Solenogastres molluscs from the BENTART Collection (South Shetland Islands, Antarctica), with a description of a new species

Moluscos Solenogastres de la Colección BENTART (Islas Shetland del Sur, Antártida), con la descripción de una nueva especie

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ABSTRACT

Four specimens from the BENTART Collection are studied (South Shetland Islands and Bransfield Strait, Antarctic). Two specimens were identified as: *Rhopalomenia carinata* Salvini-Plawen, 1978 collected on a muddy, gravel bottom at a depth of 710 m, off Livingston Island, and *Rhopalomenia rhynchopharyngeata* Salvini-Plawen, 1978 from a muddy bottom at a depth of 235 m off Livingston Island. One specimen, collected from a fine muddy and sandy bottom at a depth of 80 m off Livingston Island, belongs to the genus *Neomenia*, presenting features which well distinguish the same from known species. It is not, however, described as a new species since the anatomic organisation of the posterior part of the animal is unknown. And one specimen, collected on a muddy bottom at a depth of 80 m off Livingston Island, is described as a the new species *Dorymenia parvidentata*. This article report on the Solenogastres previously studied in the BENTART Collection.

RESUMEN

Se estudian cuatro ejemplares de la Colección BENTART (Islas Shetland del Sur y estrecho de Bransfield, Antártida). Dos ejemplares fueron identificados como: *Rhopalomenia carinata* Salvini-Plawen, 1978 recogida en un fondo fangoso y de gravas a 710 m de profundidad en la Isla Livingston y *Rhopalomenia rhynchopharyngeata* Salvini-Plawen, 1978 procedente de un fondo fangoso a 235 m de profundidad en la Isla Livingston. Un ejemplar, procedente de un fondo de fango fino y arena a 80 m de profundidad en la Isla Livingston, pertenece al género *Neomenia* y presenta rasgos que lo separan claramente de las especie conocidas, pero no es descrito como una nueva especie ya que no se conoce la organización anatómica de la parte posterior del animal. Y un ejemplar, recogido en una fondo fangoso a 80 m de profundidad en la isla Livingston, es descrito como la nueva especie *Dorymenia parvidentata*. Se informa sobree los Solenogastres ya estudiados de la Colección BENTART.

KEY WORDS: *Neomenia* sp., *Rhopalomenia carinata*, *Rhopalomenia rhynchopharyngeata*, *Dorymenia parvidentata*, Mollusca, Solenogastres, Antarctica.
PALABREAS CLAVE: *Neomenia* sp., *Rhopalomenia carinata*, *Rhopalomenia rhynchopharyngeata*, *Dorymenia parvidentata*, Moluscos, Solenogastros, Antártida.

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INTRODUCTION

During the Spanish campaigns BENTART'94 and BENTART'95, for the study of the Antarctic benthos off the Livingston and Deception Islands (South Shetland Islands) and in the Bransfield Strait, north of the Antarctic Peninsula, 17 specimens of Solenogastres Molluscs were collected. Research had previously been conducted in this area to gain knowledge of the benthonic fauna (U.S. Antarctic Research Program, 1961-1972), resulting in the description of 23 species of Solenogastres (SALVINI-PLAWEN, 1978). Study of the BENTART Collection of Solenogastres revealed that the majority of specimens collected belonged to new species. *Dorymenia troncosoi* García-Álvarez, Urgorri and Salvini-Plawen, 1998, 5 specimens: 4 collected south of Livingston Island on muddy bottoms at a depth of 65-66 m, and 1 specimen collected north of the same Island on a muddy bottom at a depth of 240 m (GARCÍA-ÁLVAREZ, URGORRI AND SALVINI-PLAWEN, 1998). *Dorymenia hesperidesi* García-Álvarez, Urgorri and Salvini-Plawen, 2000, 1 specimen collected on a muddy bottom at a depth of 235 m south of Livingston Island; *Dorymenia menchuescribanae* García-Álvarez, Urgorri and Salvini-Plawen, 2000, 6 specimens: 5 collected south of Livingston Island on *Ophidiogorgia paradoxa* Bayar, 1980, at a depth of 50 m, and 1 specimen collected south of the same Island on a muddy bottom at a depth of 66 m (GARCÍA-ÁLVAREZ, URGORRI AND SALVINI-PLAWEN, 2000). *Ocheyoherpia bursata* García-Álvarez and Urgorri, 2003, 1 specimen collected off Deception Island on a gravel bottom at a depth of 248 m (GARCÍA-ÁLVAREZ AND URGORRI, 2003, in press). In this paper, 4 specimens from the BENTART Collection are studied. Two specimens were identified as belonging to two species previously known in the study area: *Rhopalomenia carinata* Salvini-Plawen, 1978 collected on a muddy and gravely bottom at a depth of 710 m off Livingston Island and *Rhopalomenia rhynchopharyngeata* Salvini-Plawen, 1978 from a muddy bottom at a depth of 235 m off Livingston Island. One specimen belonging to the genus *Neomenia* presented features, which well distinguish it from known species, although it is not described as a new species since the anatomic organisation of the posterior part of the animal is unknown, this specimen was collected from a fine muddy and sandy bottom, at a depth of 80 m off Livingston Island. And one specimen, collected on a muddy bottom at a depth of 80 m off Livingston Island, is described as a the new species *Dorymenia parvidentata*.

MATERIAL AND METHODS

The specimens studied were fixed and preserved in 70% alcohol. The sclerites were studied by separation of small pieces of cuticle from the central dorsal area of the body and from the ventral groove. These pieces were treated with 5% sodium hypochlorite for 12 hours in order to isolate the sclerites; they were them rinsed with distilled water, dried under a heater at 40°C and mounted using synthetic resin. For the anatomical study, the specimen were decalcified in an ethylenediaminetetracetic acid (EDTA) solution 12 hours, embedded in paraffin and a series of 10 μm cross sections cut which were stained with Azan of Heidenhain. The anatomy was reconstructed from the serial sections.

RESULTS

Order NEOMENIAMORPHA Pelseneer, 1906
Family NEOMENIIDAE Ihering, 1876
Genus *Neomenia* Tullberg, 1875

Neomenia sp.

Material examined: One specimen, 3.7 mm in length and 1.4 mm in width at the anterior part, and 0.7 mm in width at the posterior part (sectioned into 10 μm transversal series). Collected at station 7-BOX-3 (62° 44′ 17″ S; 60° 28′ 11″ W) with a box-corer trawl on a fine muddy and sandy bottom, at a depth of 80 m off Livingston Island (South Shetland Islands, Antarctic) during the Spanish campaign, BENTART'95, for the study of the Antarctic benthos,.

Description: The body of the animal is wider at the anterior end than at the posterior end, and gradually narrows in diameter between the two (Fig. 1A). The sclerites do not appear to protrude from the cuticle, but they have a very shiny appearance. The ventral groove is well visible. In alcohol the colour of the animal is yellowish white. The cuticle is 30-50 μm thick with papillae at the base. Underneath the epidermis there is a thick subepithelial layer matrix up to 70 μm (Fig. 2A). The mantle produces three types of sclerites: elongated laminate scales not forming grooves (120 μm x 14 μm) (Fig. 1B); solid slightly curved acicular spicules (100μm x 4.5 mm) (Fig. 1C); elongated scales in the shape of grooves (100 μm x 16 μm) (Fig. 1D). The pedal pit is located below the oral opening and the anterior part of the pharynx (Fig. 1E). In a preserved state, it has a narrow opening. Its epithelium is ciliated and at its end the three folds are visible that continue on to the pedal groove (Fig. 2B). These folds are likewise ciliated and the middle one is larger than the two lateral ones. At the end of the body, the two lateral folds become smaller, and only the middle fold is still present. In the pallial cavity 10 to 12 respiratory folds are visible, but due to the poor condition of the animal, it is impossible to affirm that this is the correct number. Moreover, the number of folds may depend on the size and the maturity of the animal. The buccal opening is found at the posterior area of the atrium (Fig. 1E). It represents the anterior end of a short tube with three internal thickenings or large lips, two dorsolateral and one ventral that are in rostral prolongation of the pharynx (Figs. 1E, 2A). The two dorsolateral lips are separated by a mid dorsal slit, but they are never separated and set off from the walls where the buccal tube is. A lateral slit from each dorsolateral lip separates the ventral lip. These slits also continue in a ventral space of this lip, separating the latter as a tongue-like formation from the wall of the buccal tube. The foregut continues into a long pharynx having a longitudinally pleated folded wall, its epithelium is covered by a fine cuticular layer. The middle portion of the pharynx is surrounded by glands and by a strong circular musculature which cause it to narrow (Figs. 1E, 2C). It opens into the midgut through a sphincter formed by a very strong circular musculature (Figs. 1E, 2D). There is no radula or radular sac and no ventral foregut glandular organs are elaborated. No rostral caecum of the midgut is present (Fig. 1E), the latter shows lateral constrictions due to the dorsoventral musculature. The cerebral ganglion is large, located dorsally to the pharynx in the middle portion above the ring of circular musculature (Fig. 1E). At either side of the cerebral ganglion, there is one lateral ganglion (Fig. 1E). A short distance behind these lateral ganglion, there are two connectives which emerge from each side of the cerebral ganglion: the strongest pair (270 μm x 20 μm each) runs vertically to join the buccal ganglion (Figs. 1E, 2C). The two buccal ganglia are located ventrolaterally of the pharynx throughout the area of strong circular musculature. They are interconnected by a ventral commissure of the pharynx. The second connectives runs to the ventral ganglia that are large and rounded (100 μm in diameter), joined with each other by a single commissure (Fig. 2B) and located above the beginning of the pedal groove and ventrally in the mid-area of the pharynx with its strong circular musculature. The atrium opens at the anterior

end of the body through a narrow slit in a dorsoventral direction. The atrium is large and in its dorsal and lateral walls, it presents several papillae forming groups of 4-7, joined together in one base (Fig. 2A).

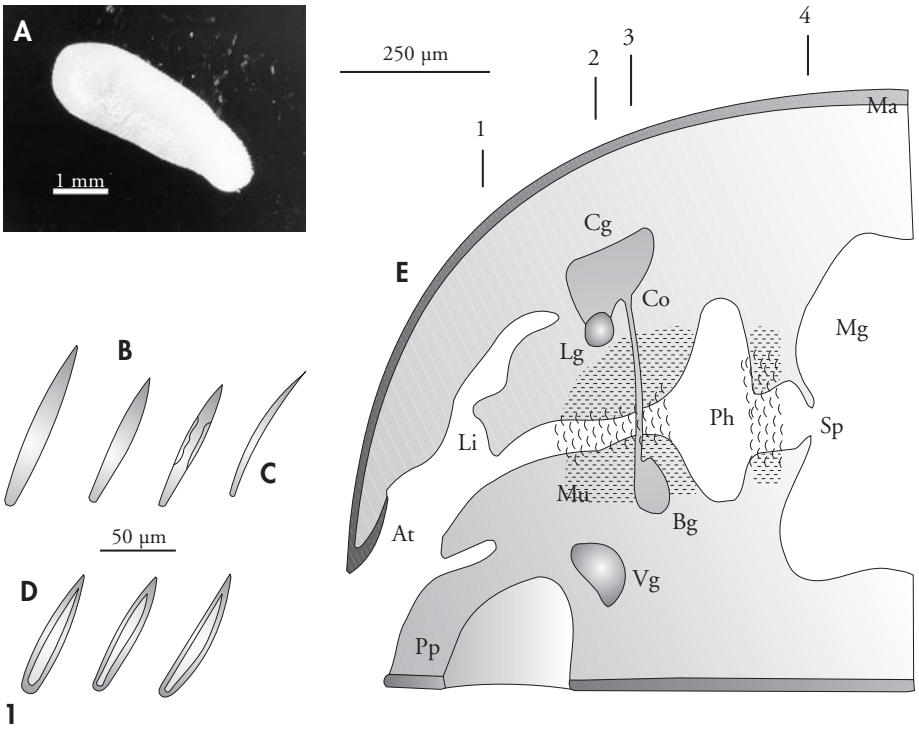
Order CAVIBELONIA Salvini-Plawen, 1978
Family RHOPALOMENIIDAE Salvini-Plawen, 1978
Genus *Rhopalomenia* Simroth, 1893

Rhopalomenia carinata Salvini-Plawen, 1978

Material examined: One specimen, 7 mm in length by 0.6 mm in width, (sectioned in 10 μm seriated cuts), was collected at station A-30 (62° 01′ 24″ S; 60° 26′ 16″ W) with a Assasiz trawl drag, on a muddy bottom at a depth of 710 m, off Livingston Island (South Shetland Islands, Antarctic) during the Spanish campaign, BENTART'95, to study the Antarctic benthos.

Description: The specimen studied was slightly flattened, laterally, in the anterior part, presenting a barely protruding dorsal cuticular keel, although this is visible in the transversal cuts (Figs. 3A-C). In alcohol the colour of the animal is light brown. Cuticle is not thick, up to 60 μm, attaining 90 μm in the keel. Sclerites are arranged in several layers within the cuticle, are hollow, straight or slightly arched aciculars in varying sizes, up to 100 μm in length, and are similar to those observed in the other species of the genus (see Fig. 151 in SALVINI-PLAWEN, 1978). Blade shaped solid scales, of up to 60 μm length, are found in the pedal groove. A single fold is presented in the pedal groove (Figs. 3D, E), which does not access the pallial cavity. The pallial cavity is small, presenting no respiratory folds, lacking abdominal spicules and copulatory spicules, the anus leading out dorsally in it, whereas the spawning duct does so ventrally. In the specimen studied, no presence of a sensitive dorsoterminal organ was noted. The mouth (Fig. 3B) opens separated from the atrium (Fig. 3C) and is located at the end of a short duct located within the buccal cavity. The radular sac in the mid part has a characteristic ventral epithelial fold (Fig. 3D). It presents a pair of ventral foregut glandular organs formed by two long ducts, which lead into supepithelial glandular follicles (type A according SALVINI-PLAWEN, 1978). Anteriorly, these ducts are located parallel to the end part of the radular sac until leading laterally into the same. These three ducts (the two glandular organs and the radular sac) are jointly surrounded by circular musculature (Figs. 3D,E). The oesophagus is very

(Right page) Figure 1. *Neomenia* sp. A: habitus; B: elongate laminate scales; C: acicular spicules; D: groove-shaped scales; E: Schematic organization of anterior body. At: atrium; Bg: buccal ganglion; Bt: buccal tube; Cg: cerebral ganglion; Cm: nervous commissure; Co: connective; Gl: glands; Lg: lateral ganglion; Li: lip; Ma: mantle; Mg: midgut; Mt: matrix; Mu: musculature; Ph: pharynx; Pp: pedal pit; Ps: pedal groove folds; Sp: sphincter; Sv: ventral blood sinus; Vg: ventral ganglion. 1-4 lines corresponding to cross-sections A-D in Figure 2. Figure 2. A-D. Microphotographs of the cross-sections of the anterior region of the body corresponding to lines 1-4 in Figure 1.
(Página derecha) Figura 1. Neomenia *sp. A: habitus; B: escamas laminares alargadas; C: espículas aciculares; D: escamas excavadas; E: organización esquemática de la parte anterior del cuerpo. At: atrio; Bg: ganglio bucal; Bt: tubo bucal; Cg: ganglio cerebral; Cm: comisura nerviosa; Co: conectivo; Gl: glándulas; Lg: ganglio lateral; Li: labio; Ma: manto; Mg: intestino; Mt: matríz; Mu: musculatura; Ph: faringe; Pp: fosa pedia; Ps: pliegues del surco pedio; Sp: esfínter; Sv: seno sanguíneo ventral; Vg: ganglio ventral. 1-4 líneas que corresponden a los cortes en sección A-D en la Figura. Figura 2. A-D. Microfotografías de los cortes en sección de la región anterior del cuerpo correspondientes a las líneas 1-4 de la Figura 1.*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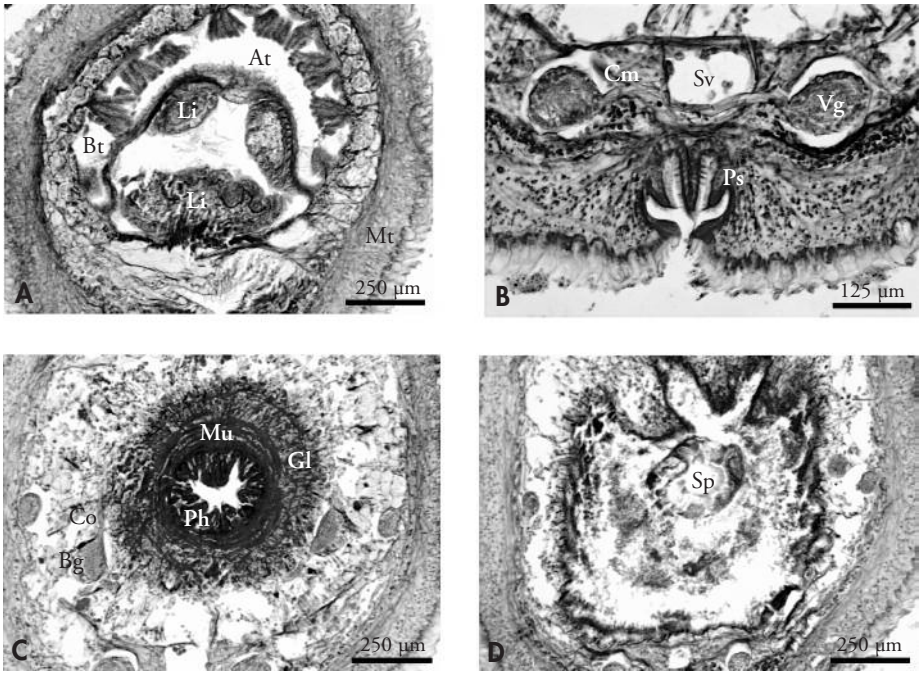
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long and is located dorsally to the radular sac and to the ventral foregut glandular organs until leading into the midgut. The midgut has a large dorso-rostral caecum, which reaches the level of the cerebral ganglion (Figs. 3B-D). The gonad is full of spermatozoids and ovules, and has a pair of dorsal seminal receptacles at the spawning ducts.

Remarks: The specimen studied is from a geographical area (Livingston Island, South Shetland Islands) close to part of the material studied in the original description (Elephant Island/ Joinville Island, South Shetland Islands), although at a considerably greater depth 710 m, as opposed to 119-220 m (SALVINI-PLAWEN, 1978). It presents a thinner cuticle than the model material, 60 μm in the present specimen 7 mm in length by 150-225 μm for specimen up to 35 mm; no pedal fold was observed within the pallial cavity, nor was there the presence of a dorsoterminal sensitive organ, as noted in the original description. But other important features particular to this species are well defined: the mouth is located at the end of a horn and separate from the atrium; the ventral glandular organs of the pharynx are subepithelial, and the anterior tubular part with the radular sac are jointly surrounded by circular musculature; it presents a ventral epithelial fold in the mid part of the radular sac; and the general structure of the gonopericardic system is similar.

Rhopalomenia rhynchopharyngeata Salvini-Plawen, 1978

Material examined: One specimen 13 mm in length and 2.1 mm in width (sectioned into 10 μm seriated cuts), collected at station A-19 (62º43'43"S; 60º31'27"W) with an Agassiz drag trawl on a muddy bottom at a depth of 235 m, off Livingston Island (South Shetland Islands, Antarctic) during the Spanish campaign, BENTART'95, for the study of the Antarctic benthos.

Description: Rolled up animal with no keel or protuberances (Fig. 4A), cylindrical in section, with a bristling appearance due to the sclerites standing out from the mantle. In alcohol the colour of the animal is light brown. Thick cuticle of up to 150 μm. The sclerites are arranged in several layers, both obliquely and radially on the cuticle, with different sized hollow, straight or slightly arched acicules, similar to those appearing in other species of the genus (see Figure 151 in SALVINI-PLAWEN, 1978), attaining maximum lengths of 200 μm. Blade shaped solid scales are found in the pedal groove of up to 80 μm in length. In the first third of the body, the pedal groove presents three folds, a longer central one of up to 120 μm, and two shorter lateral folds of up to 70 μm. In the posterior part only one fold is found, which does not access the pallial cavity (Figs. 4C-E). The pallial cavity is small, without respiratory folds, lacking abdominal spicules and copulatory spicules (Fig. 4B), and the anus open dorsally into the cavity. The spawning duct opens independently of the pallial cavity, since it ends unpaired, free and directly outside the cavity on the ventral part (Fig. 4B). There is a dorsoterminal sensitive organ located at the posterior end of the body. The mouth opens separated from the atrium. It lacks a radula but presents a short radular sac. The ventral foregut glandular organs are formed by two long ducts into which subepithelial glandular follicles open (Type A according to Salvini-Plawen, 1978). Anteriorly, these ducts are located freely to both sides of the radular sac, until they open laterally into the radular sac, and are not jointly surrounded to the radular sac by a common circular musculature. The oesophagus is very long, and open into the ventral part of the midgut. The midgut has a dorso-rostral caecum, which extends to the level of the cerebral ganglion. The rectum (Figs. 4C,D,E) is circular in section (diameter up to 150 μm). The gonad is full of spermatozoids and ovules. The pericardium is not very voluminous and is circular in section

Figure 3. *Rhopalomenia carinata* Salvini-Plawen, 1978. A: habitus; B-E: microphotographs of the cross-sections of the anterior region of the body. At: atrium; Bo: buccal opening; Cg: cerebral ganglion; Dc: dorsal caecum; Fd: ventral epithelial fold of the radular sac; Ke: keel; Lg: lateral ganglion; Mu: circular musculature; Ph: pharynx; Rs: radular sac; Vfg: ventral foregut glandular organ.
Figure 3. Rhopalomenia carinata *Salvini-Plawen, 1978. A: habitus; B-E: microfotografías de los cortes en sección de la región anterior del cuerpo. At: atrio; Bo: abertura bucal; Cg: ganglio cerebral; Dc: ciego dorsal; Fd: pliegue epitelial ventral del saco radular; Ke: cresta; Lg: ganglio lateral; Mu: musculatura circular; Ph: faringe; Rs: saco radular; Vfg: órgano glandular ventral de la faringe.*

(diameter of 200-250 µm), the heart is located dorsally in the pericardium, is relatively large and perfectly bilobulated (Fig. 4E). There is a pair of seminal receptacles lying dorsal to the spawning ducts (Fig. 4F). The spawning ducts (Figs. 4C-F) are circular in section (up to 400 µm in diameter), and with their glandular walls, in the posterior part fuse into a single duct (Fig. 4E), also circular in section (up to 450 µm in diameter) and with glandular walls.

Remarks: The specimen studied here is from a geographical area (Livingston Island, South Shetland Islands) close to part of the material studied in the original description (Elephant Island / Joinville Island, South Shetland Islands) and at a similar depth (Salvini-Plawen, 1978). This specimen is of a larger size (13 mm x 2.1 mm) than those studied in the original description (10 mm x 1 mm); the cuticle is thicker, 150 µm as opposed to 120 µm, the same occurring with the

length of the folds in the pedal groove, where the central groove attains 120 μm and the lateral grooves 70 μm, as opposed to 85 μm and 60 μm in the model specimen. The gonad is not observed as being divided into two by a septum, as indicated in the original description. The characteristics of this species are well defined (see Table 4, p. 159, in SALVINI-PLAWEN, 1978): the specimen presents a bristly appearance due to the radially arranged sclerites; the spawning duct open directly into the pallial cavity; no radula; the radular sac is short; and the anterior parts of the ventral foregut glandular organs are located laterally to the radular sac, without circular musculature surrounding the three ducts.

Family PRONEOMENIIDAE Simroth, 1893
Genus *Dorymenia* Heath, 1911

Dorymenia parvidentata sp. nov.

Type material: Holotype measuring 7.0 mm in length, 0.6 mm in width (spicule slide, specimen in seriated sections).
Type locality: Livingston Island (station A-7, BENTART'95) (South Shetland Islands, Antarctic) 62º44'07"S, 60º27'42"W from a silt bottom at 80 m depth.
Deposit and derivatio nominis: The holotype is deposited in the "Museo Nacional de Ciencias Naturales" of Madrid, number: MNCN 15.02/12. The specific name refers to the few radular teeth it has (from the Latin: *parvum*: small amount; *dens*: tooth).

Diagnosis: Body 7.0 x 0.6 mm, in rounded section, with no keel or protuberances. Not thick cuticle (50 μm). With hollow acicular sclerites. Radula with 10-12 short based teeth with a pointed, slightly curved apex. Pallial cavity with walls with no diverticles, extending anteriorly into a ventral sac. Unpaired spawning duct leading into the dorsal wall of the pallial cavity. A pair of four pointed copulatory spicules star shaped in section. Without abdominal spicules. Elongated erythrocytes with no granulations. With a dorsoterminal sensitive organ.

Description: Animal with an elongated, cylindrically shaped body, with no protuberances or keel (Fig. 5A). Smooth mantle surface, with no projecting sclerites and a visible ventral groove. In alcohol the colour of the animal is light brown. Cuticle is not thick, measuring about 55 μm, with hollow, slightly arched acicular sclerites of up to 180 μm in length (Fig. 5C) arranged in layers. Along the pedal groove there are two further types of sclerites: solid, slightly curved acicular spicules of up to 160 μm, with one of its two ends pointed and other rounded (Fig. 5D) and blade shaped scales of up to 110 μm in length (Fig. 5E). The pedal groove starts in a small pedal pit (Fig. 5F) and presents a single fold (Fig. 6D), which does not access the pallial cavity. The pallial cavity opens onto the exterior by a narrow ventro-posterior opening, and presents no respiratory folds or diverticles in its walls (Fig. 6F). It has a pair of copulatory spicules, in section star-shaped with four pointes, arranged ventrolaterally on some small protuberances in the walls of the pallial cavity (Figs. 5G, 6E). It lacks abdominal spicules. The anus opens out into the dorsal wall of the pallial cavity (Fig. 5G). The pallial cavity presents an ample sac, which extends ventro-anteriorly below the pericardioducts and the rectum (Figs. 5G, 6E). The atrial sensitive organ presents several simple papilla on its walls, and dorsally to this organ lies the cerebral ganglion (Figs. 5F, 6A), the only part of the nervous system to be observable in this specimen. It has a single dorsoterminal sensitive organ (Fig. 5G). The mouth opens into the atrial cavity, occupying a dorsoposterior position, and is located at the end of duct, which in the case of the specimen studied, was found to be evaginated (Figs. 5F, 6B). The pharynx is short and in the midgut pre-

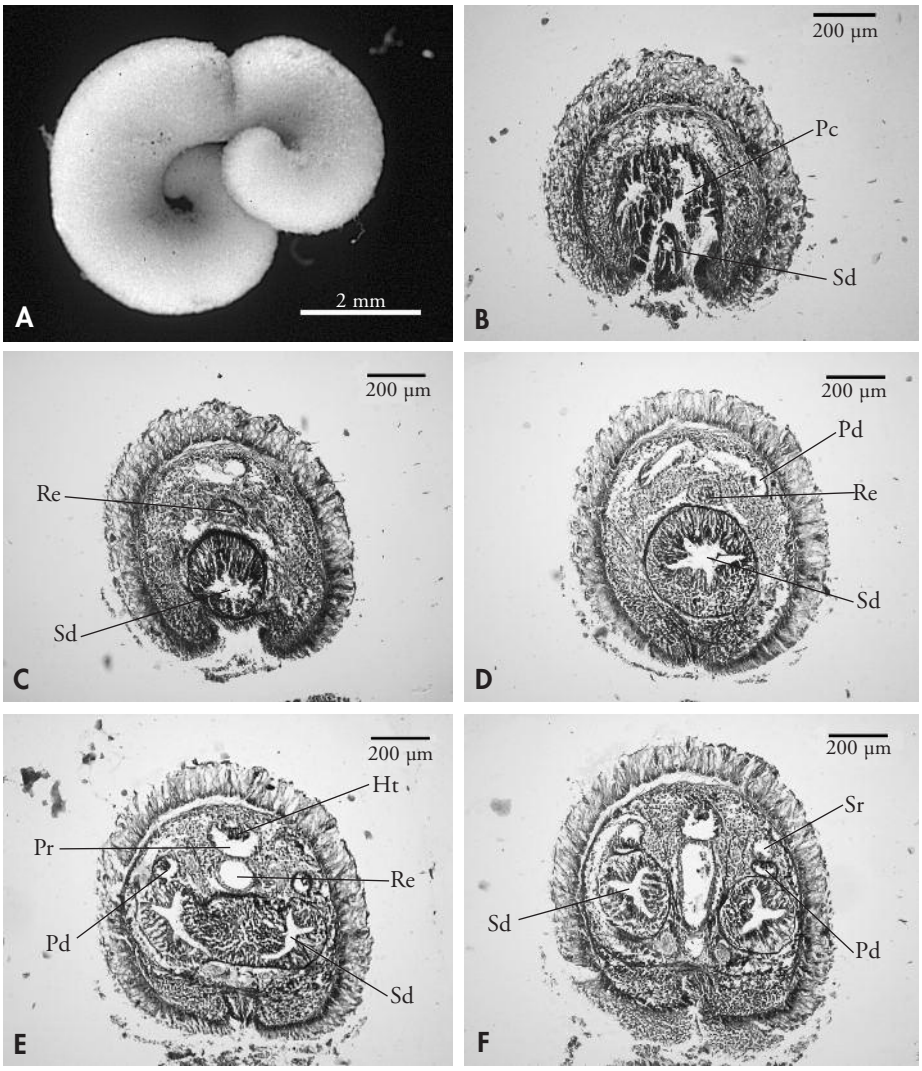

Figure 4. *Rhopalomenia rhynchopharyngeata* Salvini-Plawen, 1978. A: habitus; B-F: microphotographs of the cross-sections of the posterior region of the body. Ht: heart; Pc: pallial cavity; Pd: pericardioduct; Pr: pericardium; Re: rectum; Sd: spawning duct; Sr: seminal receptacle.
Figure 4. Rhopalomenia rhynchopharyngeata *Salvini-Plawen, 1978. A: habitus; B-F: microfotografías de los cortes en sección de la región posterior del cuerpo. Ht: corazón; Pc: cavidad paleal; Pd: pericardioducto; Pr: pericardio; Re: recto; Sd: conducto de desove; Sr: receptáculo seminal.*

sents a very short dorso-rostral caecum (Figs. 5F, 6B). It has a short radular sac, and a polystichous/polyseriate radula, consisting of 10-12 teeth measuring 20-25 µm length, with a short base and elongated, slightly curved apex (Fig. 5B). Teeth are located isolated upon a basal membrane. The pair of ventral foregut glandular organs (Figs. 5F, 6C) are epithelial and tubular shaped (Type C, according to Salvini-Plawen, 1978), leading laterally into the anterior part of the

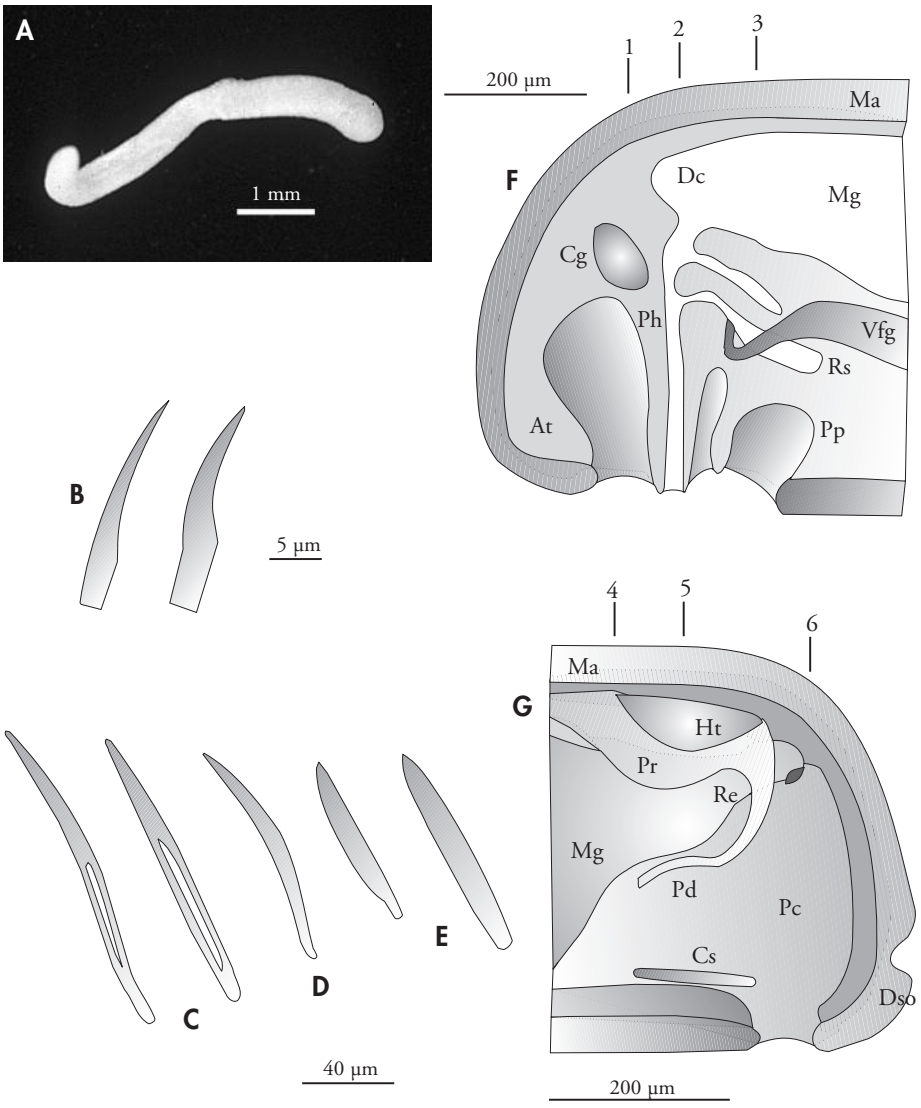

Figure 5. *Dorymenia parvidentata* sp. nov. A: habitus; B: radular teeth; C: hollow spicules; D: groove solid spicules; E: groove scales; F: schematic organization of anterior body; G: Schematic organization of posterior body. At: atrium; Cg: cerebral ganglion; Cs: copulatory spicule; Dc: dorsal caecum; Dso: dorsoterminal sense organ; Ht: heart; Ma: mantle; Mg: midgut; Pc: pallial cavity; Pd: pericardioduct; Ph: pharynx; Pp: pedal pit; Pr: pericardium; Re: rectum; Rs: radular sac; Vfg: ventral foregut glandular organ. 1-6 lines corresponding to cross-sections A-F in Figure 6.
Figura 5. Dorymenia parvidentata *sp. nov. A: habitus; B: dientes radulares; C: espículas huecas; D: espícula maciza del surco pedio; E: escamas del surco pedio; F: organización esquemática de la parte anterior del cuerpo; G: organización esquemática de la parte posterior del cuerpo. At: atrio; Cg: ganglio cerebral; Cs: espídula copuladora; Dc: ciego dorsal; Dso: órgano sensitivo dorsoterminal; Ht: corazón; Ma: manto; Mg: intestino; Pc: cavidad paleal; Pd: pericardioducto; Ph: faringe; Pp: fosa pedia; Pr: pericardio; Re: recto; Rs: saco radular; Vfg: órgano glandular ventral de la faringe. 1-6 lineas que corresponden a los cortes en sección A-F en la Figura 6.*

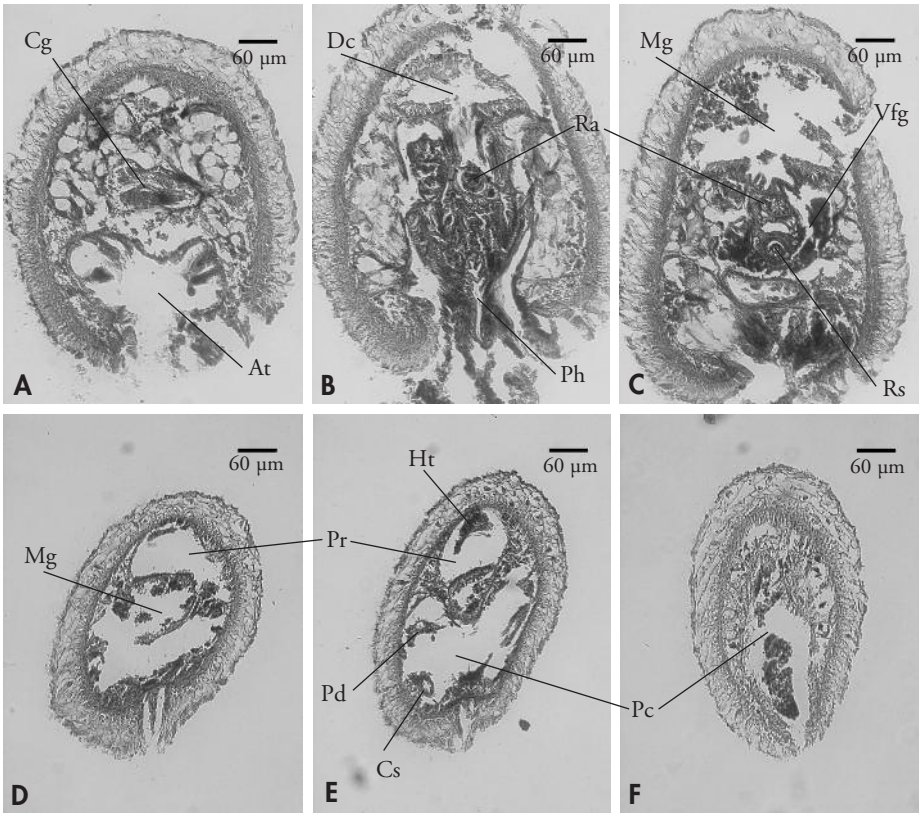

Figure 6. *Dorymenia parvidentata* sp. nov. A,B,C: microphotographs of the cross-sections of the anterior region of the body corresponding to lines 1,2,3 in Figure 5. D,E,F: microphotographs of the cross-sections of the posterior region of the body corresponding to lines 4,5,6 in Figure 3. At: atrium; Cg: cerebral ganglion; Cs: copulatory spicule; Dc: dorsal caecum; Ht: heart; Mg: midgut; Pc: pallial cavity; Pd: pericardioduct; Ph: pharynx; Pr: pericardium; Ra: radula; Rs: radular sac; Vfg: ventral foregut glandular organ.

Figure 6. Dorymenia parvidentata *sp. nov. A,B,C: microfotografías de los cortes en sección de la región anterior del cuerpo correspondientes a las líneas 1,2,3 de la Figura 5. D,E,F: microfotografías de los cortes en sección de la región posterior del cuerpo correspondientes a las líneas 4,5,6 de la Figura 5. At: atrio; Cg: ganglio cerebral; Cs: espícula copuladora; Dc: ciego dorsal; Ht: corazón; Mg: intestino; Pc: cavidad paleal; Pd: pericardioducto; Ph: faringe; Pr: pericardio; Ra: rádula; Rs: saco radular; Vfg: órgano glandular ventral de la faringe.*

radular sac, and are located ventrally under the first third of the midgut. The erythrocytes are elongated (15 μm length) and present no granulations. The heart is clearly bilobulated ventrally (Fig. 6E), and is located inside a large pericardium. The pair of pericardioducts lead out from the pericardium on the posterior-lateral part, and are laocated ventrolaterally to the digestive duct. The exemplar was immature, no ovules or spermatozoids were observed in the gonads, the periocardioducts can be observed as narrow ducts until they vanish, no spawning duct is present (Figs. 5G, 6E) and no seminal receptacles or the anterior part of the reproductive apparatus were noted.

DISCUSSION

Neomenia sp. belongs to the order Neomeniamorpha, as it presents solid acicular sclerites together with groove-shaped scales; there are no ventral glandular organs in the pharynx; with respiratory folds, and it is assigned to the family Neomeniidae, as it has a relatively thick cuticle with epithelial papillae and subepithelial matrix, solid acicular sclerites and elongated groove-shaped scales, it lacks a radula and has a pedal groove with several folds (SALVINI-PLAWEN, 1978).

At present two genera of the family Neomeniidae are known: *Neomenia* Tullberg, 1875 and *Heathimenia* Salvini-Plawen, 1967. The specimen is assigned to the genus *Neomenia* as it fulfils the main characteristics of the genus: a somewhat thick cuticle with papillae; solid, grooved sclerites; buccal opening in the atrium; absence of a radula and ventral glandular organs in the pharynx; midgut with lateral constrictions and the presence of respirators folds (WIREN, 1892; SALVINI-PLAWEN, 1978). The status of the genus *Heathimenia* with *H. verrilli*, collected in the Gulf of Saint Lawrence on the east coast of North America (HEATH, 1918) is not settled and the species needs re-examination (SALVINI-PLAWEN, 1967, 1978).

Currently six Antarctic or Sub-Antarctic species are known to belong to the genus *Neomenia*. *N. permagna* Salvini-Plawen, 1978 is a South Pacific species collected at a depth of 549 m. The following characteristics distinguish it from *Neomenia* sp.: the body size (12 cm x 3 cm); the presence of only groove-shaped scales and solid acicular sclerites; a pedal groove having 25 folds; a rostral tube-like pharynx, without a terminal sphincter. *N. labrosa* Salvini-Plawen, 1978 was collected on the South Shetland Islands (Elephant Island) at a depth of 220-240 m. It is differentiated from *Neomenia* sp. by the following features: the presence of only groove-shaped scales and solid acicular sclerites; a pedal groove having 13-1 folds; a pharynx with a lateral slit at each side in the rostral portion which separates the dorsal and ventral lips, without a terminal sphincter. *N. trapeziformis* Salvini-Plawen, 1978 is a South Pacific species that was collected on the Antipode Islands at a depth of 2010-2110 m (SALVINI-PLAWEN, 1978).

The main characteristics distinguishing it from *Neomenia* sp. are: a body with strong lateral edges and an even number or dorsal lumps that give it its shape in the typical trapezoidal section; the presence of only groove-shaped scales; arrowhead-shaped sclerites and solid acicular sclerites; a pedal groove having 23-3 folds; a pharynx with a short lateral slit at each side in the rostral portion, separating the dorsal and ventral lips; the ventral lip is not separated from the wall of the buccal cavity. *N. crenagulata* Salvini-Plawen, 1978 is a South Indian species, collected from the Kerguelen Islands at 585 m. The characteristics that separate it from *Neomenia* sp. are: the presence of only groove-shaped scales and solid acicular sclerites; a pedal groove having 13-1 folds, a pharynx with a ventral slit in the rostral portion; the dorsal wall of the pharynx has pronounced folds that hang over the buccal space. *N. laminata* Salvini-Plawen, 1978 was collected from the South Orkney Islands at a depth of 298-302 m. The main traits serving to differentiate it from *Neomenia* sp. are: a pedal groove with 7-3 folds; a pharynx without slits to delimit the lips. *N. propietecta* Salvini-Plawen, 1978 was collected from the Ross Sea near Victoria Land at a depth of 344-351 m. The characteristics separating it from *Neomenia* sp. are: the presence of only groove-shaped scales and acicular sclerites with keels; a pedal groove with one fold; a pharynx without slits to delimit the lips.

Due to the considerable damage of the posterior body, it was only possible to study and reconstruct the anterior part of the single specimen available. The differences between *Neomenia* sp. and other species of this genus are quite clear, especially owing to the presence of the three large lips in the rostral portion of the pharynx, the elongated laminate mantle scales, as well as its geographical

location. But as its important posterior organs are unknown, it is not described as a new species until it is confirmed with new data.

Dorymenia parvidentata sp. nov. belongs to the order Cavibelonia, as it presents hollow acicular sclerites ordered into several layers within a relatively thick cuticle, and is classified in the family Proneomeniidae based on the fact that it has a polystic/polyseriated radula and tubular epithelial ventral foregut glandular organs of type C (SALVINI-PLAWEN, 1978). The characteristics which locate this new species within the genus *Dorymenia* are well defined: the mouth opens into the atrium; the genital orifice is impair, it presents a dorsoterminal sensitive organ, has copulatory spicules and the pallial cavity presents no respiratory folds.

Taking into account the radular structure and teeth form (SALVINI-PLAWEN, 1978; GARCÍA-ÁLVAREZ *et al*., 2000), the species of the genus *Dorymenia* may be classified into three general groups: one group presenting numerous short radular teeth with a curved apex and long base; another group with short based teeth and one or two medium sized teeth; and a third group, which includes *Dorymenia parvidentata* sp. nov., characterised by presenting a radula with few, very elongated and short based apex teeth, constituting: *Dorymenia acutidentata* Salvini-Plawen, 1978; *Dorymenia paucidentata* Salvini-Plawen, 1978 and *Dorymenia singulatidentata* Salvini-Plawen, 1978.

With each of the three species cited above, *Dorymenia parvidentata* sp. nov. presents significant differences (see Table 1 in GARCÍA-ÁLVAREZ *et al*., 2000). *Dorymenia parvidentata* sp. nov. presents 10-12 radular teeth, whereas *D. acutidentata* has 22-26, *D. paucidentata* 12-14 and *D. singulatidentata* 14. The pallial cavities are very different, *Dorymenia parvidentata* sp. nov. presents no diverticles and extends anteriorly in a ventral sac, whereas in *D. actuidentata* it has numerous diverticles and a dorsoanterior sac, in *D. paucidentata* lacks diverticles and presents a pair of lateral sacs and a pair of ventroanterior sacs and in *D. singulatidentata* lacks diverticles and presents a pair of ventroanterior sacs. Also, sectioning of the copulatory spicules in *D. acutidentata* and *D. singulatidentata* reveals a circular formation and not a four-pointed star as in *Dorymenia parvidentata* n. sp. Finally, in *D. acutidentata* the pedal fold enters the pallial cavity, whereas this is not the case in *Dorymenia parvidentata* sp. nov.

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