



# A large biodiversity of “skeneimorph” (Gastropoda: Vetigastropoda) species from the South Azorean Seamount Chain, with the description of seventeen new species

Una extensa biodiversidad de especies de “skeneimorfos” (Gastropoda: Vetigastropoda) de la cadena de montañas submarinas del Sur de las Azores, con la descripción de diecisiete especies nuevas

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## ABSTRACT

Forty-six “skeneimorph” species from the South Azorean Seamount Chain (SASC) have been studied. These comprise taxa in the superfamilies Trochoidea (family Skeneidae) and Seguenzioidea (families Trochaclididae, Pendromidae, Eudaroniidae and several genera which are not assigned to a family). Seventeen new species are proposed, fifteen in Seguenzioidea (*Trochaclis fortis* n. sp., *Trochaclis carinata* n. sp., *Trochaclis platoensis* n. sp., *Adeuomphalus axistriatus* n. sp., *Adeuomphalus curvistriatus* n. sp., *Eudaronia spirata* n. sp., *Eudaronia mikra* n. sp., *Anekes anderswareni* n. sp., *Anekes mikrosculpta* n. sp., *Anekes umbiliculpta* n. sp., *Anekes varisculpta* n. sp., *Moelleriopsis atlantis* n. sp., *Moelleriopsis gritta* n. sp., *Moelleriopsis meteorminora* n. sp., and *Trenchia teriuga* n. sp.) and two in Trochoidea (*Mikro perforata* n. sp., and *Skenea basicarinata* n. sp.). Three species are transferred to different genera: *Xyloskenea xenos* Hoffman, van Heugten & Lavaleye, 2010 is assigned to *Trenchia*, *Trochus (Margarita) minima* Seguenza, 1876 and *Lissotesta scalaroides* Rubio & Rolán, 2013 to *Mikro*. Twelve species (26%) are only known from the SASC and are probably endemic to this region. Twenty-one species are known from the SASC and/or the Azores seamounts and this set is probably endemic to this larger area. Five amphiatlantic species were found (11% of total species): *Ganesa nitidiuscula* Jeffreys, 1883, *Rugulina fragilis* (G.O. Sars, 1878), *Trochaclis islandica* Warén, 1989, *Xyloskenea naticiformis* Jeffreys, 1883 and *Xyloskenea translucens* (Dall, 1927). About 50% of the skeneimorph species found on the SASC are known from an extensive distribution area in the NE Atlantic and only few of them also live in the Mediterranean Sea. As usual on seamounts, the number of live-taken specimens is very low compared to empty shells of the thanatocenosis.

## RESUMEN

Se han estudiado cuarenta y seis especies de “skeneimorfos” de la cadena de montañas submarinas del Sur de las Azores (SASC). Entre ellos hay taxones en las superfamilias Trochoidea (familia Skeneidae) y Seguenzioidea (familias Trochaclididae, Pendromidae, Eudaroniidae y varios géneros sin asignar a una familia). Se proponen diecisiete especies nuevas, quince en Seguenzioidea (*Trochaclis fortis* n. sp., *Trochaclis carinata* n. sp., *Trochaclis platoensis* n. sp., *Adeuomphalus axistriatus* n. sp., *Adeuomphalus curvistriatus* n. sp., *Euda-*

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*ronia spirata* n. sp., *Eudaronia mikra* n. sp., *Anekes anderswareni* n. sp., *Anekes mikrosculpata* n. sp., *Anekes umbilisculpta* n. sp., *Anekes varisculpta* n. sp., *Moelleriopsis atlantis* n. sp., *Moelleriopsis gritta* n. sp., *Moelleriopsis meteorminora* n. sp. y *Trenchia teriuga* n. sp.) y dos en Trochoidea (*Mikro perforata* n. sp. y *Skenea basicarinata* n. sp.). Se transfieren tres especies a diferentes géneros: *Xyloskenea xenos* Hoffman, van Heugten & Lavaley, 2010 se asigna a *Trenchia*, *Trochus (Margarita) minima* Seguenza, 1876 y *Lissotesta scalaroides* Rubio & Rolán, 2013 a *Mikro*. Doce especies (26%) solo se conocen de la SASC y son probablemente endémicos de esta región. Se conocen 21 especies de la SASC y/o los montes submarinos de las Azores y este conjunto es probablemente endémico de este área más grande. Se encontraron cinco especies anatlánticas (11% del total de especies): *Ganesa nitidiuscula* Jeffreys, 1883, *Rugulina fragilis* (G.O. Sars, 1878), *Trochaclis islandica* Warén, 1989, *Xyloskenea naticiformis* Jeffreys, 1883 y *Xyloskenea translucens* (Dall, 1927). El 50% de las especies de skeneimorfos que se encuentran en el SASC se conocen de una amplia área de distribución en el Atlántico nororiental y pocas de ellas viven también en el mar Mediterráneo. Como es habitual en montañas submarinas, el número de ejemplares recolectados vivos es bajísimo comparado con el de conchas en la tanatocenosis.

KEY WORDS: Mollusca, Trochoidea, Skeneidae, Seguenzioidea, Pendromidae, Trochaclididae, Eudaroniidae, North Atlantic, endemic species, taxonomy.

PALABRAS CLAVE: Moluscos, Trochoidea, Skeneidae, Seguenzioidea, Pendromidae, Trochaclididae, Eudaroniidae, Atlántico norte, especies endémicas, taxonomía.

## INTRODUCTION

This paper reviews skeneimorph species in the super families Trochoidea and Seguenzioidea that were encountered in sediment samples gathered during three cruises to seamounts in the South Azorean Seamount Chain (SASC). The SASC is located about 500 km south of the Azores and about 1500 km west of the NW African coastline (Fig. 1A). All SASC and Azorean seamounts are of volcanic origin with a summit bathymetric range between 200 and 500 m. These submarine structures have a rugged outline and most of them are surrounded by a steep slope reaching depths exceeding 1000 m.

The SEAMOUNT-2 cruise (GOFAS 1993) visited the Atlantis, Tyro, Plato, Irving, Hyères, and Great Meteor seamounts (Fig. 1B). The POS397 cruise (GEORGE 2010) explored the summit plateau of the Great Meteor Seamount. The M151 cruise (FRANK 2018) appraised various seamounts South of the Azores, and Atlantis, Great Meteor and Little Meteor seamounts in the SASC (Fig. 1B).

This paper is the fourth in a series of studies on molluscan groups in the SASC; previous papers discussed Seguenziidae (HOFFMAN ET AL., 2020a), the genus *Papuliscala* in Epitoniidae (HOFFMAN ET AL., 2020b) and Calliostomatidae (GOFAS & HOFFMAN, 2020). HOFFMAN ET AL. (2020a) discussed the oceanographic aspects of the SASC seamounts, an overview of previous publications on Mollusca and the methodology.

The family name Skeneidae has been traditionally used as a “purgatory” for minute, unpigmented, trochiform to planispiral shells that lack nacre and range from smooth to elaborately sculptured, awaiting their classificatory fates through anatomical and molecular studies (HICKMAN, 2013). To acknowledge this situation, authors tended to use the informal name “skeneimorph” (WARÉN, 1992; KANO, 2008) or “skeneiform” (HICKMAN, 1998) for such microgastropods sharing the characters described above, whereas Skeneidae is restricted for such species being closely

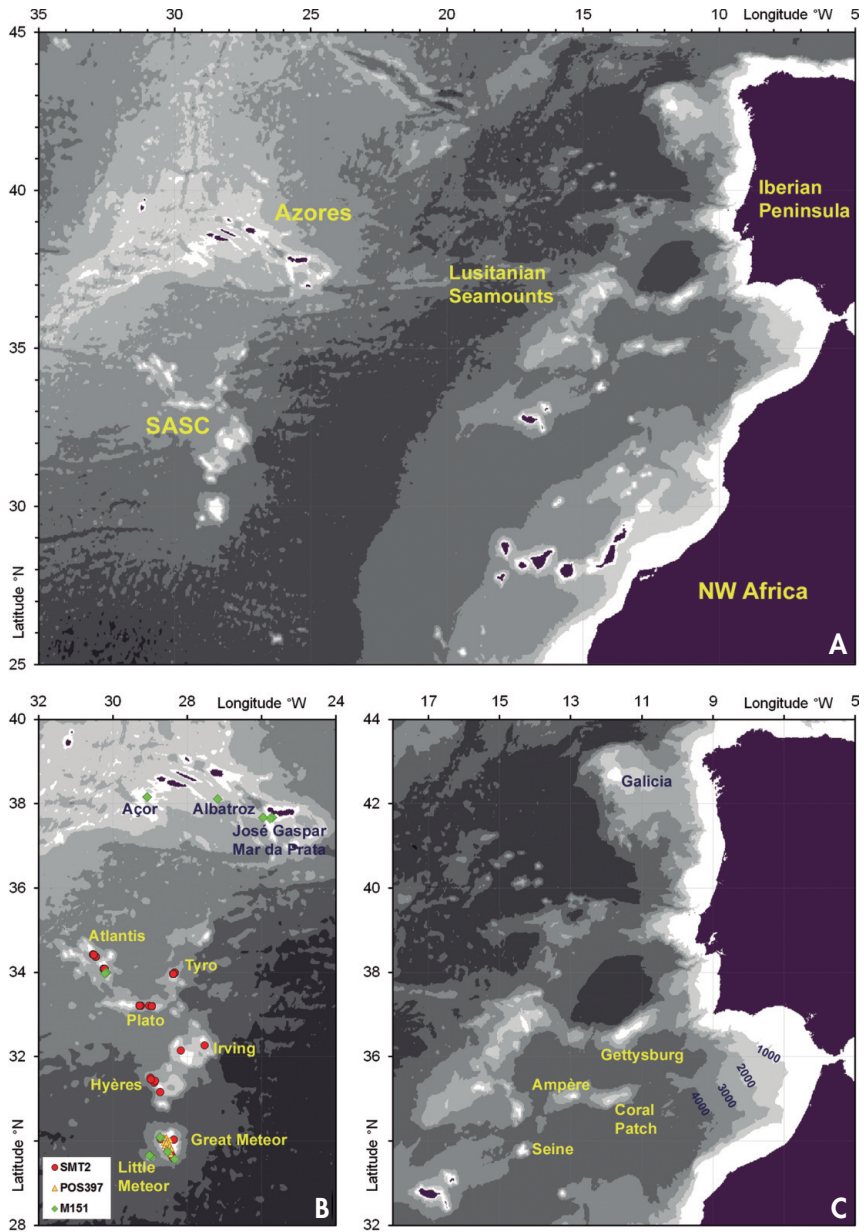


Figure 1. Location maps. A: overview of the NE Atlantic showing the South Azorean Seamount Chain (SASC), the Azores and Lusitanian seamount group; B: seamounts in the SASC and near the Azores, the stations from three cruises used in this study are shown; C: the Lusitanian seamount group with key seamounts indicated. Bathymetric data from GEBCO, depth contours 1000 m.

*Figura 1. Mapas de ubicación. A: vista general del Atlántico NE mostrando la cadena de montañas submarinas del Sur de las Azores (SASC), las Azores y el grupo de montañas submarinas lusitánicas; B: montañas submarinas en la SASC y cerca de las Azores, se muestran las estaciones de las tres campañas utilizadas en este estudio; C: el grupo de montañas submarinas lusitánicas con indicación de las principales. Datos batimétricos de GEBCO, isobatas de 1000 m.*

related to the type genus *Skenea* (HICKMAN, 2013; HASZPRUNAR ET AL., 2016).

Many of the species historically assigned to Skeneidae or Trochidae (within Trochoidea) have not only been excluded from this family but even moved to other vetigastropod superfamilies, like Seguenzioidea (KANO, 2008; KUNZE ET AL., 2008, 2016; KANO ET AL., 2009) or other non-vetigastropod clades, like Neomphalina (HEB ET AL., 2008; KUNZE ET AL., 2008), or families in the subclass Heterobranchia (KUNZE ET AL., 2008; HASZPRUNAR ET AL., 2011).

Skeneimorph gastropods are widely distributed on the bathyal slopes and plateaus in the NE Atlantic (WARÉN, 1992; HOFFMAN ET AL., 2010, 2018). Both historical and recent papers are important contributions on skeneimorph taxa from the NE Atlantic. JEFFREYS (1883, 1884) reported on the Mollusca procured during the 'Lightning' and 'Porcupine' expeditions and introduced the genus *Ganesa* Jeffreys, 1884 and several new species. DAUTZENBERG & FISCHER (1896, 1897) described the Mollusca collected by R.V. Princess Alice, many of them endemic species from around the Azores. BOUCHET & WARÉN (1979) and WARÉN (1989, 1991, 1992, 1996) introduced the family Pendromidae Warén, 1991, the genera *Anekes* Bouchet & Warén 1979, *Akritogyra* Warén 1992, *Retigyra* Warén 1996, and *Mikro* Warén 1996 and many new species. Likewise WARÉN (1992) provided the most important review on skeneimorph species in the NE Atlantic and the Mediterranean Sea. MARSHALL (1988, 1995) reviewed skeneimorphs from the SW Pacific Ocean and introduced the genus *Xyloskenea* Marshall, 1988 and also many new species. More recently, HOFFMAN ET AL. (2008, 2010, 2018) introduced the genus *Lopheliella* Hoffman, van Heugten & Lavaleye, 2008 and described several new species. KANO, CHIKYU & WARÉN (2009) reviewed the genus *Adeuomphalus* Seguenza, 1876, and RUBIO ET AL. (2011, 2015, 2019) and RUBIO & ROLÁN (2013) reviewed many skeneimorphs, including the genus

*Parviturbo* Pilsbry & McGinty, 1945. RUBIO ET AL. (2019), introduced the genus *Seamountiella* Rubio, Gofas & Rolán, 2019 and described several new species.

## MATERIAL AND METHODS

This paper combines material from the cruises SEAMOUNT 2 (GOFAS, 1993), POS397 (GEORGE, 2010) and M151 (FRANK, 2018). All raw material from POS397 and M151 were sediment samples stored at SaM. The material from the SEAMOUNT 2 cruise were pre-sorted samples obtained by dredges, which were stored in the MNHN. The POS397 material was sorted from sediment samples obtained by Shipek grabs. Molluscan remains from M151 were sorted from sediment samples taken by ROV manipulator, van Veen grabs and box cores. Very few specimens were collected alive during these cruises; most observations were based on empty shells.

The shells were sorted to species level using a stereo microscope. Selected specimens for each species were photographed using a Scanning Electron Microscope (SEM, Vega3 – Tescan at SaM). The specimens were mounted on SEM stubs and were coated with gold. Previous attempts failed to obtain high quality images of shells without gold coating using low voltage and low vacuum. SEM imaging was carried out by secondary electron (SE) imaging using an incident electron energy of 10 keV. Occasionally, back-scatter electron (BSE) imaging was used when too much sample charging was experienced in SE imaging. Line drawings were additionally made for the new species.

All holotypes and most paratypes were deposited in MNHN. Their images and associated location data will be made accessible at the MNHN homepage. Few paratypes were stored in SMF. The remaining material from the SEAMOUNT 2 cruise was deposited in MNHN. The remaining material from the POS397 and M151 was stored in the

reference collection at SaM. Albeit not mandatory, ZooBank registrations were made for all the new taxa described in this paper.

A species distribution has been inferred for all skeneimorph species encountered during the three cruises of this study as well as for species reported by BECK *ET AL.* (2006) from the Seine, Ampère and Gettysburg seamounts and by HOFFMAN & FREIWALD (2017) from the Coral Patch Seamount (Fig. 1C). Species in this list are compared with literature records from the NE and NW Atlantic.

Coordinates in degrees and minutes from original station lists were con-

verted to decimal degrees, which are standard for use in Geographic Information Systems (GIS).

Abbreviations:

Institutions: MNHN - Muséum National d’Histoire Naturelle; SMF – Senckenberg Museum Frankfurt; SaM – Senckenberg am Meer; SaMID – collection identification number at SaM.

Cruises: M151 – R/V Meteor Cruise 151; POS397 – R/V Poseidon cruise 397; R/V – research vessel; SMT2 – R/V Suroit cruise SEAMOUNT2.

Morphology: H – height; W – width, diameter in apertural view.

## SYSTEMATIC RESULTS

### MOLLUSCA, GASTROPODA, VETIGASTROPODA

#### Superfamily SEGUENZIOIDEA Verrill, 1884

We have included species belonging to Pendromidae, Trochaclididae and

Eudaroniidae, and others without family allocation.

#### Family PENDROMIDAE Warén, 1991

#### Genus *Rugulina* Palazzi, 1988

Type species: *Daronia monterosatoi* van Aartsen & Bogi, 1987 by original designation, Mediterranean Sea.

Shells of *Rugulina* are fragile depressed with wide open umbilicus, and spiral cordlets. Aperture is strongly prosocline, sharp, elongated.

Six species are currently known in the genus; three from the Antarctic and three

from the northern hemisphere: *Rugulina monterosatoi* (van Aartsen & Bogi, 1987) from the Mediterranean Sea, *R. fragilis* (G.O. Sars, 1878) from the northeastern Atlantic and *R. verrilli* (Tryon, 1888) from the northwestern Atlantic.

#### *Rugulina fragilis* (G.O. Sars, 1878) (Fig. 2)

*Adeorbis fragilis* G.O. Sars 1878: 213, tab. 22, fig. 19a-c.

*Rugulina fragilis*: WARÉN, 1991: 72-73, figs. 11A-E; 13A-B.

**Material examined:** Azores, Mar da Prata • 4 shells; 37.601°N, 25.874°W; 190 m; 16 Oct. 2018; M151/23160; grab. • 6 shells; 37.659°N, 25.789°W; 599 m; 19 Oct. 2018; M151/23181; box core. Atlantis Seamount • 2 shells; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. • 1 shell; 33.996°N, 30.177°W; 617 m; 21 Oct. 2018; M151/23408; grab. Plato Seamount • 5 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge.

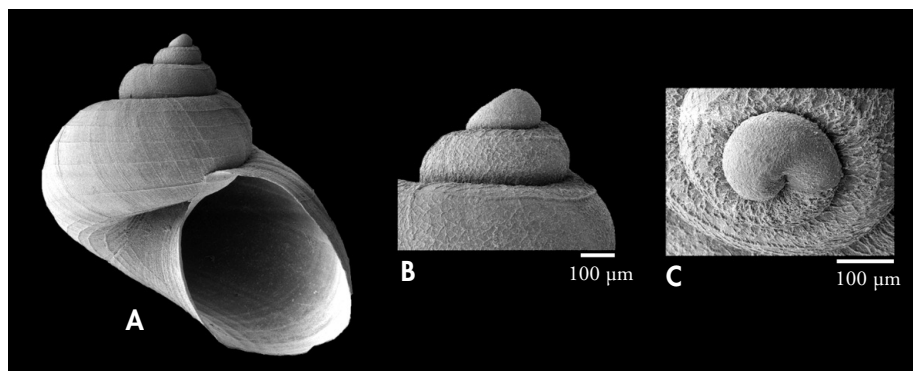


Figure 2. *Rugulina fragilis* (G.O. Sars, 1878). A: Plato Seamount – SMT2/DW250, H 2.6 mm, W 2.5 mm; B, C: protoconch W 0.21 mm.

Figura 2. *Rugulina fragilis* (G.O. Sars, 1878). A: Banco Plato - SMT2/DW250, 2,6 mm alto, 2,5 mm ancho; B, C: protoconcha 0,21 mm ancho.

**Distribution:** Greenland, Iceland, Norway (WARÉN, 1991), Rockall Bank, Porcupine Basin (FREIWALD & BECK, 2007, HOFFMAN ET AL., 2010), Seine Seamount (BECK ET AL., 2006), Canaries

(ORTEGA & GOFAS, 2019), Azores and SASC (this study), 150–1500 m.

**Remarks:** The species has a yellowish shell with spiral cords and a chaotic sculpture on the upper part of the whorls.

## Family TROCHACLIDIDAE Thiele, 1928

### Genus *Trochaclis* Thiele, 1912

Type taxon: *Trochaclis antarctica* Thiele, 1912 by monotypy, Antarctic.

WARÉN (1992) provided a diagnosis for the shell in the genus: small, tall-spined shell with smooth sculpture except for two to four, strong, steeply ascending spiral cords in the umbilicus. Protoconch spirally aligned hexagonal cells.

Twelve species are currently known in the genus, eight of them extant of which

five extant and two fossils were described by MARSHALL (1995) from New Zealand. The species from New Zealand show a wide morphological variability. Two species are known in the Atlantic and Mediterranean Sea: *Trochaclis islandica* Warén, 1996 and *T. versiliensis* Warén, Carrozza & Rocchini in WARÉN (1992).

### *Trochaclis islandica* Warén, 1989 (Fig. 3)

*Trochaclis islandica* Warén, 1989: 9-11, figs. 6-7.

**Material examined:** Plato Seamount • 1 shell; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge.

**Distribution:** known from Greenland, Iceland, Norway, off Ireland (WARÉN, 1989), SASC (this study), 150–1500 m.

**Remarks:** The species can be identified by three cords in the umbilical area; it lacks a supraperipheral cord on the first whorl of the teleoconch.

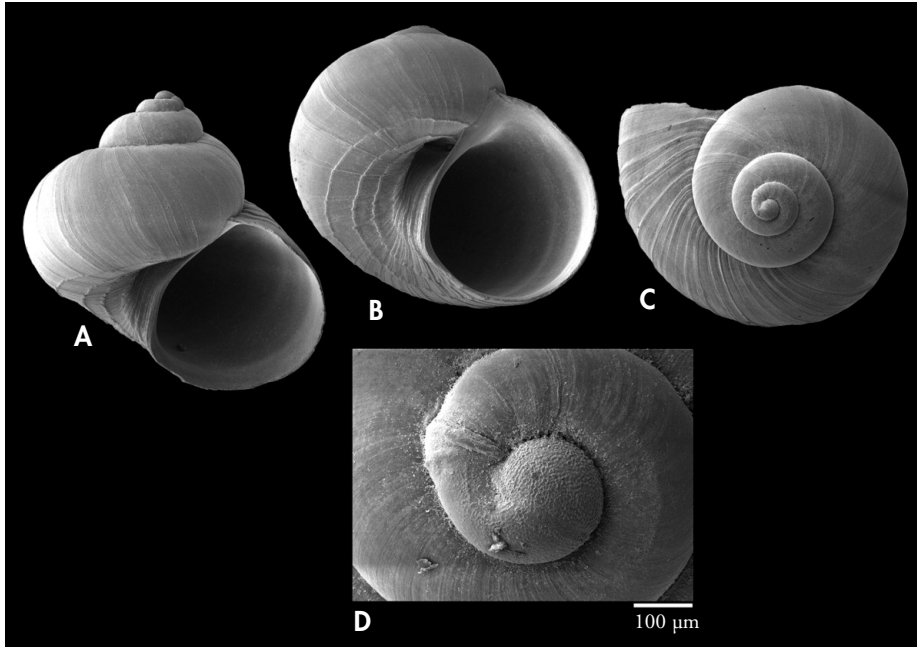


Figure 3. *Trochaclis islandica* Warén, 1989. A-C: Plato Seamount – SMT2/DW250, H 2.9 mm, W 3.0 mm; D: protoconch W 0.34 mm.

Figura 3. *Trochaclis islandica* Warén, 1989. A-C: Banco Plato – SMT2/DW250, 2,9 mm alto, 3,0 mm ancho; D: protoconcha 0,34 mm ancho. Barras de escala 100  $\mu$ m.

*Trochaclis versiliensis* Warén, Carrozza & Rocchini in Warén, 1992 (Fig. 4)

*Trochaclis versiliensis* Warén, Carrozza & Rocchini in Warén, 1992: 180, figs. 26E, 36A-D; HOFFMAN *ET AL.* 2018: 30-31, figs. 21-24.

**Material examined:** Azores, Mar da Prata • 4 shells; 37.673°N, 25.925°W; 595 m; 08 Oct. 2018; M151/23111; grab. • 3 shells; 37.661°N, 25.918°W; 599 m; 08 Oct. 2018; M151/23112; grab. • 1 shell; 37.666°N, 25.966°W; 952 m; 17 Oct. 2018; M151/23168; grab. • 5 shells; 37.659°N, 25.789°W; 599 m; 19 Oct. 2018; M151/23181; box core. Atlantis Seamount • 4 shells; 34.412°N, 30.513°W; 795–830 m; 03 Feb. 1993; SMT2/DW264; dredge. • 3 shells; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. • 3 shells; 33.996°N, 30.177°W; 617 m; 21 Oct. 2018; M151/23408; grab. Tyro Seamount • 1 live-collected specimen, 3 shells; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge. Great Meteor Seamount • 2 shells; 29.565°N, 28.339°W; 944 m; 25 Oct. 2018; M151/23425-R6; ROV sample. • 4 shells; 29.568°N, 28.339°W; 855 m; 25 Oct. 2018; M151/23425-R9; ROV sample. • 1 shell; 30.086°N, 28.726°W; 906 m; 26 Oct. 2018; M151/23429-R8; ROV sample. Little Meteor Seamount • 2 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab.

**Distribution:** Rockall Bank, Porcupine Basin, the Lusitanian seamounts off NW Morocco, off Portugal, NW Spain (WARÉN, 1992, HOFFMAN *ET AL.* 2018), SASC, Azores (this study) and the western Mediterranean (WARÉN 1992), 200–1000 m.

**Remarks:** The species can be identified by the two strong and rough cords in the umbilical area, and a characteristic cord on the first teleoconch whorl. The latter feature is occasionally weak or absent. *T. islandica* is more raised and has three umbilical cords.

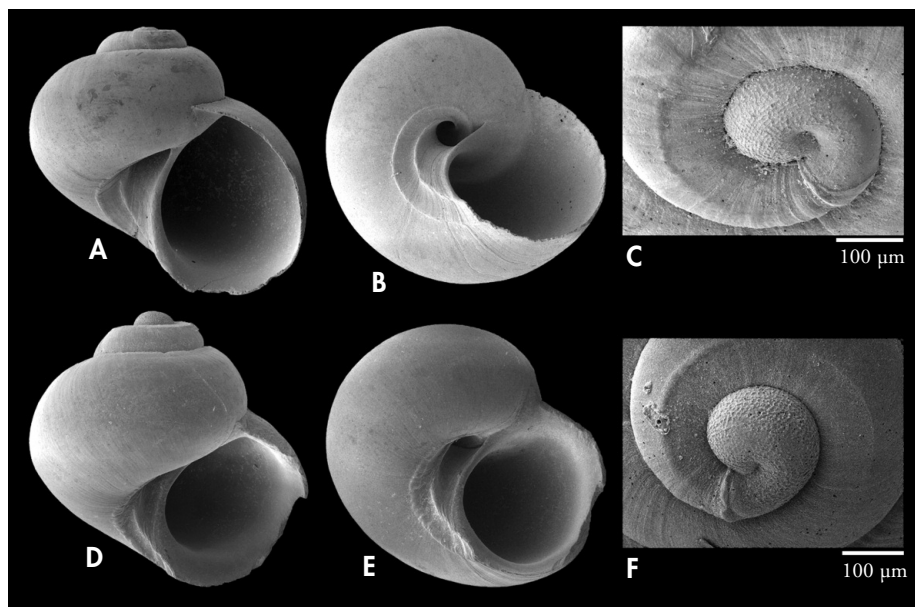


Figure 4. *Trochaclis versiliensis* Warén, Carrozza & Rocchini, 1992. A, B: Atlantis Seamount – M151/23404, H 1.9 mm, W 2.0 mm; C: protoconch W 0.25 mm, same as A-B; D, E: Little Meteor Seamount – M151/23438, H 1.2 mm, W 1.2 mm; F: protoconch W 0.23 mm, same as D-E.

*Figura 4. Trochaclis versiliensis* Warén, Carrozza & Rocchini, 1992. A-B: Banco Atlantis – M151/23404, 1,9 mm alto, 2,0 mm ancho; C: protoconcha 0,25 mm ancho, misma que A-B; D, E: Pequeño Banco Meteor – M151/23438, 1,2 mm alto, 1,2 mm ancho; F: protoconcha 0,23 mm ancho, misma que D-E.

### *Trochaclis fortis* n. sp. (Figs. 5, 6)

**Type material:** *Holotype*, Little Meteor Seamount • 1 shell (Figs. 5A-D); 29.655°N, 29.004°W; 464 m; 27 Oct. 2018; M151 / 23438; grab, in coarse bioclastic sand with coral rubble; MNHN-IM-2000-35648.

**Type locality:** Little Meteor Seamount, 29.655°N – 29.004°W, 464 m.

**Etymology:** *fortis* (Latin) refers to the strong appearance of the shell.

*Holotype*, an empty shell (Figs. 6A-D): Small (H 1.7 mm, W 1.4 mm) and solid shell with a flattened apex, cyrtocoenoid outline, spire apical angle about 52°, with umbilical cord on the base, white.

**Protoconch:**  $\frac{3}{4}$  whorls, spirally aligned flat pits with flattened walls, flexuous sharp lip, somewhat flaring, followed by a straight thick varix forming a rounded rim and with a tapering edge towards teleoconch, W 0.25 mm. Transition to teleoconch clear by varix and change in sculpture (Figs. 5B, 6D).

**Teleoconch:** Three rounded whorls, suture very shallow. First whorl with smooth spiral cord forming a weak keel,

surface flattened above cord, convex below, numerous fine prosocline growth lines. Second whorl convex, spiral cord faded out, whorl descending with upper suture below periphery, whorl surface smooth (with round predation hole dorsally). Third (body) whorl smooth with several prosocline growth markings, suture shallow, smeared.

Base of body whorl with a weak keel demarcating umbilical area and a thick and steep cord at the outer edge of umbilicus. Umbilicus very narrow, crescent-shaped.

Aperture 50% of shell height, oblong, slightly angular at union with penultimate



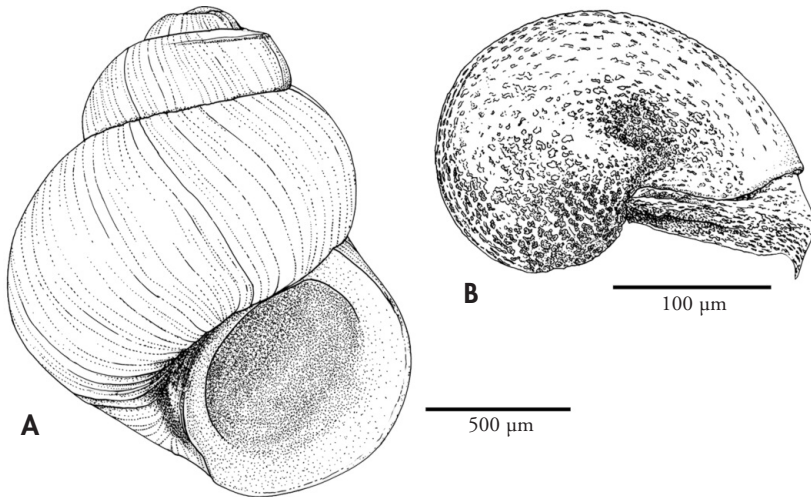


Figure 5. *Trochaclis fortis* n. sp. A: Little Meteor Seamount – M151/23438, holotype, apertural view, H 1.7 mm; B: apical view of protoconch showing sculpture with spirally aligned pits, a flexuous lip followed by a varix, W 0.25 mm.

*Figura 5. Trochaclis fortis* n. sp. A: Pequeño Banco Meteor - M151/23438, holotipo, vista apertural, 1,7 mm alto; B: vista apical de la protoconcha mostrando la escultura con hoyos alineados en espiral, un borde flexuoso seguido de una variz, 0,25 mm ancho.

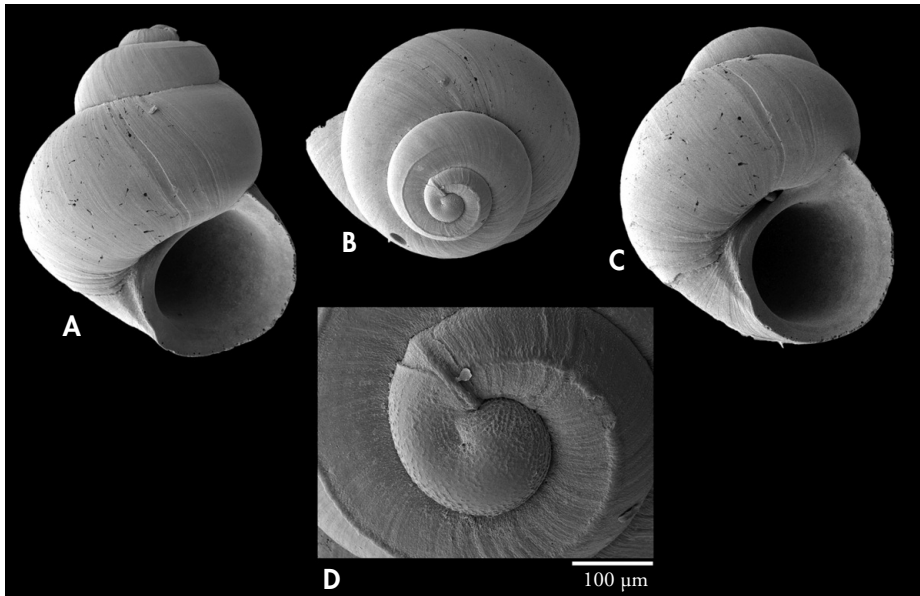


Figure 6. *Trochaclis fortis* n. sp. A-C: Little Meteor Seamount – M151/23438, holotype, H 1.7 mm, W 1.4 mm. D: protoconch W 0.25 mm.

*Figura 6. Trochaclis fortis* n. sp. A-C: Pequeño Banco Meteor – M151/23438, holotipo, 1,7 mm alto, 1,4 mm ancho. D: protoconcha 0,25 mm ancho.

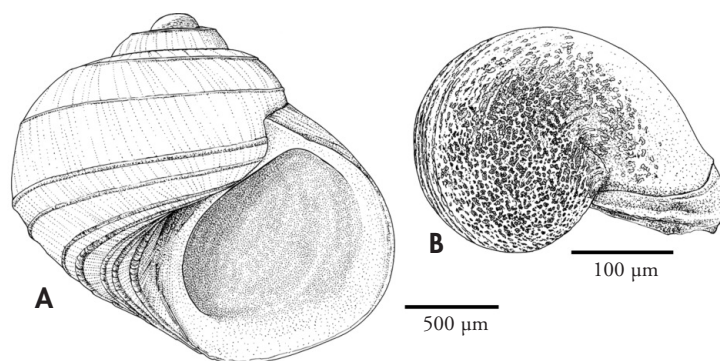


Figure 7. *Trochaclis carinata* n. sp. Plato Seamount – SMT2/DW250, holotype, apertural view, H 1.8 mm; B: apical view of protoconch showing sculpture with spirally aligned pits, a flexuous lip followed by a varix, W 0.31 mm.

Figura 7. *Trochaclis carinata* n. sp. A: Banco Plato - SMT2/DW250, holotipo, vista apertural, 1,8 mm alto; B: vista apical de la protoconcha mostrando la escultura con hoyos alineados en espiral, un borde flexuoso seguido de una variz, 0,31 mm ancho.

whorl. Peristome flexuous at base, thick, outer lip bevelled to a sharp edge, prosocline at 30° with spire axis. Columella and parietal lip smooth, thick and curved, inside of whorl smooth. Angle of union with penultimate whorl about 80°.

Variability: Unknown.

Distribution: Only known from the type locality.

Remarks: The species is placed in the genus *Trochaclis* based on the proto-

conch and the umbilical sculpture. It is very similar to *Trochaclis versiliensis* but this species is less raised and it has an open umbilicus with two strong cords (Figs. 4A,B,D,E). It is also similar to *Trochaclis atypica* (Laws, 1939) and *Trochaclis bucina* (Laws, 1941), both from the Miocene of New Zealand; these species are adapically more raised and their whorls are more flattened (MARSHALL, 1995).

### *Trochaclis carinata* n. sp. (Figs. 7, 8)

**Type material:** *Holotype*, Plato Seamount. • 1 shell (Figs. 6A-D); 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge, in sediment with dead coral fragments; MNHN-IM-2000-35649.

**Type locality:** Plato Seamount, 33.210°N – 29.287°W, 1450–1500 m.

**Etymology:** *carinata* (Latin) refers to the weak keels on the body whorl.

*Holotype*, an empty shell (Figs. 8A-D): Small (H 1.8 mm, W 2.0 mm) and solid shell, with a regularly raised spire, with weakly angular whorls, apical angle about 100°, with strong umbilical cords on the base, white.

Protoconch:  $\frac{3}{4}$  whorls, spirally aligned network of flat pits on the nucleus, smooth towards the convex lip, thick rounded smooth varix, W 0.31 mm. Transition to teleoconch clear by varix and change in sculpture (Fig. 8D).

Teleoconch: 2  $\frac{1}{4}$  smooth rounded whorls, numerous fine, prosocline growth lines, spiral supraparietal cord with weak keel decreasing in strength, faded on body whorl. Surface flattened above cord, convex below. Suture very shallow, sloping, union at about 80° to previous whorl. A second weak cord above suture.

Base of body whorl with eight strong spiral cords below periphery, smooth and rounded, spaced irregularly with flattened

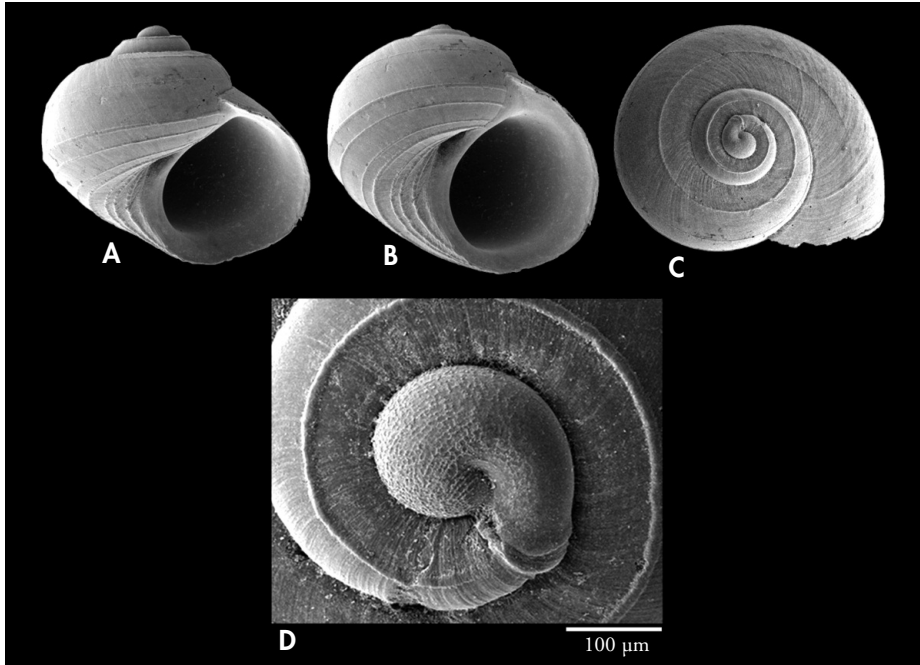


Figure 8. *Trochaclis carinata* n. sp. A-C: Plato Seamount – SMT2/DW250, holotype, H 1.8 mm, W 2.0 mm; D: protoconch W 0.31 mm.

Figura 8. *Trochaclis carinata* n. sp. A-C: Banco Plato – SMT2/DW250, holotipo, 1,8 mm alto, 2,0 mm ancho; D: protoconcha 0,31 mm ancho.

interspaces. Upper basal cord starting below end of suture, forming weak keel. Fourth basal cord forming another weak keel demarcating umbilical area. Four strong cords on umbilical area; last cord with strong keel at edge of umbilicus. Umbilicus narrow, deep, tortuous.

Aperture 60% of shell height, rounded, angular at union with penultimate whorl. Outer lip sharp, bevelled to a cutting edge, thick, prosocline at 30° with spire axis. Columella curved. Columellar callus thick, smooth; parietal

callus thin, smooth; inside of whorl smooth. Angle of union with penultimate whorl sloping at about 75°.

Variability: unknown.

Distribution: only known from the type locality.

Remarks: The species is placed in the genus *Trochaclis* based on the protoconch and umbilical sculpture. It is similar to *Trochaclis versiliensis* as it shares the adapical cord on the upper whorl surface, however, this species has only two strong basal cords (Figs. 4A, B, D, E).

### *Trochaclis platoensis* n. sp. (Figs. 9, 10)

**Type material:** *Holotype*, Plato Seamount • 1 shell (Figs. 10A-D); 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge, in sediment with dead coral fragments; MNHN-IM-2000-35650. *Paratypes*: • 3 shells (Figs. 10E-O); same data as for holotype; MNHN-IM-2000-35651. • 3 shells; same data as for holotype; MNHN-IM-2000-35652.

**Type locality:** Plato Seamount, 33.210°N – 29.287°W, 1450–1500 m.

**Etymology:** *platoensis* (Latin) refers to the type locality, the Plato Seamount.

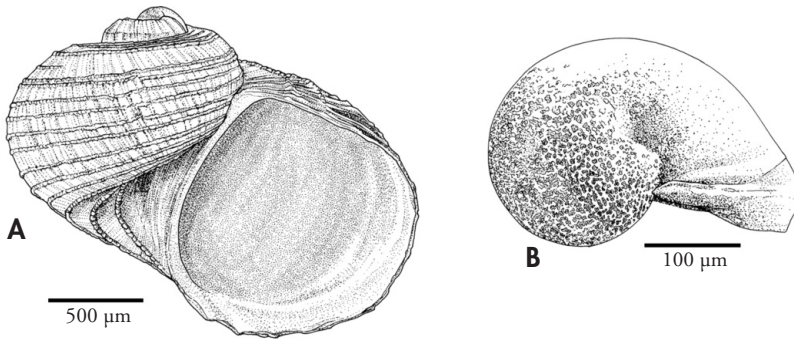


Figure 9. *Trochaclis platoensis* n. sp. A: Plato Seamount – SMT2/DW250, holotype, apertural view, H 1.9 mm; B: apical view of protoconch showing sculpture with spirally aligned pits, a flexuous lip followed by a varix, W 0.33 mm.

Figura 9. *Trochaclis platoensis* n. sp. A: Banco Plato - SMT2/DW250, holotipo, vista apertural, 1,9 mm alto; B: vista apical de la protoconcha mostrando la escultura con hoyos alineados en espiral, un borde flexuoso seguido de una variz, 0,33 mm ancho.

*Holotype, an empty shell (Figs. 10A-D):* Small (H 1.9 mm, W 2.3 mm) and moderately solid shell with a regularly raised apex with well-rounded whorls, spire apical angle about 110°, sculpture of strong spiral cords on rough whorl surface, white.

*Protoconch:*  $\frac{3}{4}$  whorls, spirally aligned network of flat pits on the nucleus, smooth towards the lip, convex lip, thick rounded smooth varix, W 0.33 mm. Transition to teleoconch clear by varix and change in sculpture (Fig. 10D).

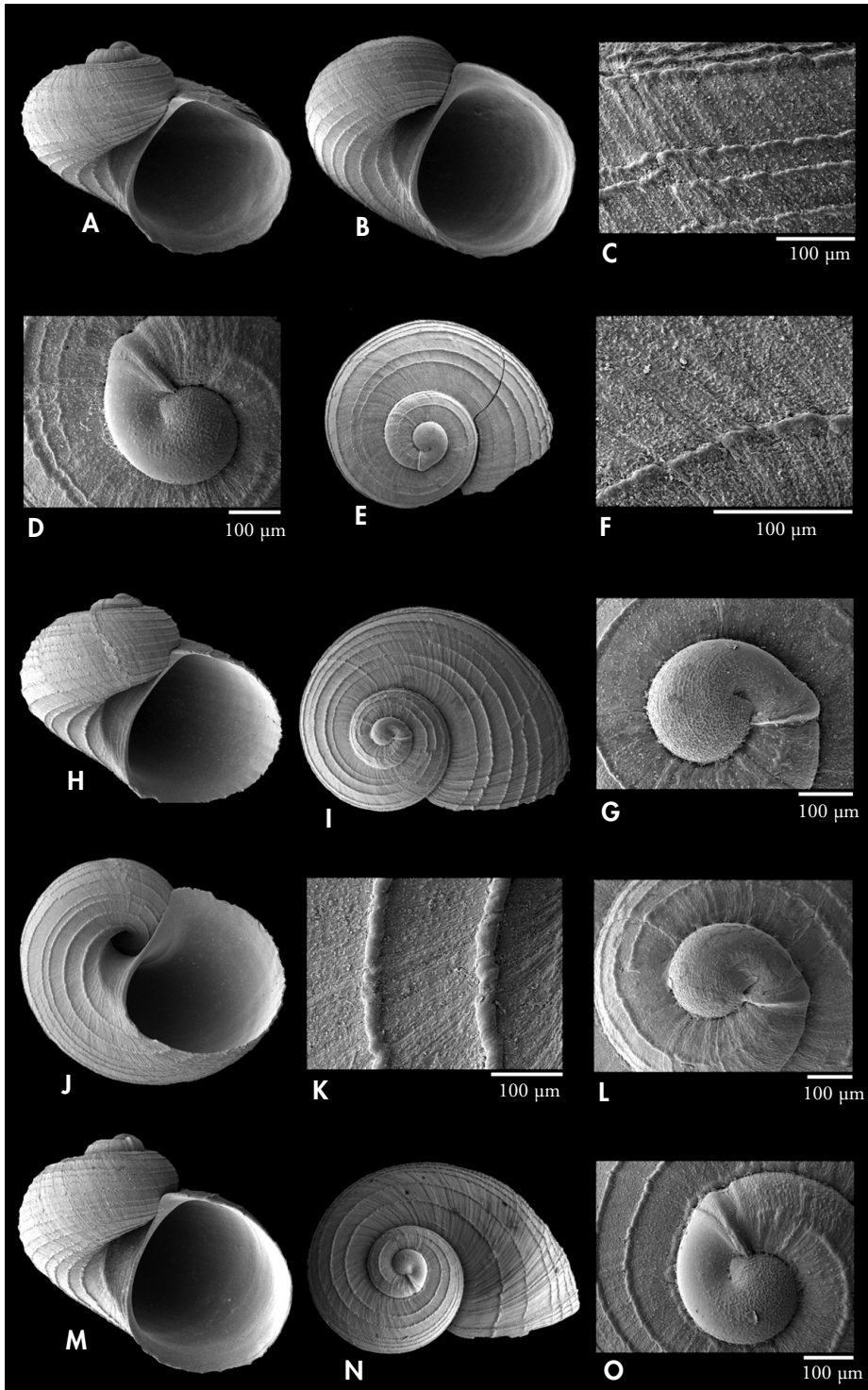
*Teleoconch:* Two whorls, numerous coarse, irregular prosocline growth lines, micro-sculpture of minute granules and spiral line segments. On first

whorl, initially one suprapерipheral cord; second cord emerges at  $\frac{1}{4}$  whorl below first cord, a third cord above at  $\frac{1}{2}$  whorl, increasing to eight cords at start of second (body) whorl. On body whorl, top cord at some distance from suture, remaining cords at irregular distances. Suture shallow, impressed, union at about 90° to previous whorl.

Base of body whorl with nine strong spiral cords, smooth and rounded, spaced regularly with rough interspaces, last cord forming a strong keel delimiting umbilicus. Base cords stronger than cords on upper whorl surface. Umbilicus open, deep, with rough growth lines inside.

(Right page) Figure 10. *Trochaclis platoensis* n. sp. A, B: Plato Seamount – SMT2/DW250, holotype, H 1.9 mm, W 2.3 mm; C: microsculpture on periphery of body whorl of the holotype; D: protoconch of the holotype W 0.33 mm; E: paratype 1, W 1.4 mm; F: microsculpture on top of body whorl, same as E; G: protoconch W 0.33 mm, same as E; H-J: paratype 2, H 1.9 mm, W 2.3 mm; K: microsculpture on base of body whorl, same as J; L: protoconch W 0.33 mm, same as J; M, N: paratype 3, H 1.7 mm, W 2.0 mm; O: protoconch W 0.32 mm, same as N.

(Página derecha) Figura 10. *Trochaclis platoensis* n. sp. A, B: Banco Plato - SMT2/DW250, holotipo, 1,9 mm alto, 2,3 mm ancho; C: microescultura en periferia de última vuelta del holotipo; D: protoconcha del holotipo 0,33 mm ancho; E: paratipo 1, 1,4 mm ancho; F: microescultura en parte superior de última vuelta, misma que E; G: protoconcha 0,33 mm ancho, misma que E; H-J: paratipo 2, 1,9 mm alto, 2,3 mm ancho; K: microescultura en base de última vuelta, misma que J; L: protoconcha 0,33 mm ancho, misma que J; M, N: paratipo 3, 1,7 mm alto, 2,0 mm ancho; O: protoconcha 0,32 mm ancho, misma que N.



Aperture 70% of shell height, D-shaped, with sharp outer lip, angular at union with penultimate whorl and at base of columella. Outer lip prosocline at 30° with spire axis. Columellar lip sharp, slightly curved, callus smooth; parietal callus thin, smooth; inside of whorl smooth. Suture deeply impressed.

Variability: little variability, in type material 16–19 spiral cords on body whorl, protoconch width 0.32–0.33 mm.

*Distribution*: only known from the type locality.

*Remarks*: This species is placed in the genus *Trochaclis* based on the sculpture of the protoconch and the smooth, rounded spiral cords. It is similar to *Trochaclis carinata* n. sp. as it shares the spiral cords on the whorl surface, however, *T. platoensis* n. sp. has more cords without keels and a rough whorl surface. It is likely that this species belongs to a different, undescribed genus but we prefer to retain the species in *Trochaclis* without the availability of soft parts or molecular analysis.

## Family EUDARONIIDAE Gründel, 2004

### Genus *Eudaronia* Cotton, 1945

Type taxon: *Cyclostrema jaffaensis* Verco, 1909 by subsequent designation, off southern Australia.

The latest classification places this genus in Seguenzioidea (KANO ET AL. 2009; BOUCHET ET AL., 2017). Shells in the genus are small, up to 3 mm in diameter, colourless, almost perfectly planispiral, with deeply concave apical surface and base; aperture trapezoidal with convex outer lip, sharp. Protoconch paucispiral, ca. 0.2 mm in diameter.

Teleoconch whorls smooth with fine growth lines, often glossy, strongly keeled at both apical and basal sides; suture impressed; aperture nearly orthocline, trapezoidal, convex outer lip sharp.

Only two species are known globally of which one is found in the NE Atlantic: *Eudaronia aperta* (Sykes, 1925).

### *Eudaronia aperta* (Sykes, 1925) (Fig. 11)

*Omalogyra aperta* Sykes, 1925: 192.

*Eudaronia aperta*: WARÉN, 1991: 80, figs. 14C–D, 18D.

**Material examined**: Plato Seamount • 434 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge.

*Distribution*: Iceland, Western Norway to Portugal (WARÉN, 1991: 80; HOFFMAN ET AL., 2010: 54), Coral Patch Seamount (HOFFMAN & FREIWALD, 2017), Plato Seamount (this study), 250–2000 m.

*Remarks*: *Eudaronia aperta* is very similar to the type species; the cross-

section of the whorl is more rounded in the type species, whose keels are weaker and more placed towards the apex and base. The protoconch is rough on the nucleus and smooth towards the edge (WARÉN, 1991: fig. 18D).

### *Eudaronia spirata* n. sp. (Figs. 12, 13)

**Type material**: *Holotype*, Plato Seamount • 1 live collected specimen (Figs. 13A–C); 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge, in sediment with dead coral fragments; MNHN-IM-2000-35653. *Paratypes*: • 1 shell (Paratype 1) and 1 live collected (Paratype 2)

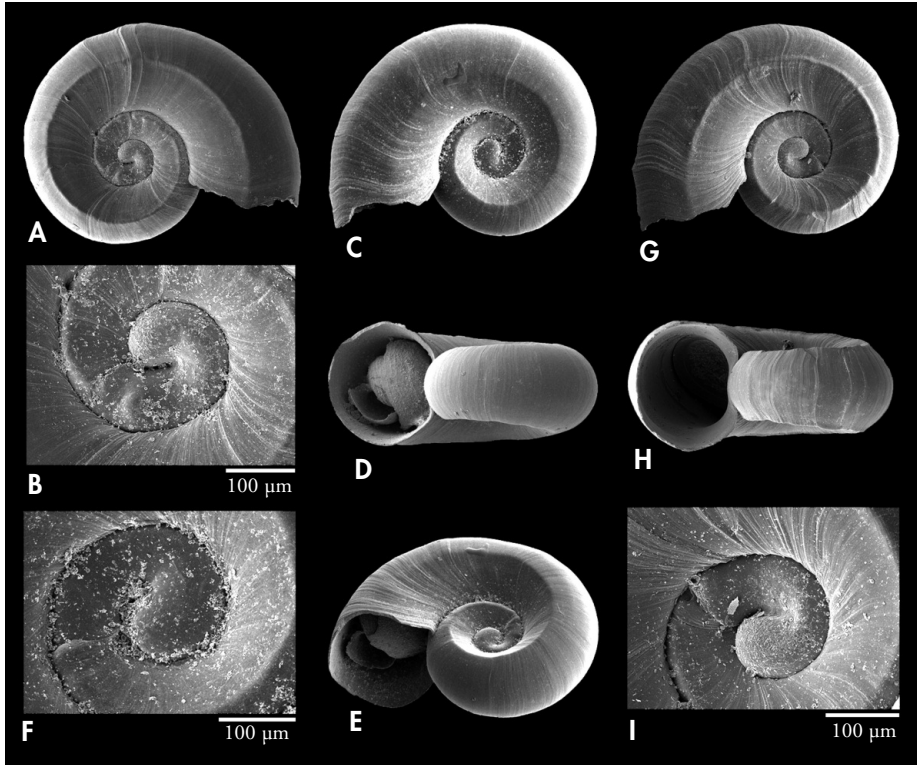


Figure 11. *Eudaronia aperta* (Sykes, 1925). A: Plato Seamount – SMT2/DW250, W 1.2 mm; B: protoconch in apical view W 0.23 mm, same as A; C-E: same locality, H 0.6 mm, W 1.2 mm; F: protoconch in basal view W 0.20 mm, same as C; G, H: same locality, H 0.6 mm, W 1.2 mm, I: protoconch in basal view W 0.20 mm, same as G.

Figura 11. *Eudaronia aperta* (Sykes, 1925). A: Banco Plato - SMT2/DW250, 1,2 mm alto; B: vista apical de la protoconcha 0,23 mm ancho, misma que A; C-E: misma localidad, 0,6 mm alto, 1,2 mm ancho; F: vista basal de la protoconcha 0,20 mm ancho, misma que C; G, H: misma localidad, 0,6 mm alto, 1,2 mm ancho; I: vista basal de la protoconcha 0,20 mm ancho, misma que G.

with dried soft parts (Figs. 13D-G); same data as for holotype; MNHN-IM-2000-35654. • 52 shells; same data as for holotype; MNHN-IM-2000-35655. • 4 shells; same data as for holotype; SMF 351094.

**Type locality:** Plato Seamount – 33.210°N – 29.287°W, 1450–1500 m.

**Etymology:** *spirata* (Latin) refers to the spiral cords on the protoconch.

*Holotype, with dried soft parts inside shell* (Fig. 13A-C): Very small (H 0.6 mm, W 1.0 mm) planispiral, with weak keels on apical and basal sides, translucent white.

**Protoconch:**  $\frac{3}{4}$  whorls, nucleus coarsely sculptured by shallow pits. Four rough spiral cords visible adapically and three cords basally. End of whorl with sharp flexuous lip, W 0.18

mm. Apical and basal view similar. Transition to teleoconch demarcated by varix and fine growth markings on the teleoconch (Fig. 13C, G).

**Teleoconch:** Planispiral with two rounded smooth whorls; perfectly concave spire apically and basally. Two weak keels placed at the centre of the apical and basal whorl surfaces. Numerous fine and flexuous growth lines.

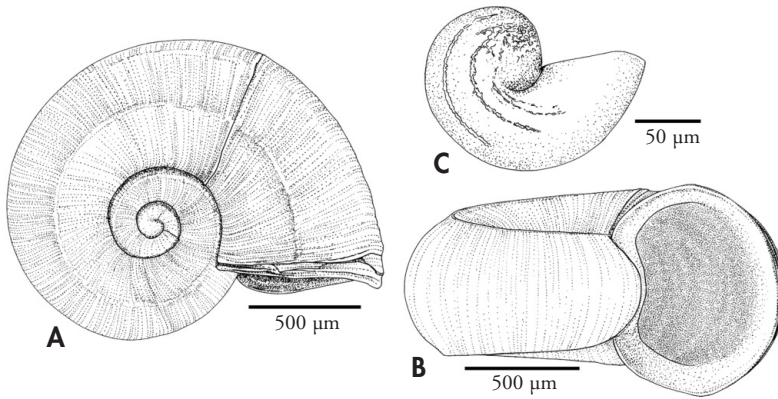


Figure 12. *Eudaronia spirata* n. sp. A, B: Plato Seamount – SMT2/DW250, paratype 1, apical view, W 1.9 mm, apertural view, H 0.9 mm; C: paratype 2, protoconch in basal view, W 0.16 mm.

Figura 12. *Eudaronia spirata* n. sp. A, B: Banco Plato - SMT2/DW250, paratipo 1, vista apical, 1,9 mm ancho, vista apertural, 0,9 mm alto; C: paratipo 2, vista basal de la protoconcha, 0,16 mm ancho.

Apical and basal sides nearly symmetrical. Suture shallow, impressed.

Aperture 100% of shell height and 35% of shell width, rounded on all sides, kidney-shaped, perfectly symmetrical. Peristome blunt, smooth, concavely flexuous on parietal side, outer lip nearly orthocline but flexuous, protruding at periphery. Callus smooth, nearly disappearing on parietal side, inside of whorl smooth. Angle of union with penultimate whorl about 80°.

Operculum, multispiral, chitinous, brown translucent (Fig. 13B).

Variability: Width up to 1.7 mm, protoconch width 0.16-0.18 mm.

Distribution: only known from the type material.

Remarks: The species is most similar to *Eudaronia aperta*, however, the latter lacks the spiral cordlets on the protoconch, and the body whorl is united with the penultimate whorl over the rounded peripheral area rather than over the whole space between keels resulting in a sharper angle at the union, about 30° versus about 80° in *E. spirata*.

### *Eudaronia mikra* n. sp. (Figs. 14, 15)

**Type material:** *Holotype*, Plato Seamount • 1 shell (Figs. 15D-G); 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge, in sediment with dead coral fragments; MNHN-IM-2000-35656. *Paratypes*: • 1 shell (Paratype 1, Figs. 15H-J); same data as for holotype; MNHN-IM-2000-35657. • 9 shells; same data as for holotype; MNHN-IM-2000-35658. • 2 shells; same data as for holotype; SMF 351095.

**Other material examined:** Atlantis Seamount • 2 shells (Figs. 15H-J); 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab; SMF 351096. Plato Seamount • 16 shells (some as *Eudaronia* cf. *mikra* n. sp., Fig. 15 K-L); 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge.

**Type locality:** Plato Seamount – 33.210°N – 29.287°W, 1450–1500 m.

**Etymology:** *mikra* (Greek mikro) refers to the small size of the protoconch.

*Holotype*, empty shell (Figs. 15A-D): Very small (H 0.9 mm, W 1.7 mm) planispiral shell, with strong keels on apical and basal sides, translucent white.

Protoconch: ¾ whorls, coarsely sculptured by shallow pits. End of whorl with sharp flexuous lip, somewhat flaring, W 0.14 mm. Apical and



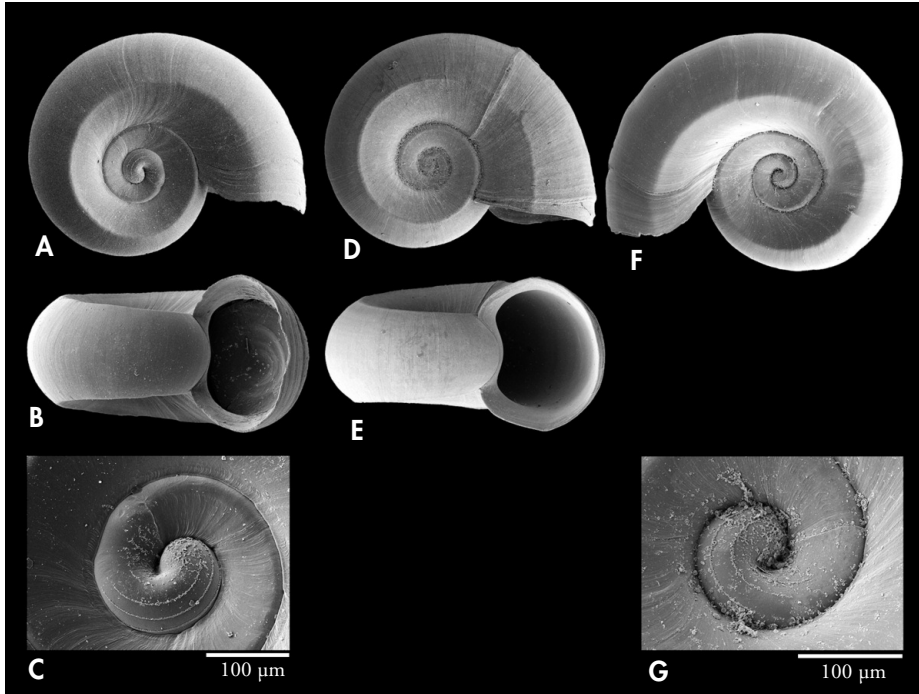


Figure 13. *Eudaronia spirata* n. sp. A: Plato Seamount – SMT2/DW250, holotype, apical view; B: holotype, apertural view with operculum inside, H 0.6 mm, W 1.0 mm; C: protoconch of the holotype in apical view W 0.18 mm. D, E: paratype 1, H 0.9 mm, W 1.7 mm, protoconch W 0.18 mm. F, G: paratype 2; F: basal view W 1.2 mm; G: protoconch in basal view W 0.16 mm.

*Figura 13. Eudaronia spirata* n. sp. A: Banco Plato - SMT2/DW250, holotipo, vista apical; B: holotipo en vista apertural con opérculo en el interior, 0,6 mm alto, 1,0 mm ancho; C: vista apical de la protoconcha del holotipo 0,18 mm ancho; D, E: paratipo 1, 0,9 mm alto, 1,7 mm ancho, protoconcha 0,18 mm ancho. F, G: paratipo 2; F: vista basal 1,2 mm ancho; G: vista basal de la protoconcha 0,16 mm ancho.

basal view similar. Transition to teleoconch demarcated by lip and change in sculpture (Figs. 15C, G, J).

Teleoconch: Planispiral with three rounded smooth whorl; perfectly concave spire apically and basally, symmetrical. Two strong keels with smooth cords placed at the centre of the apical side and more towards periphery on the basal surface. On the first teleoconch whorl, 24 broad and straight axial ribs merging into the spiral cords; ribs extending towards suture at periphery. Axial ribs fading on second whorl; third whorl smooth. Numerous fine growth lines. Suture deeply impressed.

Aperture 100% of shell height and 28% of shell width, rounded on parietal

and peripheral sides, weakly angular at both keels, nearly symmetrical. Peristome blunt, smooth, concavely flexuous on parietal side, outer lip nearly orthocline but flexuous, protruding at periphery. Callus smooth, fading away on parietal side, inside of whorl smooth. Angle of union with penultimate whorl about 40°.

Variability: Width up to 2.0 mm, protoconch width 0.13-0.14 mm. Some of the shells (Figure 15 K-L) from Plato Seamount, DW242 have the ribs continued over the subsequent whorls, yet definitely evanescent compared to *Adeuomphalus densicostatus*.

*Distribution:* SASC, Plato and Atlantis Seamounts.

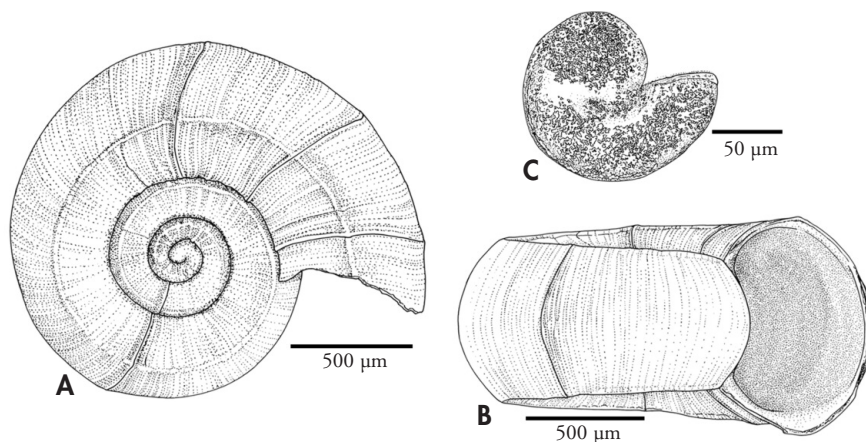


Figure 14. *Eudaronia mikra* n. sp. A, B: Plato Seamount – SMT2/DW250, holotype, apical view, W 1.7 mm, apertural view, H 0.9 mm; C: paratype 1, protoconch in basal view, W 0.14 mm.

Figura 14. *Eudaronia mikra* n. sp. A, B: Banco Plato - SMT2/DW250, holotipo, vista apical, 1,7 mm ancho, vista apertural, 0,9 mm alto; C: paratipo 1, vista basal de la protoconcha, 0,14 mm ancho.

*Remarks:* *Eudaronia mikra* differs strikingly from the two previous species in having distinct axial riblets on the early part of the teleoconch, very much in the

style of *Adeuomphalus* spp. *E. aperta*, has a larger protoconch and weaker spiral cords. *Eudaronia spirata* n. sp. has spiral cordlets on its protoconch, which is also larger.

#### Family not assigned

#### Genus *Adeuomphalus* Seguenza, 1876

Type taxon: *Adeuomphalus ammoniformis* Seguenza, 1876 by monotypy, Pliocene to Lower Pleistocene, Sicily, Italy.

KANO *ET AL.* (2009) reviewed this genus and placed it in Seguenzioidae, but its family is currently unassigned. These authors provided a detailed diagnosis: shell small, up to 3 mm in diameter, colourless, almost planispiral with concave apical surface and base. Protoconch paucispiral, about 0.2 mm in diameter. Teleoconch whorls sculptured with straight or flexuous axial ribs, often keeled at both apical and basal sides; suture

deeply impressed; aperture nearly orthocone, horseshoe-shaped.

Twelve Recent species are known globally, three of which live in bathyal zones of the NE Atlantic: *A. ammoniformis* Seguenza, 1876, *A. densicostatus* (Jeffreys, 1884) and *A. sinuosus* (Sykes, 1925). All these NE Atlantic species were found on the SASC and two additional new species are described herein.

#### *Adeuomphalus ammoniformis* Seguenza, 1876 (Figs. 16H-L)

*Adeuomphalus ammoniformis* Seguenza, 1876: 10; KANO *ET AL.*, 2009: 401-403, figs. 1F-I.

**Material examined:** Plato Seamount • 3 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. • 1 shell; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge.

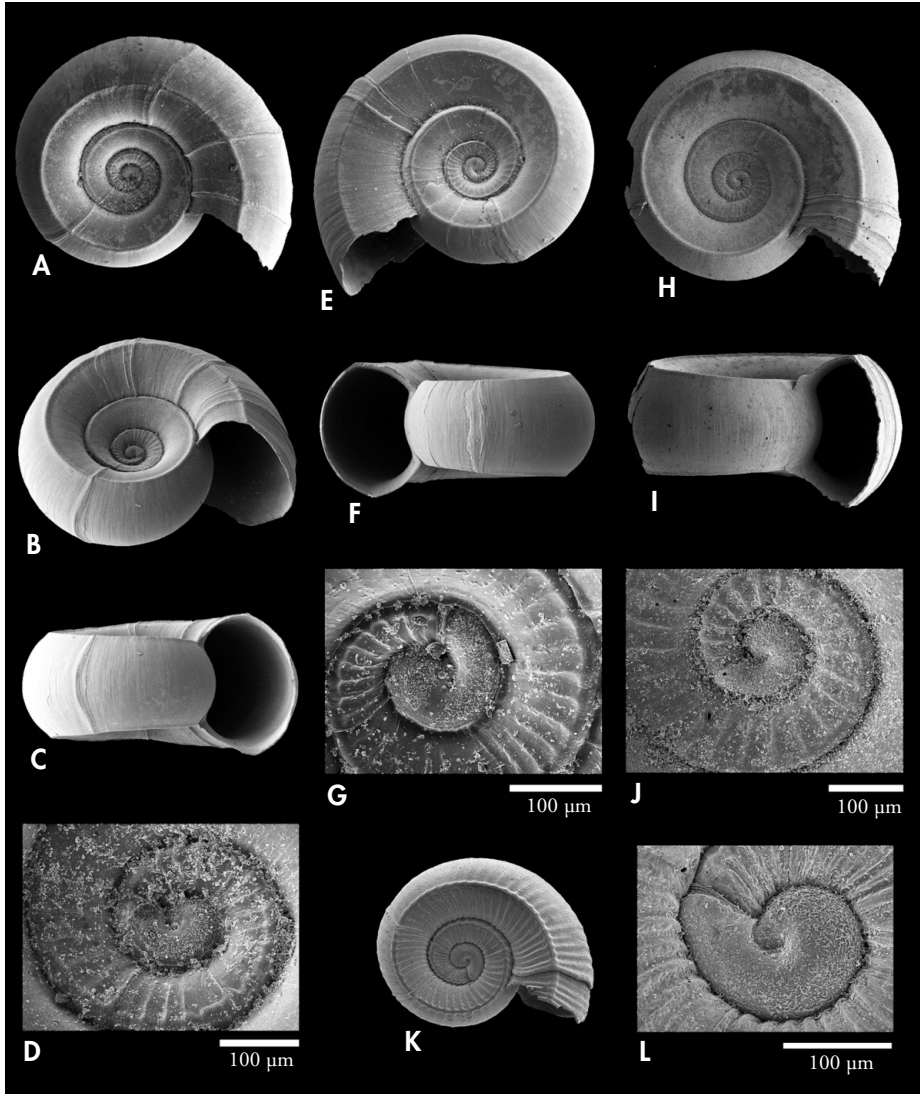


Figure 15. *Eudaronia mikra* n. sp. A-C: Plato Seamount – SMT2/DW250, holotype, apical and apertural views H 0.9 mm, W 1.7 mm; D: protoconch of the holotype in apical view W 0.14 mm; E, F: same locality, paratype 1, basal and apertural views, H 0.8 mm, W 1.6 mm; G: protoconch in basal view W 0.14 mm, same as E; H, I: Atlantis Seamount – M151/23404, apical view and apertural views H 0.9 mm, W 1.7 mm; J: protoconch in apical view W 0.13 mm, same as H; K: *Eudaronia* cf. *mikra* n. sp., Plato Seamount – SMT2/DW242, a small shell with ribbing continued until second whorl, apical view W 0.95 mm; L: protoconch, same as K.

Figura 15. *Eudaronia mikra* n. sp. A-C: Banco Plato - SMT2/DW250, holotipo, vistas apical y apertural, 0,9 mm alto, 1,7 mm ancho; D: vista apical de la protoconcha del holotipo 0,14 mm ancho; E, F: misma localidad, paratipo 1, vistas basal y apertural, 0,8 mm alto, 1,6 mm ancho; vista basal de la protoconcha 0,14 mm ancho, misma que E; H, I: Banco Atlantis - M151/23404, vistas apical y apertural 0,9 mm alto, 1,7 mm ancho; J: vista apical de la protoconcha 0,13 mm ancho, misma que H; K: *Eudaronia* cf. *mikra* n. sp., concha pequeña con costillas continuadas hasta la segunda vuelta, Banco Plato - SMT2/DW242, vista apical W 0,95 mm; L: protoconcha, misma que K.

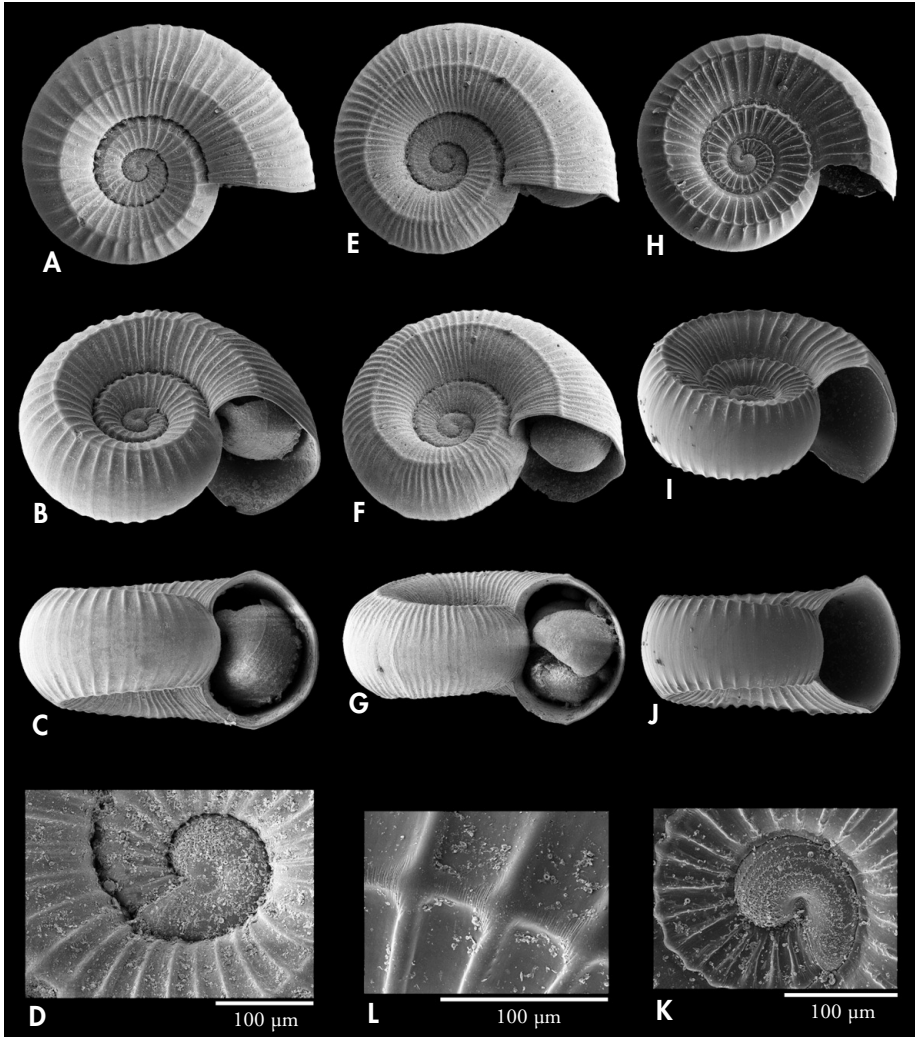


Figure 16. *Adeuomphalus densicostatus* (Jeffreys, 1884). A-C: Plato Seamount – SMT2/DW250, H 0.6 mm, W 1.1 mm; D: apical view of the protoconch W 0.15 mm, same as A; E-G: H 0.7 mm, W 1.3 mm. H-J: *Adeuomphalus ammoniformis* Seguenza, 1876, Plato Seamount – SMT2/DW250. H 0.57 mm, W 1.07 mm; K: apical view of the protoconch W 0.13 mm, same as H; L: microsculpture, same as H.

Figura 16. *Adeuomphalus densicostatus* (Jeffreys, 1884). A-C: Banco Plato - SMT2/DW250, 0,6 mm alto, 1,1 mm ancho; D: vista apical de la protoconcha 0,15 mm ancho, misma que A; E-G: 0,7 mm alto, 1,3 mm ancho. H-J: *Adeuomphalus ammoniformis* Seguenza, 1876, Banco Plato - SMT2/DW250, 0,57 mm alto, 1,07 mm ancho; K: vista apical de la protoconcha 0,13 mm ancho, misma que H; L: microescultura, misma que H.

*Distribution:* dead or fossil in western Mediterranean (WARÉN, 1991), living in the Alboran sea (GOFAS ET AL.

2011). Hatton- and Rockall Banks (HOFFMAN ET AL., 2010), Porcupine Seabight (FREIHWALD & BECK, 2007), Lusi-

tanian seamounts and banks (BECK *ET AL.*, 2006; HOFFMAN & FREIWALD, 2017), Plato Seamount (this study).

*Remarks:* *Adeuomphalus ammoniformis* is similar to *A. densicostatus*, but the

axial ribs of the present species are stronger, more sinuous and more widely spaced (KANO *ET AL.*, 2009) and the two spiral cords form keels and are placed closer to the periphery.

### *Adeuomphalus densicostatus* (Jeffreys, 1884) (Figs. 16A-G)

*Homalogyra densicostata* Jeffreys, 1884: 129, pl. 10, fig. 1

*Adeuomphalus densicostatus*: KANO *ET AL.*, 2009: 403-404, figs. 1A-E.

**Material examined:** Azores, Mar da Prata • 1 shell; 37.666°N, 25.966°W; 952 m; 17 Oct. 2018; M151/23168; grab. Plato Seamount • 2 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge.

*Distribution:* dead or fossil in western Mediterranean (KANO *ET AL.*, 2009), Hatton and Rockall Banks (HOFFMAN *ET AL.*, 2010), Lusitanian seamounts, banks and off western Iberian Peninsula (KANO *ET AL.*, 2009; HOFFMAN & FREIWALD, 2017), Azores, Plato Seamount (this study). Watson (1886: 677) reported this species from off Culebra Island, West Indies, but FERNÁNDEZ-GARCÉS *ET AL.* (2019) described several similar species from the Caribbean and a re-

examination of the specimen would be needed to ascertain the record.

*Remarks:* see remarks under *Adeuomphalus ammoniformis* for differences with this species. As in *A. ammoniformis*, the axial ribs on our specimens have faded on the periphery; this is considered a variety. *Adeuomphalus xerente* Absalão, 2009 from off Brazil may be a junior synonym of *A. densicostatus*, but our material is not sufficient for this to be ascertained.

### *Adeuomphalus* cf. *sinuosus* (Sykes, 1925) (Fig. 17)

*Homalogyra sinuosa* Sykes, 1925: 192, pl. 9, fig. 8.

*Adeuomphalus sinuosus*: KANO *ET AL.*, 2009: 408, figs. 4A-B.

**Material examined:** Plato Seamount • 13 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge.

*Distribution:* off southern Portugal (39°42'N, 09°43'W, 1990 m), Plato Seamount (this study, 1500 m).

*Remarks:* *Adeuomphalus sinuosus* is a rare species only known from two bathyal locations. Compared to *A. densicostatus*, the axial ribs of the present species are stronger, more sinuous and more widely spaced (KANO *ET AL.*, 2009) and there are no keels whatsoever on the sides. The syntypes of *A.*

*sinuosus* and a further specimen collected on the Galicia Bank have axial ribs fading out on the last whorls, contrary to the specimens from Plato. Specimens, however, are too few for a conclusion to be reached. FERNÁNDEZ-GARCÉS *ET AL.* (2019: 4-5, figs. 1A-F) described a very similar *A. diegoalejandroi* from off North Cuba (1455 m), which has a more pronounced microsculpture between the axial ribs.

### *Adeuomphalus axistriatus* n. sp. (Figs. 18, 19)

**Type material:** *Holotype*, Plato Seamount • 1 shell (Figs. 19A-D); 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge, in sediment with dead coral fragments; MNHN-IM-2000-35659.

**Type locality:** Plato Seamount – 33.210°N – 29.287°W, 1450–1500 m.

**Etymology:** *axistriatus* (Latin) refers to the straight axial rib sculpture.

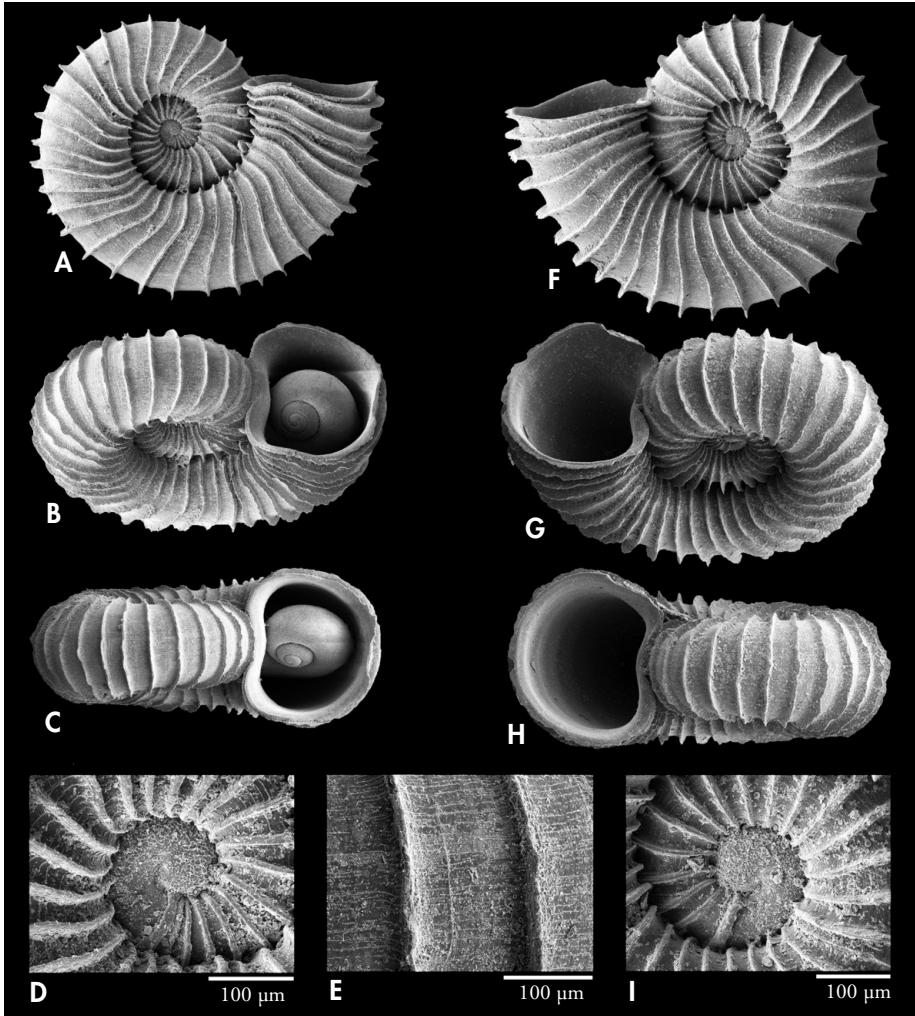


Figure 17. *Adeuomphalus cf. sinuosus* (Sykes, 1925). A-C: Plato Seamount – SMT2/DW250, H 0.9 mm, W 2.0 mm; D: protoconch in basal view W 0.16 mm, same as A; E: microsculpture, same as C; F-H: same locality, H 0.9 mm, W 1.8 mm; I: protoconch in apical view W 0.18 mm, same as F.  
 Figura 17. *Adeuomphalus cf. sinuosus* (Sykes, 1925). A-C: Banco Plato - SMT2/DW250, 0,9 mm alto, 2,0 mm ancho; D: vista basal de la protoconcha 0,16 mm ancho, misma que A; E: microescultura, misma que C; F-H: misma localidad, 0,9 mm alto, 1,8 mm ancho; I: vista apical de la protoconcha 0,18 mm ancho, misma que F.

*Holotype*, an empty shell (Figs. 19A-D): Very small (H 0.5 mm, W 1.2 mm) planispiral shell with strong straight axial rib sculpture, without spiral cords, white.

*Protoconch*:  $\frac{3}{4}$  whorls, coarsely sculptured by flat pits, straight thick

and smooth varix, W 0.14 mm. Apical and basal view very similar. Transition to teleoconch clear by varix and change in sculpture (Fig. 19D).

*Teleoconch*: Planispiral with two rounded whorls, with smooth straight ribs, regularly spaced, continuous from

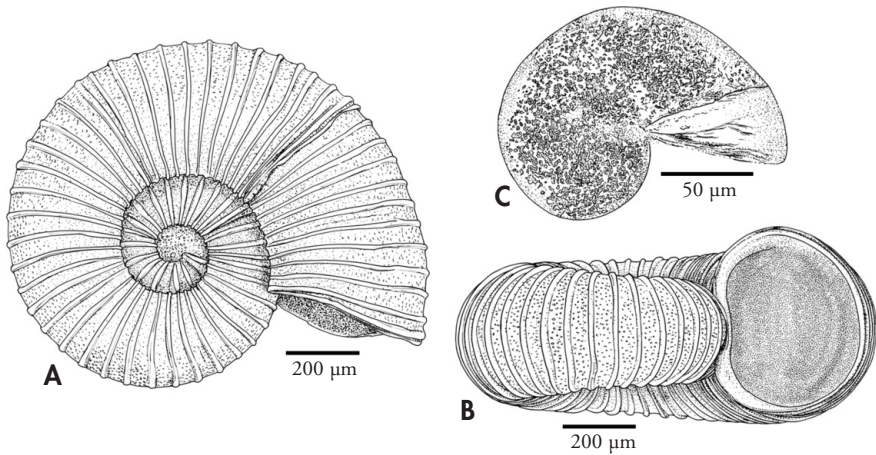


Figure 18. *Adeuomphalus axistriatus* n. sp. A: Plato Seamount – SMT2/DW250, holotype, apical view W 1.2 mm, apertural view H 0.5 mm; C: protoconch in basal view, W 0.14 mm.

*Figura 18. Adeuomphalus axistriatus n. sp. A: Banco Plato - SMT2/DW250, holotipo, vista apical 1,2 mm ancho, vista apertural 0,5 mm alto; C: vista basal de la protoconcha, 0,14 mm ancho.*

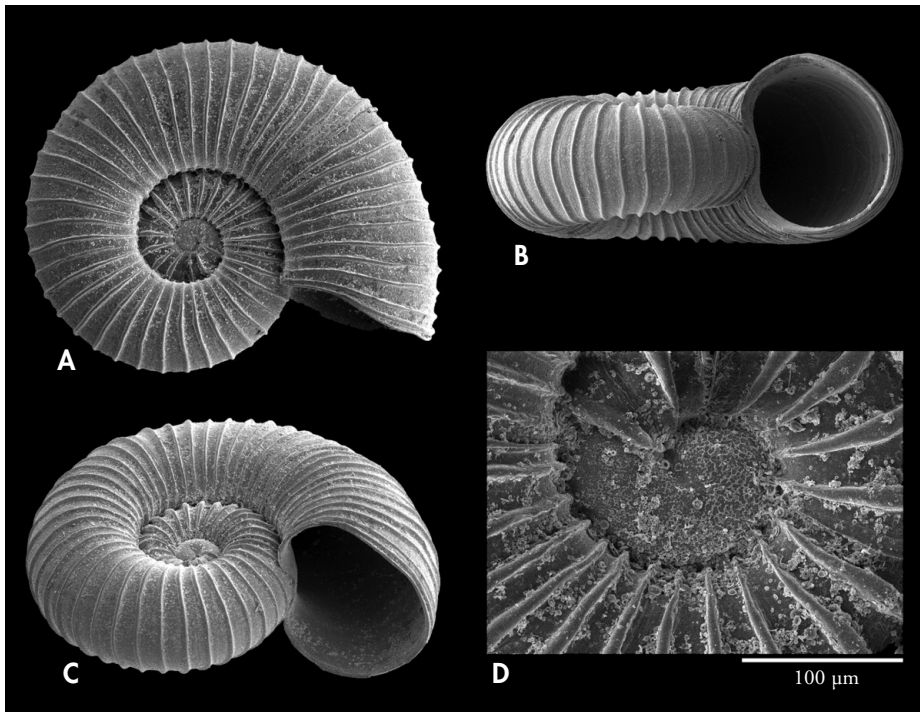


Figure 19. *Adeuomphalus axistriatus* n. sp. A-C: Plato Seamount – SMT2/DW250, holotype, H 0.5 mm, W 1.2 mm; D: protoconch in apical view W 0.14 mm.

*Figura 19. Adeuomphalus axistriatus n. sp. A-C: Banco Plato – SMT2/DW250, holotipo, 0,5 mm alto, 1,2 mm ancho; D: vista apical de la protoconcha 0,14 mm ancho.*

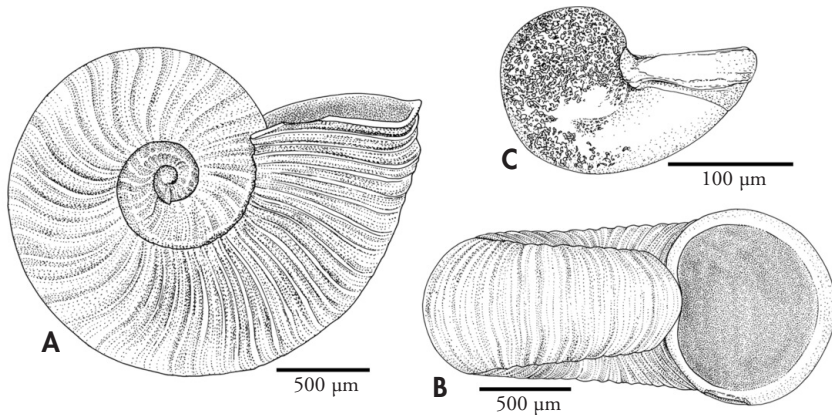


Figure 20. *Adeuomphalus curvistriatus* n. sp. A: Plato Seamount – SMT2/DW250, holotype, apical view W 2.3 mm, apertural view H 1.0 mm; C: protoconch in basal view, W 0.20 mm.

Figura 20. *Adeuomphalus curvistriatus* n. sp. A: Banco Plato - SMT2/DW250, holotipo, vista apical 2,3 mm ancho, vista apertural 1,0 mm alto; C: vista basal de la protoconcha, 0,20 mm ancho.

apical to basal end, 19 ribs on first whorl, 42 ribs on the second whorl. Areas between ribs smooth with very fine growth lines. Apical to basal sides nearly symmetrical. Suture very deep.

Aperture 100% of shell height and 35% of shell width, rounded on all sides, kidney-shaped, slightly oblique adapically. Peristome blunt, smooth, concavely flexuous on parietal side, outer lip nearly orthocline. Callus smooth, thinning on parietal side, inside of whorl smooth with weak axial undulations following external sculpture. Angle of union with penultimate whorl 0°.

Variability: unknown.

Distribution: only known from the type locality.

Remarks: The species is placed in the genus *Adeuomphalus* based on the morphology of the symmetrical planispiral shell, sculpture and protoconch. It is similar to *Adeuomphalus densicostatus*, however, this species has flexuous ribs and two spiral cords forming keels (Figs. 16A-G). It is also similar to *A. ammoniformis*, which has less but stronger axial ribs and also two spiral keels (Figs. 16H-L). *Adeuomphalus sinuosus* also lacks the spiral ribs but has sharp, flexuous axial ribs (Figs. 17A-I). FERNÁNDEZ-GARCÉS ET AL. (2019: 5, figs. 2A-F) described a very similar *A. valentinae* from off the northern coast of Cuba (1455 m); that species has micro-cordlets between the axial ribs whereas *A. axistriatus* n. sp. is smooth.

### *Adeuomphalus curvistriatus* n. sp. (Figs. 20, 21)

**Type material:** *Holotype*, Plato Seamount • 1 shell (Figs. 21A-E); 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge, in sediment with dead coral fragments; MNHN-IM-2000-35660.

**Type locality:** Plato Seamount – 33.210°N – 29.287°W, 1450–1500 m.

**Etymology:** *curvistriatus* (Latin) refers to the flexuous axial rib sculpture.

*Holotype*, an empty shell (Figs. 21A-E): Very small (H 1.0 mm, W 2.3 mm) planispiral shell with flexuous axial rib sculpture, without spiral cords on body whorl, white.

Protoconch:  $\frac{3}{4}$  whorls, nucleus coarsely sculptured by flat pits, end of whorl smooth with straight thick and smooth varix, W 0.20 mm. Apical and basal view similar. Transition to teleo-



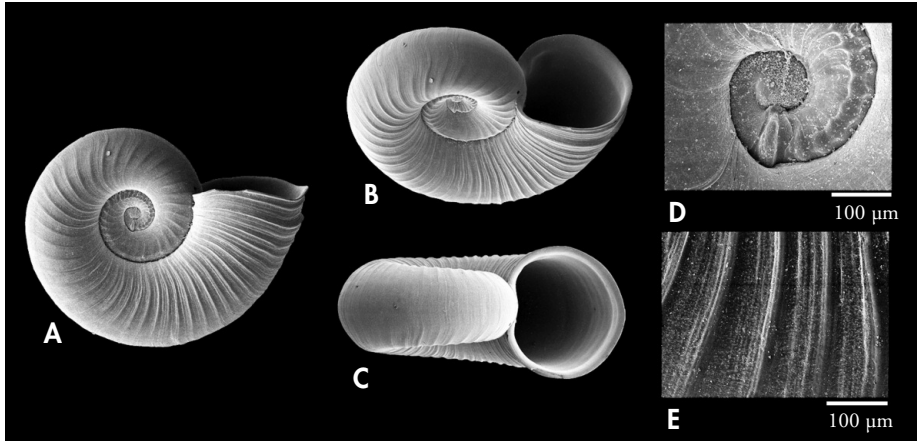


Figure 21. *Adeomphalus curvistriatus* n. sp. A-C: Plato Seamount – SMT2/DW250, holotype, H 1.0 mm, W 2.3 mm; D: protoconch in basal view W 0.20 mm; E: microsculpture.

Figura 21. *Adeomphalus curvistriatus* n. sp. A-C: Banco Plato – SMT2/DW250, holotipo, 1,0 mm alto, 2,3 mm ancho; D: vista basal de la protoconcha 0,20 mm ancho; E: microescultura.

conch clear by varix and change in sculpture (Fig. 21D).

Teleoconch: Planispiral with  $2 \frac{1}{4}$  rounded whorls with smooth flexuous ribs on apical and on basal surfaces, faded on periphery, 24 ribs on first whorl, 43 on the body whorl. Two smooth spiral cords on first  $\frac{1}{2}$  whorl, merged into the axial ribs. Axial ribs weak on apical and basal ends of first whorl, fine growth lines between ribs. Strong growth markings between ribs on body whorl. Apical to basal sides nearly symmetrical. Suture deep.

Aperture 100% of shell height and 35% of shell width, rounded on all sides, kidney-shaped, perfectly symmetrical. Peristome blunt, smooth, concavely flexuous on parietal side, outer lip nearly

orthocline but flexuous, protruding at periphery. Callus smooth, nearly disappearing on parietal side, inside of whorl smooth. Angle of union with penultimate whorl  $0^\circ$ .

Variability: unknown.

Distribution: only known from the type locality.

Remarks: The species is similar to *Adeomphalus densicostatus*, however, this species has two spiral cords and lacks the marked growth lines between ribs (Figs. 16A-G). *Adeomphalus axistriatus* has straight axial ribs, which are continuous on the peripheral whorl surface, and has a smaller protoconch (Figs. 18A-D). *Adeomphalus sinuosus* has strong and sharp flexuous ribs, which are continuous across the periphery (Figs. 17A-I).

### Genus *Akritogyra* Warén, 1992

Type taxon: *Akritogyra curvilineata* Warén, 1992 by original designation. The type locality is the Bay of Biscay,  $48^\circ 47'N - 11^\circ 13'W$ , 1430–1550 m.

WARÉN (1992) originally placed *Akritogyra* within Skeneidae (Trochoidea), but KANO *ET AL.* (2009) relocated the genus in Seguenzioidea, even though its family is currently unassigned. WARÉN

(1992) provided a detailed diagnosis of the genus based on *Akritogyra similis* (Jeffreys, 1883), *A. conspicua* (Monterosato, 1880) and *A. curvilineata* Warén, 1992. The shell has the following characteris-

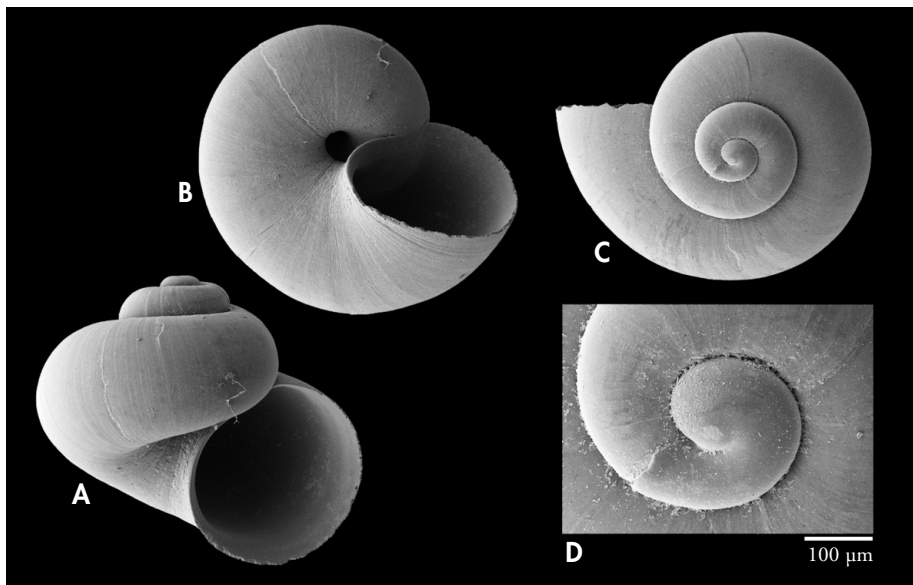


Figure 22. *Akritogyra similis* (Jeffreys, 1883). A-B: Plato Seamount – SMT2/DW250, H 1.5 mm, W 1.7 mm; C: same locality, apical view, W 1.7 mm; D: protoconch W 0.27 mm, same as C.  
 Figura 22. *Akritogyra similis* (Jeffreys, 1883). A-B: Banco Plato - SMT2/DW250, 1,5 mm alto, 1,7 mm ancho; C: vista apical, 1,7 mm ancho; D: protoconcha 0,27 mm ancho, misma que C.

tics (WARÉN 1992): protoconch of 0.5 - 0.6 whorls, finely granulate. First 0.1 - 0.5 teleoconch whorl often sculptured with irregular net-sculpture or by short lines, or smooth. An uneven, irregularly pitted surface in umbilicus. Up to 2.5 convex teleoconch whorls.

Four species are known in the NE Atlantic: the type species *Akritogyra curvilineata* Warén, 1992, *A. conspicua* (Monterosato, 1880) from the Mediterranean Sea, *A. similis* (Jeffreys, 1883) from off Iceland and NW Europe, *A. helicella* Warén, 1993 from off Iceland.

### *Akritogyra similis* (Jeffreys, 1883) (Fig. 22)

*Cyclostrema simile* Jeffreys, 1883: 92, pl. 19 fig. 4.

*Akritogyra similis*: WARÉN, 1992: 161-162, figs. 13E-F, 14A-B, 15C.

**Material examined:** Azores, Mar da Prata • 2 shells; 37.673°N, 25.925°W; 595 m; 08 Oct. 2018; M151/23111; grab. • 1 shell; 37.666°N, 25.966°W; 952 m; 17 Oct. 2018; M151/23168; grab. Atlantis Seamount • 1 shell; 33.996°N, 30.177°W; 617 m; 21 Oct. 2018; M151/23408; grab. Plato Seamount • 6 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. • 13 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge.

**Distribution:** NE Atlantic: Iceland, Bay of Biscay, NW Morocco (WARÉN, 1992), Rockall and Hatton Banks (HOFFMAN ET AL. 2010), Azores, SASC (DAUTZENBERG, 1927 and this study), 593–2102 m.

**Remarks:** The shell of *Akritogyra similis* has straight growth lines and lip and a smooth surface of whorls. The Mediterranean species *A. conspicua* (Monterosato, 1880) is similar but has a smaller protoconch and teleoconch (WARÉN, 1992).

## Genus *Anekes* Bouchet & Warén, 1979

Type taxon: *Anekes undulisculpta* Bouchet & Warén, 1979 by original designation, Arctic, abyssal. The genus was included in Seguenzioidea by KANO *ET AL.* (2009) and this is reflected in MOLLUSCABASE (2020).

WARÉN (1992) provided a diagnosis for the shell: small, tall-spined, with fine sculpture of irregularly branching or anastomosing lines, usually of mainly spiral direction. Protoconch with granular sculpture.

Four species are currently known in the NE Atlantic: *Anekes undulisculpta* Bouchet & Warén, 1979, *A. affinis* (Jeffreys, 1883), *A. paucistriata* Warén, 1992, and *A. sculpturata* Warén, 1992.

### *Anekes paucistriata* Warén, 1992 (Fig. 23)

*Anekes paucistriata* Warén, 1992: 165-166, figs. 19D, 20B-D, 21A, 22B

**Material examined:** Azores, Mar da Prata • 82 shells; 37.673°N, 25.925°W; 595 m; 08 Oct. 2018; M151/23111; grab. • 39 shells; 37.661°N, 25.918°W; 599 m; 08 Oct. 2018; M151/23112; grab. • 1 shell; 37.666°N, 25.966°W; 961 m; 09 Oct. 2018; M151/23121; grab. Atlantis Seamount • 270 shells; 34.082°N, 30.255°W; 335–340 m; 02 Feb. 1993; SMT2/DW255; dredge. • 270 shells; 33.997°N, 30.203°W; 420–460 m; 02 Feb. 1993; SMT2/DW258; dredge. • 94 shells; 34.080°N, 30.248°W; 330 m; 04 Feb. 1993; SMT2/TS270; suprabenthic sled. • 8 shells; 34.086°N, 30.226°W; 280 m; 05 Feb. 1993; SMT2/DW274; dredge. Tyro Seamount • 5 shells; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge. Plato Seamount • 26 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. Hyères Seamount • 1 shell; 31.387°N, 28.892°W; 480 m; 15 Jan. 1991; SMT2/DW182; dredge. • 1 shell; 31.465°N, 28.985°W; 700–750 m; 17 Jan. 1998; SMT2/DW192; dredge. Great Meteor Seamount • 5 shells; 29.565°N, 28.339°W; 948 m; 25 Oct. 2018; M151/23425-R1; ROV sample. • 6 shells; 29.565°N, 28.332°W; 945 m; 25 Oct. 2018; M151/23425-R4; ROV sample. • 16 shells; 29.565°N, 28.339°W; 944 m; 25 Oct. 2018; M151/23425-R6; ROV sample. • 14 shells; 29.568°N, 28.339°W; 855 m; 25 Oct. 2018; M151/23425-R9; ROV sample. • 1 shell; 30.086°N, 28.726°W; 906 m; 26 Oct. 2018; M151/23429-R8; ROV sample. Little Meteor Seamount • 12 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab.

**Distribution:** off southwestern Portugal and Mediterranean Sea (WARÉN, 1992; METZGER, 2005; BECK *ET AL.*, 2006), Porcupine Basin (FREIWALD & BECK, 2007), Rockall Bank (HOFFMAN *ET AL.*, 2010), Madeira and Seine Seamount (SEGERS *ET AL.* 2009), Coral Patch Seamount (HOFFMAN & FREIWALD, 2017), Canary Is. (ORTEGA & GOFAS, 2019) SASC and the Azores (this study), 167–1500 m.

**Remarks:** The species can be identified by the flexuous sharp lip and the sculpture of fine anastomosing threads on the initial teleoconch and the sparsely-spread, short branching threads on the last two whorls. Its suture is shallow, impressed. An adult of *A. paucistriata* was found afloat in a plankton tow far from the bottom (WARÉN, 1992), a circumstance which could explain a very broad distribution across seamounts.

### *Anekes mikrosulpta* n. sp. (Figs. 24, 25)

**Type material:** Holotype, Plato Seamount • 1 shell (Figs. 25A-E); 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge, in sediment with dead coral fragments; MNHN-IM-2000-35661. **Paratypes:** • 2 shells (Figs. 25F-I); same data as for holotype; MNHN-IM-2000-35662. • 37 shells; same data as for holotype; MNHN-IM-2000-35663.

**Other material examined:** Azores, Mar da Prata • 1 shell; 37.666°N, 25.966°W; 961 m; 09 Oct. 2018; M151/23121; grab. • 10 shells; 37.666°N, 25.966°W; 952 m; 17 Oct. 2018; M151/23168; grab. Atlantis Seamount • 2 shells; 34.412°N, 30.513°W; 795–830 m; 03 Feb. 1993; SMT2/DW264; dredge. • 30

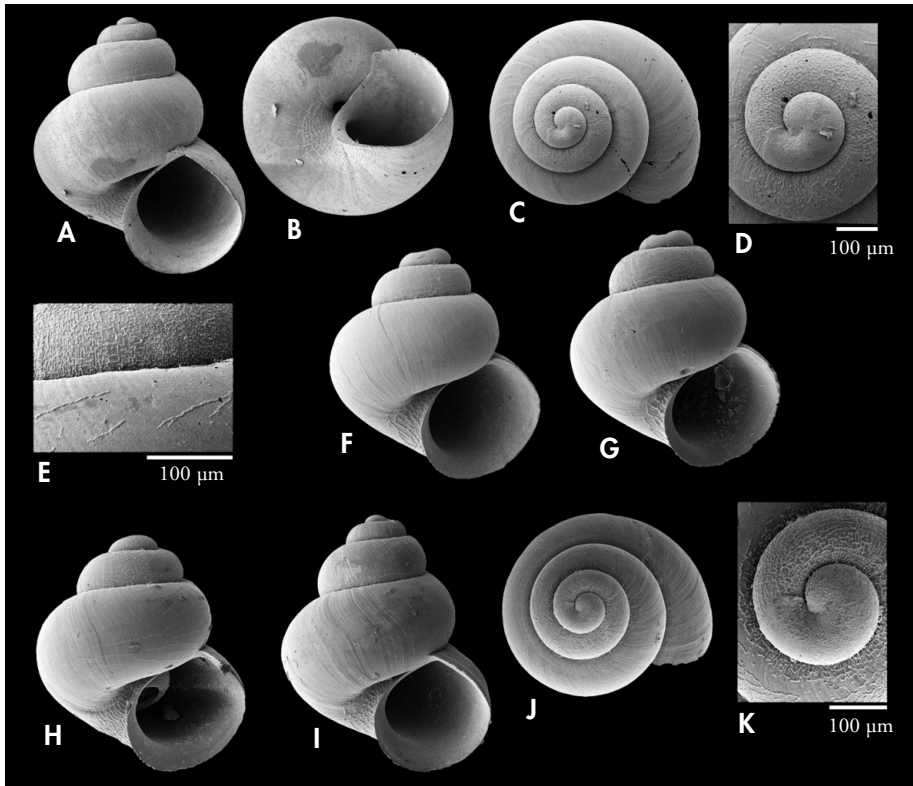


Figure 23. *Anekes paucistriata* Warén, 1992. A, B: Great Meteor Seamount – M151/23425-ROV6, A-B: H 1.3 mm, W 1.1 mm; C: same locality, W 1.0 mm; D: protoconch W 0.22 mm and microsculpture of teleoconch whorls 1 & 2, same as C; E: microsculpture, same as A; F: same locality, H 1.0 mm, W 0.9 mm; G: same locality, H 1.0 mm, W 0.9 mm. H: Tyro Seamount – SMT2/TS270, H 0.9 mm, W 0.8 mm; I: same locality, H 1.4 mm, W 1.1 mm; J: same locality, W 0.9 mm; K: protoconch W 0.22 mm, same as J.

Figura 23. *Anekes paucistriata* Warén, 1992. A, B: Gran Banco Meteor - M151/23425-ROV6, 1,3 mm alto, 1,1 mm ancho; C: misma localidad, 1,0 mm ancho; D: protoconcha 0,22 mm ancho y microescultura de vueltas 1 y 2 de teleoconcha, misma que C; E: microescultura, misma que A; F: misma localidad, 1,0 mm alto, 0,9 mm ancho; G: misma localidad, 1,0 mm alto, 0,9 mm ancho. H: Banco Tyro - SMT2/TS270, 0,9 mm alto, 0,8 mm ancho; I: misma localidad, 1,4 mm alto, 1,1 mm ancho; J: misma localidad, 0,9 mm ancho; K: protoconcha 0,22 mm ancho, misma que J.

shells; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. **Tyro Seamount** • 11 shells (Figs. 25J-M of two shells); 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge. **Plato Seamount** • 4 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. • 1 shell; 33.207°N, 29.247°W; 1700–1800 m; 01 Feb. 1992; SMT2/DW249; dredge. **Great Meteor Seamount** • 3 shells; 29.565°N, 28.339°W; 944 m; 25 Oct. 2018; M151/23425-R6; ROV sample. • 2 shells; 29.568°N, 28.339°W; 855 m; 25 Oct. 2018; M151/23425-R9; ROV sample. • 1 shell; 30.086°N, 28.726°W; 906 m; 26 Oct. 2018; M151/23429-R8; ROV sample. **Little Meteor Seamount** • 2 shells; 29.654°N, 29.015°W; 865 m; 27 Oct. 2018; M151/23434-R4; ROV sample. • 47 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab. • 1 shell; 29.654°N, 29.014°W; 811 m; 27 Oct. 2018; M151/23437; grab.

**Type locality:** Plato Seamount – 33.210°N – 29.287°W, 1450–1500 m.

**Etymology:** The name refers to the microscopic sculpture (Greek: mikro for small).

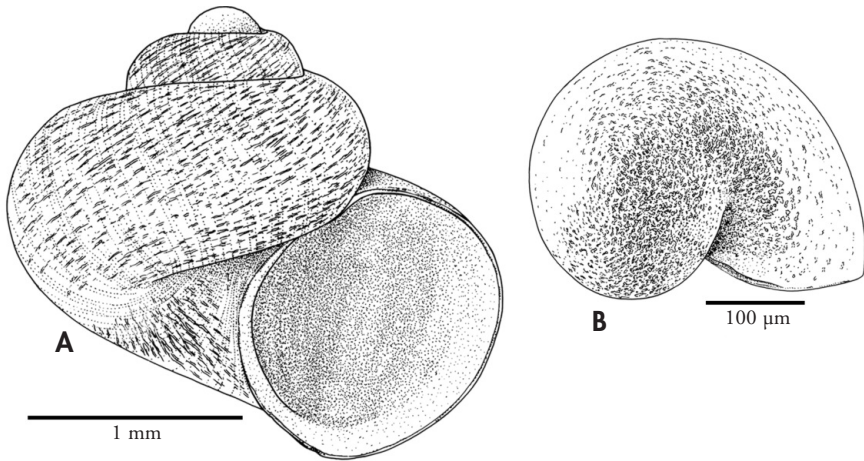


Figure 24. *Anekes mikrosulpta* n. sp. A: Plato Seamount – SMT2/DW250, holotype, apertural view, H 2.1 mm; B: Tyro Seamount – SMT2/DW278, apical view of finely granulated protoconch, W 0.39 mm.

*Figura 24. Anekes mikrosulpta n. sp. A: Banco Plato - SMT2/DW250, holotipo, vista apertural, 2,1 mm alto; B: Banco Tyro - SMT2/DW278, vista apical de la protoconcha finamente granulada, 0,39 mm ancho.*

*Holotype, an empty shell (Figs. 24A, 25A-E):* Small (H 2.1, W 2.3 mm), thin and fragile shell with a low spire (apical angle  $100^\circ$ ) and raised apex, deep suture, a fine network of microsculpture covering the entire teleoconch, translucent white.

*Protoconch:* Simple nucleus,  $\frac{1}{2}$  whorl, finely granulated, with convex sharp lip, somewhat flaring, W 0.38 mm. Transition to teleoconch clear by change in sculpture (Figs. 25D of holotype, 25I, M of paratype and additional shell).

*Teleoconch:* 2  $\frac{1}{4}$  rounded whorls, all whorls convex, fine network structure of oblique anastomosing and branching cordlets on the second and body whorls (Fig. 25E). Fine oblique and flexuous growth lines, few stronger growth marks, angle with spire axis at periphery about  $30^\circ$ . Umbilicus wide open.

*Aperture* 60% of shell height, nearly circular, slightly angular basally and adapically at union with penultimate whorl. Columellar lip sharp, partly covering umbilicus. Outer lip sharp, proso-

cline, slightly flexuous. Callus smooth, inside of whorl smooth. Section of union with penultimate whorl short, with an angle nearly  $0^\circ$ .

*Variability:* Little variability in shell shape, some variability in density of net sculpture, height up to 2.1 mm, protoconch width 0.36–0.38 mm.

*Distribution:* SASC and Azores, 677–1800 m.

*Remarks:* The species is placed in the genus *Anekes* based on the protoconch, and of the diagnostic network sculpture which continues into the open umbilicus. The type species *A. undulisculpta*, from the Norwegian Sea, has a more raised spire and more spirally oriented microsculpture. *Anekes sculpturata* has a rough sculpture and straight growth lines. *Anekes affinis* has a straight lip and a much looser mesh of microsculpture. *Anekes paucistriata* has a smooth whorl surface with scarce oblique cordlets. *Akritogyra curvilineata* is similar to this species because it also has oblique flexuous growth markings but it lacks a reticulate microsculpture.

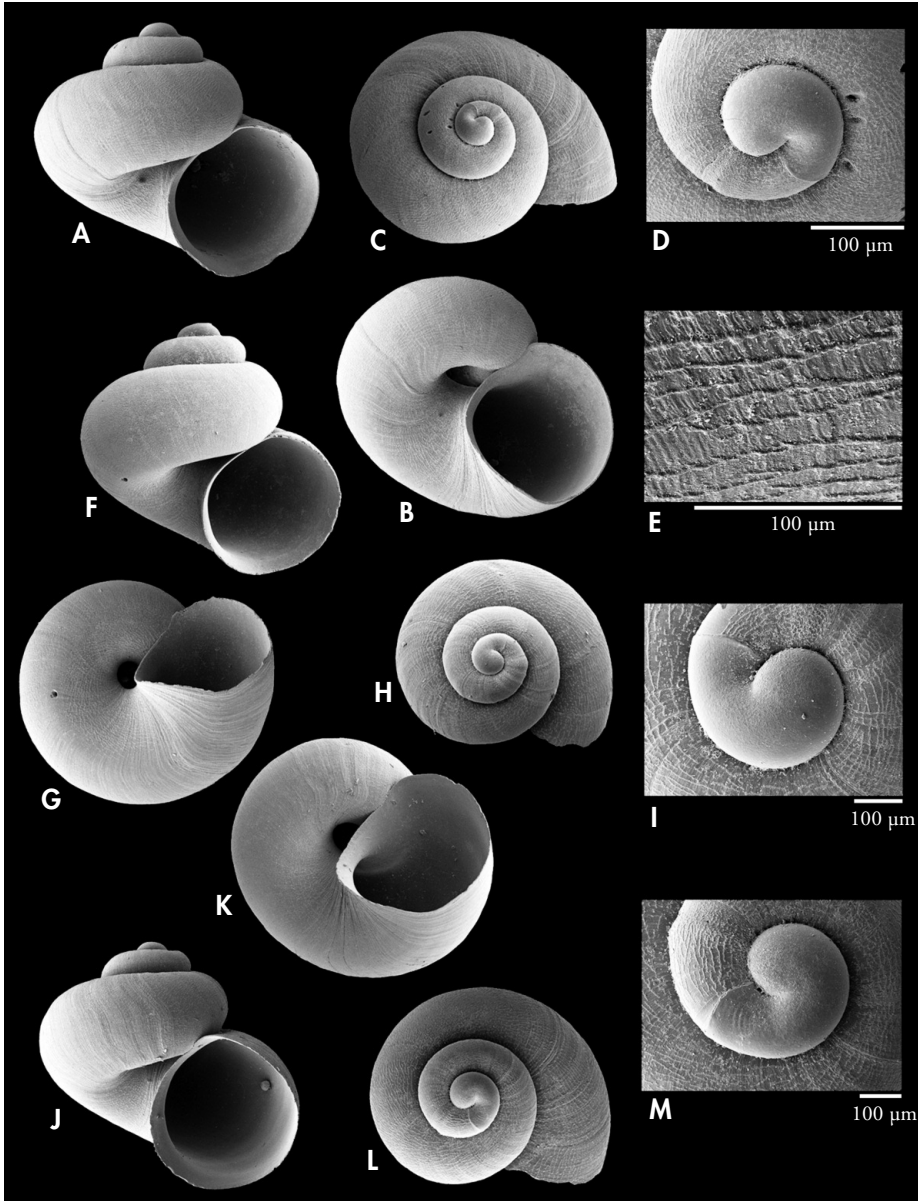


Figure 25. *Anekes mikrosculpta* n. sp. A-C: Plato Seamount – SMT2/DW250, holotype, H 2.1 mm, W 2.3 mm; D: protoconch of the holotype, W 0.38 mm; E: microsculpture; F, G: paratype 1, same locality, H 2.0 mm, W 2.1 mm; H: paratype 2, same locality, apical view, W 1.8 mm; I: protoconch W 0.36 mm, same as H; J, K: Tyro Seamount – SMT2/DW278, H 2.0 mm, W 2.0 mm; L: same locality, apical view, W 1.6 mm; M: protoconch W 0.39 mm, same as L.

Figura 25: *Anekes mikrosculpta* n. sp. A-C: Banco Plato - SMT2/DW250, holotipo, 2,1 mm alto, 2,3 mm ancho; D: protoconcha del holotipo 0,38 mm ancho; E: microescultura; F, G: paratipo 1, misma localidad, 2,0 mm alto, 2,1 mm ancho; H: paratipo 2, misma localidad, vista apical, 1,8 mm ancho; I: protoconcha 0,36 mm ancho, misma que H; J, K: Banco Tyro - SMT2/DW278, 2,0 mm alto, 2,0 mm ancho; L: misma localidad, vista apical, 1,6 mm ancho; M: protoconcha 0,39 mm ancho, misma que L.

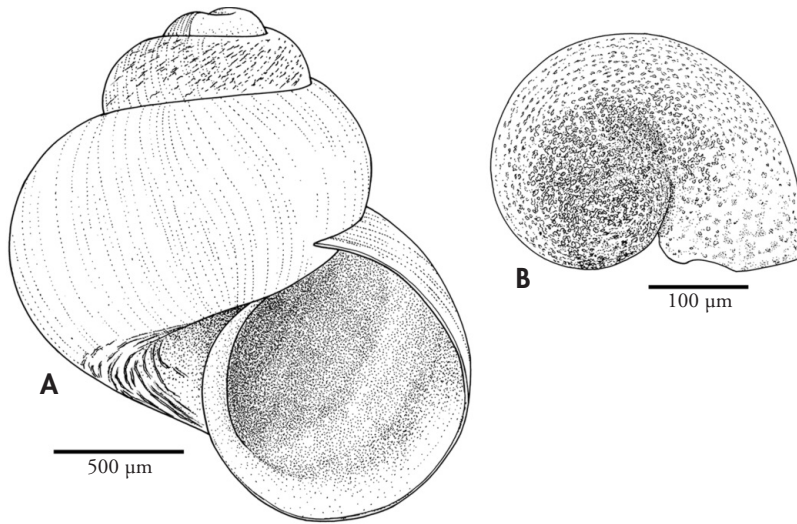


Figure 26. *Anekes anderswareni* n. sp. A: Little Meteor Seamount – M151/23436, holotype, apertural view H 1.9 mm; B: apical view of finely granulated protoconch, W 0.33 mm.

*Figura 26. Anekes anderswareni* n. sp. A: *Pequeño Banco Meteor* - M151/23436, holotipo, vista apertural 1,9 mm alto; B: vista apical de la protoconcha finamente granulada, 0,33 mm ancho.

### *Anekes anderswareni* n. sp. (Figs. 26, 27)

**Type material:** *Holotype*, Little Meteor Seamount • 1 shell (Figs. 27A-C); 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab, in bioclastic sand with dead coral fragments. *Paratypes*: • 3 shells (Figs. 27D-H); same data as for holotype; MNHN-IM-2000-35664. • 2 shells; same data as for holotype; SMF 351097.

**Other material examined:** Azores, Mar da Prata • 10 shells; 37.673°N, 25.925°W; 595 m; 08 Oct. 2018; M151/23111; grab. • 36 shells; 37.661°N, 25.918°W; 599 m; 08 Oct. 2018; M151/23112; grab. • 6 shells; 37.666°N, 25.966°W; 961 m; 09 Oct. 2018; M151/23121; grab. • 1 shell; 37.659°N, 25.789°W; 599 m; 19 Oct. 2018; M151/23181; box core. Azores, Açor Bank • 9 shells; 38.156°N, 29.084°W; 339 m; 13 Oct. 2018; M151/23139; grab. Atlantis Seamount • 4 shells; 34.086°N, 30.226°W; 280 m; 05 Feb. 1993; SMT2/DW274; dredge. • 63 shells; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. Tyro Seamount • 32 shells; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge. Plato Seamount • 4 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. • 121 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge. Hyères Seamount • 6 shells; 31.387°N, 28.892°W; 480 m; 15 Jan. 1991; SMT2/DW182; dredge. Little Meteor Seamount • 2 shells; 29.654°N, 29.015°W; 865 m; 27 Oct. 2018; M151/23434-R4; ROV sample. • 1 shell; 29.654°N, 29.014°W; 811 m; 27 Oct. 2018; M151/23437; grab.

**Type locality:** Little Meteor Seamount – 29.654°N – 29.015°W, 852 m.

**Etymology:** The specific name *anderswareni* is honouring the significant contributions of Anders Warén to the knowledge of the NE Atlantic molluscs, particularly the taxonomic review of skeneimorphs.

*Holotype*, an empty shell (Figs. 27A-C): Small (H 1.9 mm, W 1.7 mm), thin and fragile shell with a regularly raised outline, convex whorls, spire apical angle about 75°, with fine irregular umbilical cordlets, translucent white.

Protoconch:  $\frac{3}{4}$  whorls, finely granular, convex sharp lip, W 0.34 mm. Transition to teleoconch clear by lip (Fig. 27C).

Teleoconch:  $2\frac{3}{4}$  rounded whorls, suture shallow impressed. Whorl surface smooth with fine growth lines at about 30°

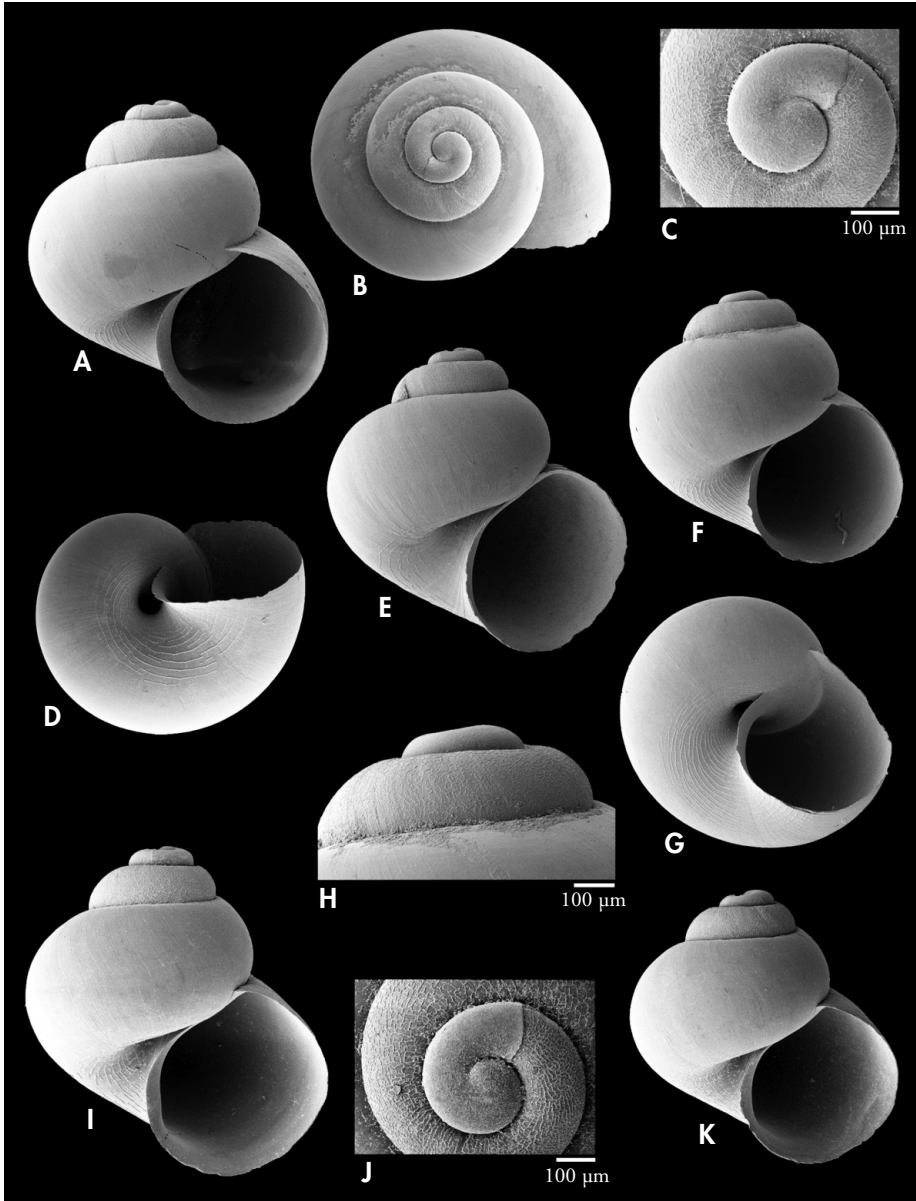


Figure 27. *Anekes anderswareni* n. sp. A, B: Little Meteor Seamount – M151/23436, holotype, H 1.9 mm, W 1.7 mm; C: protoconch of the holotype, W 0.33 mm; D: paratype 1, same locality, H 1.5 mm; E: paratype 2, same locality, H 2.0 mm, W 1.9 mm; F, G: paratype 3, same locality, H 1.7 mm, W 1.7 mm; H: protoconch, same as F; I: Plato Seamount – SMT2/DW250, H 2.1 mm, W 1.9 mm; J: protoconch W 0.37 mm, same as I; K: same locality, H 2.0 mm, W 1.9 mm.

*Figura 27. Anekes anderswareni* n. sp. A, B: Pequeño Banco Meteor - M151/23436, holotipo, 1,9 mm alto, 1,7 mm ancho; C: protoconcha del holotipo 0,33 mm ancho; D: paratipo 1, misma localidad, 1,5 mm ancho; E: paratipo 2, misma localidad, 2,0 mm alto, 1,9 mm ancho; F, G: paratipo 3, misma localidad, 1,7 mm alto, 1,7 mm ancho; H: protoconcha, misma que F; I: Banco Plato - SMT2/DW250, 2,1 mm alto, 1,9 mm ancho; J: protoconcha 0,37 mm ancho, misma que I; K: 2,0 mm alto, 1,9 mm ancho.



with spire axis. The first whorl with fine network of axial and spiral line segments; network faded away on second whorl.

Base of body whorl with about 10 interrupted, irregular spiral cordlets outside umbilical area, minor spiral line segments inside umbilicus. Umbilicus open, deep.

Aperture 60% of shell height, nearly circular, angular at the union to penultimate whorl with an angle ca. 90°. Peristome thin and sharp, outer lip prosocline. Columella thin and curved. Callus very thin and smooth, inside of whorl smooth.

Variability: Most specimens show a shallow impressed suture; the union of outer lip with the preceding whorl is at nearly 90°. Very few specimens show a deep suture on the body whorl with a rounded peristome and a tangential

union with the penultimate whorl. The number of umbilical cordlets is variable; the holotype has about 10 spiral cordlets but its umbilicus is predominantly smooth. Some specimens have up to 12 threads that develop also inside the umbilicus.

*Distribution*: SASC, Azores, 280–1500 m. BECK *ET AL.* (2006: 49) showed a shell from the Seine Seamount.

*Remarks*: Placement in the genus *Anekes* is based on the morphology of the protoconch, and on the umbilical sculpture. This species is similar to *Anekes paucistriata*, but the latter has a more raised spire (apical angle 60° compared to 75° in *A. anderswareni*), weak cordlets on the second whorl, and a chaotic umbilical sculpture. All other species of *Anekes* have a fine network sculpture on the whorl surface.

### *Anekes umbilisculpta* n. sp. (Figs. 28, 29)

**Type material**: *Holotype*, Plato Seamount • 1 shell (Figs. 29A-D); 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge, in sediment with dead coral fragments; MNHN-IM-2000-35666. *Paratypes*: • 1 shell (Paratype 1, Fig. 29E); same data as for holotype; MNHN-IM-2000-35667. • 2 shells (Paratypes 2, 3, Figs. 29F-H); MNHN-IM-2000-35668.

**Other material examined**: Azores, Albatroz Seamount • 2 shells; 38.116°N, 27.182°W; 770 m; 10 Oct. 2018; M151/23125; grab. Great Meteor Seamount • 1 shell (as *Anekes cf. umbilisculpta* n. sp., Fig. 29J); 29.565°N, 28.332°W; 945 m; 25 Oct. 2018; M151/23425-R4; ROV sample. Little Meteor Seamount • 1 shell; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab.

**Type locality**: Plato Seamount – 33.210°N – 29.287°W, 1450–1500 m.

**Etymology**: *umbilisculpta* refers to the sculpture, solely present in the umbilical area.

*Holotype, an empty shell* (Figs. 29A-D): Very small (H 1.5 mm, W 1.3 mm), thin and fragile shell with a regularly raised outline, convex whorls, apical angle about 70°, microsculpture only present in umbilicus, translucent white.

Protoconch:  $\frac{3}{4}$  whorls, finely granular on nucleus, smooth towards lip, convex sharp lip, W 0.29 mm. Transition to teleoconch clear by lip and change in sculpture (Figs. 29D,I).

Teleoconch: 2  $\frac{1}{2}$  rounded whorls, suture initially deep, shallow impressed on body whorl. Whorl surface smooth with numerous irregular growth lines, prosocline at about 30° with spire axis.

Umbilicus narrow, open, deep; sculpture of numerous spiralling

dashes, restricted to base of whorl and umbilicus (Figs. 29B,G).

Aperture 50% of shell height, nearly circular, angular at the union to penultimate whorl (angle ca. 90°). Peristome; thin and sharp, outer lip prosocline. Columella thin and curved. Callus very thin and smooth, inconspicuous along parietal area, inside of whorl smooth (Fig. 29A,E,F,J).

Variability: Height of shells up to 1.7 mm. Observed range of protoconch width is small: 0.28–0.29 mm (Figs. 29D,I). The ratio of the aperture height to the shell height varies between 45% in a large specimen (Fig. 29J) to 55% in a smaller specimen (Fig. 29F). Range of apical angle: 59–74°. Slight variation in density of dashes

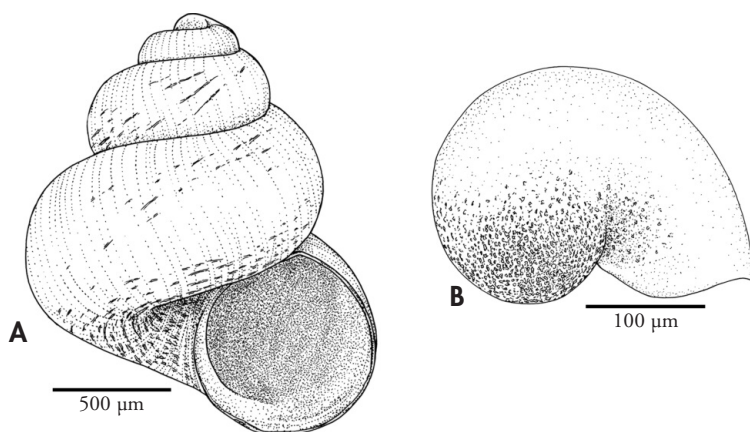


Figure 28. *Anekes umbilisculpta* n. sp. A: Great Meteor Seamount – M151/23425R4, apertural view, H 1.7 mm; B: apical view of finely granulated protoconch, W 0.28 mm.

Figura 28. *Anekes umbilisculpta* n. sp. A: Gran Banco Meteor - M151/23425R4, vista apertural, 1,7 mm alto; B: vista apical de la protoconcha finamente granulada, 0,28 mm ancho.

in umbilical sculpture. The specimen from the Great Meteor Seamount could be a different, even if closely related species, as it has a more elevated profile and an inconspicuous oblique sculpture on the second teleoconch whorl (Fig. 28, 29J).

*Distribution*: SASC, Azores, 852–1500 m.

*Remarks*: Placement in the genus *Anekes* is based on the morphology of the protoconch and outline and on the umbilical sculpture. The species is most similar to *A. anderswareni* n. sp.

*Anekes paucistriata* and *Anekes anderswareni* n. sp. have a microsculpture on the first teleoconch whorl whereas *A. umbilisculpta* n. sp. has none. *Anekes paucistriata* has a dense and chaotic umbilical sculpture and *A. anderswareni* n. sp. has a more continuous spiral sculpture in the umbilical area. All other species in *Anekes* have a microsculpture on the first whorl of the teleoconch and a more chaotic umbilical sculpture similar to *A. paucistriata*.

### *Anekes varisculpta* n. sp. (Figs. 30, 31)

**Type material**: *Holotype*, Tyro Seamount • 1 shell (Figs. 31G-H); 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge; MNHN-IM-2000-35669. *Paratypes*: • 2 shells (Fig. 31I); same data as for holotype; MNHN-IM-2000-35670. • 10 shells; same data as for holotype; MNHN-IM-2000-35671.

**Other material examined**: Azores, Albatroz Seamount • 2 shells; 38.116°N, 27.182°W; 770 m; 10 Oct. 2018; M151/23125; grab. Atlantis Seamount • 24 shells (Figs. 31A-F); 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. Plato Seamount • 51 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. • 9 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge. Great Meteor Seamount • 1 shell; 29.565°N, 28.339°W; 948 m; 25 Oct. 2018; M151/23425-R1; ROV sample. • 1 shell; 29.565°N, 28.332°W; 945 m; 25 Oct. 2018; M151/23425-R4; ROV sample. • 1 shell; 29.565°N, 28.339°W; 944 m; 25 Oct. 2018; M151/23425-R6; ROV sample. • 1 shell; 29.568°N, 28.339°W; 855 m; 25 Oct. 2018; M151/23425-R9; ROV sample. • 1 shell; 30.086°N, 28.726°W; 906 m; 26 Oct. 2018; M151/23429-R8; ROV sample. Little Meteor Seamount • 5 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab. • 1 shell; 29.654°N, 29.014°W; 811 m; 27 Oct. 2018; M151/23437; grab.

**Type locality**: Tyro Seamount – 33.963°N – 28.373°W, 890–925 m.

**Etymology**: *varisculpta* refers the change in sculpture between the first whorl and the body whorl.

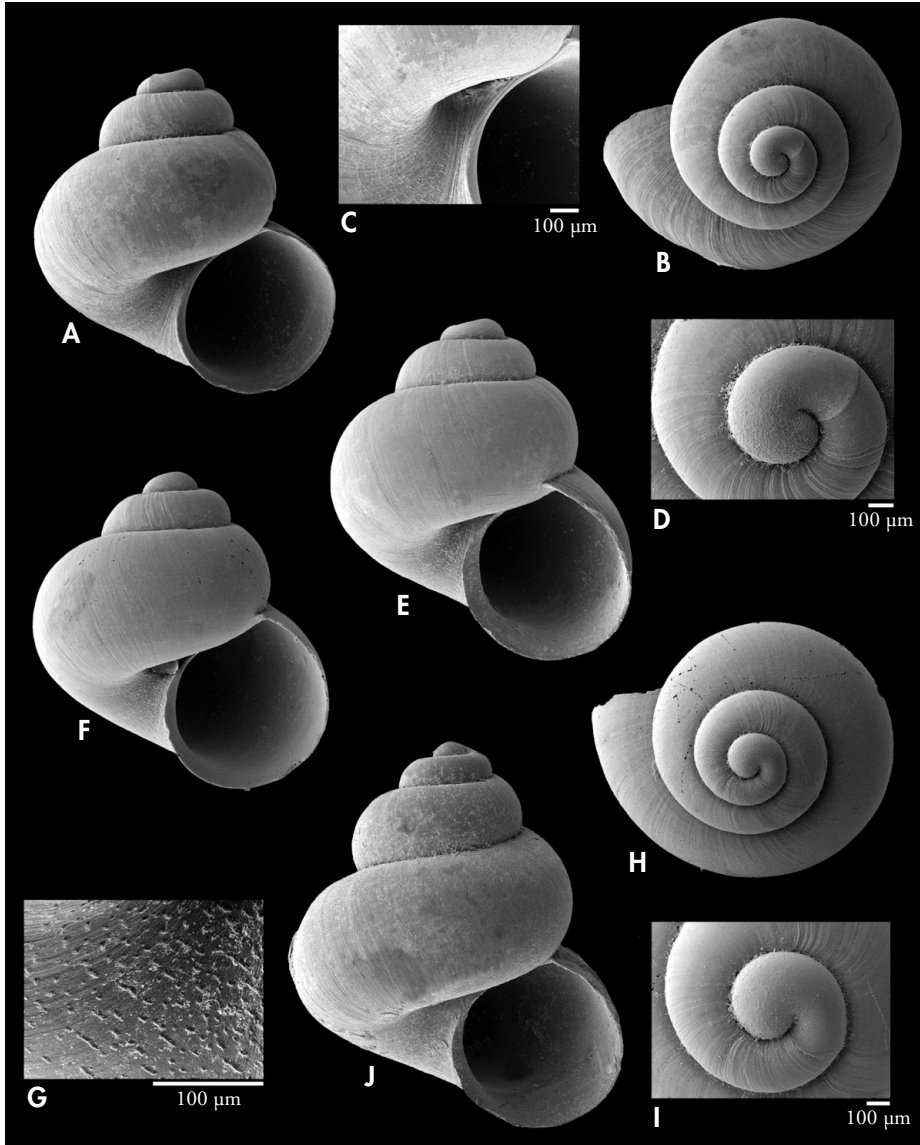


Figure 29. *Anekes umbiliculpta* n. sp. A, B: Plato Seamount, SMT2/DW250, holotype, H 1.5 mm, W 1.3 mm; C: detail of the umbilicus; D: protoconch of the holotype W 0.29 mm; E: paratype 1, same locality, H 1.4 mm W 1.3 mm; F: paratype 2, same locality, H 1.4 mm, W 1.3 mm; G: detail of microsculpture near umbilicus, same as F; H: paratype 3, same locality, W 1.3 mm; I: protoconch W 0.28 mm, same as H; J: *Anekes* cf. *umbiliculpta* n. sp., Great Meteor Seamount, M151/23425R4, H 1.7 mm, W 1.5 mm, protoconch W 0.28 mm.

Figura 29. *Anekes umbiliculpta* n. sp. A, B: Banco Plato, SMT2/DW250, holotipo, 1,5 mm alto, 1,3 mm ancho; C: detalle del ombligo; D: protoconcha del holotipo 0,29 mm ancho; E: paratipo 1, misma localidad, 1,4 mm alto, 1,3 mm ancho; F: Paratipo 2, misma localidad, 1,4 mm alto, 1,3 mm ancho; G: detalle de la microescultura cerca del ombligo, misma que F; H: paratipo 3, misma localidad, 1,3 mm ancho; I: protoconcha 0,28 mm ancho, misma que H; J: *Anekes* cf. *umbiliculpta* n. sp., Gran Banco Meteor, M151/23425R4, 1,7 mm alto, 1,5 mm ancho, protoconcha 0,28 mm ancho.

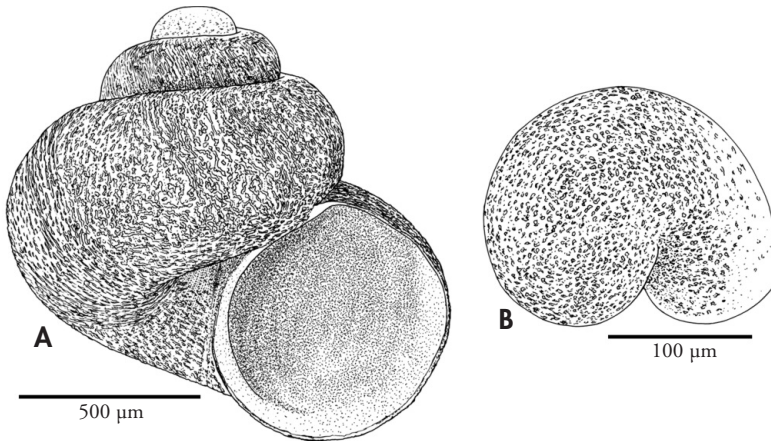


Figure 30. *Anekes varisculpta* n. sp. A: Tyro Seamount – SMT2/DW278, holotype, apertural view, H 1.2 mm; B: apical view of finely granulated protoconch, W 0.21 mm.

Figura 30. *Anekes varisculpta* n. sp. A: Banco Tyro - SMT2/DW278, holotipo, vista apertural, 1,2 mm alto; B: vista apical de la protoconcha finamente granulada, 0,21 mm ancho.

*Holotype, an empty shell* (Figs. 31G-H): Very small (H 1.2 mm, W 1.2 mm), thin and fragile shell with a regularly raised outline, convex whorls, spire apical angle about 80°, microsculpture of branching and anastomosing threads, translucent white.

Protoconch:  $\frac{3}{4}$  whorls, finely granular, convex sharp lip, W 0.21 mm. Transition to teleoconch clear, limited by a lip (Fig. 31D, F, H).

Teleoconch: 2  $\frac{1}{4}$  rounded whorls, suture deep. Whorl surface with network sculpture, dominating axial undulating ridges. Irregular flexuous growth lines at about 30° with spire axis. The first whorl with fine network of axial undulating lines connected with short spiral line segments.

Base of body whorl sculpture coarser, dominating undulating and discontinuous axial ridges and coarse granules (Fig. 31B). Umbilicus open, deep; sculpture network of horizontal undulating lines connected by short axial line segments.

Aperture 58% of shell height, nearly circular, tangential to penultimate whorl (angle 0°). Peristome uninterrupted, thin and sharp, columellar lip slightly flaring, outer lip prosocline, slightly flexuous. Columella thin and curved.

Callus very thin and smooth, inside of whorl smooth (Fig. 31G).

Variability: Height and width of shells up to 1.3 mm. Range of protoconch width is large: 0.21–0.29 mm (Figs. 31D, F, H). Apical outline angle 76–81°. Suture of body whorl shallow impressed rather than deep in some specimens (Fig. 31I, paratype 1). Slight variation in coarseness of sculpture.

*Distribution*: SASC, Azores, 677–1500 m.

*Remarks*: *Anekes affinis* (Jeffreys, 1883) and *Granigyra inflata* (Warén, 1992) have a similar outline but these species have a looser mesh of the microsculpture. *Anekes sculpturata* Warén, 1992 also has a similar outline but that species has a finer net sculpture with branching and anastomosing lines whereas *A. varisculpta* n. sp. has coarse isolated ridges. *Anekes mikrosulpta* n. sp. has a lower spire and a finer, more predominantly spiral net sculpture. *Anekes undulisculpta* Bouchet & Warén, 1979 was described from abyssal depths in the Norwegian Sea and it has a network of fine undulating spiral striae. *Anekes paucistriata* Warén, 1992 and *A. anderswareni* n. sp. have a predominantly smooth body whorl with a mostly umbilical microsculpture.

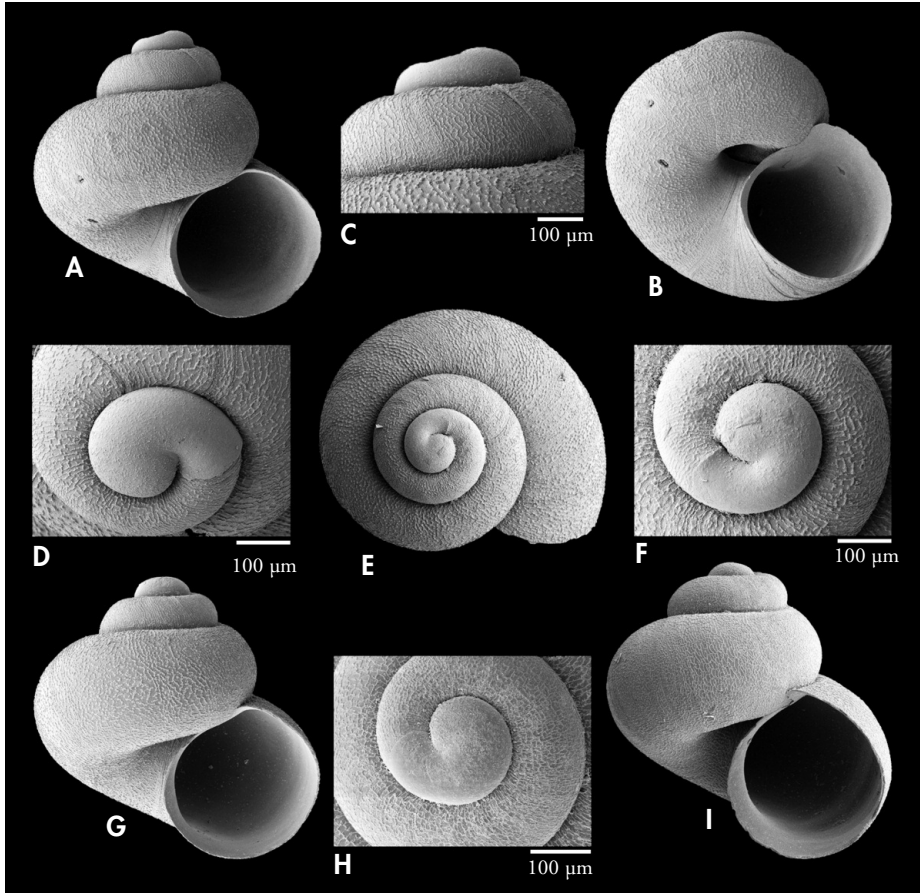


Figure 31. *Anekes varisculpta* n. sp. A, B: Atlantis Seamount – M151/23404, H 1.3 mm, W 1.3 mm; C, D: protoconch W 0.29 mm, same as A-B; E: same locality, W 1.3 mm; F: protoconch W 0.28 mm, same as E; G: Tyro Seamount – SMT2/DW278, holotype, H 1.2 mm, W 1.2 mm; H: protoconch of the holotype W 0.21 mm; I: paratype 1, same locality, H 1.0 mm, W 0.9 mm.

*Figura 31. Anekes varisculpta* n. sp. A, B: Banco Atlantis - M151/23404, 1,3 mm alto, 1,3 mm ancho; C, D: protoconcha 0,29 mm ancho, misma que A-B; E: misma localidad, 1,3 mm ancho; F: protoconcha 0,28 mm ancho, misma que E; G: Banco Tyro - SMT2/DW278, holotipo, 1,2 mm alto, 1,2 mm ancho; H: protoconcha del holotipo 0,21 mm ancho; I: paratipo 1, misma localidad, H 1,0 mm alto, W 0,9 mm ancho.

### Genus *Granigyra* Dall, 1889

Type taxon: *Granigyra limata* (Dall, 1889) by monotypy, off Cuba, 560 m.

The latest classification includes the genus in Seguenzioidea, but its family is currently unassigned (KANO *ET AL.* 2009; MOLLUSCABASE, 2020). WARÉN (1992) provided a diagnosis of the shell of the genus: small-sized, globular shell with

granular sculpture, round aperture and open umbilicus.

Five species are known in the NE Atlantic and Mediterranean Sea: *Granigyra tenera* (Jeffreys, 1883) and *G. pruinosa* (Jeffreys, 1883) described from off Portu-

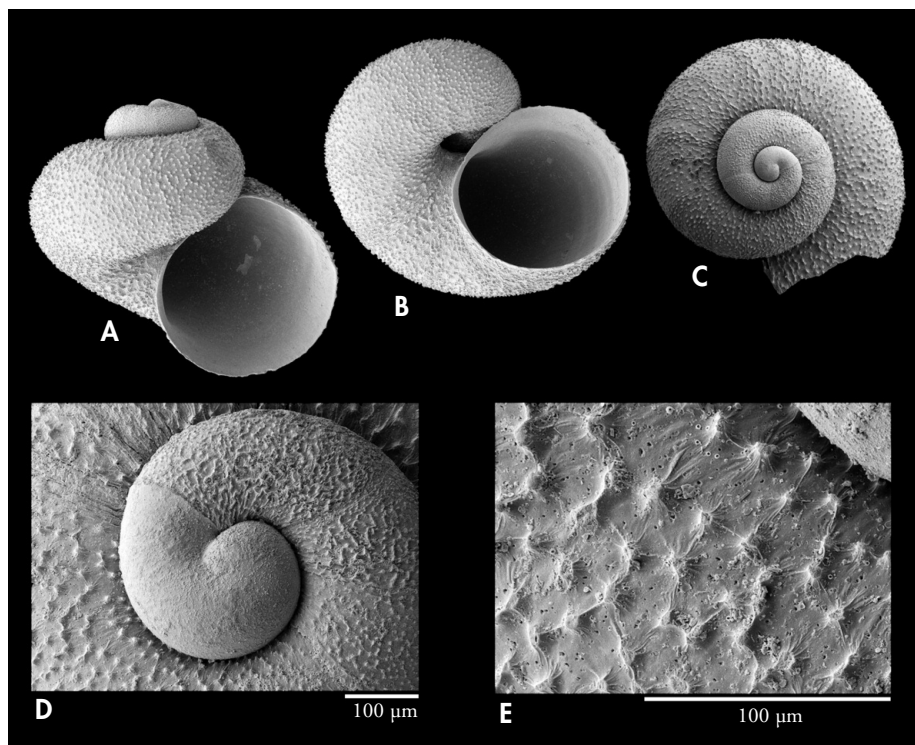


Figure 32. *Granigyra granulifera* Warén, 1992. A, B: Little Meteor Seamount – M151/23436, H 1.6 mm, W 1.7 mm; C: same locality, W 1.8 mm; D: protoconch W 0.28 mm, same as C; E: micro-sculpture, same as C.

Figura 32. *Granigyra granulifera* Warén, 1992. A, B: Pequeño Banco Meteor - M151/23436, 1,6 mm alto, 1,7 mm ancho; C: misma localidad, 1,8 mm ancho; D: protoconcha 0,28 mm ancho, misma que C; E: microescultura, misma que C.

gal, *G. granulifera* Warén, 1992 described from the central Mediterranean, 2460–2500 m and *G. arenosa* Warén, 1993 described from off the Faroes, 1083 m. WARÉN (1996) added *Granigyra inflata*

(Warén, 1992) on the grounds that the radula and soft parts are more similar to other *Granigyra* than to *Anekes* where it was originally included based on its reticulate microsculpture.

### *Granigyra granulifera* Warén, 1992 (Fig. 32)

*Granigyra granulifera* Warén, 1992: 176-177, figs. 32E-F, 34B, 35A-E.

**Material examined:** Little Meteor Seamount • 2 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab.

**Distribution:** Bay of Biscay to Madeira and the central Mediterranean Sea (WARÉN, 1992), Little Meteor Seamount (this study), 700–4300 m.

**Remarks:** *Granigyra granulifera* can be differentiated from *G. arenosa* Warén, 1993 by its finer granular sculpture.

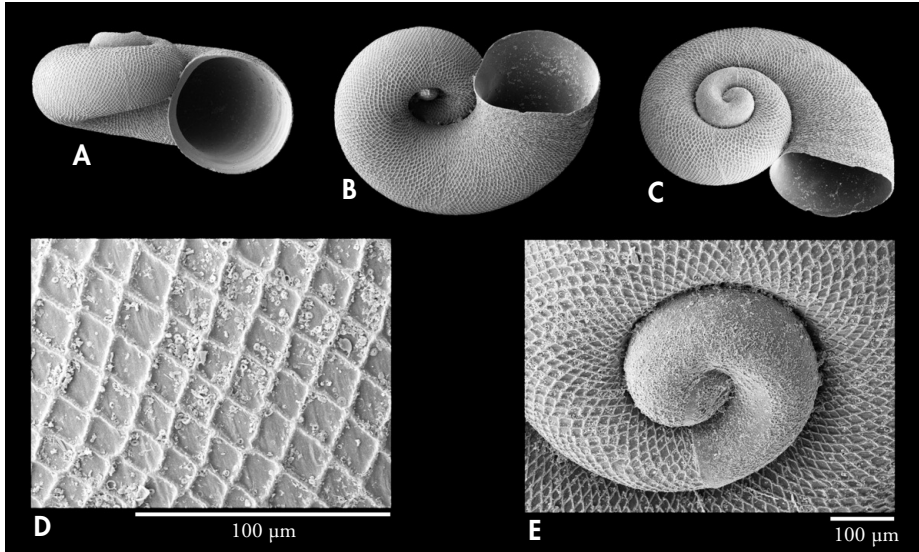


Figure 33. *Retigyra iheringi* (Dautzenberg & H. Fischer, 1897). A-C: Plato Seamount – SMT2/DW250, H 0.7 mm, W 1.4 mm; D: microsculpture; E: protoconch W 0.32 mm.

Figura 33. *Retigyra iheringi* (Dautzenberg & H. Fischer, 1897). A-C: Banco Plato - SMT2/DW250, 0,7 mm alto, W 1,4 mm ancho; D: microescultura; E: protoconcha 0,32 mm ancho.

### Genus *Retigyra* Warén, 1989

Type taxon: *Cyclostrema millipunctatum* Friele, 1886 by original designation, north of Lofoten, ca. 1000 m.

The latest classification places the genus in Seguenzioidea, but its family is currently unassigned (KANO *ET AL.* 2009; MOLLUSCABASE, 2020). WARÉN (1989: 6) provided a diagnosis for the genus: small depressed shell covered by two sets of narrow and raised ribs on a smooth surface,

which form a net-sculpture. Umbilicus wide.

Three species are known in the genus; all of them from the NE Atlantic: *Retigyra millipunctata* (Friele, 1886), *R. iheringi* (Dautzenberg & H. Fischer, 1897) from the Azores, 1600 m, and *R. granulosa* (Sykes, 1925) from off western Portugal, 1993 m.

#### *Retigyra iheringi* (Dautzenberg & H. Fischer, 1897) (Fig. 33)

*Cyclostrema iheringi* Dautzenberg & H. Fischer, 1897: 174-175, pl. IV, figs. 5-8.

**Material examined:** Plato Seamount • 3 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge.

**Distribution:** The Azores (DAUTZENBERG & H. FISCHER, 1897) and Plato Seamount (this study), 1450–1600 m.

**Remarks:** The species has a very depressed teleoconch with a deep

suture and a wide-open umbilicus; the lip is slightly flexuous. The sculpture is a regular diamond-shaped network of curved lines (Figs. 33D-E). It appears to be a very rare taxon.

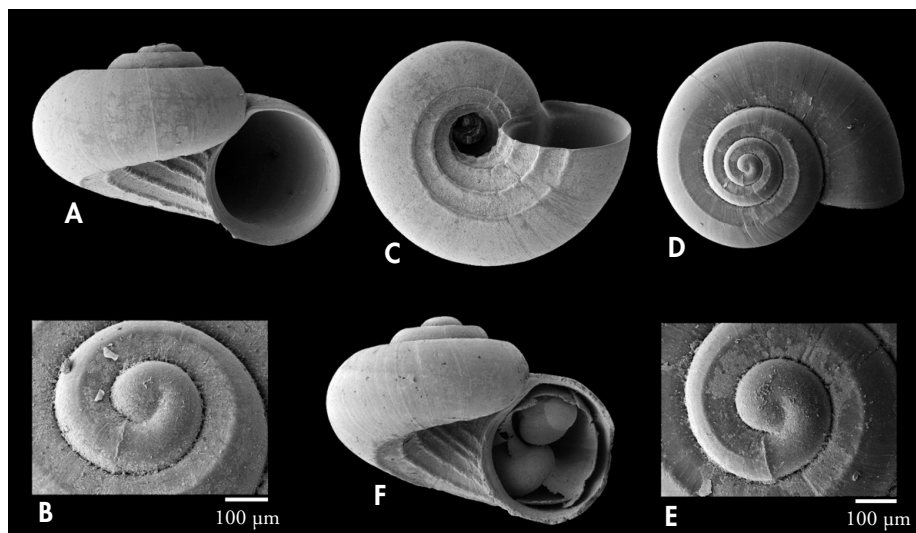


Figure 34. *Moelleriopsis richardi* (Dautzenberg & H. Fischer, 1896). A: Plato Seamount – SMT2/DW250, H 1.6 mm, W 2.3 mm; B: protoconch W 0.28 mm, same as A; C: W 1.7 mm; D: apical view, W 2.3 mm; E: protoconch W 0.30 mm, same as D; F: Atlantis Seamount – M151/23404, H 1.0 mm, W 1.5 mm.

Figura 34. *Moelleriopsis richardi* (Dautzenberg y H. Fischer, 1896). A: Banco Plato - SMT2/DW250, 1,6 mm alto, 2,3 mm ancho; B: protoconcha 0,28 mm ancho, misma que A; C: 1,7 mm ancho; D: vista apical, 2,3 mm ancho; E: protoconcha 0,30 mm ancho, misma que D; F: Banco Atlantis - M151/23404, 1,0 mm alto, 1,5 mm ancho.

### Genus *Moelleriopsis* Bush, 1897

Type taxon: *Moelleriopsis abyssicola* Bush, 1897 by original designation. Type locality off New England, 1769 fathoms.

KANO *ET AL.* (2009) listed the genus as a “plausible” member of the Seguenzioidea, but did not include it in their molecular dataset. MOLLUSCABASE (2020) includes it in Seguenzioidea with its family currently unassigned. Nevertheless ROMANI & BOGI (2016) proposed to provisionally place *Moelleriopsis* in the family Skeneidae. The type species is quite raised with a deep open umbili-

cus, with three strong cords in the umbilical area (BUSH, 1897).

Ten species are known of which three are extant in the NE Atlantic: *Moelleriopsis messanensis* (Seguenza, 1876), described from Pleistocene outcrop near Messina, Sicily, *Moelleriopsis normani* (Dautzenberg & H. Fischer, 1897) and *Moelleriopsis richardi* (Dautzenberg & H. Fischer, 1896) described from the Azores.

#### *Moelleriopsis richardi* (Dautzenberg & H. Fischer, 1896) (Fig. 34)

*Cyclostrema richardi* Dautzenberg & H. Fischer, 1896: 484-485, pl. 21 figs. 7-9

**Material examined:** Atlantis Seamount • 4 shells; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. • 9 shells; 34.412°N, 30.513°W; 795–830 m; 03 Feb. 1993; SMT2/DW264; dredge.



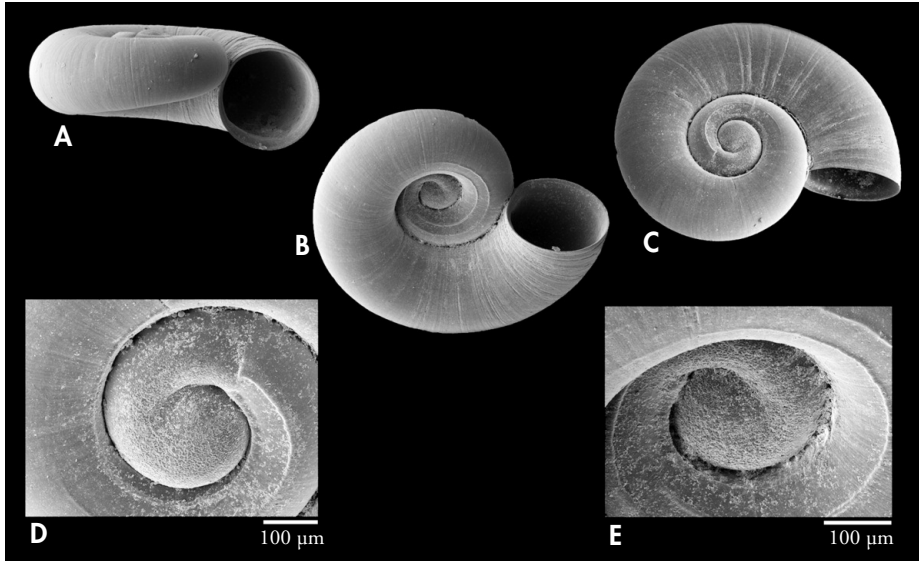


Figure 35. *Moelleriopsis normani* (Dautzenberg & H. Fischer, 1897). A-C: Plato Seamount – SMT2/DW250.H 0.6 mm, W 1.6 mm; D: apical view of protoconch W 0.37 mm; E: basal view of protoconch.

Figura 35. *Moelleriopsis normani* (Dautzenberg y H. Fischer, 1897). A-C: Banco Plato - SMT2/DW250, 0,6 mm alto, 1,6 mm ancho; D: vista apical de la protoconcha, 0,37 mm ancho; E: vista basal de la protoconcha.

Tyro Seamount • 27 shells; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge.  
Plato Seamount • 175 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge.

*Distribution:* Azores (DAUTZENBERG & H. FISCHER, 1896) and northern SASC (this study), 677–1500 m.

*Remarks:* The species can be identified by its depressed outline, strong umbilical cords (Figs. 34A,C,F), weak supra-peripheral spiral ridge (Figs. 34B, D-E), and dark

brown periostracum. *Moelleriopsis messanensis* (Seguenza, 1876) is somewhat more raised and has a different protoconch (ROMANI & BOGI, 2016). *Moelleriopsis normani* (Figs. 35A-C) is more flattened and has weak cordlets in the umbilical area and on the whorl surface.

### *Moelleriopsis normani* (Dautzenberg & H. Fischer, 1897) (Fig. 35)

*Cyclostrema normani* Dautzenberg & H. Fischer, 1897: 175-176, pl. 4 figs. 9-11

**Material examined:** Azores, Mar da Prata • 1 shell; 37.666°N, 25.966°W; 952 m; 17 Oct. 2018; M151/23168; grab. Azores, Açor Bank • 2 shells; 38.156°N, 29.084°W; 339 m; 13 Oct. 2018; M151/23139; grab. Plato Seamount • 25 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. • 1 shell; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge.

*Distribution:* Azores (DAUTZENBERG & H. FISCHER, 1897: 175; this study) and Plato Seamount (this study), 952–1846 m.

*Remarks:* The species can be identified by its nearly planispiral outline (Figs. 35A-C). All other NE Atlantic taxa in *Moelleriopsis* have a slightly raised spire.

*Moelleriopsis atlantis* n. sp. (Figs. 36, 37)

**Type material:** *Holotype*, Atlantis Seamount • 1 shell (Fig. 37A); 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab, in coarse bioclastic sand with coral rubble, live hydrozoans and sponges; MNHN-IM-2000-35672. *Paratypes*: • 4 shells (Figs. 37B-D); same data as for holotype; MNHN-IM-2000-35673, • 5 shells; same data as for holotype; SMF 351098.

**Other material examined:** Azores, Mar da Prata • 2 shells; 37.673°N, 25.925°W; 595 m; 08 Oct. 2018; M151/23111; grab. Atlantis Seamount • 230 shells; 34.082°N, 30.255°W; 335–340 m; 02 Feb. 1993; SMT2/DW255; dredge. • 10 shells; 34.432°N, 30.542°W; 610–655 m; 03 Feb. 1993; SMT2/DW263; dredge. • 23 shells; 34.080°N, 30.248°W; 330 m; 04 Feb. 1993; SMT2/TS270; suprabenthic sled. • 70 shells; 34.086°N, 30.226°W; 280 m; 05 Feb. 1993; SMT2/DW274; dredge. • 10 shells; 33.996°N, 30.177°W; 617 m; 21 Oct. 2018; M151/23408; grab. Tyro Seamount • 74 shells; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge. Plato Seamount • 40 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. Great Meteor Seamount • 2 shells; 29.816°N, 28.433°W; 299 m; 19 Mar. 2010; POS397/106-1; grab. • 1 shell; 29.816°N, 28.433°W; 300 m; 19 Mar. 2010; POS397/106-2; grab. • 1 shell; 29.750°N, 28.466°W; 292 m; 21 Mar. 2010; POS397/111-2; grab. • 1 shell; 29.683°N, 28.434°W; 289 m; 21 Mar. 2010; POS397/114-7; grab. • 1 shell; 29.565°N, 28.339°W; 948 m; 25 Oct. 2018; M151/23425-R1; ROV sample. • 2 shells; 29.565°N, 28.332°W; 945 m; 25 Oct. 2018; M151/23425-R4; ROV sample. • 1 shell; 29.565°N, 28.339°W; 944 m; 25 Oct. 2018; M151/23425-R6; ROV sample. • 6 shells; 29.568°N, 28.339°W; 855 m; 25 Oct. 2018; M151/23425-R9; ROV sample. • 1 shell; 30.086°N, 28.726°W; 906 m; 26 Oct. 2018; M151/23429-R8; ROV sample. Little Meteor Seamount • 2 shells; 29.654°N, 29.015°W; 865 m; 27 Oct. 2018; M151/23434-R4; ROV sample. • 18 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab. • 7 shells; 29.654°N, 29.014°W; 811 m; 27 Oct. 2018; M151/23437; grab. • 1 shell; 29.655°N, 29.004°W; 464 m; 27 Oct. 2018; M151/23438; grab.

**Type locality:** Atlantis Seamount – 33.971°N – 30.206°W, 677 m.

**Etymology:** *atlantis* refers to the type locality, the Atlantis Seamount.

*Holotype*, an empty shell (Fig. 37A): Small (H 1.1 mm, W 1.5 mm) fragile shell with a flattened apex, irregularly growing spire, whorls nearly circular in section, with spiral cordlets, deep suture, translucent white.

Protoconch: Simple nucleus,  $\frac{3}{4}$  whorls, with somewhat rough surface, orthocone sharp lip, flexuous, somewhat flaring with thin rim, W 0.24 mm (Fig. 37D from paratype 2). Transition to teleoconch clear by change in sharp lip (Fig. 37D).

Teleoconch: two inflated whorls with circular cross-section and several clear growth lines, flat apex with descending body whorl.

First whorl flush with protoconch, first  $\frac{1}{4}$  whorl with one faint cordlet, next  $\frac{1}{2}$  whorl with a second cordlet close above the first. Following  $\frac{1}{4}$  whorl with third cordlet close below first. Second (body) whorl, first  $\frac{1}{2}$  whorl smooth with three supraprochordal cordlets, fine growth lines, oblique yet straight at 10° with spire axis; whorl descending in last  $\frac{1}{2}$  whorl well below periphery of penultimate whorl. Base with eight fine spiral

cordlets in the umbilical area; umbilicus deep and open (Fig. 37B of paratype 1).

Aperture 65% of spire height with nearly circular, slightly prosocline, rounded lip straightened on with parietal area and slightly angular at the union with penultimate whorl. Outer lip blunt, somewhat bevelled inside, columellar lip sharp. Inside smooth.

Variability: Variability of outline is low; the number and frequency of growth scars and the strength of spiral cords on the base is variable.

*Distribution:* SASC and Azores, 280–811 m.

*Remarks:* *Moelleriopsis messanensis* (Seguenza G., 1876) and *M. richardi* (Dautzenberg & Fischer H., 1896) have a raised apex and strong umbilical cords whereas *M. atlantis* n. sp. has a depressed apex and weak umbilical cordlets. *Moelleriopsis normani* (Dautzenberg & H. Fischer, 1897) has a nearly planispiral spire. "*Cyclostrema*" *sykesi* Dautzenberg & Fischer, 1897 is larger, with a higher spire and it has more regular and stronger spiral cordlets apically and in the umbilical area.

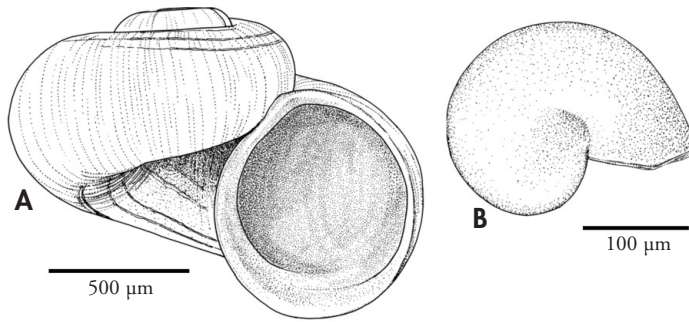


Figure 36. *Moelleriopsis atlantis* n. sp. A: Atlantis Seamount – M151/23404, holotype, apertural view, H 1.1 mm; B: paratype 2, apical view of smooth protoconch, W 0.24 mm.  
 Figura 36. *Moelleriopsis atlantis* n. sp. A: Banco Atlantis - M151/23404, holotipo, vista apertural, 1,1 mm alto; B: paratipo 2, vista apical de la protoconcha lisa, 0,24 mm ancho.

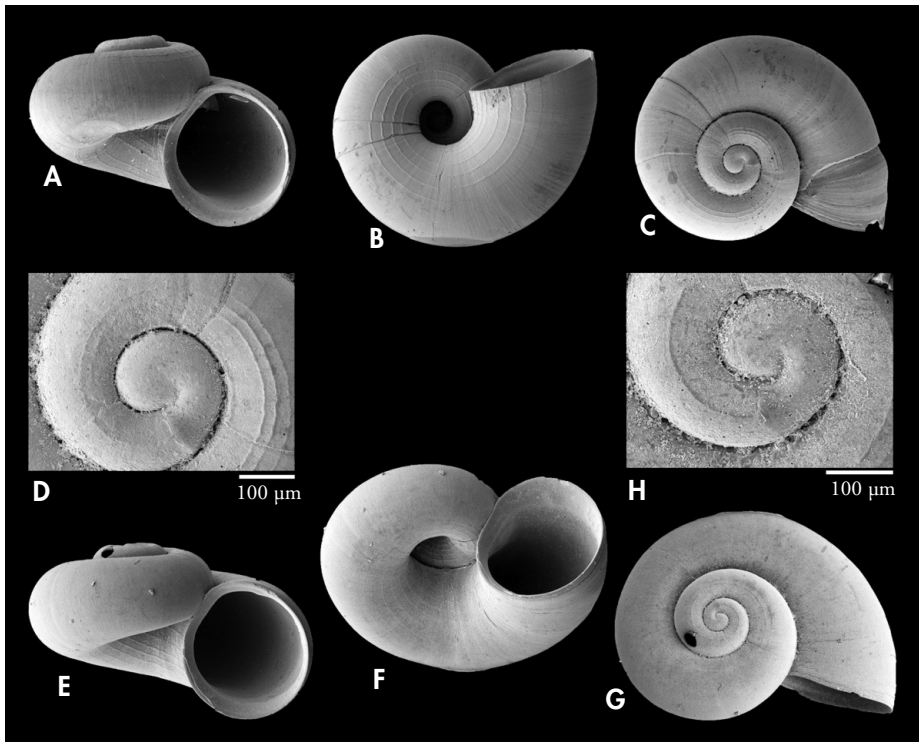


Figure 37. *Moelleriopsis atlantis* n. sp. A: Atlantis Seamount – M151/23404, holotype, H 1.1 mm, W 1.5 mm; B: same locality, paratype 1, W 1.5 mm; C: same locality, paratype 2 in apical view; D: protoconch W 0.24 mm, same as C; E-G: Plato Seamount – SMT2/DW242, H 1.2 mm, W 2.0 mm; H: protoconch W 0.22 mm, same as G.  
 Figura 37. *Moelleriopsis atlantis* n. sp. A: Banco Atlantis - M151/23404. A: holotipo, 1,1 mm alto, 1,5 mm ancho; B: paratipo 1, 1,5 mm ancho; C: paratipo 2, vista apical; D: protoconcha 0,24 mm ancho, misma que C; E-G: Banco Plato - SMT2/DW242, 1,2 mm alto, 2,0 mm ancho; H: protoconcha 0,22 mm ancho, misma que G.

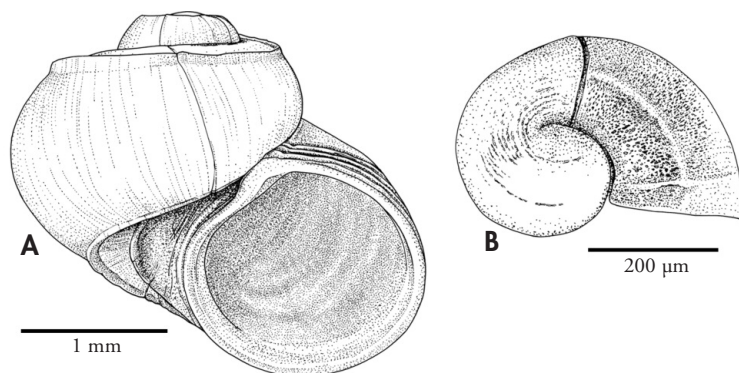


Figure 38. *Moelleriopsis gritta* Hoffman n. sp. A: Plato Seamount – SMT2/DW242, holotype, apertural view, H 2.3 mm; B: Atlantis Seamount – M151/23404, apical view of protoconch with fine spiral striae, W 0.32 mm, followed by initial teleoconch with supraperipheral cord.

*Figura 38. Moelleriopsis gritta Hoffman n. sp. A: Banco Plato - SMT2/DW242, holotipo, vista apertural, 2,3 mm alto; B: Banco Atlantis - M151/23404, vista apical de la protoconcha con estrias espirales finas, 0,32 mm ancho, seguida del inicio de la teleoconcha con cordón supraperiférico.*

### *Moelleriopsis gritta* Hoffman n. sp. (Figs. 38, 39)

**Type material:** *Holotype*, Plato Seamount • 1 shell (Figs. 39A-D); 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge, in bioclastic sand with live and dead corals and live sponges; MNHN-IM-2000-35674. *Paratypes*: • 1 shell (Figs. 39E-F); same data as for holotype; MNHN-IM-2000-35675. • 14 shells; same data as for holotype; MNHN-IM-2000-35675.

**Other material examined:** Azores, Mar da Prata • 8 shells; 37.673°N, 25.925°W; 595 m; 08 Oct. 2018; M151/23111; grab. • 6 shells; 37.661°N, 25.918°W; 599 m; 08 Oct. 2018; M151/23112; grab. • 1 shell; 37.659°N, 25.789°W; 599 m; 19 Oct. 2018; M151/23181; box core. Atlantis Seamount • 9 shells (Figs. 39G-I); 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. • 5 shells; 33.996°N, 30.177°W; 617 m; 21 Oct. 2018; M151/23408; grab. Great Meteor Seamount • 1 shell; 30.084°N, 28.500°W; 309 m; 17 Mar. 2010; POS397/98-1; grab. • 1 shell; 29.565°N, 28.339°W; 944 m; 25 Oct. 2018; M151/23425-R6; ROV sample. Little Meteor Seamount • 5 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab. • 1 shell; 29.655°N, 29.004°W; 464 m; 27 Oct. 2018; M151/23438; grab. • 1 shell; 29.645°N, 28.975°W; 284 m; 27 Oct. 2018; M151/23440; grab.

**Type locality:** Plato Seamount – 33.197°N – 28.949°W, 690–710 m.

**Etymology:** named after Gritta Veit-Köhler, marine biologist and partner of the first author, for her support in the studies.

*Holotype*, an empty shell (Figs. 39A-D): Small (H 2.3 mm, W 2.6 mm), moderately solid shell with a flattened apex, cyrtococonoid outline with convex whorls, strong spiral carinae, white shell.

Protoconch: ½ whorls, smooth with fine irregular spiral striae, convex sharp lip, W 0.32 mm. Transition to teleoconch clear by change in sculpture (Fig. 39D).

Teleoconch: 2 ½ rounded whorls, suture shallow.

First whorl flush with protoconch, with one thick, smoothly rounded cord on the

shoulder. Surface smooth with numerous fine growth lines and three growth marks with thickened line. Microsculpture with numerous rounded shallow pits, pit diameter about 1 µm. Remaining 1 ½ whorls descending, spiral cord sharper forming a keel. Microsculpture as in first whorl.

Base of body whorl with two strong spiral cords, widely spaced, one outside and one in the umbilical area. Umbilicus open, deep, tortuous, partly covered by columellar callus. Inside smooth with fine growth lines.

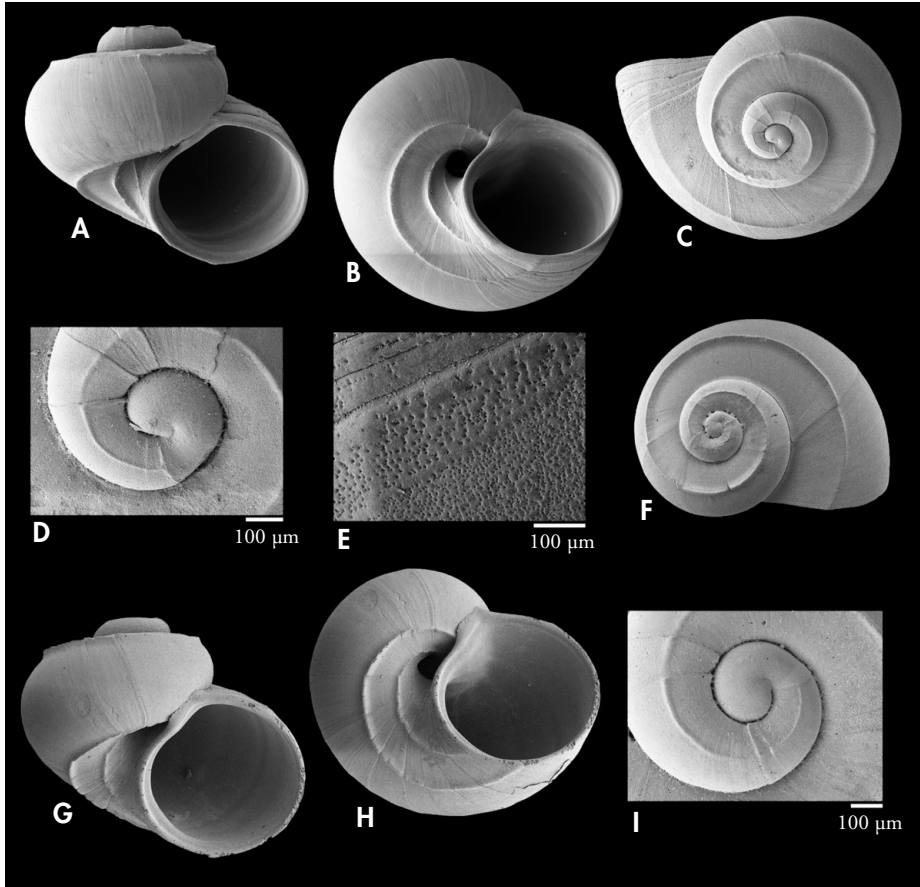


Figure 39. *Moelleriopsis gritta* Hoffman n. sp. A-C: Plato Seamount – SMT2/DW242, holotype, H 2.3 mm, W 2.8 mm; D: protoconch of the holotype, W 0.31 mm; E: paratype W 2.6 mm; F: microsculpture, same as E; G-I: Atlantis Seamount – M151/23404, H 2.3 mm, W 2.6 mm; I: protoconch W 0.32 mm.

*Figura 39. Moelleriopsis gritta Hoffman n. sp. A-C: Banco Plato - SMT2/DW242, holotipo, 2,3 mm alto, 2,8 mm ancho; D: protoconcha del holotipo, 0,31 mm ancho; E: paratipo 2,6 mm ancho; F: microescultura, misma que E; G-I Banco Atlantis - M151/23404, 2,3 mm alto, 2,6 mm ancho; protoconcha 0,32 mm ancho.*

Aperture 65% of shell height, near circular with convex indent along parietal side, angular (ca. 90°) at union of outer lip to penultimate whorl. Peristome thick and rounded, outer lip prosocline at 20° with spire axis, opening nearly flat. Columella thin and curved. Callus thick and smooth with thickened rim on inside columellar lip, inside of whorl smooth.

Variability: Height up to 2.3 mm. The thin umbilical cord inside the

umbilicus may be faint or occasionally lacking.

*Distribution:* SASC and Azores, 309–944 m.

*Remarks:* The placement in the genus *Moelleriopsis* is based on the protoconch and the spiral cords in the umbilicus and on the presence of a shoulder. The new species is morphologically similar to the type species *Moelleriopsis abyssicola*.

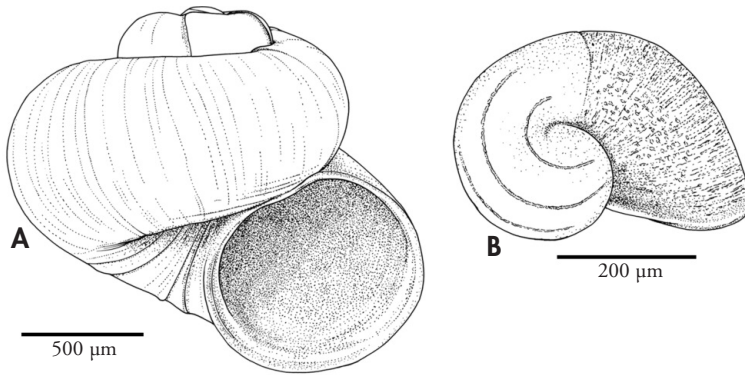


Figure 40. *Moelleriopsis meteorminora* n. sp. A: Little Meteor Seamount – M151/23438, holotype, apertural view, H 1.5 mm; B: paratype 2, apical view of protoconch showing three spiral cordlets, W 0.30 mm, followed by a finely pitted teleoconch.

*Figura 40. Moelleriopsis meteorminora* n. sp. A: *Pequeño Banco Meteor* - M151/23438, holotipo, vista apertural, 1,5 mm alto; B: paratipo 2, vista apical de la protoconcha mostrando tres cordones espirales, 0,30 mm ancho, seguida de una teleoconcha con diminutas punturas.

### *Moelleriopsis meteorminora* n. sp. (Figs. 40, 41)

**Type material:** *Holotype*, Little Meteor Seamount • 1 shell (Figs. 41A-B); 29.655°N, 29.004°W; 464 m; 27 Oct. 2018; M151/23438; grab, in coarse bioclastic sand with coral rubble; MNHN-IM-2000-35677. Paratypes: • 2 shells (Paratypes 1 and 2, Figs. 41C-E); same data as for holotype; MNHN-IM-2000-35678; • 4 shells; same data as for holotype; SMF 351099.

**Other material examined:** *Great Meteor Seamount* • 1 shell; 29.750°N, 28.533°W; 319 m; 24 Oct. 2018; M151/23419; grab. • 1 shell; 30.084°N, 28.566°W; 301 m; 15 Mar. 2010; POS397/92-2; grab. • 1 shell; 30.017°N, 28.533°W; 288 m; 16 Mar. 2010; POS397/95-6; grab. • 1 shell; 29.683°N, 28.434°W; 289 m; 21 Mar. 2010; POS397/114-6; grab. • 3 shells; 29.683°N, 28.434°W; 289 m; 21 Mar. 2010; POS397/114-7; grab. *Little Meteor Seamount* • 9 shells; 29.645°N, 28.975°W; 284 m; 27 Oct. 2018; M151/23440; grab. • 4 shells; 29.633°N, 28.967°W; 282 m; 27 Oct. 2018; M151/23441; grab..

**Type locality:** Little Meteor Seamount – 29.655°N – 29.004°W, 464 m.

**Etymology:** *meteorminora* refers to the type locality; Little Meteor Seamount.

*Holotype, an empty shell* (Figs. 41A-B): Small (H 1.5 mm, W 1.7 mm) fragile shell with a cyrtconoid outline and flattened apex, irregularly growing spire, rounded whorls, deep suture, translucent white.

Protoconch: Simple nucleus, 0.6 whorls, smooth background with three spiral cordlets, convex sharp lip, W 0.30 mm. Transition to teleoconch clear by change in sculpture (Fig. 41E of paratype 2).

Teleoconch: two inflated whorls with circular cross-section and several clear growth lines.

First whorl, first ¼ whorl rough frosted sculpture, ending with sharp

growth scar; following ¾ whorl with fine frosted sculpture with fine microscopic pits; last ¼ whorl descending towards periphery of protoconch whorl. Second (body) whorl with several growth scars, fine growth lines, oblique yet straight at 10° with spire axis; whorl descending well below periphery of penultimate whorl. Base with eight fine spiral threads below periphery and four spiral cords surrounding the wide open and deep umbilicus (Fig. 32C of paratype 1). Smooth apparently but microsculpture irregularly pitted, pit size 0.5–1.5 µm (Fig. 41B).

Aperture 50% of spire height with nearly circular, slightly prosocline, com-

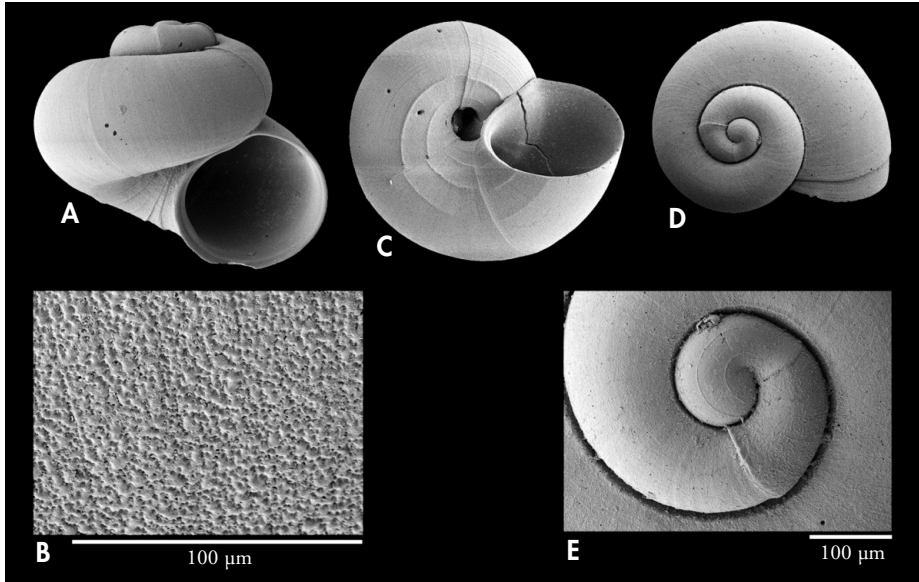


Figure 41. *Moelleriopsis meteorminora* n. sp. A: Little Meteor Seamount – M151/23438, holotype, apertural view, H 1.5 mm, W 1.7 mm; B: microsculpture of the holotype; C: paratype 1, same locality, basal view, W 1.5 mm; D: paratype 2, same locality, apical view, W 1.7 mm; E: protoconch W 0.30 mm, same as D.

Figura 41. *Moelleriopsis meteorminora* n. sp. A: Pequeño Banco Meteor - M151/23438, holotipo, vista apertural, 1,5 mm alto, 1,7 mm ancho; B: microescultura del holotipo; C: paratipo 1, misma localidad, vista basal, 1,5 mm ancho; D: paratipo 2, misma localidad, vista apical, 1,7 mm ancho, protoconcha 0,30 mm ancho, misma que D.

plete peristome with rounded outline with concave bulge on parietal side (Figs. 41A,C). Suture deep, aligned with surface penultimate whorl (Fig. 41A). Inner lip with raised edge (likely coincident with edge of operculum), inside smooth (Fig. 41A).

Variability: Variability of outline is low; the number and frequency of growth scars and the strength of spiral threads and cords on the base is variable.

*Distribution*: SASC, Little- and Great Meteor Seamounts, 282–464 m.

*Remarks*: The placement in the genus *Moelleriopsis* is based on the protoconch and the spiral cords in the umbilical area.

*Moelleriopsis normani* has a nearly planispiral outline, and *Moelleriopsis sykesi* has stronger umbilical cords and it is more depressed than *M. meteorminora*. *Moelleriopsis messanensis* from off the continental margins of SW Europe and NW Africa has a more depressed outline and has more and stronger umbilical cords.

### Genus *Xyloskenea* B.A. Marshall, 1988

Type taxon: *Xyloskenea costulifera* B.A. Marshall, 1988 by original designation, off New Zealand.

MARSHALL (1988) originally placed *Xyloskenea* in Skeneidae (Trochoidea), but KANO *ET AL.* (2009) included it in Seguen-

zioidea without an assigned family. The shell of the type taxon (see WARÉN & BOUCHET 1993: 29) is characterised by an

inflated spire with a flattened apex, an open umbilicus with strong spiralling keel that ends on the columella. The protoconch is sculptured with spiral cords. The initial teleoconch has several strong axial ribs.

Eight species are currently known worldwide (MOLLUSCABASE, 2020). The most important review on *Xyloskenea* was provided by MARSHALL (1988), who described four species with a similar shell shape from New Zealand. Two species were described by DALL (1927)

from the NW Atlantic and subsequently placed in *Xyloskenea* (RUBIO ET AL., 2011: 212): one originally in Tornidae (*Lydiophnis translucens*), and one in Vitrinellidae (*Vitrinella rhyssa*). JEFFREYS (1883) described *Cithna naticiformis* from the NE Atlantic and WARÉN (1996) redescribed this taxon and transferred it to *Xyloskenea*. HOFFMAN ET AL. (2010) described *Xyloskenea xenos* from the Hatton Bank, but this taxon is here transferred to *Trenchia* (see below).

### *Xyloskenea naticiformis* (Jeffreys, 1883) (Fig. 42)

*Cithna naticiformis* Jeffreys, 1883: 112, pl. 20, fig. 11.

*Xyloskenea naticiformis*: WARÉN, 1996: 202, figs. 3A-D, 5A-D, 6A-D, 7C.

**Material examined:** Atlantis Seamount • 1 shell (Figs. 42A-B); 34.082°N, 30.255°W; 335 m; 02 Feb. 1993; SMT2/DW255; dredge. • 8 shells; 34.373°N, 30.463°W; 1190–1340 m; 03 Feb. 1993; SMT2/DW261; dredge. • 1 shell; 34.412°N, 30.513°W; 795–830 m; 03 Feb. 1993; SMT2/DW264; dredge. • 5 shells; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. Tyro Seamount • 2 shells; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge. Plato Seamount • 2 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. • 12 shells (Figs. 33C-I); 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge. Little Meteor Seamount • 1 shell; 29.654°N, 29.015°W; 865 m; 27 Oct. 2018; M151/23434-R4; ROV sample. • 1 shell; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab.

**Distribution:** Amphiatlantic, 18–65°N, 677–4862 m (WARÉN, 1996: 202; REX ET AL., 2002: 218–223; HOFFMAN ET AL., 2010: 53; this study).

**Remarks:** The shell of *X. naticiformis* exhibits a wide morphological variability: within one location we found a gradual transition from somewhat compressed specimens with a single keel at the base of the body whorl to specimens with more

raised and inflated whorls that also have a supraperipheral angle without really forming a keel. The form with a basal keel only has been figured by WARÉN (1996) whereas specimens with an incipient additional keel high on the whorl surface have been shown by REX ET AL. (2002); these specimens may be conspecific with *X. naticiformis* or alternatively belong to *X. translucens* (Dall, 1927).

### *Xyloskenea translucens* (Dall, 1927) (Fig. 43)

*Lydiophnis translucens* Dall, 1927: 124.

*Xyloskenea translucens*: RUBIO ET AL., 2011: 212, figs. 120A-F.

**Material examined:** Atlantis Seamount • 55 shells; 34.082°N, 30.255°W; 335–340 m; 02 Feb. 1993; SMT2/DW255; dredge. • 2 shells; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. • 1 shell; 33.996°N, 30.177°W; 617 m; 21 Oct. 2018; M151/23408; grab. Plato Seamount • 25 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. Great Meteor Seamount • 1 shell; 29.565°N, 28.339°W; 944 m; 25 Oct. 2018; M151/23425-R6; ROV sample.

**Distribution:** off Georgia, U.S.A. (DALL, 1927; RUBIO ET AL., 2011), SASC (this study), Lusitanian banks and seamounts (HOFF-

MAN & FREIWALD, 2017: 68, figs. 37–40 as *Trenchia biangulata* Rubio & Rolán, 2013). Amphiatlantic, 29.5–34.1°N, 335–1050 m.



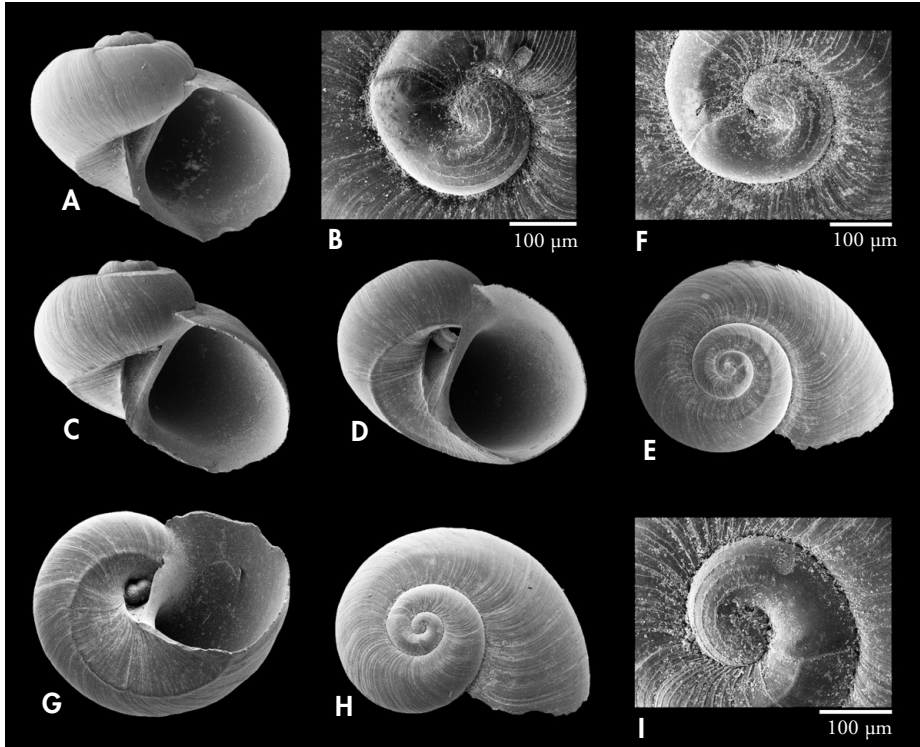


Figure 42. *Xyloskenea naticiformis* (Jeffreys, 1883). A: Atlantis Seamount – SMT2/DW255, H 1.4 mm, W 1.6 mm; B: protoconch W 0.26 mm, same shell as A; C-E: Plato Seamount – SMT2/DW250, H 1.5 mm, W 1.9 mm; F: protoconch W 0.25 mm, same as E; G: same locality, W 1.8 mm; H: same locality, W 1.6 mm; I: protoconch W 0.25 mm, same as H.

Figura 42. *Xyloskenea naticiformis* (Jeffreys, 1883). A: Banco Atlantis - SMT2/DW255, 1,4 mm alto, 1,6 mm ancho; B: protoconcha 0,26 mm ancho, misma que A; C-E: Banco Plato - SMT2/DW250, 1,5 mm alto, 1,9 mm ancho; F: protoconcha 0,25 mm ancho, misma que E; G: misma localidad, 1,8 mm ancho; H: misma localidad, 1,6 mm ancho; I: protoconcha 0,25 mm ancho, misma que H.

*Remarks:* *Trenchia biangulata* Rubio & Rolán, 2013 is similar in having two keels but has a smooth protoconch. The specimens reported by HOFFMAN & FREIWALD (2017: figs. 37-40 as *Trenchia biangulata*) from the Coral Patch Seamount show three cordlets on the

protoconch, therefore belong to *Xyloskenea translucens* as shown by RUBIO *ET AL.* (2011: 212, USNM108434). The specimens found in this study (Figs. 43C, G) also show the spiral cordlets and are considered conspecific to *Xyloskenea translucens*.

### Genus *Trenchia* Knudsen, 1964

Type taxon: *Trenchia wolffi* Knudsen, 1964 by original designation, Kermadec Trench, 5850–6730 m.

KANO *ET AL.* (2009) included the genus in Seguenzioidea without an assigned family.

KNUDSEN (1964) provided a brief diagnosis for the genus: a small conical shell, a relatively large aperture, a thin

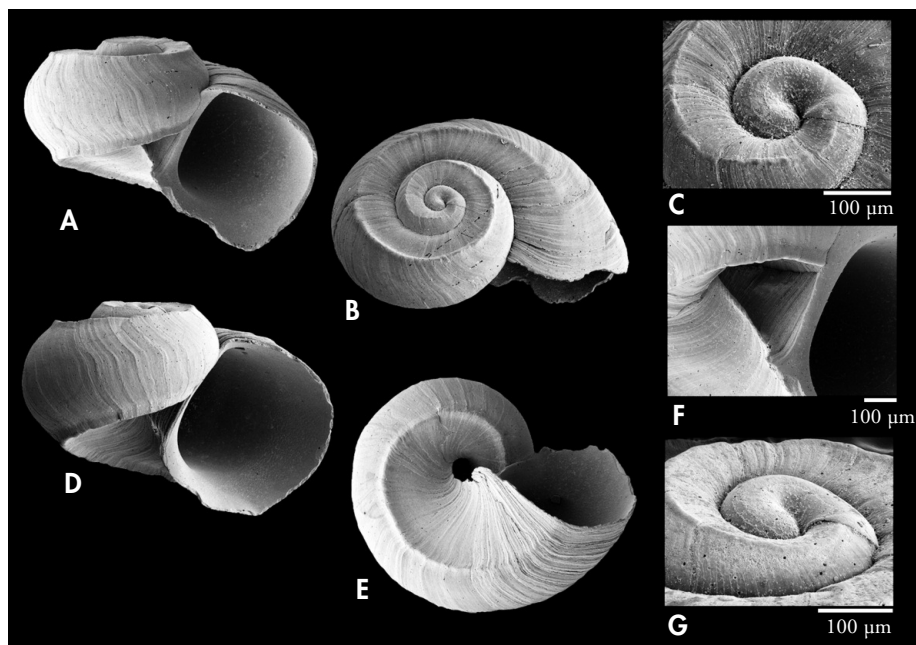


Figure 43. *Xyloskenea translucens* (Dall, 1927). A, B: Atlantis Seamount – M151/23408, H 1.4 mm, W 1.6 mm; C: protoconch W 0.26 mm, same as B; D, E: same locality, H 1.5 mm, W 1.9 mm; F: detail of umbilicus, same as D; G: protoconch W 0.25 mm, same as D.

Figura 43. *Xyloskenea translucens* (Dall, 1927). A, B: Banco Atlantis - M151/23408, 1,4 mm alto, 1,6 mm ancho; C: protoconcha 0,26 mm ancho, misma que B; D, E: misma localidad, 1,5 mm alto, 1,9 mm ancho; F: detalle del ombligo. misma que D; G: protoconcha 0,25 mm ancho, misma que D.

horny operculum and a rhipidoglossate radula with two lateral teeth and numerous marginal teeth. The type species has a smooth protoconch, diameter 0.35 mm. The teleoconch has one cord on the upper whorl surface, one below the periphery and a sharp keel in the umbilicus. Compared to *Xyloskenea*, species of *Trenchia* have a similar shell

and radula but differ essentially in having a smooth and featureless protoconch, (WARÉN & BOUCHET 1993).

RUBIO & ROLÁN (2013) described two species: *Trenchia anselmoi* from the Alboran Sea and *T. biangulata* from Galicia Bank and the Canaries. *Xyloskenea xenos* Hoffman, van Heugten & Lavaleye, 2010 is transferred herein to the genus *Trenchia*.

*Trenchia xenos* (Hoffman, van Heugten & Lavaleye, 2010) comb. nov. (Fig. 44)

*Xyloskenea xenos* Hoffman, van Heugten & Lavaleye, 2010: 53-54, figs. 28-33.

**Material examined:** Azores, Mar da Prata • 1 shell; 37.673°N, 25.925°W; 595 m; 08 Oct. 2018; M151/23111; grab. Atlantis Seamount • 53 shells; 34.373°N, 30.463°W; 1190–1340 m; 03 Feb. 1993; SMT2/DW261; dredge. • 9 shells; 34.432°N, 30.542°W; 610–655 m; 03 Feb. 1993; SMT2/DW263; dredge. • 2 shells; 34.412°N, 30.513°W; 795–830 m; 03 Feb. 1993; SMT2/DW264; dredge. • 28 shells (Figs. 44A-D); 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. Tyro Seamount • 1 shell; 33.998°N, 28.343°W; 945–1000 m; 06 Feb. 1995; SMT2/DW277; dredge. • 39 shells (Figs. 44F-I); 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge. Plato Seamount • 4 shells;

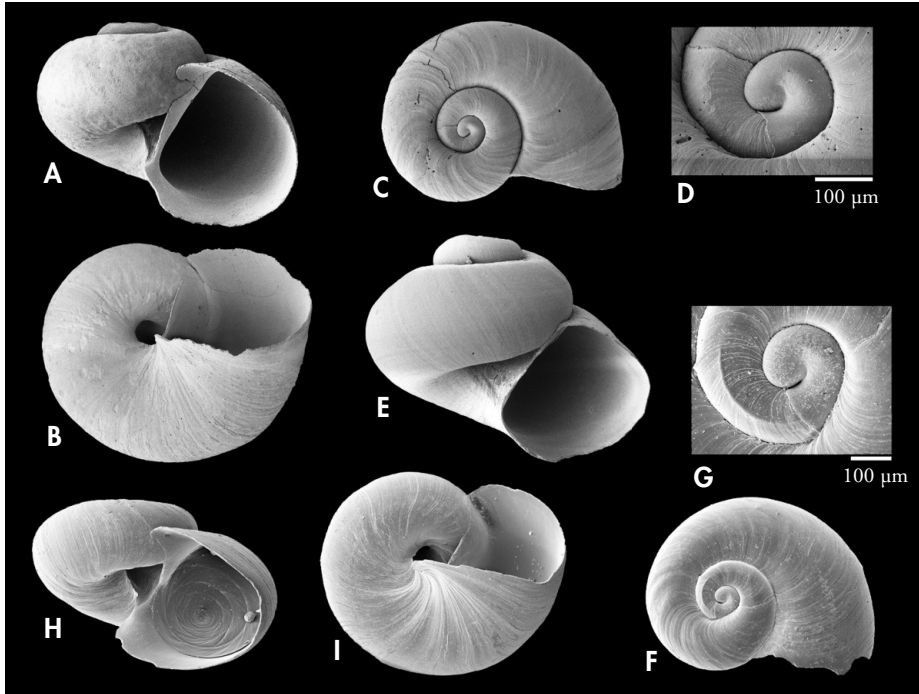


Figure 44. *Trenchia xenos* (Hoffman, van Heugten & Lavaleye, 2010). A, B: Atlantis Seamount – M151/23404, H 3.1 mm, W 4.1 mm; C: same locality, W 1.5 mm; D: protoconch W 0.20 mm, same as C; E: Plato Seamount – SMT2/DW250, H 2.4 mm, W 3.1 mm. F: Tyro Seamount – SMT2/DW278, W 1.8 mm; G: protoconch W 0.28 mm, same as F; H, I: same locality, live-collected specimen, H 1.6 mm, W 2.2 mm.

Figura 44. *Trenchia xenos* (Hoffman, van Heugten y Lavaleye, 2010). A, B: Banco Atlantis - M151/23404, 3,1 mm alto, 4,1 mm ancho; C: misma localidad, 1,5 mm ancho; D: protoconcha 0,20 mm ancho, misma que C; E: Banco Plato - SMT2/DW250, 2,4 mm alto, 3,1 mm ancho. F: Banco Tyro - SMT2/DW278, 1,8 mm ancho; G: protoconcha 0,28 mm ancho, misma que F; H, I: misma localidad, ejemplar recogido vivo, 1,6 mm alto, 2,2 mm ancho.

33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. • 13 shells (Fig. 44E); 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge. Great Meteor Seamount • 1 shell; 29.565°N, 28.339°W; 944 m; 25 Oct. 2018; M151/23425-R6; ROV sample. • 1 shell; 29.568°N, 28.339°W; 855 m; 25 Oct. 2018; M151/23425-R9; ROV sample. Little Meteor Seamount • 12 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab.

**Distribution:** Hatton Bank (HOFFMAN *ET AL.*, 2010), Azores and SASC (this study), 340–1340 m.

**Remarks:** The morphology of the shell is variable; some specimens have a flat apex (Figs. 35D, G), others are more raised (Fig. 35E). *Trenchia xenos* has a smooth protoconch,  $\frac{3}{4}$  whorl; RUBIO & ROLÁN (2013) indicated an error with the reported size of the protoconch in

the original description, which should be W 0.20–0.28 mm (Figs. 44C, F).

The smooth protoconchs of specimens from the SASC fit *Trenchia* rather than *Xyloskenea* whose protoconch has a spiral cord sculpture (MARSHALL, 1988; BOUCHET & WARÉN, 1993; RUBIO *ET AL.*, 2011).

MCLEAN (1992: 275) reviewed the similar genus *Choristella* Bush 1892, which

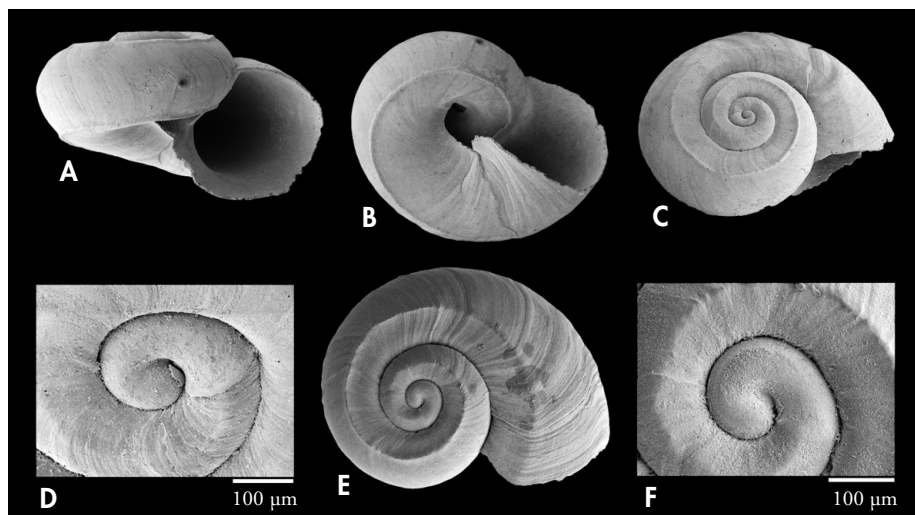


Figure 45. *Trenchia biangulata* Rubio & Rolán, 2013. A-C: Atlantis Seamount – M151/23404, H 1.5 mm, W 2.5 mm; D: protoconch W 0.26 mm; E: Atlantis Seamount – M151/23408, W 2.3 mm; F: protoconch W 0.22 mm.

Figura 45. *Trenchia biangulata* Rubio & Rolán, 2013. A-C: Banco Atlantis – M151/23404, 1,5 mm ancho, 2,5 mm ancho; D: protoconcha 0,26 mm ancho; E: Banco Atlantis– M151/23408, 2,3 mm ancho; F: protoconcha 0,22 mm ancho.

has a smooth protoconch, a complete peristome, a deep suture and an umbilical keel. Most species in *Choristella* have a raised spire with 2–3 smooth inflated whorls like for example *Choristella nofronii* McLean, 1992 from the Alboran Sea (McLEAN, 1992: 281–282, fig. 16). *C. ponderi* McLean, 1992 from Australia has a flattened spire as our species. WARÉN (1996: 202) suggested a

granular sculpture of the nucleus; this character is not present in our species.

We move *Xyloskenea xenos* to the genus *Trenchia* to be consistent with the morphological assignment of the European species *Trenchia anselmoi* Rubio & Rolán, 1993 and *Trenchia biangulata* Rubio & Rolán, 1993, both with a smooth protoconch and flattened outline.

### *Trenchia biangulata* Rubio & Rolán, 2013 (Fig. 45)

*Trenchia biangulata* Rubio & Rolán, 2013: 2–4, figs. 1–6.

**Material examined:** *Atlantis Seamount* • 2 shells; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. • 1 shell; 33.996°N, 30.177°W; 617 m; 21 Oct. 2018; M151/23408; grab.

**Distribution:** Galicia Bank, Canary and Salvage Islands (RUBIO & ROLÁN, 2013), Coral Patch Seamount (HOFFMAN & FREIWALD, 2017) and Atlantis Seamount (this study), 400–1000 m. Shells reported as *Trenchia* sp. from the Sedlo, Seine and Ampère Seamounts by BECK ET AL. (2006) cannot be conclu-

sively be identified as belonging to this species or to *Xyloskenea translucens*, since the image of the protoconch is unclear.

**Remarks:** *Xyloskenea translucens* has a protoconch sculpture with spiral cords and the spire is slightly more raised. *Trenchia biangulata* has a smooth protoconch sculpture.

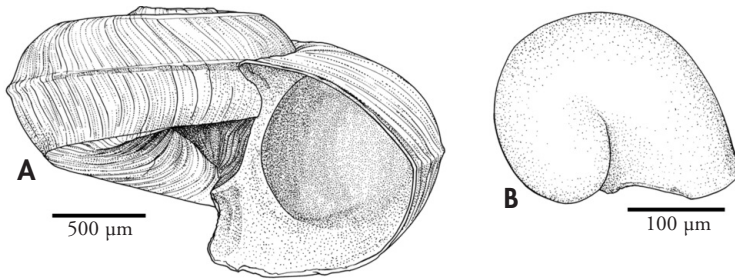


Figure 46. *Trenchia teriuga* n. sp. A: Tyro Seamount – SMT2/DW278, holotype, apertural view, H 1.4 mm; B: Atlantis Seamount – M151/23404, apical view of smooth protoconch with flexuous lip, W 0.26 mm.

Figura 46. *Trenchia teriuga* n. sp. A: Tyro Seamount - SMT2/DW278, holotipo, vista apertural, 1,4 mm alto; B: Atlantis Seamount - M151/23404, vista apical de la protoconcha liso con un borde flexuoso, 0,26 mm ancho.

*Trenchia teriuga* n. sp. (Figs. 46, 47)

**Type material:** Holotype, Tyro Seamount • 1 shell (Figs. 47A-D); 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge, in sediment with live and dead corals, live sponges, brachiopods, echinoderms and crustaceans; MNHN-IM-2000-35679. *Paratypes:* • 2 shells (Figs. 47E-F, G); same data as for holotype; MNHN-IM-2000-35680. • 125 shells; same data as for holotype; MNHN-IM-2000-35681.

**Other material examined:** Azores, Mar da Prata • 1 shell; 37.666°N, 25.966°W; 961 m; 09 Oct. 2018; M151/23121; grab. • 1 shell; 37.666°N, 25.966°W; 952 m; 17 Oct. 2018; M151/23168; grab. Atlantis Seamount • 40 shells; 34.373°N, 30.463°W; 1190–1340 m; 03 Feb. 1993; SMT2/DW261; dredge. • 6 shells; 34.412°N, 30.513°W; 795–830 m; 03 Feb. 1993; SMT2/DW264; dredge. • 18 shells (Figs. 47H-L); 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. Plato Seamount • 4 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. • 22 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge. • Great Meteor Seamount • 1 shell; 29.565°N, 28.339°W; 948 m; 25 Oct. 2018; M151/23425-R1; ROV sample. • 2 shells; 29.565°N, 28.339°W; 944 m; 25 Oct. 2018; M151/23425-R6; ROV sample. • 2 shells; 29.568°N, 28.339°W; 855 m; 25 Oct. 2018; M151/23425-R9; ROV sample. • 1 shell; 30.086°N, 28.726°W; 906 m; 26 Oct. 2018; M151/23429-R8; ROV sample. Little Meteor Seamount • 13 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab.

**Type locality:** Tyro Seamount – 33.963°N – 28.373°W, 890–925 m.

**Etymology:** *teriuga* (Latin: *ter iuga*) refers to the three ridges (cords) on the body whorl.

*Holotype, an empty shell* (Figs. 47A-D): Small (H 1.4 mm, W 2.3 mm) solid shell with a flat, regularly growing spire, with three sharp spiral keels, white.

Protoconch: Simple nucleus,  $\frac{3}{4}$  whorls, smooth, flexuous sharp lip, somewhat flaring, W 0.26 mm. Transition to teleoconch clear by change in sculpture (Fig. 47D of holotype, Fig. 47F of paratype).

Teleoconch: 2  $\frac{1}{4}$  rounded whorls, all whorls moderately convex, supraperipheral spiral cord forming a weak keel. Peripheral cord visible only on the last whorl, but determines a channel

above suture on previous whorls. Suture deeply impressed.

First whorl flush with protoconch, numerous fine growth lines with a few growth scars. Second whorl (in part body whorl) with strong second cord at periphery, smooth and rounded. Whorl surface sloping above top spiral cord, convex below. Numerous growth lines, prosocline. The upper cord fades on the body whorl.

Base of body whorl (second whorl and  $\frac{1}{4}$  of third whorl) with third spiral cord, forming a keel, whorl flattened above and below towards umbilicus.

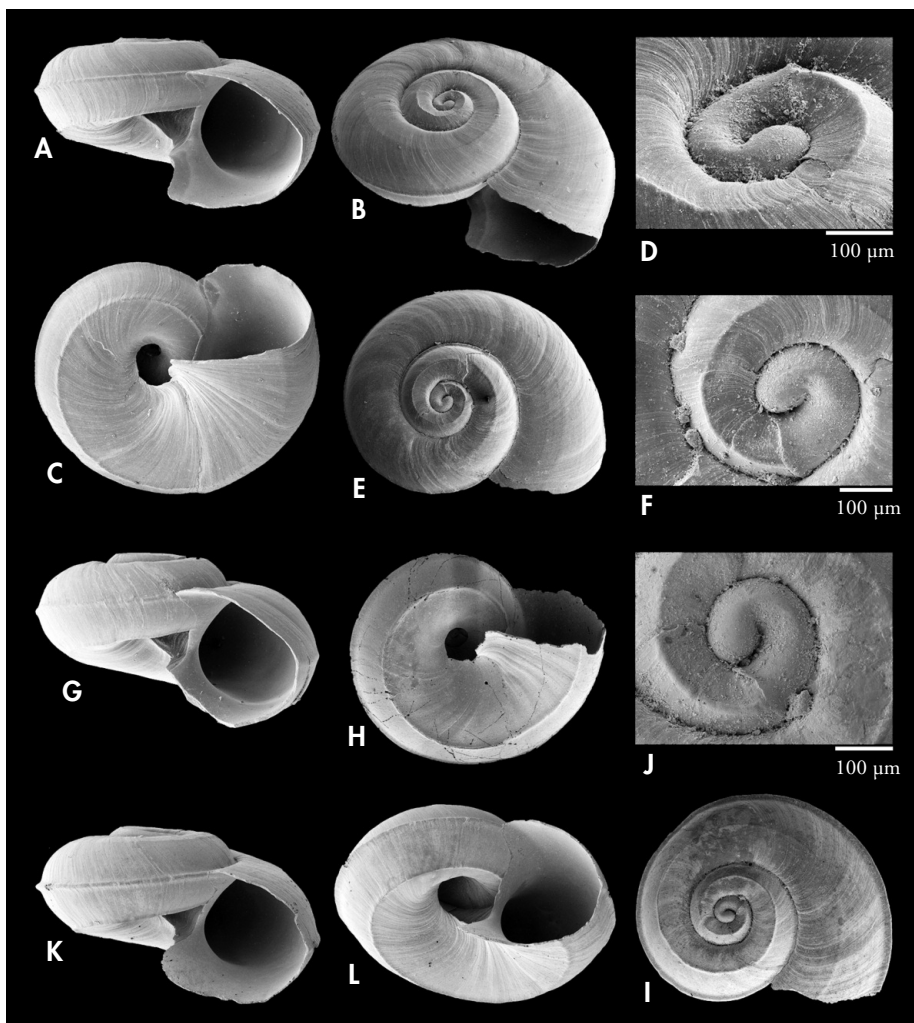


Figure 47. *Trenchia teriuga* n. sp. A-C: Tyro Seamount – SMT2/DW278, holotype, H 1.4 mm, W 2.3 mm; D: protoconch of the holotype W 0.26 mm; E: Paratype 1, same locality, W 2.3 mm; F: protoconch W 0.26 mm, same as E; G: paratype 2, same locality, H 1.3 mm, W 2.2 mm. H: Atlantis Seamount – M151/23404, W 1.9 mm; I: same locality, W 2.0 mm; J: protoconch W 0.26 mm, same as I; K, L: same locality, H 1.3 mm, W 2.1 mm.

Figura 47. *Trenchia teriuga* n. sp. A-C: Banco Tyro – SMT2/DW278, holotipo, 1,4 mm alto, 2,3 mm ancho; D: protoconcha del holotipo 0,26 mm ancho; E: paratipo 1, misma localidad, 2,3 mm ancho; F: protoconcha 0,26 mm ancho, misma que E; G: paratipo 2, misma localidad, 1,3 mm alto, 2,2 mm ancho; H: Banco Atlantis – M151/23404, 1,9 mm ancho; I: misma localidad, 2,0 mm ancho; J: protoconcha 0,26 mm ancho, misma que I; K, L: misma localidad, 1,3 mm alto, 2,1 mm ancho.

Umbilicus wide and open, demarcated by another sharp keel running from base of columella and spiralling inside. Inside umbilicus, numerous growth lines.

Aperture 75% of shell height, oblong, angular (90°) at union with penultimate whorl. Columellar lip sharp, protruding at its base to cover

umbilical keel. Outer lip sharp, prosocline. Columellar and parietal callus smooth, thinning on parietal side, inside of whorl smooth. Angle of union with penultimate whorl about 90°.

Variability: The upper cord is occasionally absent, or only weakly present on the initial teleoconch. The peripheral and base cords are always present. Width up to 2.5 mm.

*Distribution*: SASC, Azores, 677–1500 m.

*Remarks*: This species is placed in the genus *Trenchia* based on the smooth protoconch. BECK *ET AL.* (2006) illustrated as *Circulus supranitidus* (Wood, 1848) a shell from the Sedlo Seamount which we believe to be *Trenchia teriuga* n. sp. *Circulus* has a wide umbilicus with several spiral cords and a strongly prosocline lip, whereas *Trenchia* has its umbilicus partly covered and has a sharp umbilical keel.

*Lydiiphnis hendersoni* Dall, 1927 is a very similar species but has a distinctly protruding peripheral keel with a flat upper and lower side (RUBIO *ET AL.*, 2011: 93-95, figs. 48A-F as *Cyclostremiscus hendersoni* placed in Tornidae), and it has a tenuous spiral microsculpture on the adapical surface of the last whorl. The animal of that species is unknown but its shell has a sharp umbilical keel similar to species in *Xyloskenea* or *Trenchia*, where it is likely to belong.

*Trenchia teriuga* is similar to *Xyloskenea naticiformis* (Jeffreys, 1883) and *X. translucens* (Dall, 1927), however, these species lack the peripheral cord and their protoconchs have a spiral sculpture. *Trenchia xenos* (Hoffman, van Heugten & Lavaleye, 2010) has a similar protoconch but its shell is larger with inflated whorls and it lacks the spiral cords. *T. biangulata* Rubio & Rolán, 2013 lacks the peripheral cord.

## Superfamily TROCHOIDEA Rafinesque, 1815

### Family SKENEIDAE W. Clark, 1851

#### Genus *Cirsonella* Angas, 1877

Type taxon: *Cirsonella australis* Angas, 1877 accepted as *Cirsonella weldii* (Tenison Woods, 1877), type by monotypy.

WARÉN (1992) provided a diagnosis of the shell: small, almost globular and smooth shell, prosocline aperture, umbilicus covered by callus. Protoconch finely and irregularly spirally striated.

Twenty-seven species are known globally according to MOLLUSCABASE (2020) three of which live in the NE

Atlantic and Mediterranean Sea: *Cirsonella romettensis* (Granata, 1877) from the continental shelves of the Mediterranean Sea, SW Europe and NW Africa, and *C. ateles* (Dautzenberg & H. Fischer, 1896) and *C. gaudryi* (Dautzenberg & H. Fischer, 1896) from off the Azores.

#### *Cirsonella ateles* (Dautzenberg & H. Fischer, 1896) (Fig. 48)

*Tharsis ateles* Dautzenberg & H. Fischer, 1896: 484, pl. 22 figs. 1-3.

**Material examined**: Azores, Mar da Prata • 1 shell; 37.661°N, 25.918°W; 599 m; 08 Oct. 2018; M151/23112; grab. • 2 shells; 37.666°N, 25.966°W; 952 m; 17 Oct. 2018; M151/23168; grab. • 1 shell; 37.659°N, 25.789°W; 599 m; 19 Oct. 2018; M151/23181; box core. Atlantis Seamount • 24 shells; 34.373°N, 30.463°W; 1190–1340 m; 03 Feb. 1993; SMT2/DW261; dredge. • 1 shell; 34.432°N, 30.542°W; 610–655 m; 03 Feb. 1993; SMT2/DW263; dredge. • 40 shells; 34.412°N, 30.513°W; 795–830 m; 03 Feb. 1993; SMT2/DW264; dredge. • 13 shells; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. Tyro Seamount • 186 shells; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278;

dredge. Plato Seamount • 9 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. • 492 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge. Irving Seamount • 1 shell; 32.143°N, 28.178°W; 1030–1035 m; 28 Jan. 1996; SMT2/DW225; dredge. Hyères Seamount • 21 shells; 31.425°N, 28.863°W; 950–1250 m; 16 Jan. 1993; SMT2/DW185; dredge. • 675 shells; 31.158°N, 28.725°W; 845–990 m; 19 Jan. 1993; SMT2/DW203; dredge. Great Meteor Seamount • 4 shells; 30.082°N, 28.730°W; 1032 m; 26 Oct. 2018; M151/23429-R1; ROV sample. • 2 shells; 30.086°N, 28.726°W; 906 m; 26 Oct. 2018; M151/23429-R8; ROV sample. Little Meteor Seamount • 5 shells; 29.654°N, 29.015°W; 865 m; 27 Oct. 2018; M151/23434-R4; ROV sample. • 56 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab. • 4 shells; 29.645°N, 28.975°W; 284 m; 27 Oct. 2018; M151/23440; grab.

*Distribution:* Azores (DAUTZENBERG & H. FISCHER, 1896; this study) and SASC (this study), 284–2102 m.

*Remarks:* This species is characterised by a descending body whorl, a crescent-shaped opening at the umbilicus, which is demarcated by a nodular keel. Occasionally, the umbilicus is fully closed by a thin transparent callus. Its umbilical area has 1–3 thin incised lines (Fig. 48D, visible in juveniles). The diameter of the protoconch is 0.28–0.30 mm. *Cirsonella gaudryi* (Dautzenberg & H. Fischer, 1896) is similar but it has always a closed umbilicus when adult, it is smaller and more compact; the

diameter of its protoconch is 0.24–0.25 mm. Adult specimens of *Cirsonella romettensis* (Granata, 1877) have a closed umbilicus; their umbilical area has strong spiral cordlets and the diameter of the protoconch is 0.25–0.29 mm.

Most shells from the Azores and the SASC have fine, incised spiral lines on the basal part of the body whorl, contrary to *C. romettensis* which is smooth.

We are uncertain whether the morphological differences of the three NE Atlantic species in *Cirsonella* are variations within one species or whether they belong to two or three species. In this study they are retained as separate species.

### *Cirsonella gaudryi* (Dautzenberg & H. Fischer, 1896) (Fig. 49)

*Tharsis gaudryi* Dautzenberg & H. Fischer, 1896: 486, pl. 21 figs. 13–15.

**Material examined:** Azores, José Gaspar Seamount • 1 live specimen and 7 shells; 37.675°N, 25.717°W; 329 m; 06 Oct. 2018; M151/23105; grab. • 3 shells; 37.675°N, 25.717°W; 311 m; 16 Oct. 2018; M151/23161; box core. Azores, Mar da Prata • 69 shells; 37.673°N, 25.925°W; 595 m; 08 Oct. 2018; M151/23111; grab. • 76 shells; 37.661°N, 25.918°W; 599 m; 08 Oct. 2018; M151/23112; grab. • 10 shells; 37.601°N, 25.874°W; 190 m; 16 Oct. 2018; M151/23160; grab. • 1 shell; 37.644°N, 25.781°W; 610 m; 16 Oct. 2018; M151/23162; grab. Azores, Açor Bank • 18 shells; 38.156°N, 29.084°W; 339 m; 13 Oct. 2018; M151/23139; grab. Atlantis Seamount • 1665 shells; 34.082°N, 30.255°W; 335–340 m; 02 Feb. 1993; SMT2/DW255; dredge. • 270 shells; 33.997°N, 30.203°W; 420–460 m; 02 Feb. 1993; SMT2/DW258; dredge. • 19 shells; 34.080°N, 30.248°W; 330 m; 04 Feb. 1993; SMT2/TS270; suprabenthic sled. • 270 shells; 34.086°N, 30.226°W; 280 m; 05 Feb. 1993; SMT2/DW274; dredge. • 16 shells; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. • 82 shells; 33.996°N, 30.177°W; 617 m; 21 Oct. 2018; M151/23408; grab. Tyro Seamount • 1 shell; 33.998°N, 28.343°W; 945–1000 m; 06 Feb. 1995; SMT2/DW277; dredge. Plato Seamount • 3 shells; 33.205°N, 29.032°W; 565 m; 31 Jan. 1993; SMT2/DW240; dredge. • 13 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. • 41 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge. Irving Seamount • 2 shells; 32.264°N, 27.531°W; 670–715 m; 30 Jan. 1993; SMT2/DW237; dredge. Hyères Seamount • 6 shells; 31.499°N, 28.992°W; 300–310 m; 17 Jan. 1994; SMT2/DE188; dredge. • 4 shells; 31.465°N, 28.985°W; 700–750 m; 17 Jan. 1998; SMT2/DW192; dredge. Great Meteor Seamount • 13 live-collected specimens 81 shells; 30.033°N, 28.368°W; 470 m; 11 Jan. 1993; SMT2/DW152; dredge. • 1 shell; 29.670°N, 28.433°W; 290 m; 13 Jan. 1993; SMT2/TS163; dredge. • 13 shells; 30.040°N, 28.712°W; 620–650 m; 14 Jan. 1993; SMT2/DE174; dredge. • 2 shells; 29.750°N, 28.533°W; 316 m; 14 Mar. 2010; POS397/89-5; grab. • 1 shell; 29.750°N, 28.533°W; 315 m; 14 Mar. 2010; POS397/89-6; grab. • 1 shell; 29.884°N, 28.601°W; 295 m; 14 Mar. 2010; POS397/90-1; grab. • 2 shells; 30.083°N,



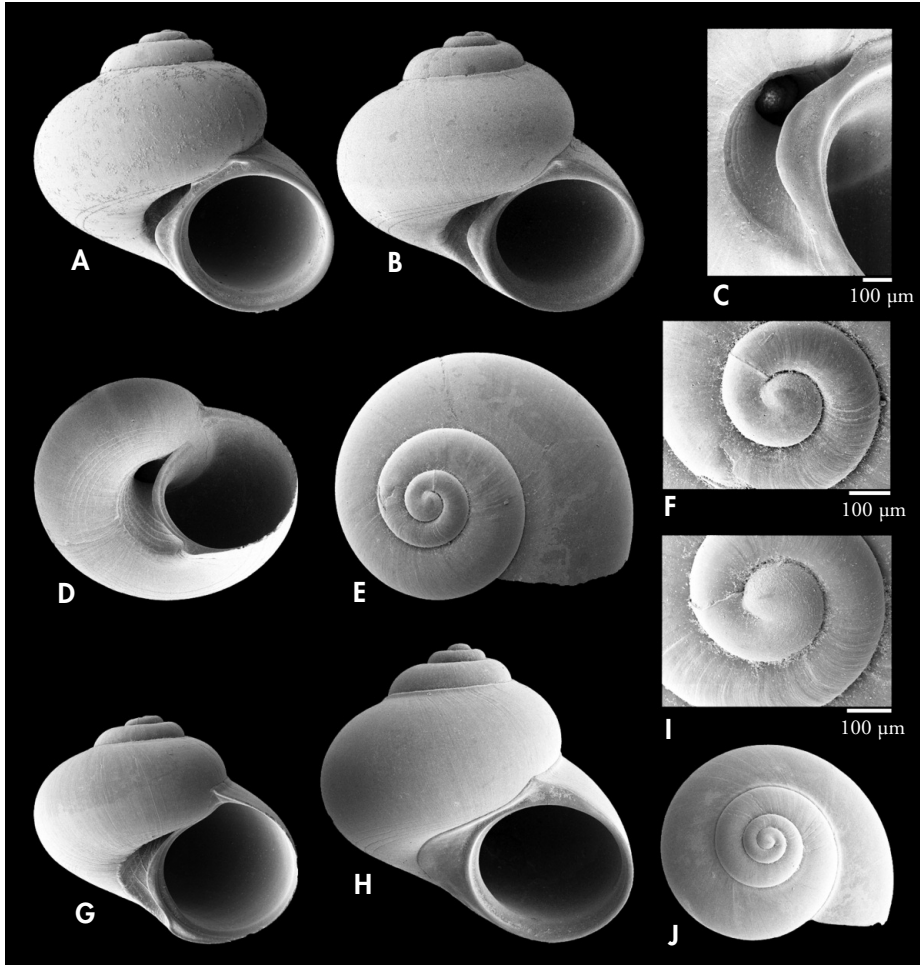


Figure 48. *Cirsonella ateles* (Dautzenberg & H. Fischer, 1896). A: Hyères Seamount – SMT2/DW203, H 2.1 mm, W 2.1 mm; B: same locality, H 2.0, W 2.1 mm; C: umbilical area, same as B; D: same locality, W 1.8 mm, umbilical view; E: same locality, W 1.6 mm; F: protoconch W 0.28 mm, same as E; G: Plato Seamount – SMT2/DW250, H 2.0 mm, W 2.3 mm; H: same locality, H 2.6 mm, W 2.6 mm; I: same locality, W 2.5 mm; J: protoconch W 0.30 mm, same as I.

Figura 48. *Cirsonella ateles* (Dautzenberg & H. Fischer, 1896). A: Banco Hyères – SMT2/DW203, 2,1 mm alto, 2,1 mm ancho; B: misma localidad, H 2,0 mm alto, 2,1 mm ancho; C: area del ombligo, misma que B; D: misma localidad, 1,8 mm ancho, vista umbilical; E: misma localidad, 1,6 mm ancho; F: protoconcha 0,28 mm ancho, misma que E; G: Banco Plato – SMT2/DW250, 2,0 mm alto, 2,3 mm ancho; H: misma localidad, 2,6 mm alto, 2,6 mm ancho; I: misma localidad, 2,5 mm ancho; J: protoconcha 0,30 mm ancho, misma que I.

28.633°W; 310 m; 15 Mar. 2010; POS397/91-10; grab. • 2 shells; 30.083°N, 28.634°W; 311 m; 15 Mar. 2010; POS397/91-11; grab. • 1 shell; 30.084°N, 28.566°W; 301 m; 15 Mar. 2010; POS397/92-2; grab. • 2 shells; 30.017°N, 28.533°W; 288 m; 16 Mar. 2010; POS397/95-6; grab. • 1 shell; 29.950°N, 28.633°W; 309 m; 17 Mar. 2010; POS397/96-7; grab. • 2 shells; 29.950°N, 28.567°W; 285 m; 19 Mar. 2010; POS397/98-1; grab. • 1 shell; 29.950°N, 28.567°W; 285 m; 19 Mar. 2010; POS397/98-3; grab. • 2

shells; 29.950°N, 28.567°W; 285 m; 19 Mar. 2010; POS397/102-3; grab. • 1 shell; 29.816°N, 28.433°W; 299 m; 19 Mar. 2010; POS397/106-1; grab. • 4 shells; 29.816°N, 28.433°W; 300 m; 19 Mar. 2010; POS397/106-2; grab. • 2 shells; 29.816°N, 28.433°W; 300 m; 19 Mar. 2010; POS397/106-3; grab. • 2 shells; 29.817°N, 28.567°W; 308 m; 20 Mar. 2010; POS397/109-7; grab. • 3 shells; 29.750°N, 28.466°W; 291 m; 21 Mar. 2010; POS397/111-1; grab. • 6 shells; 29.750°N, 28.466°W; 292 m; 21 Mar. 2010; POS397/111-2; grab. • 2 shells; 29.750°N, 28.466°W; 293 m; 21 Mar. 2010; POS397/111-3; grab. • 4 shells; 29.683°N, 28.434°W; 288 m; 21 Mar. 2010; POS397/114-5; grab. • 4 shells; 29.683°N, 28.434°W; 289 m; 21 Mar. 2010; POS397/114-6; grab. • 15 shells; 29.683°N, 28.434°W; 289 m; 21 Mar. 2010; POS397/114-7; grab. • 18 shells; 29.750°N, 28.533°W; 319 m; 24 Oct. 2018; M151/23419-2; grab. • 2 shells; 29.565°N, 28.339°W; 948 m; 25 Oct. 2018; M151/23425-R1; ROV sample. • 2 shells; 29.565°N, 28.332°W; 945 m; 25 Oct. 2018; M151/23425-R4; ROV sample. • 35 shells; 29.565°N, 28.339°W; 944 m; 25 Oct. 2018; M151/23425-R6; ROV sample. • 39 shells; 29.568°N, 28.339°W; 855 m; 25 Oct. 2018; M151/23425-R9; ROV sample. **Little Meteor Seamount** • 34 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab. • 210 shells; 29.655°N, 29.004°W; 464 m; 27 Oct. 2018; M151/23438; grab. • 22 shells; 29.645°N, 28.975°W; 284 m; 27 Oct. 2018; M151/23440; grab. • 16 shells; 29.633°N, 28.976°W; 282 m; 27 Oct. 2018; M151/23441; grab. • 9 shells; 29.633°N, 28.983°W; 274 m; 27 Oct. 2018; M151/23442; grab.

*Distribution:* Azores (DAUTZENBERG & H. FISCHER, 1896; this study), SASC (this study), off western Morocco (DAUTZENBERG, 1927) and Hatton Bank (HOFFMAN ET AL., 2010), 274–2018 m.

*Remarks:* *Cirsonella romettensis* (Granata, 1877) is similar but its umbilical area has strong spiral cords in juveniles whereas *C. gaudryi* has weak

cordlets or is smooth (HOFFMAN ET AL., 2008, figs. 33J-K). Adult specimens of *C. ateles* grow larger with a more descending body whorl, a larger protoconch (0.28-0.30 mm versus 0.24-0.25 mm in *C. gaudryi*) and the umbilicus has a narrow crescent-shaped opening in most specimens; most specimens are found deeper than those of *C. gaudryi*.

### Genus *Ganesa* Jeffreys, 1883

Type taxon: *Ganesa nitidiuscula* Jeffreys, 1883, subsequent designation by BUSH (1897), syntypes from Donegal Bay, Ireland and off Cape Mondego, Portugal, bathyal.

Three species are known globally: the type taxon and *Ganesa panamensis* Dall, 1881, from off western Central

America, and *Ganesa poseidonae* Hoffman & Freiwald, 2018 from off Mauritania.

### *Ganesa nitidiuscula* Jeffreys, 1883 (Fig. 50)

*Ganesa nitidiuscula* Jeffreys, 1883: 94, pl. XIX fig. 8.

*Ganesa nitidiuscula*: WARÉN, 1980: 17; WARÉN, 1991: 176, fig. 33B; HOFFMAN ET AL., 2018: 28-29, figs. 1-12.

**Material examined:** Azores, Mar da Prata • 43 shells; 37.673°N, 25.925°W; 595 m; 08 Oct. 2018; M151/23111; grab. Atlantis Seamount • 17 shells; 34.412°N, 30.513°W; 795–830 m; 03 Feb. 1993; SMT2/DW264; dredge. • 30 shells; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. Tyro Seamount • 1 shell; 33.998°N, 28.343°W; 945–1000 m; 06 Feb. 1995; SMT2/DW277; dredge. • 203 shells; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge. Plato Seamount • 5 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. Great Meteor Seamount • 1 shell; 29.568°N, 28.339°W; 855 m; 25 Oct. 2018; M151/23425-R9; ROV sample. Little Meteor Seamount • 4 shells; 29.654°N, 29.015°W; 865 m; 27 Oct. 2018; M151/23434-R4; ROV sample. • 21 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab. • 2 shells; 29.654°N, 29.014°W; 811 m; 27 Oct. 2018; M151/23437; grab.

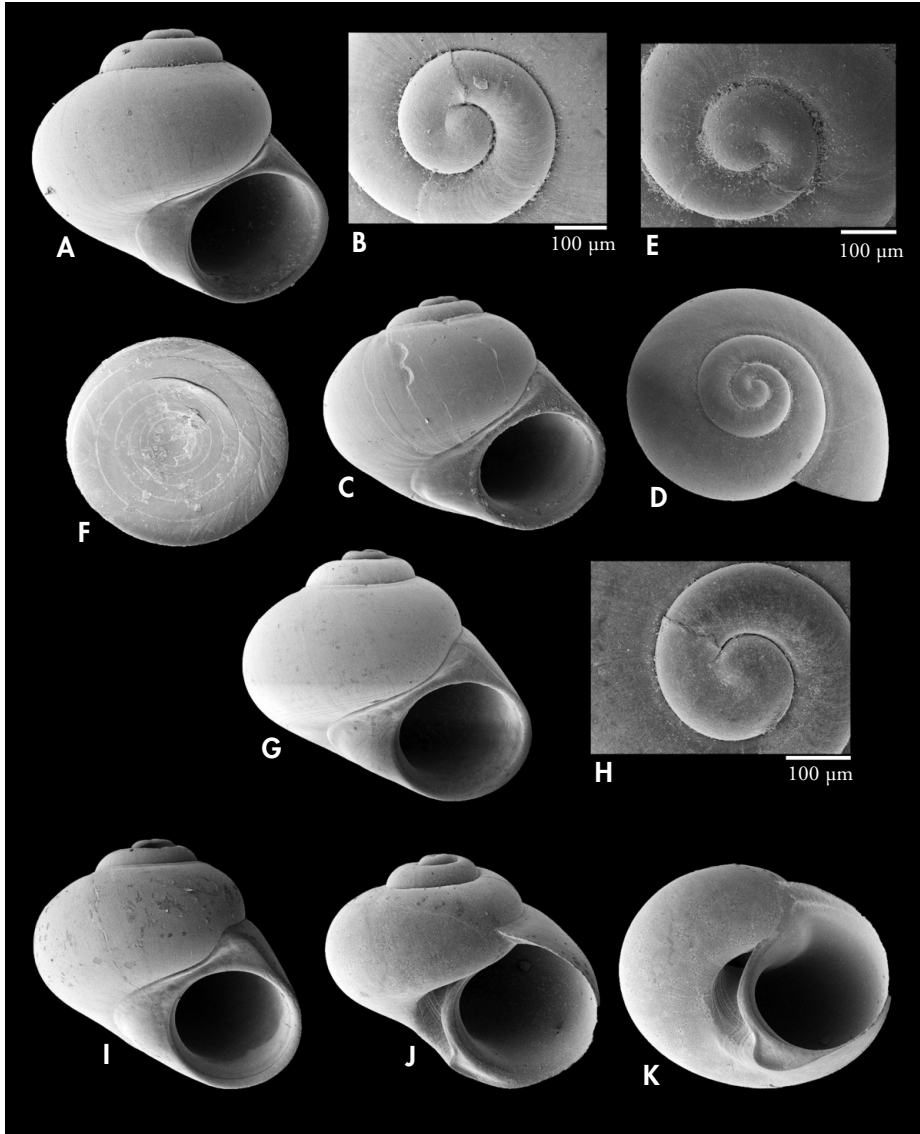


Figure 49. *Cirsonella gaudryi* (Dautzenberg & H. Fischer, 1896). A: Atlantis Seamount – SMT2/DW255, H 1.7 mm, W 1.8 mm; B: protoconch W 0.24 mm, same as A; C, D: Great Meteor Seamount – SMT2/DW152, H 1.7 mm, W 2.0 mm; E: protoconch W 0.24 mm; F: operculum W 0.90 mm, same specimen as C-D; G: Little Meteor Seamount – M151/23438, H 1.7 mm, W 1.9 mm; H: protoconch W 0.25 mm, same as G; I: Great Meteor Seamount – POS397/114, H 1.9 mm, W 2.0 mm; J, K: same locality, H 1.3 mm, W 1.5 mm.

Figure 49. *Cirsonella gaudryi* (Dautzenberg & H. Fischer, 1896). A: Banco Atlantis – SMT2/DW255, 1,7 mm alto, 1,8 mm ancho; B: protoconcha 0,24 mm ancho, misma que A; C, D: Gran Banco Meteor – SMT2/DW152, 1,7 mm alto, 2,0 mm ancho; E: protoconcha 0,24 mm ancho; F: opérculo 0,90 mm ancho, mismo ejemplar que C-D; G: Pequeño Banco Meteor – M151/23438, 1,7 mm alto, 1,9 mm ancho; H: protoconcha 0,25 mm ancho, misma que G; I: Gran Banco Meteor – POS397/114, 1,9 mm alto, 2,0 mm ancho; J, K: misma localidad, 1,3 mm alto, 1,5 mm ancho.

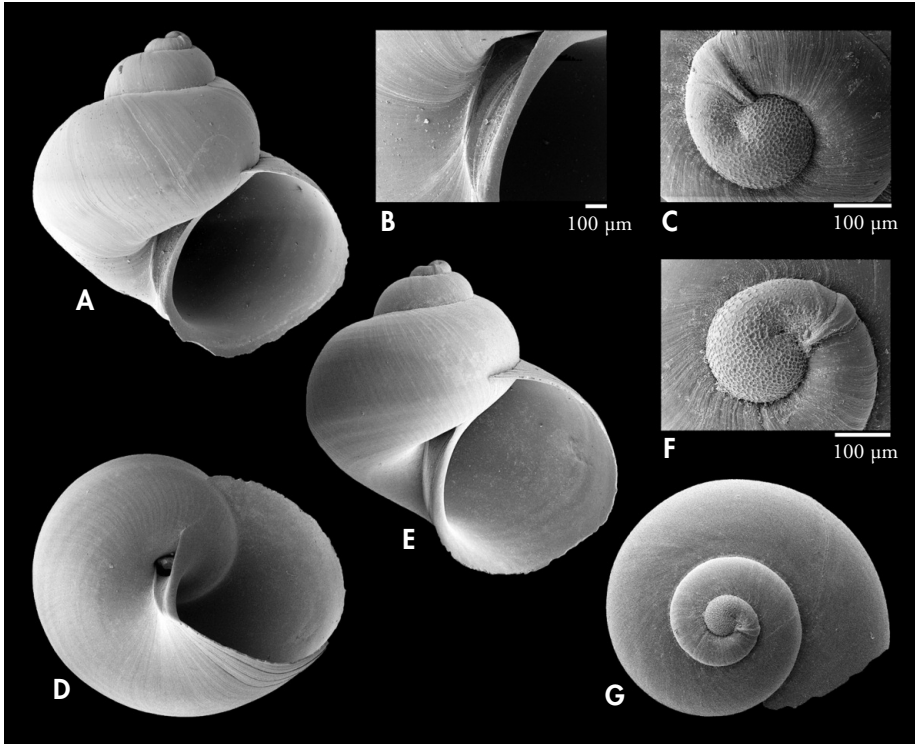


Figure 50. *Ganesa nitidiuscula* Jeffreys, 1883. A: Tyro Seamount – SMT2/DW278, H 2.7 mm, W 2.5 mm; B: detail of umbilical area; C: protoconch W 0.28 mm, same as A; D, E: same locality, H 2.4 mm, W 2.5 mm; F: same locality, W 1.4 mm; G: protoconch W 0.28 mm, same as F.  
 Figura 50. *Ganesa nitidiuscula* Jeffreys, 1883. A: Banco Tyro – SMT2/DW278, 2,7 mm alto, 2,5 mm ancho; B: protoconcha 0,28 mm ancho, misma que A; D, E: misma localidad, 2,4 mm alto, 2,5 mm ancho; F: misma localidad, 1,4 mm ancho; G: protoconcha 0,28 mm ancho, misma que F.

*Distribution:* Known from the Faroes (Jeffreys, 1883) to Mauritania (HOFFMAN ET AL., 2018) and SASC (this study) in the NE Atlantic and on the Bahamas Bank in the NW Atlantic (HOFFMAN ET AL., 2018). Bathymetric range 474–2000 m.

*Remarks:* This species can easily be identified by its chaotic cellular sculpture on the protoconch and the near-vertical rib in the umbilical area (HOFFMAN ET AL., 2018; this study, Figs. 50A-F).

### Genus *Lopheliella* Hoffman, van Heugten & Lavaleye, 2008

Type taxon: *Lopheliella rockallensis* Hoffman, van Heugten & Lavaleye, 2008 by original designation, Rockall Bank.

HOFFMAN ET AL. (2008) provided a diagnosis: adult size 1.8 to 2.8 mm, somewhat swollen or globose elevated spire, solid, with prosocline aperture. Protoconch globose, maximum diam-

eter 0.3 mm, ending with varix and a regular honeycomb sculpture. Exposed and open umbilicus with a chink, which is smooth or with a spiral cord.

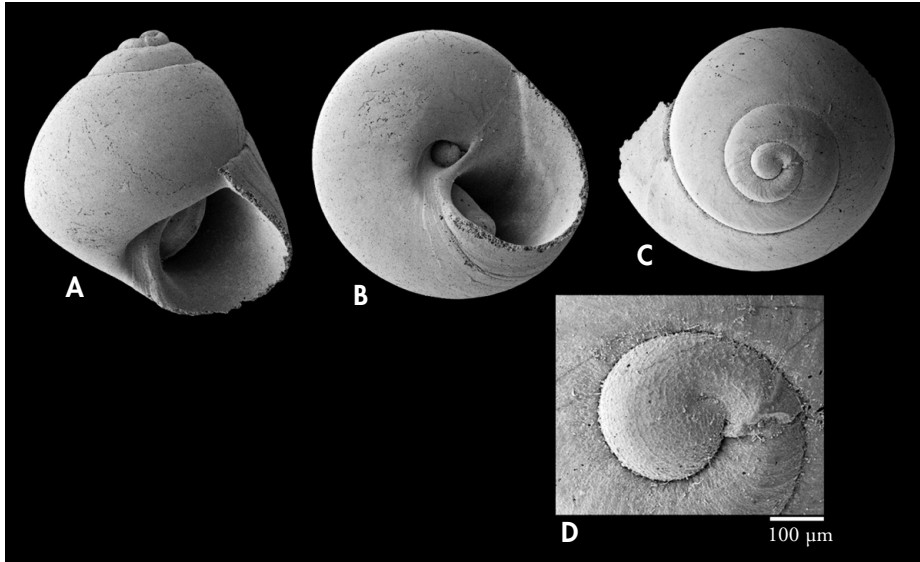


Figure 51. *Lopheliella rockallensis* Hoffman, van Heugten & Lavaleye, 2008. A, B: Tyro Seamount – SMT2/DW278, H 2.1 mm, W 1.9 mm; C: same locality, W 1.7 mm; D: protoconch W 0.31 mm, same as C.

Figura 51. *Lopheliella rockallensis* Hoffman, van Heugten & Lavaleye, 2008. A, B: Banco Tyro – SMT2/DW278, 2,1 mm alto, 1,9 mm ancho; C: misma localidad, 1,7 mm ancho; D: protoconcha 0,31 mm ancho, misma que C.

Five species are known in the NE Atlantic of which four species were described by HOFFMAN *ET AL.* (2008) from the Rockall Bank: *Lopheliella rock-*

*allensis*, *L. moolenbeeki*, *L. hermesae* and *L. moundforceae*; HOFFMAN *ET AL.* (2018) described *L. coralfishae* from the Hatton Bank.

*Lopheliella rockallensis* Hoffman, van Heugten & Lavaleye, 2008 (Fig. 51)

*Lopheliella rockallensis* Hoffman, van Heugten & Lavaleye, 2008: 41, figs. 1-5, 20.

**Material examined:** Tyro Seamount • 4 shells; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge.

**Distribution:** The species is known from Rockall Bank (HOFFMAN *ET AL.*, 2008) and Tyro Seamount (this study), 557–925 m.

**Remarks:** This species has only been encountered in two locations; in the Rockall Bank it was found in association with sponges (Hexactinellida) and coral rubble.

*Lopheliella moolenbeeki* Hoffman, van Heugten & Lavaleye, 2008 (Fig. 52)

*Lopheliella moolenbeeki* Hoffman, van Heugten & Lavaleye, 2008: 41-42, figs. 6-9, 21.

**Material examined:** Tyro Seamount • 5 shells; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge.

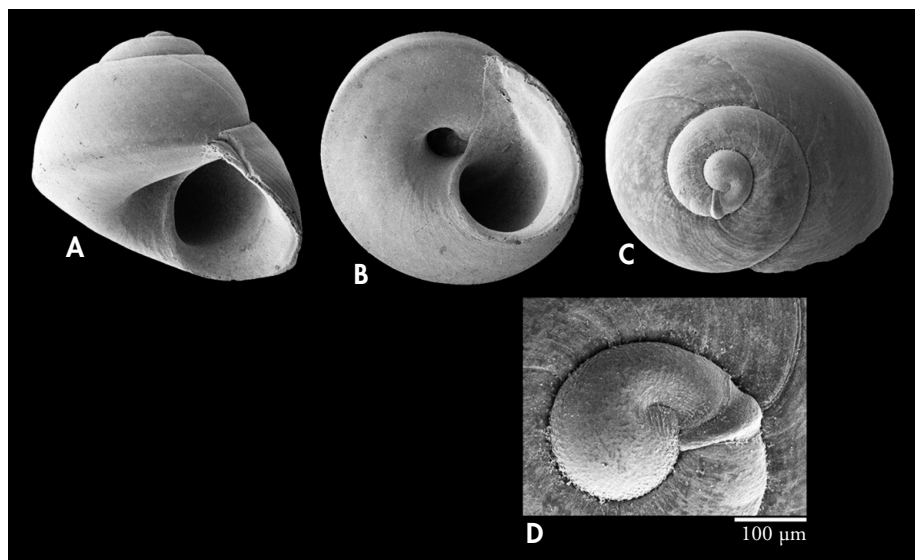


Figure 52. *Lopheliella moolenbeeki* Hoffman, van Heugten & Lavaleye, 2008. A, B: Tyro Seamount – SMT2/DW278, H 1.6 mm, W 1.7 mm; C: same locality, W 1.3 mm; D: protoconch W 0.30 mm, same as C.  
 Figura 52. *Lopheliella moolenbeeki* Hoffman, van Heugten & Lavaleye, 2008. A, B: Banco Tyro – SMT2/DW278, 1,6 mm alto, 1,7 mm ancho; C: misma localidad, 1,3 mm ancho; D: protoconcha 0,30 mm ancho, misma que C.

**Distribution:** The species is known from Rockall- and Hatton Bank (HOFFMAN ET AL., 2008), and Tyro Seamount (this study), 557–958 m.

**Remarks:** It has been found in the Rockall and Hatton Banks in association with siliceous sponges (Hexactinellida) and coral rubble.

### Genus *Mikro* Warén, 1996

Type taxon: *Mikro globulus* Warén, 1996 by original designation, off Iceland, 1099 m.

WARÉN (1996) provided a diagnosis of the shell: very small, with smooth protoconch, apically keeled first teleoconch whorl, and intra-umbilical keel.

Five species are known in the Atlantic and Mediterranean Sea: the type species,

*M. cerion* (Dall, 1927) from off SE U.S.A., *M. giustii* (Bogi & Nofroni, 1989) from off southern Europe, *M. hattonensis* Hoffman, van Heugten & Lavaleye, 2010 described from the Hatton Bank, and *M. oviceps* Ortega & Gofas, 2019 from the Canaries.

### *Mikro globulus* Warén, 1996 (Fig. 53)

*Mikro globulus* Warén, 1996: 199, figs. 1C-F, 2, 7D, 8D, 10D.

**Material examined:** Atlantis Seamount • 1 shell; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. Tyro Seamount • 1 shell; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge. Plato Seamount • 2 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge. Little Meteor Seamount • 1 shell; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab.

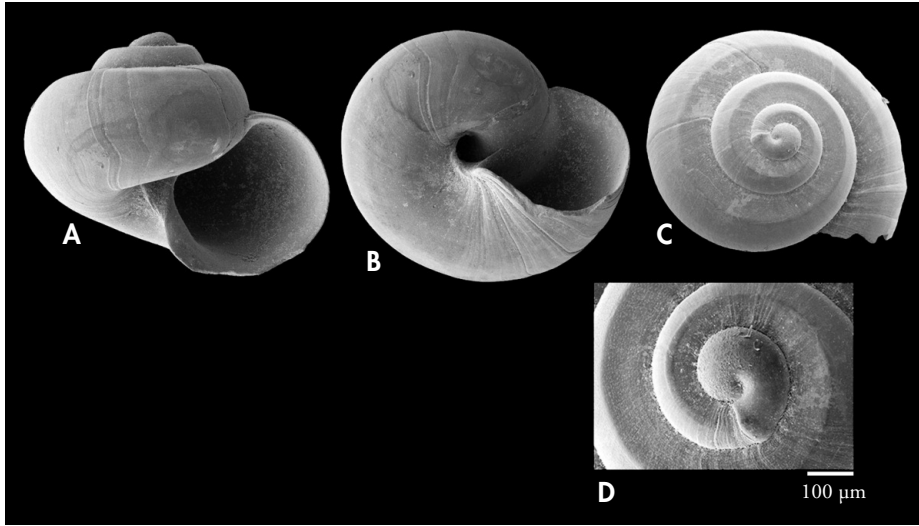


Figure 53. *Mikro globulus* Warén, 1996. A, B: Plato Seamount – SMT2/DW250, H 1.2 mm, W 1.4 mm; C: same locality, W 1.4 mm; D: protoconch W 0.26 mm, same as C.

Figura 53. *Mikro globulus* Warén, 1996. A, B: Banco Plato – SMT2/DW250, 1,2 mm alto, 1,4 mm ancho; C: misma localidad, 1,4 mm ancho; D: protoconcha 0,26 mm ancho, misma que C.

**Distribution:** This species has been found off Iceland (WARÉN, 1996), the Rockall Bank (FREIWALD & BECK, 2007), and SASC (this study), 677–1500 m.

**Remarks:** Shell characterised by the depressed spire with inflated whorls and its flexuous outer lip. The umbilical keel is similar to that of *Xyloskenea* Marshall, 1988 and *Trenchia* Knudsen, 1964.

### *Mikro minima* (G. Seguenza, 1876) comb. nov. (Fig. 54)

*Trochus (Margarita) minima* Seguenza, 1876: 186.

*Trochus minutulus* Jeffreys, 1883: 95, pl. 20 fig. 2.

*Lissotesta minima*: WARÉN, 1992: 171-172, figs. 25E-F, 29A-C.

**Material examined:** Tyro Seamount • 20 shells; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge. Plato Seamount • 55 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge. Great Meteor Seamount • 1 shell; 29.601°N, 28.380°W; 550–575 m; 13 Jan. 1994; SMT2/DW166; dredge. Little Meteor Seamount • 1 shell; 29.654°N, 29.015°W; 865 m; 27 Oct. 2018; M151/23434-R4; ROV sample. • 1 shell; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab.

**Distribution:** From the Rockall Bank (HOFFMAN *ET AL.*, 2010), Bay of Biscay to the Ibero-Moroccan Gulf (WARÉN, 1992), the Canaries (ORTEGA & GOFAS, 2019, misidentified as *Mikro globulus*), and SASC (this study), 500–2300 m.

**Remarks:** This species has been placed by WARÉN (1992) in the genus *Lissotesta* Bush, 1897, which has a partially hidden

protoconch and a rounded shoulder on the initial whorls. The genus *Mikro* Warén, 1996 has an exposed protoconch and the initial teleoconch has a flattened shoulder with a keel; the umbilical area is conical with a weak keel. *Mikro minima* shares the shell morphology of *Mikro* and not that of *Lissotesta*. Its similarity to *Mikro* was already highlighted by WARÉN (1996: 199).

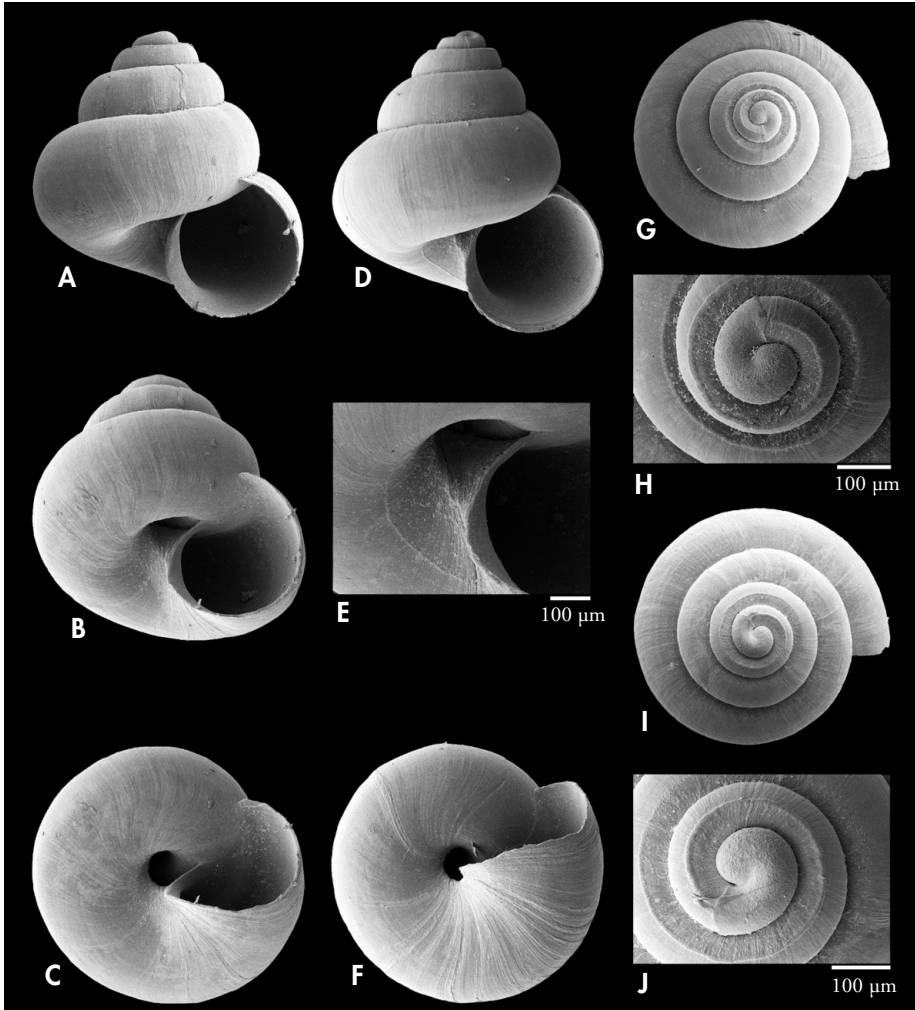


Figure 54. *Mikro minima* (G. Seguenza, 1876). A-C: Plato Seamount – SMT2/DW250, H 1.1 mm, W 1.1 mm; D: same locality, H 1.4 mm, W 1.3 mm; E: umbilical view, same as D; F: same locality, basal view, W 1.3 mm; G: same locality, apical view, W 1.2 mm; H: protoconch W 0.20 mm, same as G; I: apical view, W 1.0 mm; J: protoconch W 0.20 mm, same as I.

Figura 54. *Mikro minima* (G. Seguenza, 1876). A-C: Banco Plato – SMT2/DW250, 1,1 mm alto, 1,1 mm ancho; D: misma localidad, 1,4 mm alto, 1,3 mm ancho; E: vista umbilical, misma que D; F: misma localidad, vista basal, 1,3 mm ancho; G: misma localidad, vista apical, 1,2 mm ancho; H: protoconcha 0,20 mm ancho, misma que G; I: misma localidad, vista apical, 1,0 mm ancho; J: protoconcha 0,20 mm ancho, misma que I.

*Mikro minima* is most similar to *Mikro cerion* (Dall, 1927), *M. giustii* Bogi & Nofroni, 1989 and *M. hattonensis* Hoffman, van Heugten & Lavaleye, 2010; these species have a similar protoconch, outline,

and cord on the shoulder of the initial teleoconch. *M. cerion* and *M. giustii* are more compressed than *M. minima*. *M. hattonensis* has a pitted microsculpture on the apex and the umbilical area.



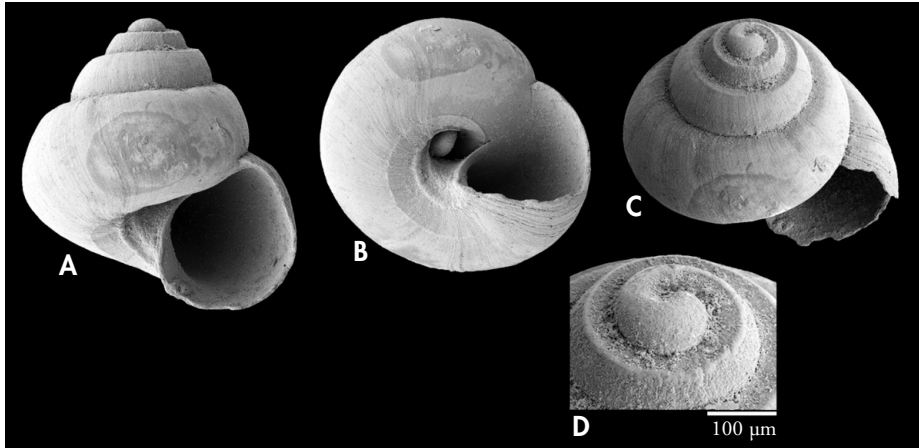


Figure 55. *Mikro cf. hattonensis* Hoffman, van Heugten & Lavaleye, 2010. A-C: Little Meteor Seamount – M151/23436, H 1.0 mm, W 1.0 mm; D: protoconch W 0.20 mm.

Figure 55. *Mikro cf. hattonensis* Hoffman, van Heugten & Lavaleye, 2010. A-C: Pequeño Banco Meteor – M151/23436, 1,0 mm alto 1,0 mm ancho; D: protoconcha 0,20 mm ancho.

*Mikro cf. hattonensis* Hoffman, van Heugten & Lavaleye, 2010 (Fig. 55)

*Mikro hattonensis* Hoffman, van Heugten & Lavaleye, 2010: 51-52, figs. 15-22.

**Material examined:** Tyro Seamount • 1 shell; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge. Plato Seamount • 19 shells; 33.197°N, 28.949°W; 690–710 m; 31 Jan. 1993; SMT2/DW242; dredge. • 1 shell; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge. Little Meteor Seamount • 2 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab.

**Distribution:** Hatton- and Rockall Bank (HOFFMAN *ET AL.*, 2010), Galicia Bank (SaMID 73164), Canaries (ORTEGA & GOFAS, 2019) and SASC (this study), 852–1500 m.

**Remarks:** We are uncertain on the specific determination of the specimens from

the SASC because the shells are eroded and the pitted microsculpture is barely visible. *Mikro globulus* and *M. giustii* have a clearly lower spire and lack the apical and umbilical pitted sculpture. *Mikro perforata* differs in that the pitted microsculpture covers the whole shell.

*Mikro perforata* n. sp. (Figs. 56, 57)

**Type material:** Holotype, Plato Seamount • 1 shell (Figs. 57A-D); 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge, in sediment with dead coral fragments; MNHN-IM-2000-35682.

**Type locality:** Plato Seamount – 33.210°N – 29.287°W, 1450–1500 m.

**Etymology:** *perforata* refers to the pitted microsculpture.

**Holotype**, an empty shell (Figs. 57A-E): Small (H 1.1 mm, W 1.0 mm), minute shell with a regularly raised, stepped outline, minutely pitted micro-sculpture, spiral cords, open umbilicus and flat apex, apical angle 70°, translucent white.

**Protoconch:** ½ whorls, finely pitted sculpture, convex lip, W 0.20 mm. Transition to teleoconch clear by change in sculpture (Fig. 57D).

**Teleoconch:** three angular whorls, deep suture. Shell covered with micro-sculp-

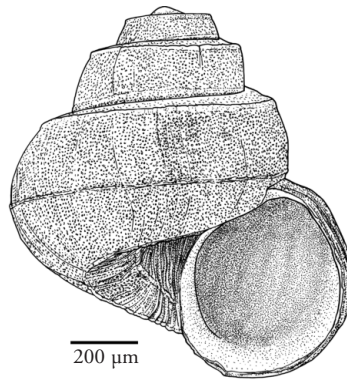


Figure 56. *Mikro perforata* n. sp., Plato Seamount – SMT2/DW250, holotype, apertural view, H 1.1 mm.  
Figura 56. *Mikro perforata* n. sp., Banco Plato - SMT2/DW250, holotipo, vista apertural, 1,1 mm alto.

ture of rounded pits (diameter 1–3  $\mu\text{m}$ ) and fine growth lines, straight and slightly prosocline on upper whorl. Two rounded and smooth cords forming keels on the upper whorl; upper keel bordering the shoulder, a second keel above the suture. Shoulder area sloping and flattened. Area between cords slightly convex.

Base of body whorl with third cord and keel demarcating the umbilical area. Supraperipheral cords fade away on body whorl. Umbilicus open, funnel-shaped, deep. Inside umbilicus, one strong spiral cord, strong growth markings.

Aperture 50% of shell height, oval, flattened along parietal side. Union of outer lip perpendicular to penultimate whorl. Peristome with blunt edge, outer lip prosocline, flexuous at the base. Columella thin and curved. Callus thin and smooth, inside of whorl smooth.

Variability: unknown.

*Distribution:* only known from the type locality.

*Remarks:* Placement in the genus *Mikro* is based on the morphology of the shell; the small size, an exposed protoconch, the flat shoulder with spiral cord and keel, an open, funnel-shaped umbilicus with a strong cord and keel. It is similar to *M. minima*, *M. hattonensis*, *M. cerion* and *M. giustii* that all have a smooth whorl surface whereas *M. perforata* n. sp. has a pitted micro-sculpture covering the full shell.

*Lissotesta scalaroides* Rubio & Rolán, 2013 is exceedingly similar and probably related, but differs in that the protoconch is much less sunken, in lacking a peripheral and periumbilical keel and in having a much less dense microsculpture on the shell surface, particularly on the base. To be consistent with the generic placement of our new species, the new combination *Mikro scalaroides* (Rubio & Rolán, 2013) is here introduced.

### Genus *Parviturbo* Pilsbry & McGinty, 1945

Type taxon: *Parviturbo rehderi* Pilsbry & McGinty, 1945 by original designation. Its type locality was Palm Beach, Florida, U.S.A., intertidal.

PILSBRY & MCGINTY (1945) provided a diagnosis of the shell of the genus: small, solid, perforate, or narrowly umbilicate, turbinate or globose-conic, few strongly convex whorls, subequal

spiral ridges, intervals crossed by axial threads. Aperture rounded, concave columella thickened. Protoconch with one or two smooth whorls. Operculum thin, corneous, and multispiral.

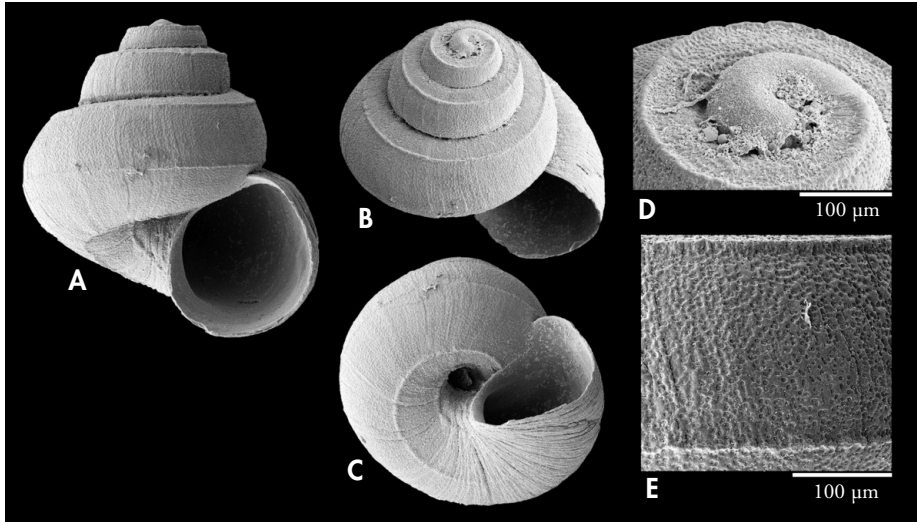


Figure 57. *Mikro perforata* n. sp. A-C: Plato Seamount – SMT2/DW250, holotype H 1.1 mm, W 1.0 mm; D: protoconch W 0.20 mm; E: micro-sculpture of the body whorl.

Figura 57. *Mikro perforata* n. sp. A-C: Banco Plato – SMT2/DW250, holotipo 1,1 mm alto, 1,0 mm ancho; D: protoconcha 0,20 mm ancho; E: microescultura de la última vuelta.

Thirty six extant and five fossil species are currently known globally according to MOLLUSCABASE (2020), nine of them known in the NE Atlantic and Mediterranean Sea (RUBIO *ET AL.*, 2015): *Parviturbo elegantulus* (Philippi,

1844), *P. alboranensis* Penas & Rolán, 2006, *P. fenestratus* (Chaster, 1896), *P. insularis* Rolán, 1988, *P. rolani* Engl, 2001, and four species described by RUBIO *ET AL.* (2015): *P. ergasticus*, *P. azoricus*, *P. multispiralis*, and *P. seamountensis*.

### *Parviturbo seamountensis* Rubio, Rolán & Gofas, 2015 (Fig. 58)

*Parviturbo seamountensis* Rubio, Rolán & Gofas in RUBIO *ET AL.*, 2015: 188, figs. 11A-B, 12 A-F.

**Material examined:** *Atlantis Seamount* • 1 shell; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. • 2 shells; 33.996°N, 30.177°W; 617 m; 21 Oct. 2018; M151/23408; grab. *Great Meteor Seamount* • 2 shells; 29.750°N, 28.533°W; 316 m; 14 Mar. 2010; POS397/89-5; grab. • 2 shells; 29.750°N, 28.533°W; 315 m; 14 Mar. 2010; POS397/89-6; grab. • 1 shell; 29.884°N, 28.601°W; 295 m; 14 Mar. 2010; POS397/90-1; grab. • 2 shells; 29.884°N, 28.601°W; 295 m; 14 Mar. 2010; POS397/90-2; grab. • 1 shell; 29.884°N, 28.601°W; 294 m; 14 Mar. 2010; POS397/90-3; grab. • 4 shells; 30.083°N, 28.633°W; 310 m; 15 Mar. 2010; POS397/91-10; grab. • 3 shells; 30.083°N, 28.634°W; 311 m; 15 Mar. 2010; POS397/91-11; grab. • 2 shells; 30.084°N, 28.566°W; 301 m; 15 Mar. 2010; POS397/92-2; grab. • 2 shells; 30.084°N, 28.566°W; 301 m; 15 Mar. 2010; POS397/92-3; grab. • 1 shell; 30.017°N, 28.533°W; 286 m; 16 Mar. 2010; POS397/95-5; grab. • 1 shell; 30.017°N, 28.533°W; 288 m; 16 Mar. 2010; POS397/95-6; grab. • 11 shells; 30.084°N, 28.500°W; 309 m; 17 Mar. 2010; POS397/98-1; grab. • 2 shells; 30.084°N, 28.500°W; 330 m; 17 Mar. 2010; POS397/98-2; grab. • 1 shell; 30.084°N, 28.501°W; 308 m; 17 Mar. 2010; POS397/98-3; grab. • 1 shell; 30.017°N, 28.467°W; 325 m; 17 Mar. 2010; POS397/99-6; grab. • 2 shells; 30.017°N, 28.467°W; 302 m; 17 Mar. 2010; POS397/99-7; grab. • 1 shell; 29.949°N, 28.500°W; 288 m; 18 Mar. 2010; POS397/100-4; grab. • 3 shells; 29.950°N, 28.500°W; 289 m; 18 Mar. 2010; POS397/100-5; grab. • 1 shell; 29.950°N, 28.500°W; 291 m; 18 Mar. 2010; POS397/100-6; grab. • 2 shells; 29.951°N, 28.433°W; 309 m; 18 Mar. 2010; POS397/101-5; grab. • 3 shells; 29.951°N, 28.433°W; 308 m; 18 Mar. 2010; POS397/101-7; grab. • 2 shells;

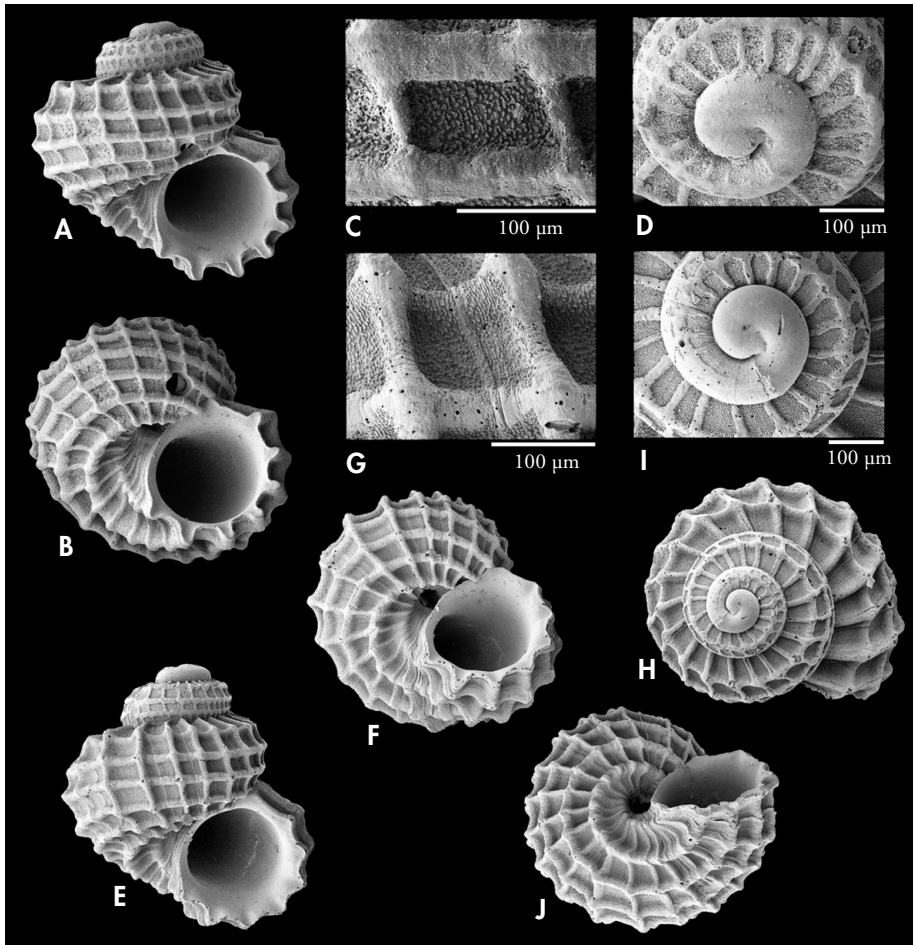


Figure 58. *Parviturbo seamountensis* Rubio, Rolán & Gofas, 2015. A, B: Great Meteor Seamount, POS397/111, H 1.0 mm, W 1.0 mm; C: microsculpture of the body whorl, same as A; D: protoconch W 0.20 mm, same as A; E, F: Great Meteor Seamount, M151/23419, H 1.4 mm, W 1.3 mm; G: microsculpture of body whorl, same as E; H: same locality, apical view, W 1.1 mm; I: protoconch W 0.22 mm, same as H; J: same locality, basal view W 1.4 mm.

Figura 58. *Parviturbo seamountensis* Rubio, Rolán & Gofas, 2015. A, B: Gran Banco Meteor, POS397/111, 1,0 mm alto, 1,0 mm ancho; C: microscultura de la última vuelta, misma que A; D: protoconcha 0,20 mm ancho, misma que A; E, F: Gran Banco Meteor, M151/23419, 1,4 mm alto, 1,3 mm ancho; G: microscultura de la última vuelta, misma que E; H: misma localidad, vista apical, 1,1 mm ancho; I: protoconcha, 0,22 mm ancho, misma que H; J: misma localidad, vista basal 1,4 mm ancho.

29.951°N, 28.567°W; 287 m; 19 Mar. 2010; POS397/102-1; grab. • 1 shell; 29.883°N, 28.533°W; 289 m; 19 Mar. 2010; POS397/103-5; grab. • 2 shells; 29.883°N, 28.466°W; 298 m; 19 Mar. 2010; POS397/104-1; grab. • 8 shells; 29.883°N, 28.466°W; 301 m; 19 Mar. 2010; POS397/104-2; grab. • 1 shell; 29.883°N, 28.466°W; 301 m; 19 Mar. 2010; POS397/104-3; grab. • 5 shells; 29.816°N, 28.433°W; 299 m; 19 Mar. 2010; POS397/106-1; grab. • 14 shells; 29.816°N, 28.433°W; 300 m; 19 Mar. 2010; POS397/106-2; grab. • 32 shells; 29.816°N, 28.433°W; 300 m; 19 Mar. 2010; POS397/106-3; grab. • 20 shells; 29.817°N, 28.567°W; 307 m; 20 Mar. 2010; POS397/109-5; grab. • 14 shells; 29.817°N, 28.567°W; 308 m; 20 Mar. 2010;

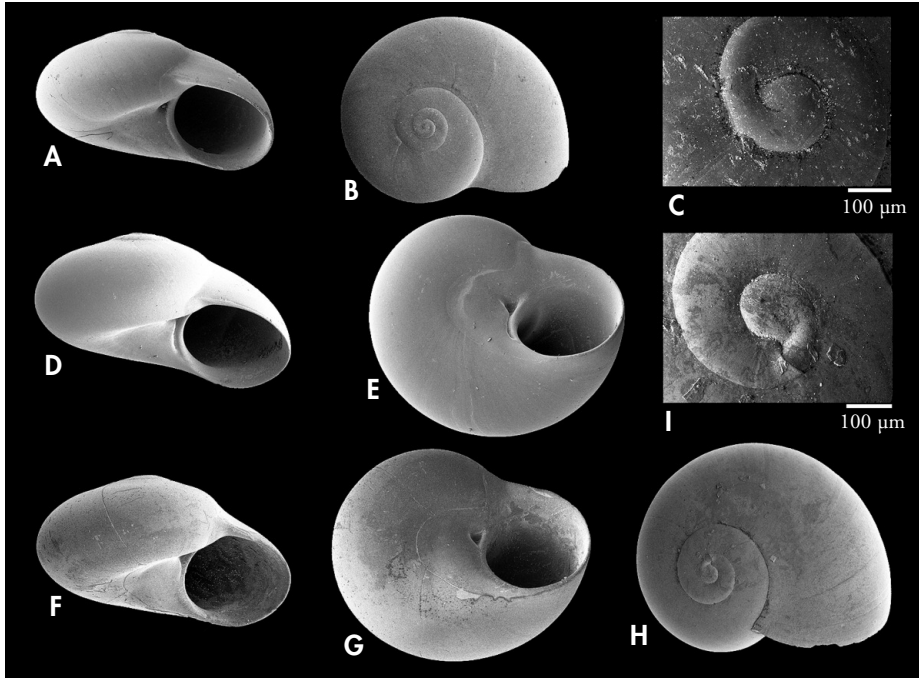


Figure 59. *Seamountiella azorica* (Dautzenberg & H. Fischer, 1896). A, B: Plato Seamount – SMT2/DW250, H 2.2 mm, W 4.0 mm; C: protoconch W 0.27 mm, same as B; D, E: same locality, H 2.5 mm, 4.1 mm. F, G: Little Meteor Seamount – M151/23436, H 2.1 mm, W 3.4 mm; H: same locality, apical view, W 2.1 mm; I: protoconch W 0.24 mm, same as H.

*Figura 59. Seamountiella azorica* (Dautzenberg y H. Fischer, 1896). A, B: Banco Plato - SMT2/DW250, 2,2 mm alto, 4,0 mm ancho; C: protoconcha 0,27 mm ancho, misma que B; D, E: misma localidad, 2,5 mm alto, 4,1 mm ancho. F, G: Pequeño Banco Meteor - M151/23436, 2,1 mm alto, 3,4 mm ancho; H: misma localidad, vista apical, 2,1 mm ancho; I: protoconcha 0,24 mm ancho, misma que H.

POS397/109-7; grab. • 20 shells; 29.750°N, 28.466°W; 291 m; 21 Mar. 2010; POS397/111-1; grab. • 25 shells; 29.750°N, 28.466°W; 292 m; 21 Mar. 2010; POS397/111-2; grab. • 10 shells; 29.750°N, 28.466°W; 293 m; 21 Mar. 2010; POS397/111-3; grab. • 1 shell; 29.816°N, 28.500°W; 298 m; 21 Mar. 2010; POS397/112-6; grab. • 3 shells; 29.749°N, 28.400°W; 293 m; 21 Mar. 2010; POS397/113-1; grab. • 12 shells; 29.683°N, 28.434°W; 288 m; 21 Mar. 2010; POS397/114-5; grab. • 31 shells; 29.683°N, 28.434°W; 289 m; 21 Mar. 2010; POS397/114-6; grab. • 40 shells; 29.683°N, 28.434°W; 289 m; 21 Mar. 2010; POS397/114-7; grab. • 41 shells; 29.750°N, 28.533°W; 319 m; 24 Oct. 2018; M151/23419-2; grab. Little Meteor Seamount • 1 shell; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab. • 30 shells; 29.655°N, 29.004°W; 464 m; 27 Oct. 2018; M151/23438; grab. • 28 shells; 29.645°N, 28.975°W; 284 m; 27 Oct. 2018; M151/23440; grab. • 5 shells; 29.633°N, 28.976°W; 282 m; 27 Oct. 2018; M151/23441; grab. • 18 shells; 29.633°N, 28.983°W; 274 m; 27 Oct. 2018; M151/23442; grab.

*Distribution:* SASC, 274–852 m (RUBIO *ET AL.*, 2015; this study).

*Remarks:* This species was described from the Great Meteor Seamount at 470 m (RUBIO *ET AL.*, 2015). It can be easily identified by its strong and coarsely reticulated sculpture. *P. rectangularis*

Rubio, Rolán & Fernández-Garcés, 2015 of Guadeloupe is similar but this species has a finer sculpture on the early teleoconch and a less pronounced outer lip. All remaining species in the genus have a dominant spiral sculpture with finer axial riblets.

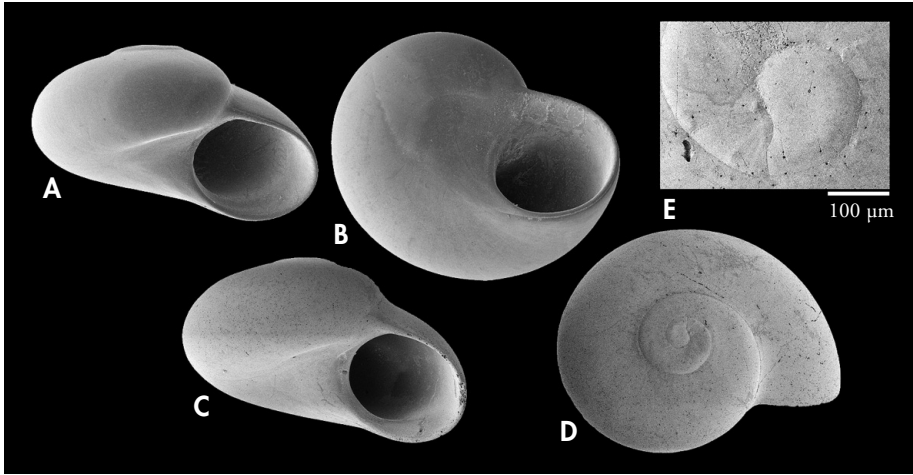


Figure 60. *Seamountiella dimidia* Rubio, Gofas & Rolán, 2019, Atlantis Seamount – M151/23404. A, B: H 1.3 mm, W 2.0 mm; C, D: same locality, H 1.3 mm, W 2.0 mm; E: protoconch W 0.22 mm, same as D.

Figura 60. *Seamountiella dimidia* Rubio, Gofas & Rolán, 2019. A, B: Banco Atlantis - M151/23404, 1,3 mm alto, 2,0 mm ancho; C, D: misma localidad, H 1,3 mm alto, 2,0 mm ancho; E: protoconcha 0,22 mm ancho, misma que D.

### Genus *Seamountiella* Rubio, Gofas & Rolán, 2019

Type taxon: *Tinostoma azorica* Dautzenberg & Fischer, 1896 by original designation, Azores.

RUBIO ET AL. (2019) provided a diagnosis for shells of the genus: solid, smooth and very shiny. Spire depressed, with flattened apex; periphery and base convex. Protoconch of 0.75 whorl, smooth. Teleoconch with an initial phase of 0.5 to 2 whorls, in which the whorl diameter increases slowly and there are marked growth lines, and a final phase of 1.1 to 2 whorls, in which the diameter of the whorl increases more rapidly. Um-

bilicus covered by columellar callus even in juvenile stage. Aperture rounded, slightly prosocline; columella arched; outer lip thin, smooth edge.

Four extant species are currently known globally (RUBIO ET AL., 2019), two of them live in the NE Atlantic: the type taxon *Seamountiella azorica* (Dautzenberg & H. Fischer, 1896) and *S. dimidia* Rubio, Gofas & Rolán, 2019. Both of them were found on the SASC.

### *Seamountiella azorica* (Dautzenberg & H. Fischer, 1896) (Fig. 59)

*Tinostoma azorica* Dautzenberg & Fischer, 1896: 485, pl. 21, figs. 16-18 [Type locality: Azores Islands, Pr. Alice, Stn 46, 1385 m - Stn 117, 2102 m].

*Seamountiella azorica*: RUBIO, GOFAS & ROLÁN, 2019: 251-258, figs. 1A-C, 3A-F, 4A-C.

**Material examined:** Azores, Mar da Prata • 21 shells; 37.673°N, 25.925°W; 595 m; 08 Oct. 2018; M151/23111; grab. • 17 shells; 37.661°N, 25.918°W; 599 m; 08 Oct. 2018; M151/23112; grab. • 2 shells; 37.659°N, 25.789°W; 599 m; 19 Oct. 2018; M151/23181; box core. Plato Seamount • 9 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge. Great Meteor Seamount • 9 shells; 29.565°N, 28.339°W; 944 m; 25 Oct. 2018; M151/23425-R6; ROV sample • 14

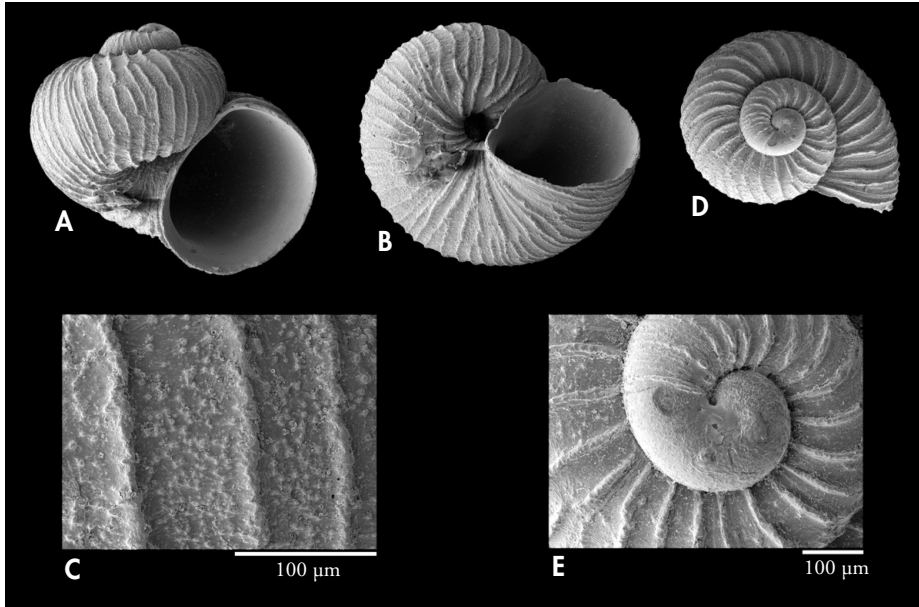


Figure 61. *Sceneia ponsonbyi* (Dautzenberg & H. Fischer, 1897). A, B: Tyro Seamount – SMT2/DW278, H 1.35 mm, W 1.52 mm; C: microsculpture, same as A; D: same locality, W 1.29 mm; E: protoconch W 0.29 mm.

Figura 61. *Sceneia ponsonbyi* (Dautzenberg y H. Fischer, 1897). A, B: Banco Tyro - SMT2/DW278, 1,35 mm alto, 1,52 mm ancho; C: microescultura, misma que A; D: misma localidad, 1,29 mm ancho; E: protoconcha 0,29 mm ancho.

shells; 29.568°N, 28.339°W; 855 m; 25 Oct. 2018; M151/23425-R9; ROV sample. • 2 shells; 30.082°N, 28.730°W; 1032 m; 26 Oct. 2018; M151/23429-R1; ROV sample. • 4 shells; 30.086°N, 28.726°W; 906 m; 26 Oct. 2018; M151/23429-R8; ROV sample. Little Meteor Seamount • 7 shells; 29.654°N, 29.015°W; 865 m; 27 Oct. 2018; M151/23434-R4; ROV sample. • 72 shells; 29.654°N, 29.015°W; 852 m; 27 Oct. 2018; M151/23436; grab. • 1 live-collected specimen, six shells; 29.654°N, 29.014°W; 811 m; 27 Oct. 2018; M151/23437; grab.

*Distribution*: Hatton Bank (HOFFMAN *ET AL.*, 2011), Azores (DAUTZENBERG & FISCHER, 1896; LOCARD, 1898; this study), SASC (RUBIO *ET AL.*, 2019; this study), Galicia Bank (RUBIO *ET AL.*, 2019), Lusitanian seamounts and banks (BECK *ET AL.*, 2006;

HOFFMAN & FREIWALD, 2017), off western Morocco (LOCARD, 1898), 470–4060 m.

*Remarks*: The genus has been tentatively placed in Skeneidae based on the radula and the operculum of *Seamountiella azorica* (RUBIO *ET AL.*, 2019).

### *Seamountiella dimidia* Rubio, Gofas & Rolán, 2019 (Fig. 60)

*Seamountiella dimidia* RUBIO, GOFAS & ROLÁN, 2019: 258–259, figs. 6A–C, 7A–F.

**Material examined**: Atlantis Seamount • 280 shells; 33.971°N, 30.206°W; 677 m; 21 Oct. 2018; M151/23404; grab. • 280 shells; 33.996°N, 30.177°W; 617 m; 21 Oct. 2018; M151/23408; grab. Plato Seamount • 5 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge. Little Meteor Seamount • 1 shell; 29.655°N, 29.004°W; 464 m; 27 Oct. 2018; M151/23438; grab.

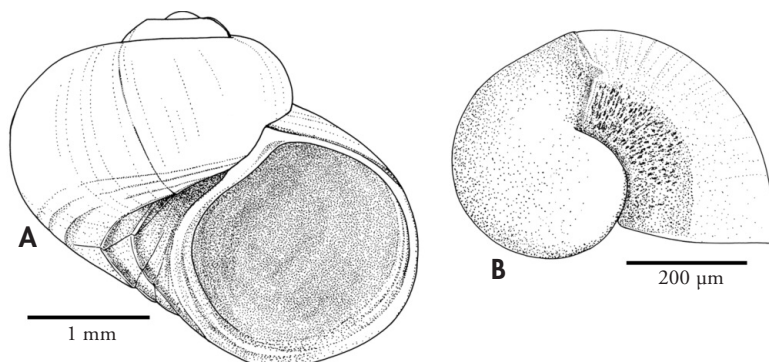


Figure 62. *Skenea basicarinata* n. sp. A: Tyro Seamount – SMT2/DW278, holotype, apertural view, H 2.7 mm; B: paratype 2, apical view of smooth protoconch, W 0.37 mm, followed by initial teleoconch with weak supraprotoconch cord.

*Figura 62. Skenea basicarinata* n. sp. A: Monte submarino Tyro - SMT2/DW278, holotipo, vista apertural, 2,7 mm alto; B: paratipo 2, vista apical de la protoconcha lisa, 0,37 mm ancho, seguida del inicio de la teleoconcha con cordón supraprotoconch débil.

*Distribution:* SASC, 280–1500 m (RUBIO ET AL., 2019; this study).

*Remarks:* *Seamountiella dimidia* is smaller than *S. azorica*, it has two differ-

entiated growth phases, it shows a protruding outer lip in adult specimens and it lacks a perforation in the parietal callus.

### Genus *Skenea* J. Fleming, 1825

Type taxon: *Helix serpuloides* Montagu, 1808 by subsequent designation. Its type locality is Devon, England.

The genus is used as a catchall for fragile, small depressed gastropods with a simple, smooth protoconch of less than one whorl. The spire may be flat or moderately raised, smooth or sculptured by spiral cords and/or axial ribs. Umbilicus may be open or closed. Aperture rounded, prosocline. Morphological variability of the shell within the genus is large. HASZPRUNAR ET AL. (2016) provided a complete anatomical description of the type species through

serial semi-thin sectioning and 3D reconstructions, and gave a diagnosis based on soft parts.

Near thirty extant species are currently known globally, most of them living in the NE Atlantic and some of them probably unrelated to the type species. *Skenea ponsonbyi* (Dautzenberg & H. Fischer, 1897) was encountered in the SASC and one additional new species is proposed below: *Skenea basicarinata* n. sp.

### *Skenea ponsonbyi* (Dautzenberg & H. Fischer, 1897) (Figs. 61A-E)

*Cyclostrema ponsonbyi* Dautzenberg & H. Fischer, 1897: 176, pl. 4 figs. 12-14.

**Material examined:** Atlantis Seamount • 1 shell; 34.412°N, 30.513°W; 795–830 m; 03 Feb. 1993; SMT2/DW264; dredge. Tyro Seamount • 2 shells; 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge.



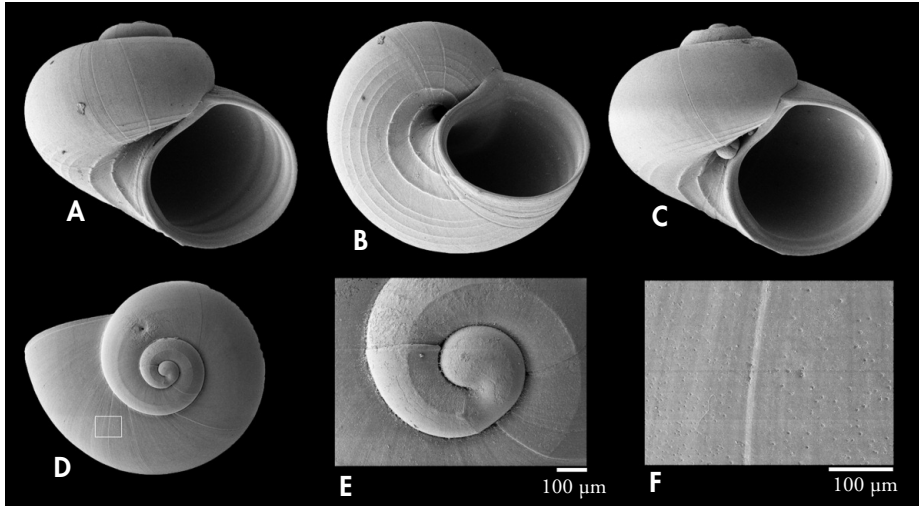


Figure 63. *Sceneia basicarinata* n. sp. A, B: Tyro Seamount – SMT2/DW278, holotype, H 2.7 mm, W 3.3 mm; C: paratype 1, same locality, H 2.8 mm, W 3.4 mm; D: paratype 2, same locality, W 3.4 mm; protoconch W 0.37 mm, same as D; F: magnified surface of the framed area on D.

Figura 63. *Sceneia basicarinata* n. sp. A, B: Banco Tyro - SMT2/DW278, holotipo, 2,7 mm alto, 3,3 mm ancho; C: paratipo 1, misma localidad, 2,8 mm alto, 3,4 mm ancho; D: paratipo 2, misma localidad, 3,4 mm ancho; E: protoconcha 0,37 mm ancho, misma que D; F: superficie enmarcada en D, aumentada.

**Distribution:** Azores (DAUTZENBERG & H. FISCHER, 1897) and SASC (this study), 795–1600 m.

**Remarks:** *Sceneia ponsonbyi* is provisionally placed in the genus *Sceneia* based on its protoconch and outline; it is a skeneimorph but its systematic place-

ment is uncertain, and a new genus is not pertinent until the soft parts are known.

The three specimens from the SASC were juveniles. The specimen described and illustrated by DAUTZENBERG & H. FISCHER (1897) has a height of 2.7 mm.

### *Sceneia basicarinata* n. sp. (Figs. 62, 63)

**Type material:** Holotype, Tyro Seamount • 1 shell (Figs. 63A-B); 33.963°N, 28.373°W; 890–925 m; 06 Feb. 1993; SMT2/DW278; dredge, in sediment with live and dead corals, live sponges, brachiopods, echinoderms and crustaceans; MNHN-IM-2000-35683. *Paratypes:* • 1 shell (Figs. 63C-F); same data as for holotype; MNHN-IM-2000-35684. • 2 shells; same data as for holotype; MNHN-IM-2000-35685.

**Other material examined:** Atlantis Seamount • 4 shells; 34.412°N, 30.513°W; 795–830 m; 03 Feb. 1993; SMT2/DW264; dredge. Plato Seamount • 2 shells; 33.210°N, 29.287°W; 1450–1500 m; 01 Feb. 1993; SMT2/DW250; dredge. Great Meteor Seamount • 1 shell; 29.750°N, 28.533°W; 319 m; 24 Oct. 2018; M151/23419-2; grab.

**Type locality:** Tyro Seamount – 33.963°N – 28.373°W, 890–925 m.

**Etymology:** *basicarinata* refers to the strong umbilical cords.

**Holotype, an empty shell (Figs. 63A-B):** Small (H 2.7 mm, W 3.3 mm), moderately solid shell with a flattened apex, convex whorls, strong basal spiral cords, white.

**Protoconch:** ½ whorls, large nucleus, smooth, with convex lip, W 0.37 mm. Slightly raised above teleoconch. Transition to teleoconch inconspicuous by fine

lip and teleoconch with spiral cord (Fig. 63E of paratype 2).

Teleoconch: 2 ½ rounded whorls. Suture shallow, impressed.

First whorl with one weak, smoothly rounded cord on the shoulder, fading away towards second whorl. Surface smooth with few fine growth markings. Microsculpture with numerous rounded shallow pits, pit diameter about 1–3 µm. Body whorl descending, supraparipheral cord faded,

Base of body whorl with six spiral cords, two strong smooth cords widely spaced outside umbilical area, four fine cords closely spaced near periphery. Umbilicus open, narrow, deep, tortuous, partly covered by columellar callus. Inside smooth with few coarse growth lines.

## DISCUSSION

Schematic distributions of skeneimorph species known from the SASC, the Azores and the Lusitanian seamounts are given in Tables I and II. The species in Seguenzioidea are listed in Table I and those in Skeneidae are given in Table II. The species from the Azores have been mainly reported by DAUTZENBERG & FISCHER (1897), RUBIO *ET AL.* (2015) or were found during cruise M151. Those from the Lusitanian seamounts have been mentioned by BECK *ET AL.* (2006) and HOFFMAN & FREIWALD (2017). The skeneimorphs from the wider NE Atlantic region have been mostly reported on by WARÉN (1992), and HOFFMAN *ET AL.* (2008, 2010, 2018) and some unreported specimens are retained in the reference collection in SaM. The species from the NW Atlantic were listed in ROSENBERG (2009), RUBIO *ET AL.* (2011) or from material in the collection in SaM; the latter was collected in various deep-water coral locations along the eastern coast of the U.S.A. and in the Gulf of Mexico.

The biodiversity of skeneimorph species belonging to Seguenzioidea and Trochoidea on the SASC is relatively high when compared to most molluscan

Aperture 60% of shell height, nearly circular with slight indent at parietal side, angular near the union with penultimate whorl, which is perpendicular. Peristome thick, smooth and rounded, outer lip prosocline at 20° with spire axis, opening plane nearly flat. Columella curved. Callus thick and smooth with thickened rim inside columellar and parietal lip, inside of whorl smooth with slight undulating growth markings.

*Distribution:* SASC, 319–1500 m.

*Remarks:* The placement in the genus *Skenea* is based on the protoconch and its similarity with the type species, *Skenea serpuloides*, and *Skenea basistriata* (Jeffreys, 1887). The latter has more, but weaker spiral cords in the umbilical area and frequently weak spiral cords on the upper whorl surface.

superfamilies; 46 species were identified, 32 of which were assigned to Seguenzioidea and 14 to Trochoidea (Skeneidae). Seventeen taxa are newly described in this paper.

Three species are transferred to different genera: *Trenchia xenos* is a new combination for *Xyloskenea xenos* Hoffman, van Heugten & Lavaleye, 2010, *Mikro minima* is a new combination for *Trochus (Margarites) minima* Seguenza, 1876 and *Mikro scalaroides* for *Lissotesta scalaroides* Rubio & Rolán, 2013.

Twelve species are currently only known from the SASC (26%) and they are likely endemic to this area. Nine additional species also occur on the seamounts near the Azores; 21 species or 46% are therefore only known from the SASC and/or the Azores seamounts and these can be considered as endemic to this larger area (Fig. 1B). GOFAS (2003) discussed a complete endemism in the genus *Trituba* within Cerithiopsidae from the SASC. Likewise, GOFAS (2007) pointed out that near 80% of Rissoidae are presumed to be endemic of the SASC, and HOFFMAN *ET AL.* (2020a) that about 50% of the Seguenziidae are pro-

Table I. Distribution of bathyal “skeneimorph” Seguenzioidea species known from the SASC, the Azores and the Lusitanian seamounts. The NE and NW Atlantic are indicated for those species also known outside the first three key regions. Coding used for distribution classes, M: SASC only; A: SASC and Azores seamounts; S: SASC, Azores and Lusitanian seamounts; X: NE Atlantic; W: amphiatlantic.

*Tabla I. Distribución de especies de Seguenzioidea “skeneimorfos” batiales conocidas de la SASC, Azores y montes submarinos lusitánicos. El Atlántico NO y NE se indican para aquellas especies que también se conocen fuera de las tres primeras regiones clave. Codificación utilizada para las categorías de distribución, M: SASC solamente; A: montes submarinos de la SASC y Azores; S: SASC, montes submarinos de Azores y lusitánicos; X: NE Atlántico; W: anfíatlántico.*

SEGUENZIOIDEA	NW Atlantic	MET	HY	IRV	PLA	TYR	ATL	Azores	Lusitan. SMTs	NE Atlantic
TOTAL SPECIES	5	32						16	23	23
<i>Rugulina fragilis</i>	W				W		W	W	W	W
<i>Trochalis islandica</i>	W				W					W
<i>Trochalis versiliensis</i>		X				X	X	X		X
<i>Trochalis fortis</i> n. sp.		M								
<i>Trochalis carinata</i> n. sp.					M					
<i>Trochalis platoensis</i> n. sp.					M					
<i>Eudaronia aperta</i>		X							X	X
<i>Eudaronia mikra</i> n. sp.					M		M			
<i>Eudaronia spirata</i> n. sp.					M					
<i>Adevomphalus ammoniformis</i>					X				X	X
<i>Adevomphalus axistriatus</i> n. sp.					M					
<i>Adevomphalus curvistriatus</i> n. sp.					M					
<i>Adevomphalus densicostatus</i>					X			X	X	X
<i>Adevomphalus sinuosus</i>					X					X
<i>Palazzia planorbis</i>	W								W	W
<i>Akritogyra curvilineata</i>									X	X
<i>Akritogyra similis</i>					X		X	X	X	X
<i>Anekes anderswareni</i> n. sp.		S	S		S	S	S	S	S	
<i>Anekes mikrosculpta</i> n. sp.		A			A	A	A	A		
<i>Anekes paucistriata</i>		X	X		X	X	X	X	X	X
<i>Anekes sculpturata</i>									X	X
<i>Anekes umbiliculpta</i> n. sp.		A						A		
<i>Anekes varisculpta</i> n. sp.		A			A	A	A	A		
<i>Granigyra granulifera</i>		X							X	X
<i>Granigyra pruinosa</i>									X	X
<i>Granigyra tenera</i>									X	X
<i>Retigyra granulosa</i>									X	X
<i>Retigyra iheringi</i>					A			A		
<i>Lissotesta gittenbergeri</i>								X	X	X
<i>Lissotesta turrita</i>									X	X
<i>Moelleriopsis messanensis</i>									X	X
<i>Moelleriopsis richardi</i>					S	S	S	S	S	
<i>Moelleriopsis normani</i>					S			S	S	
<i>Moelleriopsis atlantis</i> n. sp.		A			A	A	A	A		
<i>Moelleriopsis gritta</i> n. sp.		A			A		A	A		
<i>Moelleriopsis meteorminora</i> n. sp.		M								
<i>Xyloskenea naticiformis</i>	W	W			W	W	W		W	W
<i>Xyloskenea translucens</i>	W	W					W		W	
<i>Trenchia biangulata</i>							X		X	X
<i>Trenchia teriuga</i> n. sp.		A			A	A	A	A		
<i>Trenchia xenos</i> comb. nov.		X			X	X	X	X		X

Table II. Distribution of bathyal “skeneimorph” Trochoidea species known from the SASC, the Azores seamounts and the Lusitanian seamounts. Same codes as for Table I.

Tabla II. Distribución de especies de Trochoidea “skeneimorfos” batiales conocidas de la SASC, montes submarinos de Azores y montes submarinos lusitánicos. Mismos códigos que en Tabla I.

SKENEIDAE	NW Atlantic	MET	HY	IRV	PLA	TYR	ATL	Azores	Lusitan.	SMTs	NE Atlantic
TOTAL SPECIES	1	14						7		7	12
<i>Cisonella romettensis</i>									X		X
<i>Cisonella ateles</i>		A	A	A	A	A	A	A			
<i>Cisonella gaudryi</i>		X	X		X	X	X	X			X
<i>Dikoleps cutleriana</i>									X		X
<i>Dikoleps nitens</i>									X		X
<i>Ganesa nitidiuscula</i>	W	W			W	W	W	W	W		W
<i>Lissomphalia bithynoides</i>									X		X
<i>Lopheliella rockallensis</i>		X									X
<i>Lopheliella moolenbeeki</i>		X									X
<i>Mikro giustii</i>									X		X
<i>Mikro globulus</i>		X			X	X	X				X
<i>Mikro hattonensis</i>					X	X					X
<i>Mikro minima</i> n. comb.		X			X	X		X	X		X
<i>Mikro perforata</i> n. sp.					M						
<i>Mikro scalaroides</i> n. comb.					M						X
<i>Parviturbo azoricus</i>								A			
<i>Parviturbo seamountensis</i>		M	M	M	M		M				
<i>Seamountiella azorica</i>		X	X	X	X		X	X	X		X
<i>Seamountiella dimidia</i>		M	M	M	M		M				
<i>Skenea ponsonbyi</i>						A	A	A			
<i>Skenea basicarinata</i> n. sp.		M			M	M	M				

bably also endemic on these seamounts. Likewise, HOFFMAN ET AL. (2020b) noted an endemicity of 91% in the genus *Papuliscala* within Epitoniidae, and GOFAS & HOFFMAN (2020) reported an endemicity of 42% in the genus *Calliostoma*. The isolated location of the SASC has probably contributed to this high degree of endemism.

Five amphiatlantic species were found (11% of SASC species): *Ganesa nitidiuscula* Jeffreys, 1883, *Rugulina fragilis* (G.O. Sars, 1878), *Trochaclis islandica* Warén, 1989, *Xyloskenia naticiformis* Jeffreys, 1883 and *Xyloskenia translucens* (Dall, 1927). The occurrence of some of these amphiatlantic taxa was to be expected assuming that a suitable habitat for this fauna exists on the SASC.

Six new species were solely encountered in one dredge sample on the Plato

Seamount (SMT2/DW250, 1400–1500 m): *Trochaclis carinata* n. sp., *Trochaclis platoensis* n. sp., *Adeuomphalus axistriatus* n. sp., *Adeuomphalus curvistriatus* n. sp., *Eudaronia spirata* n. sp. and *Mikro perforata* n. sp. Obviously, it can be expected that more skeneimorph species are to be discovered on the SASC once more extensive sampling is done.

Most of the encountered skeneimorph taxa have a wide bathymetric range, some of them occurring deeper than 2000 m (see SYSOEV, 2014); about 50% of them are known from the continental slopes, banks and seamounts of the NE Atlantic Ocean. Few species are also known in the western Mediterranean Sea. It is likely that the origin of most skeneimorph species is from the north-eastern Atlantic.

The simple protoconchs of skeneimorph species suggest a non-plank-

trophic larval development. It is yet unknown how some vetigastropods manage to cross abyssal gaps of some 1000 km in the central Atlantic without suitable bathyal habitats as stepping stones, whereas other species are restricted to a smaller distribution area like the SASC. One possibility as a consequence of their small size is drifting as adults in the plankton, as was documented for *Anekes paucistriata* by WARÉN (1992). The skeneimorph taxa of the SASC seem to have a similar restricted distribution and dispersal capability as other vetigastropods such as the species of *Clelandella* within Trochidae (GOFAS, 2005), Seguenziidae (HOFFMAN *ET AL.*, 2020a), and Calliostomatidae (GOFAS & HOFFMAN, 2020).

Only *Trochaclis versiliensis*, *Eudaronia spirata*, *Trenchia xenos*, *Cirsonella gaudryi* and *Seamountiella azorica* were collected alive and were found dry inside their shells during sorting through the large volume of sediment. The strikingly low number of live-collected specimens compared to shells may be explained by the sedimentological setting of the seamounts (VON RAD, 1974). There is no terrigenous input, the pelagic sediment consisting of foraminiferal and pteropod shells is so light that it is immediately winnowed to deeper parts. The only sig-

nificant sources of sediment on the summit platforms are the products of local erosion and the benthic calcareous remains produced in situ, including shells. This may explain why the sediment contains relatively large quantities of shells, some of which may be hundreds or thousands of years old.

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