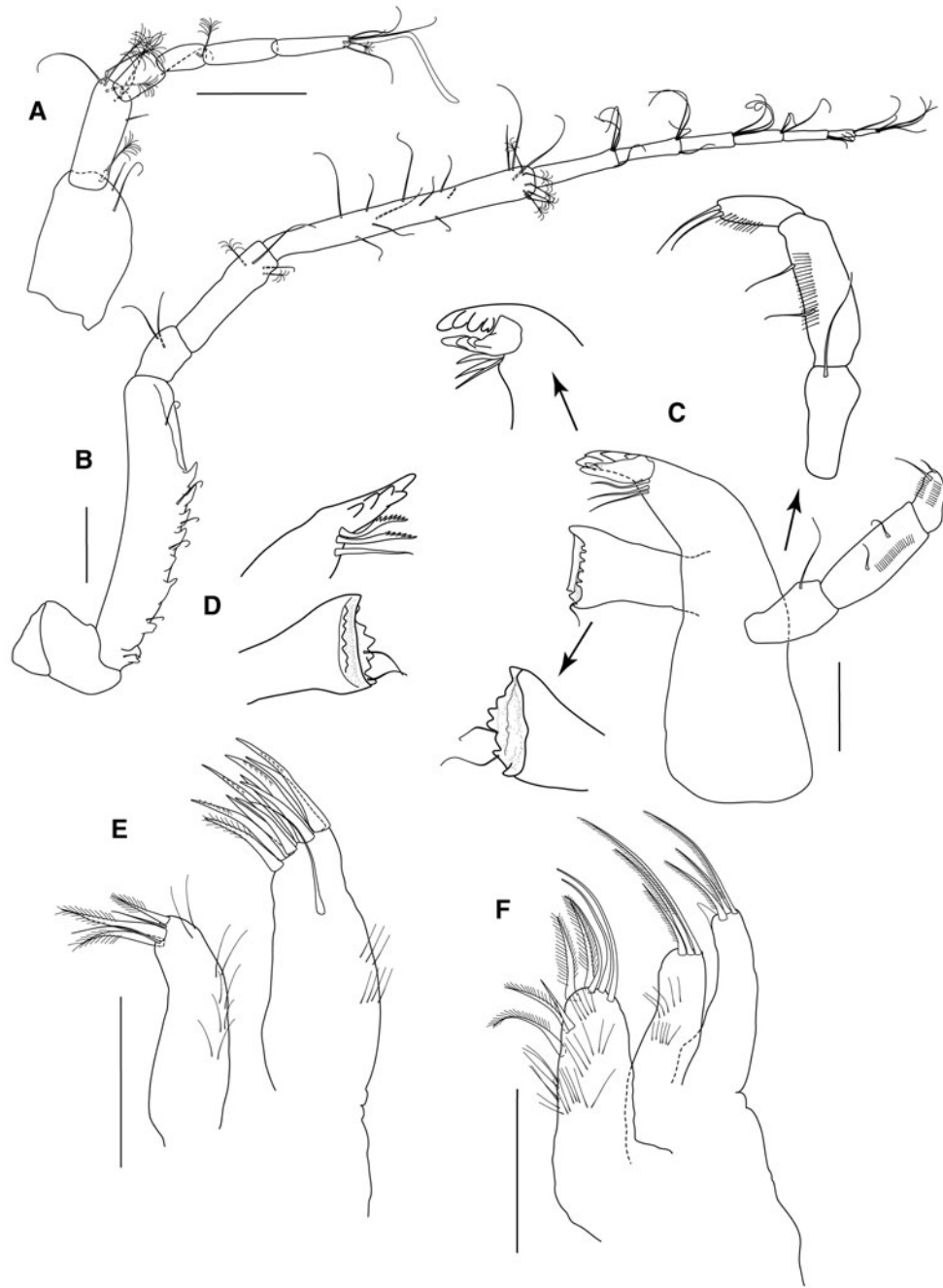


Fig. 6. *Neasellus argentinensis* sp. nov. Holotype male, MACN-In 40407: (A) habitus in dorsal view; (C) head in ventral view. Paratype female, MACN-In 40408-a: (B) habitus in dorsal view. Paratype male, MACN-In 40408-b: (D) uropod. Scale bars: A and B, 0.5 mm; C, 0.2 mm; D, 0.1 mm.



**Fig. 7.** *Neasellus argentinensis* sp. nov. Paratype male, MACN-In 40408-b: (A) antennula; (B) antenna; (C) left mandible with details of palp, incisor and molar processes; (D) detail of incisor and molar processes of right mandible; (E) maxillula; (F) maxilla. Scale bars: A and B, 0.1 mm; C, E and F, 0.05 mm.

Paratypes: 2 terminal males, 4 males, 18 ovigerous females, 5 females and 8 juveniles, same data as holotype (MACN-In 40408).

#### ADDITIONAL MATERIAL

Four terminal males, 16 males, 3 ovigerous females, 18 females, Fishing vessel 'Maxal II', coordinates:  $\sim 37^{\circ}00'S$   $53^{\circ}59'W$ , water depth: 500 m, associated to a sponge entangled in a crab trap; coll. Sebastián Horta & Ebol Rojas; leg. Fabrizio Scarabino, 17 December 2006 (MNHNM w/n).

#### ETYMOLOGY

The epithet is a toponym referring that the species was collected off the coast of Argentina.

#### DIAGNOSIS

Head, frontal margin sinuous, convex at midline and concave laterally (in female broadly convex, not sinuous), marginally denticulate. Eyestalks not surpassing lateral margins of pereonite 1, club-shaped, curved backwards in distal half, apex rounded with few ommatidia, marginally denticulate. Fused pereonites 1 and 2 as long as pereonites 3–6 combined. Head and body dorsally covered by scattered long setae. Pereonite 4 lateral margins recessed from lateral margins of pereonites 3 and 5 in both sexes. Antenna, article 3 longest, lateral margin with denticles on proximal half, bulge with 1 seta and 1 denticle.

In terminal males sexual dimorphism is present not only in the enlarged pereonite 1 but also in the anterior margin of the head



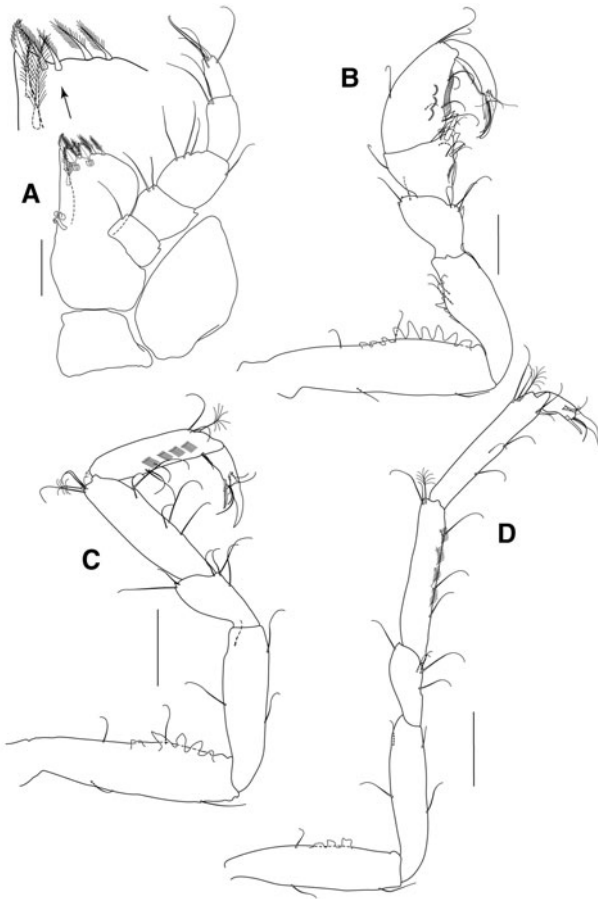


Fig. 8. *Neasellus argentinensis* sp. nov. Paratype male, MACN-In 40408-b: (A) maxilliped with detail of endita (fan setae not drawn in the detail); (B–D) pereopods I, II and VII, respectively. Scale bars: A, 0.5 mm; B–D, 0.1 mm.

(see above), and in the shape of the lateral margins of pereonites 1–3 which are projected in males and rounded in females.

#### DESCRIPTION

Body tapering posteriorly, dorsal surface with scattered long simple setae; width 0.65 length in female (0.79 in male), widest at pereonite 2.

Head sexually dimorphic in the shape of the anterior margin, not in the size of the head, length 0.30 width; length posterior to eyestalks 0.3 anterior length in female (0.64 in male). Frontal margin sinuous, convex at midline and concave laterally in male (broadly convex, not sinuous, in female), marginally denticulate, with angular lateral margins adjacent to antennae. Eyestalks length 2 width in female (2.2 in male), lateral apex rounded with few denticles, shaft axis curved backwards in distal half.

Pereonites 1–2 fused at midline, articulation only visible laterally. Pereonites 1–3 lateral margins projecting as a rounded spatulate process in male (rounded, not projecting, in female); pereonite 4 laterally rounded, recessed from lateral margin of pereonites 3 and 5; pereonites 5 and 6 lateral margins distinctly projecting as a long spatulate process; pereonite 7 slightly projecting, recessed from lateral margin of pereonite 6. Pereonite 1 sagittal length 1.2 midline length in male. All pereonites lateral margins denticulate.

Pleon length 0.86 width in female (0.83 in male). Pleonite 1 width 0.63 distance between uropods, length 0.2 width.

Pleotelson dorsal surface smooth; proximal margin length subequal to lateral margin length; forming  $55^\circ$  angle with medial axis of pleon; in ventral view anterior length 0.05 total pleotelson length; lateral margin nearly straight and denticulate, with 12–15 denticles per side; posterior margin apex broadly rounded with a notch at midline, forming  $80^\circ$  angle from vertex to uropod insertions, set apart from lateral margins by concavity at level of uropods, with large denticles laterally all of approximately same size, 8–10 denticles each side, none on the distal notch.

Antennula articles 1–2 combined reaching eyestalk apex; article 1 tubular, longer and broader than 2; article 2 distal margin with 3 broom and 3 simple setae. Antennula articles 5–6 of subequal length, longer than articles 3–4.

Antenna article 3 tubular, width 0.20 length, with 8 denticles, article 5 distinctly longer than article 4; flagellum with 7 articles, proximal article distinctly longer than more distal articles, proximal article 1.4 length of second article.

Mandible molar process distally flared, triturative surface oval-shaped. Maxilliped palp articles 1 and 2 with lateral spine.

Pereopod I basis anterior margin with row of blunt spines, length 3.85 width; ischium anterior margin with row of spines; merus anterior margin with 2 minute denticles, posterior margin with 1 spine; carpus triangular, distal width 0.97 posterior margin length, posterior margin with translucent flanges proximal to robust setae and between robust setae; propodus narrowing distally to insertion of dactylus, with 2 robust setae and translucent flange; dactylus with translucent flange on posterior margin. Pereopod II basis anterior margin with a row of spines; carpus posterior margin with simple setae only; propodus posterior margin with 1 distal robust seta; dactylus dorsal claw robust, longer than dactylus, ventral claw pectinate, shorter and much thinner than dorsal claw.

Male pleopod I lateral lobes distinctly projecting from mid-lateral margin, width 0.4 distance to midline, with bluntly triangular distal sublobe partly overlapped by proximal sublobe; distal projection length 0.13 pleopod total length, forming obtuse angle, with rounded apices. Female operculum nearly circular, width subequal to length.

Uropods on margin of pleotelson; protopod hidden.

#### SIZE RANGE

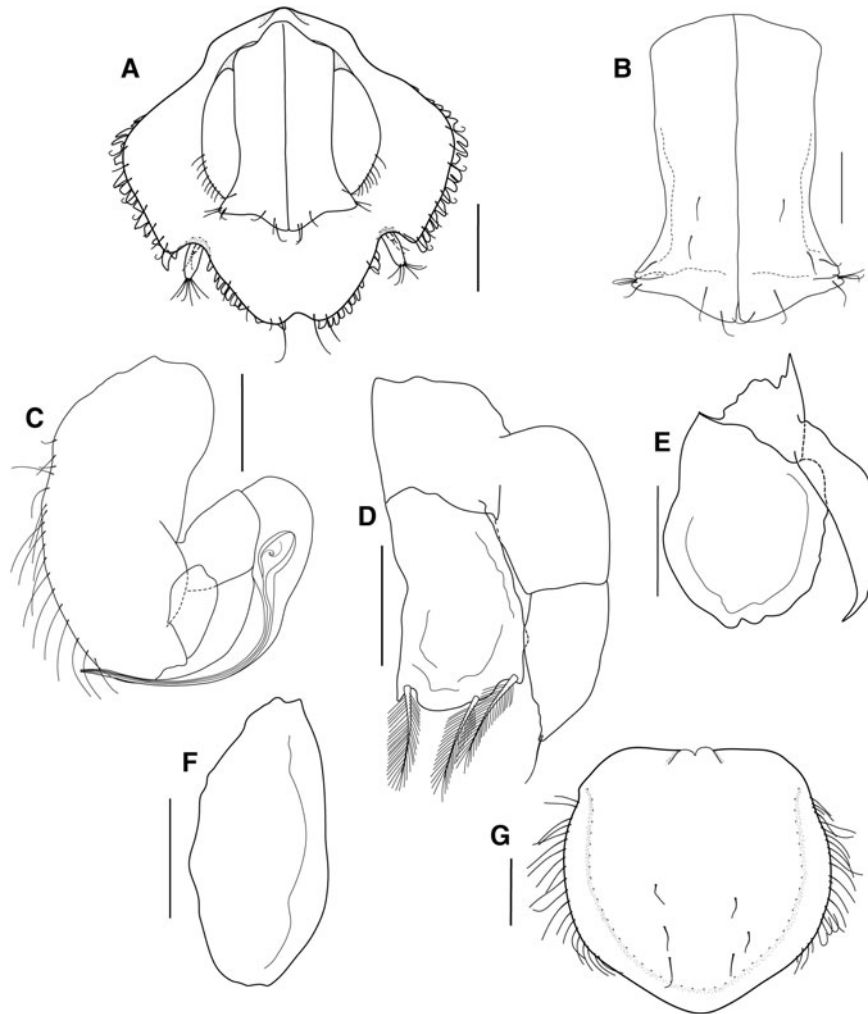
Ovigerous females 1.4–1.7 mm, females 1.2–1.5 mm, terminal males 1.6–1.8 mm, males 1.1–1.3, juveniles 0.9–1.1 mm.

#### DISTRIBUTION

Only known from off Buenos Aires province, from 500 to 1140 m.

#### REMARKS

*Neasellus argentinensis* sp. nov. is very similar to *N. kerguelensis* Beddard, 1886; the new species, however, can be distinguished by the deep notch between the frontal margin of head and the eyestalks, article 1 of antennula inserts in that notch; the presence of few ommatidia on the eyestalks; and by the scattered long setae on the dorsum of head and body. The width/length ratio of the head also distinguished these two species, being 3.7 in *N. argentinensis* sp. nov. and 2.9 in *N. kerguelensis*. Sexual dimorphism in the head and in the first three pereonites is present in *N. argentinensis* sp. nov., whereas females of *N. kerguelensis* are still unknown.



**Fig. 9.** *Neasellus argentinensis* sp. nov. Paratype male, MACN-In 40408-b: (A) pleotelson in ventral view; (B–F) pleopods I–V, respectively. Paratype female, MACN-In 40408-c: (G) operculum. Scale bars: A, 0.2 mm; B–G, 0.1 mm.

*Neasellus bicarinatus* sp. nov.  
(Figures 11–15)

**TYPE MATERIAL**

Holotype: ovigerous female, 1.7 mm, COPLA II Expedition, RV 'Puerto Deseado', Station 3, coordinates: 38°41.05'S 55°56.93'W; water depth: 208 m; coll. Brenda Doti & Natalia Alberico, 5 June 2010 (MACN-In 40409).

Paratypes: 8 ovigerous females, 4 males, 3 juveniles and 1 specimen broken, same data as holotype (MACN-In 40410).

**ADDITIONAL MATERIAL**

COPLA II Expedition, RV 'Puerto Deseado', coll. Brenda Doti & Natalia Alberico: 1 female and 1 male, Station 2, coordinates: 39°31.29'S 55°48.28'W, water depth: 168 m; 5 June 2010 (MACN-In 40411). One female and 1 juvenile, Station 11, coordinates: 42°19.99'S 58°24.96'W, water depth: 284 m; 6 June 2010 (MACN-In 40412). Six ovigerous females, 3 males and 10 juveniles, Station 16, coordinates: 45°13.63'S 60°38.57'W, water depth: 110 m; 19 June 2010 (MACN-In 40413). Mejillón II Expedition, RV 'Puerto Deseado', coll. Ignacio Chiesa: 1 ovigerous female, 3 females and 3 males,

Station 8(2), coordinates: 38°49.42'S 55°39.18'W, water depth: 113 m; 11 September 2009 (MACN-In 40414).

**ETYMOLOGY**

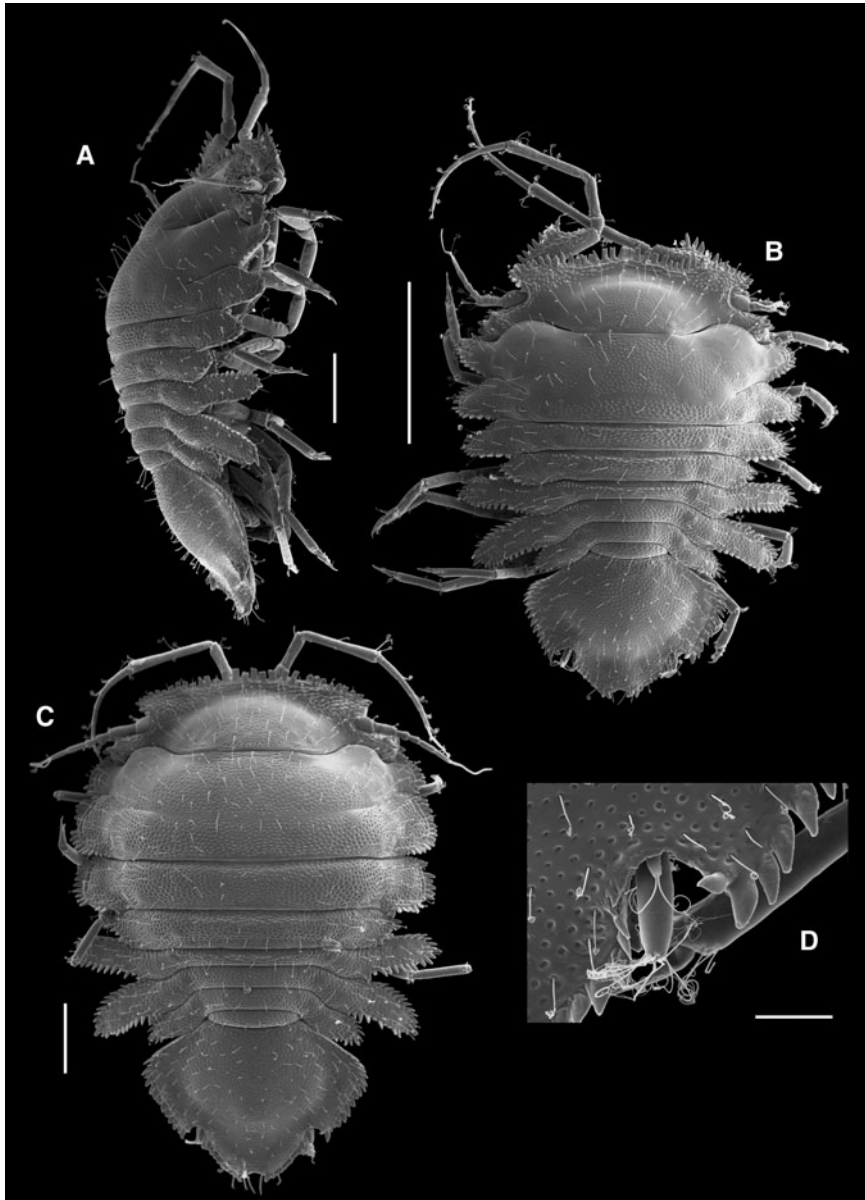
The epithet is derived from the Latin 'bi' (=two) and 'carina' (=ridge) in reference to the two dorso-lateral ridges of the pleotelson.

**DIAGNOSIS**

Head, frontal margin with 2 dorsolaterally projecting rectangular lobes, marginally denticulate. Eyestalks not surpassing lateral margins of pereonite 1, club-shaped, curved backwards in distal half, apex rounded with 3 ommatidia. Pereonites 1–3, 5 and 6 produced laterally into single processes; pereonites 4 and 7 laterally rounded. All pereonites marginally denticulate. Pleotelson with two dorso-lateral ridges, composed by two rows of denticles each; posterior margin pointed. Antenna article 3 triangular, marginally denticulate, distal margin with a deep concavity beside the insertion of article 4.

**DESCRIPTION**

Body tapering posteriorly; width 0.61 length in female (0.70 in male), widest at pereonite 3 in female (at pereonite 1 in male).



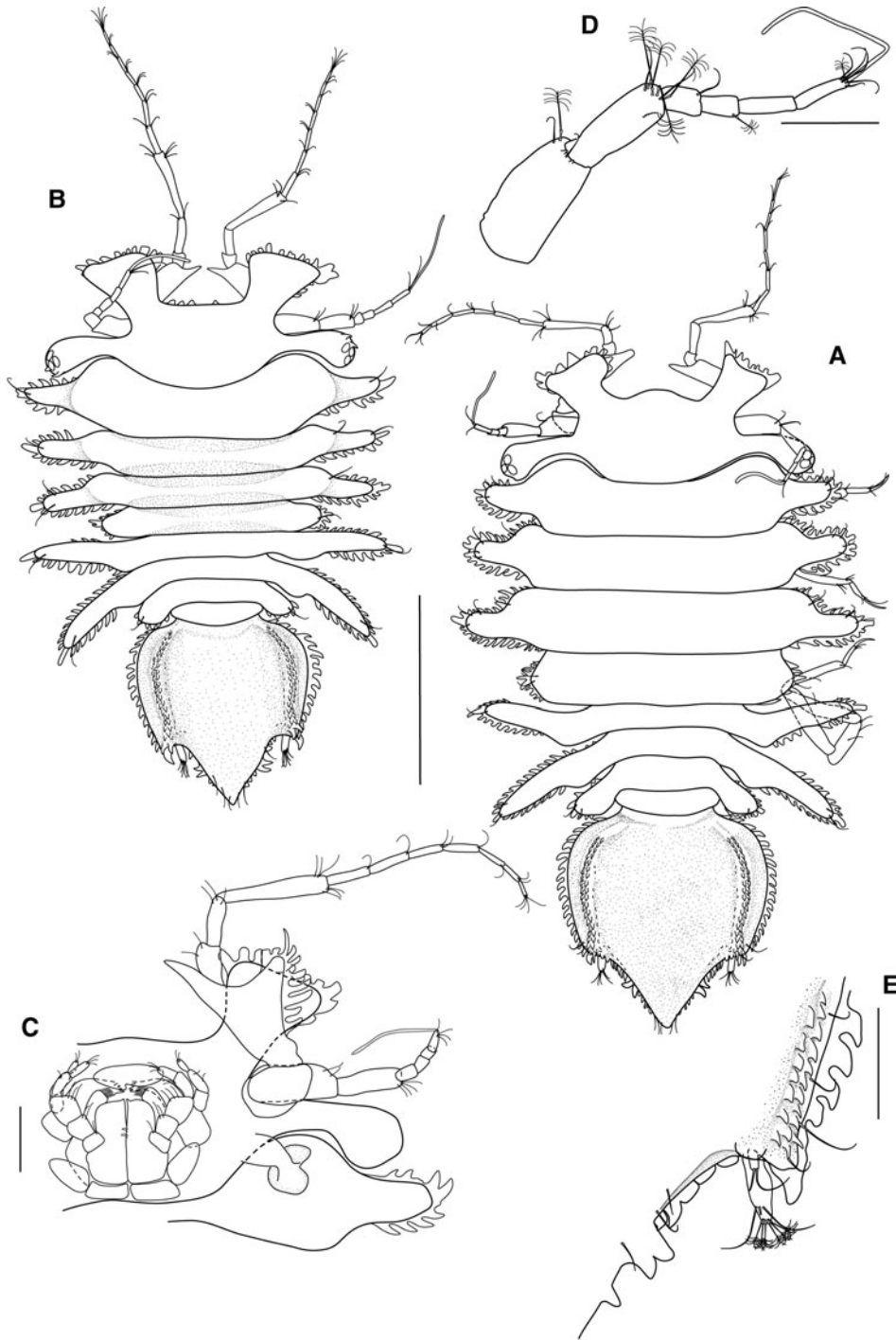
**Fig. 10.** *Neasellus argentinensis* sp. nov. SEM photos. Paratype male, MACN-In 40408-e: (A and B) habitus in lateral and dorsal views, respectively; (D) uropod. Paratype female, MACN-In 40408-d: (C) habitus in dorsal view. Scale bars: A and C, 200  $\mu\text{m}$ ; B, 500  $\mu\text{m}$ ; D, 50  $\mu\text{m}$ .

Head length 0.30 width; length posterior to eyestalks 0.7 anterior length in female (1.1 in male). Frontal margin with 2 dorsolaterally projecting rectangular lobes, each lobe projecting well beyond anterior apex, marginally denticulate; anterior rim dorsoventrally thin in lateral view. Eyestalks length 2.3 width in female (2.1 in male), lateral apex rounded with few denticles, shaft axis curved backwards in distal half, shaft before apex constricted proximally, long axis angling forward at  $\sim 25^\circ$  in female ( $30^\circ$  in male).

Pereonites 1–3 lateral margins projecting as a rounded spatulate process; pereonite 4 laterally rounded, recessed from lateral margins of pereonites 3 and 5; pereonites 5 and 6 distinctly projecting as a long spatulate process; pereonite 7 laterally rounded, not projecting; recessed from lateral margins of pereonite 6. Pereonite 1 sagittal length 1.46 midline length in female (1.33 in male). Pereonites 5 and 6 proximo-posterior margin with lobe. All pereonite lateral margins denticulate.

Pleon length 1.20 width in female. Pleonite 1 width 0.76 distance between uropods, length 0.24 width. Pleotelson dorsal surface with two dorso-lateral ridges, composed by two rows of denticles each; proximal margin length shorter than lateral margin length; forming  $60^\circ$  angle with medial axis of pleon; lateral margins denticulate, with 19–20 denticles per side; posterior margin apex pointed, forming  $90^\circ$  angle from vertex to uropod insertions in female ( $85^\circ$  in male), set apart from lateral margins by concavity at level of uropods, with denticles on entire margin all of approximately same size, plus 2 large diverging denticles at midlength of posterior margin, with 11–12 denticles each side.

Antennula articles 1–2 combined reaching eyestalk apex; article 1 tubular, longer and broader than 2, with 2 small denticles distomedially; article 2 distal margin with 4 broom and 2 simple setae; articles 5–6 of subequal length, longer than articles 3–4.



**Fig. 11.** *Neasellus bicarinatus* sp. nov. Holotype female, MACN-In 40409: (A) habitus in dorsal view; (C) head in ventral view. Paratype male, MACN-In 40410-a: (B) habitus in dorsal view. Paratype female, MACN-In 40410-b: (D) antennula; (E) uropod. Scale bars: A and B, 0.5 mm; C–E, 0.1 mm.

Antenna article 3 triangular, marginally denticulate, width 0.77 length, distal margin with a deep concavity beside the insertion of article 4, distomedially with pointed projection; article 5 distinctly longer than article 4; flagellum with 8 articles, proximal article distinctly longer than more distal articles, proximal article 1.1 length of second article.

Mandible molar process distally flared, tritritative surface oval-shaped. Maxilliped palp article 1 with lateral spine.

Pereopod I basis anterior margin with a smooth ridge, length 2.97 width; ischium anterior margin with 2 short spines; merus

anterior margin with 1 spine, posterior margin with 1 spine; carpus triangular, distal width 0.83 posterior margin length, posterior margin with translucent flange proximal to robust setae, 2 denticles between robust setae and 1 denticle distal to robust setae; propodus narrowing distally to insertion of dactylus, with 2 robust setae and translucent flange; dactylus posterior margin with translucent flange. Pereopod II carpus posterior margin with simple setae only; propodus posterior margin with 1 distal robust seta; dactylus dorsal claw thin, longer than dactylus, ventral claw much shorter than dorsal claw.

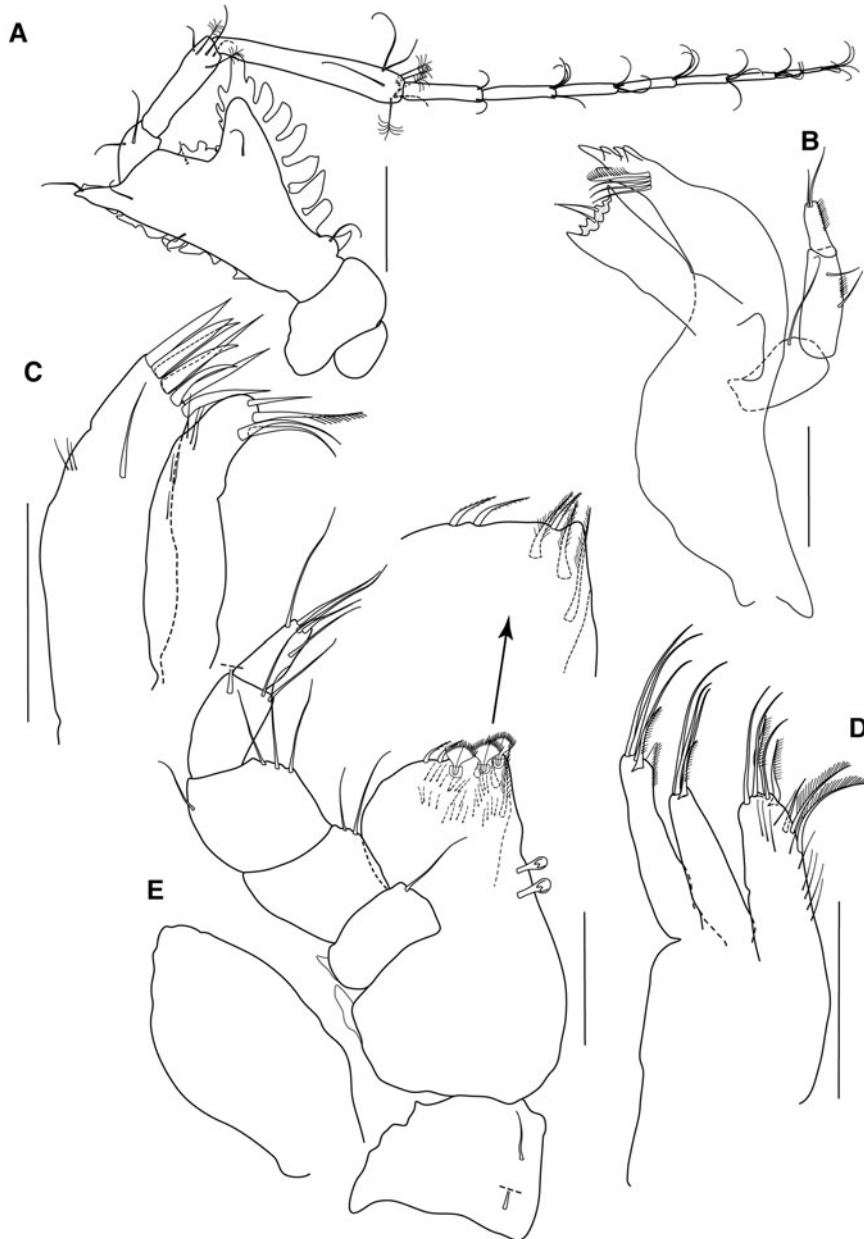


Fig. 12. *Neasellus bicarinatus* sp. nov. Paratype female, MACN-In 40410-b: (A) antenna; (B) right mandible; (C) maxillula; (D) maxilla; (E) maxilliped, with detail of endita (fan setae not drawn in the detail). Scale bars: A, 0.1 mm; B–E, 0.05 mm.

Male pleopod I lateral lobes width 0.4 distance to midline, distal sublobe partly overlapped by proximal sublobe; distal projection length 0.32 pleopod total length, forming acute angle, with bluntly pointed apices. Female operculum distal part tapering with concave distolateral margins, width 0.75 length.

Uropods on margin of pleotelson, recessed into simple cuticle fold; protopod absent; exopod vestigial.

#### SIZE RANGE

Ovigerous females 1.4–1.7 mm, males 1.1–1.3 mm, juveniles 0.7–0.9 mm.

#### DISTRIBUTION

From off Buenos Aires province (38°S 55°W) to Chubut province (45°S 60°W), in a depth range from 110 to 284 m.

#### REMARKS

The frontal margin of the head, the antenna article 3 and the pleotelson distinguish *Neasellus bicarinatus* sp. nov. from the remaining species of the genus. In fact, the combination of characters present in *N. bicarinatus* have made difficult the decision of in which genus it should be placed. The head projections resemble those present in the genus *Paramunna*, but the arrangement of the lateral margins of the pereonites are clearly as those present in the *Neasellus* species. The antenna with a triangular article 3 and the pleotelson with two dorsolateral ridges are unique features even among the family; because of these features, the new species could require a new genus. Considering that other genera within the family also include some morphological variation among species, I prefer to provisionally include this species in *Neasellus* until a phylogenetic analysis of these genera is carried out.

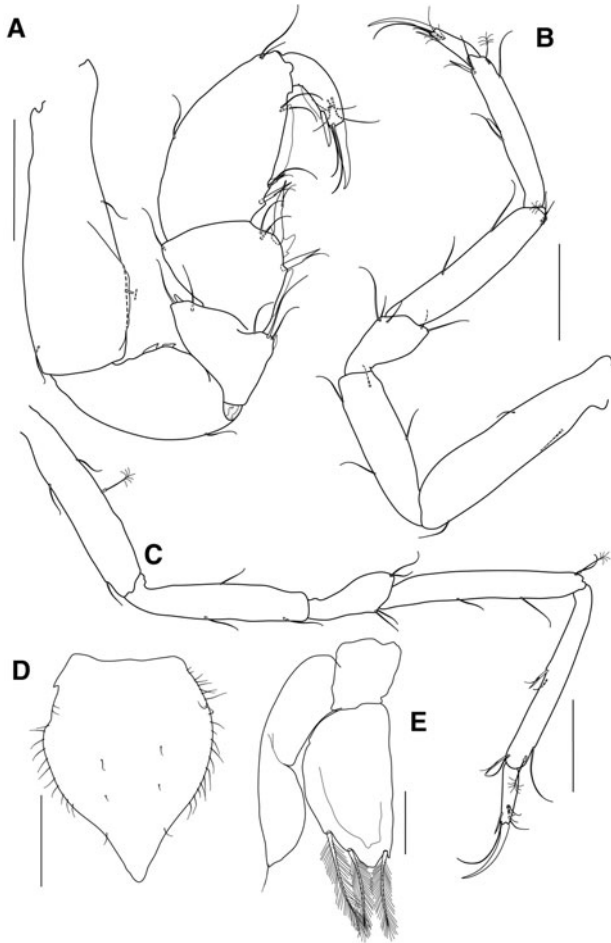


Fig. 13. *Neasellus bicarinatus* sp. nov. Paratype female, MACN-In 40410-b: (A–C) pereopods I, II and VII, respectively; (D) operculum; (E) pleopod III. Scale bars: A–C, E, 0.1 mm; D, 0.2 mm.

DISCUSSION

In the south-west Atlantic, between 35° and 56°S, the species richness of asellote isopods is remarkably high south of 47°S

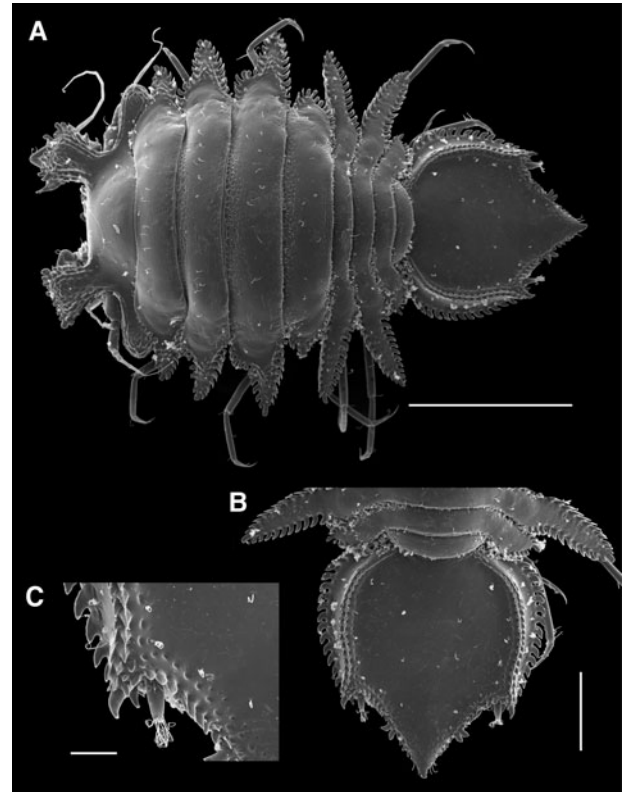


Fig. 15. *Neasellus bicarinatus* sp. nov. SEM photos. Paratype female, MACN-In 40410-c: (A) habitus in dorsal view; (B) detail of pereonite 6 to pleotelson in dorsal view; (C) uropod. Scale bar: A, 500 µm; B, 200 µm; C, 50 µm.

(Doti *et al.*, 2014). The three new species described herein were found at lower latitudes (37°–45°S), *Pentaceration pleonarietis* sp. nov. was found at 75 m depth, while *Neasellus bicarinatus* sp. nov. and *N. argentinensis* sp. nov. were collected deeper than 100 m. Based on the biodiversity patterns of the different invertebrate groups two biogeographic provinces have been recognized in the Argentine Sea, viz: the Argentine Biogeographic Province and the Magellan

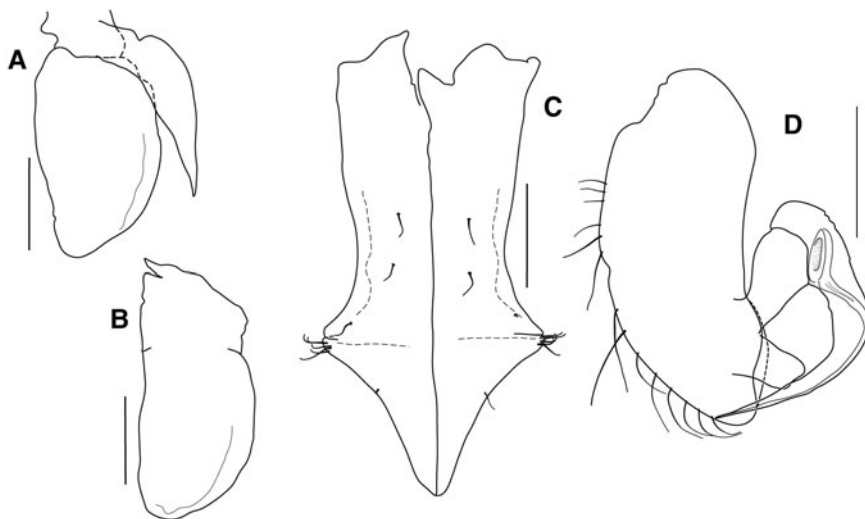


Fig. 14. *Neasellus bicarinatus* sp. nov. Paratype female, MACN-In 40410-b: (A and B) pleopods IV and V, respectively. Paratype male, MACN-In 40410-a: (C and D) pleopods I and II, respectively. Scale bars: 0.1 mm.

Biogeographic Province (ABP and MBP, respectively) (Doti *et al.*, 2014; and references therein). An exact limit between these two provinces is difficult to ascertain, Roux *et al.* (1988) studying the distribution of molluscs and echinoderms found that off Mar del Plata (38°–39°S) the transitional area between the ABP and the MBP occurs at a depth of around 76–81 m. Thus, *N. argentinensis* and *N. bicarinatus* could be considered as members of the magellan assemblage whereas *P. pleonarietis* could be part of any of the two assemblages since it was found in the transitional area of both biogeographic provinces.

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