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New northern Atlantic species of the family Fissurellidae (Gastropoda, Vetigastropoda)

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Key words: Mollusca, Gastropoda, *Cornisepta*, *Profundisepta*, *Fissurisepta*, Cape Verde, Mid Atlantic Ridge, biodiversity, taxonomy, new species.

Four species of the family Fissurellidae were identified from two deep bathyal samples from the Cape Verde Islands and on the Mid-Atlantic Ridge. *Cornisepta magna* spec. nov. is described from off São Nicolau, Cape Verde islands. *Cornisepta microphyma*, *Profundisepta bipolar* spec. nov. and an undescribed species of the genus *Fissurisepta* were found on the Mid Atlantic Ridge.

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INTRODUCTION

New species of the family Fissurellidae (Vetigastropoda) are presented here. The identification of new species is the result of a general review of poorly known vetigastropod species collected in two bathyal samples from the northern Atlantic Ocean during the CANCAP VI expedition (1982 by R/V Tydeman) to the Cape Verde Islands and from the JGOFS IV expedition (1990 by R/V Tyro) to the northern Mid-Atlantic Ridge. The CANCAP VI expedition aimed to study the benthic fauna of the Cape Verde archipelago. The JGOFS IV expedition focused on the benthic processes near the Mid-Atlantic Ridge as part of the Joint Global Ocean Flux Study.

The Fissurellidae occur in all the world's oceans from the littoral zones to the abyssal depths. This study discusses a

few poorly-known and new Atlantic species in the genera *Cornisepta* J. H. McLean & Geiger, 1998, *Profundisepta* J. H. McLean & Geiger, 1998 and *Fissurisepta* Seguenza, 1863.

Examples of important historical records of Atlantic species in *Profundisepta* are Jeffreys (1877: on the type species *P. profundi*), Watson (1883: *P. sportella*) and Dautzenberg & Fischer (1897: *P. alicei*). Historical accounts of the genus *Cornisepta* include those by Seguenza (1863: *C. rostrata*), Watson (1883: *C. acuminata*) and Dautzenberg & Fischer (1897: *C. microphyma*). Historical records for *Fissurisepta* include Seguenza (1863: *F. papillosa*), Watson (1883: *F. oxia*) and Jeffreys (1883: *F. granulosa*).

Recent studies of Atlantic species in the three genera have been carried out by McLean & Geiger (1998), Simone & Cunha (2014), Barrio González (2015) and Hoffman & Freiwald (2023). McLean & Geiger (1998) introduced the genera *Cornisepta* and *Profundisepta*, they discussed all previously known Atlantic species in *Fissurisepta* and described two new species in *Cornisepta*. Simone & Cunha (2014) reviewed a large group of new deep-water fissurellids from off the coast of southern Brazil. They described three new species in *Cornisepta* and one in *Profundisepta*. Barrio González (2015) reviewed species in the three genera from the Azorean seamounts, the Lusitanian seamounts and the Galicia Bank. Hoffman & Freiwald (2023) reported on species in *Cornisepta* and *Profundisepta* from seamounts south of the Azores and they described a new species in *Profundisepta*. Cunha et al. (2019) studied the molecular phylogeny of the fissurellid genera; their work is the basis for the current generic assignments.

MATERIAL AND METHODS

The material studied was collected from a bathyal station during the CANCAP VI cruise (1984) off São Nicolau, Cabo Verde Islands, and from a bathyal station during the

SGORV-IV cruise (1985) off the Mid Atlantic Ridge. Sampling was carried out with an Agassiz trawl (CANCAP) and a box corer (JGOFS IV). No live fissurellid specimens were found in the samples studied.

The imaging procedure was described in Hoffman & Freiwald (2023). All material is kept at the Naturalis Biodiversity Center in Leiden, the Netherlands.

Abbreviations. – Morphological: H = height of the shell in mm; L = length of a shell in mm; W = width of a shell in mm. Institutes: RMNH = Rijksmuseum voor Natuurlijke Historie, now Netherlands Center for Biodiversity – Naturalis, Leiden, the Netherlands.

SYSTEMATIC RESULTS

Class Gastropoda Cuvier, 1795

Subclass Vetigastropoda Salvini-Plawen, 1980

Superfamily Fissurelloidea J. Fleming, 1822

Family Fissurellidae J. Fleming, 1822

Genus *Cornisepta* J. H. McLean & Geiger, 1998

Type species (by original designation): *Fissurisepta antarctica* Egorova, 1972.

***Cornisepta microphyma* (Dautzenberg & H. Fischer, 1896)**

Figs 1-2

Fissurisepta microphyma Dautzenberg & Fischer, 1896: 492-493, pl. 22 fig. 14. Type locality: Azores, 861 m.

Cornisepta microphyma — Barrio González, 2015: 188, figs 61A-C.

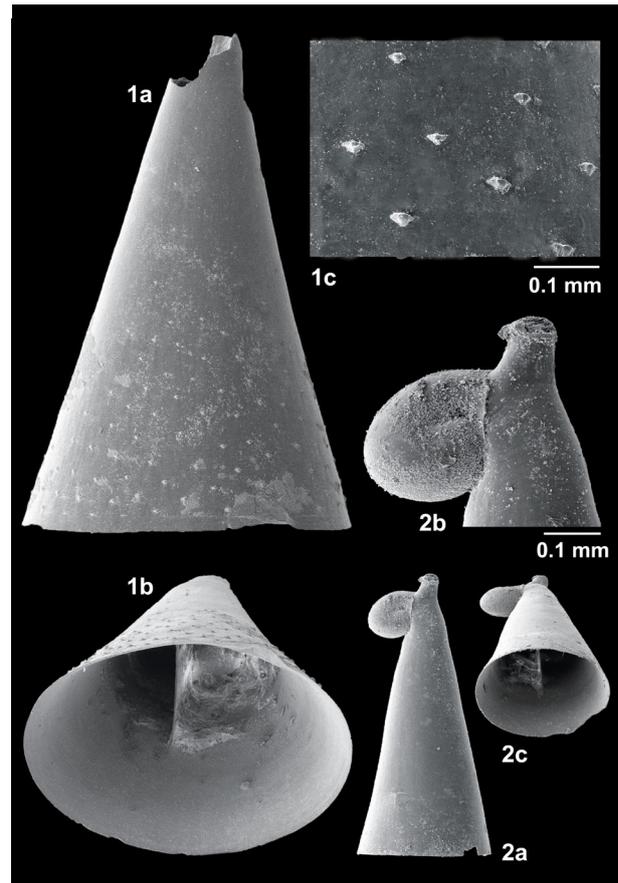
Cornisepta corrali [nomen nudum] — Barrio González, 2015: 201-226.

Cornisepta microphyma — Gofas et al., 2021: 13, pl. 2 fig. 6.

Cornisepta microphyma — Hoffman & Freiwald, 2023: 84-85, figs 16a-c.

Material examined (6 shells). — **Mid Atlantic Ridge.** 6 shells; 48°21.3'N, 27°9.1'W; depth 2162 m; 18.vi.1990, box core, JGOFS-IV/T90-108 (Figs 1-2), RMNH.MOL.453811.

Remarks. — The taxon can be identified by its fine tubercles in a quinquex arrangement and its highly elevated conical shape. We illustrate a juvenile specimen with protoconch, a small tubular apical opening and smooth teleoconch with sharp apical angle (Figs 2a-b). The initial tubercles on the teleoconch are minute (Figs 1a, 1c). The species has been recorded from the Rockall Bank (Hoffman et al. 2011), the Galicia Bank (Gofas et al., 2019), the Azorean (Barrio González, 2015; Hoffman & Freiwald, 2023) and Lusitanian seamounts (Barrio González, 2015), and the Mid-Atlantic Ridge (this study).



Figs 1-2. *Cornisepta microphyma*. Mid Atlantic Ridge, JGOFS-IV/T90-108, RMNH.MOL.453811. **1a-c.** juvenile specimen, H 2.5 mm, L 1.1 mm, W 1.1 mm. **1a.** Side view. **1b.** Basal view. **1c.** External sculpature near margin. **2a-c.** Juvenile specimen, H 1.4 mm, L 0.7 mm, W 0.4 mm. **2a.** Side view. **2b.** Protoconch diameter 0.20 mm. **2c.** Basal view.

***Cornisepta magna* spec. nov.**

Figs 3-4

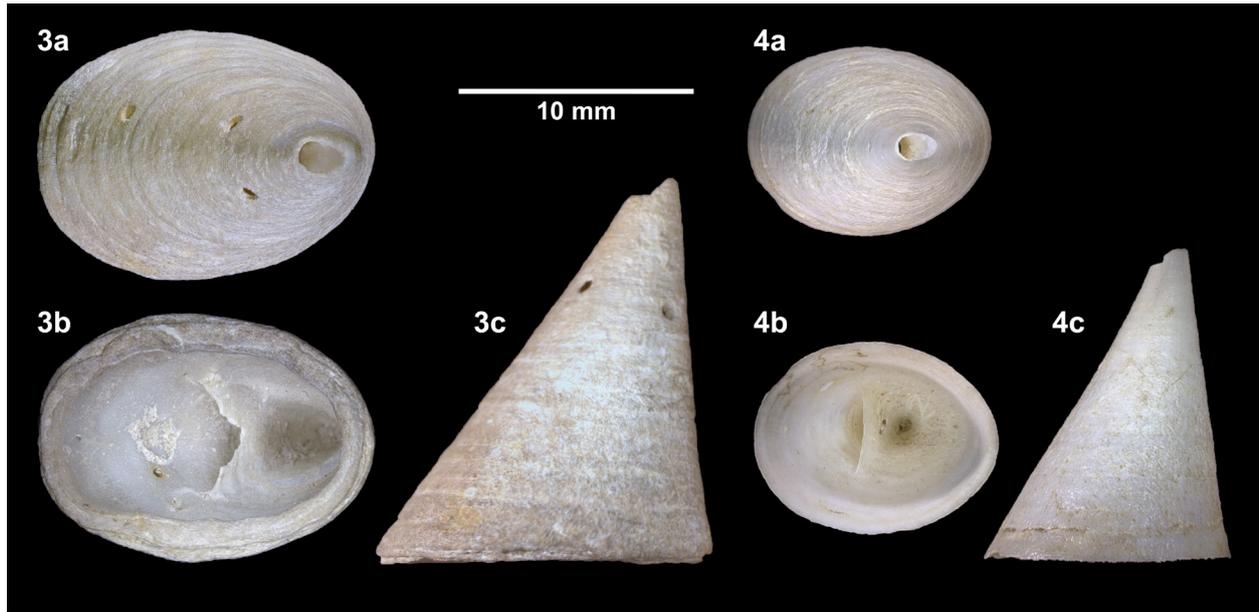
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Type material (2 shells). — **Cape Verde Islands.** Holotype (Figs 3a-c); SW of São Nicolau; 16°23'N, 24°37'W; depth 3000-3250 m; 14/15.vi.1982; CANCAP 6.092; 3.5 m Agassiz trawl; RMNH.MOL.453812. Paratype (Figs 4a-c); same locality as holotype; RMNH.MOL.453813.

Type locality. — Cape Verde Islands, SW of São Nicolau; 16°23'N, 24°37'W; depth 3000-3250 m.

Etymology. — The name refers to the large size of the species.

Description. — Shell size maximum for genus (length 14 mm, height 16 mm, width 10 mm), solid shell with elevated obliquely conical outline, oblong aperture, oval apical foramen with septum nearly perpendicular to the aperture plane. Colour white.



Figs 3-4. *Cornisepta magna* spec. nov. Cape Verde Islands, CANCAP 6.092, 3000 m. **3a-c.** Paratype, RMNH.MOL.453812, H 16 mm, L 14 mm, W 10 mm, apical angle 42°. **3a.** Apical view. **3b.** Basal view. **3c.** Side view. **4a-c.** RMNH.MOL.453813, Holotype, H 13 mm, L 10 mm, W 8 mm, apical angle 39°. **4a.** Apical view. **4b.** Basal view. **4c.** Side view. Anterior side left.

Protoconch unknown. Teleoconch: Apical angle about 40°; anterior outline straight, angle 60° with apertural plane; posterior slightly concave, about 80° with apertural plane. Apertural plane flat, oblong outline, more convex posteriorly. Foramen obliquely broken off, oblong, more convex posteriorly, septum placed posteriorly. Sculpture with numerous irregular co-marginal growth lines; no radial sculpture. Internally smooth with strong thickening of anterior and side margins (forming flat marginal rim in paratype). Septum present at apical half of shell, placed at 40% from anterior end, obliquely curved from posterior end foramen, sharp slightly convex margin, perpendicular at union with internal shell. Apertural margin thick, bevelled. Soft parts unknown.

Variability: Adult height 13-16 mm. Posterior outline ranges from straight to slightly concave.

Distribution. — Only known from type locality.

Remarks. — Generic placement is based on its morphological similarity to the type species and to most species in the genus; it shares the obliquely conical teleoconch with an oval foramen. The lack of microsculpture, the broad bevelled margin and the large shell dimensions are unique within the genus. All hitherto known congeneric species have a height of less than 10 mm, most of the species less than 5 mm. *Cornisepta rostrata* (Seguenza, 1863) and *C. microphyma* (Dautzenberg & H. Fischer, 1896) are found in the NE Atlantic, including the Azores, they are smaller (up to 6 mm in height) and have regularly aligned granules (Barrio González, 2015; Hoffman & Freiwald, 2023);

our species is larger (up to 16 mm) and is smooth except for the growth markings. *Cornisepta acuminata* (R.B. Watson, 1883) from the western Atlantic also has a granular sculpture and is smaller (up to about 6 mm). Simone & Cunha (2014) described *Cornisepta uirapa*, *C. arrepiata* and *C. aninga* from off SE Brazil; all are smaller (maximum 3-5 mm) and have a regular granular sculpture. McLean & Geiger (1998) illustrated the type species *Cornisepta antarctica* (Egorova, 1972) from Antarctica and *C. pacifica* (Cowan, 1969), *C. verenae* J. H. McLean & Geiger, 1998 and *C. levinae* J. H. McLean & Geiger, 1998 from the NE Pacific; all are smaller than 5 mm and most have a granular microsculpture. *C. pacifica* is less elevated with a curved conical outline and is smooth.

The paratype shows four predation holes.

Genus *Profundisepta* J. H. McLean & Geiger, 1998

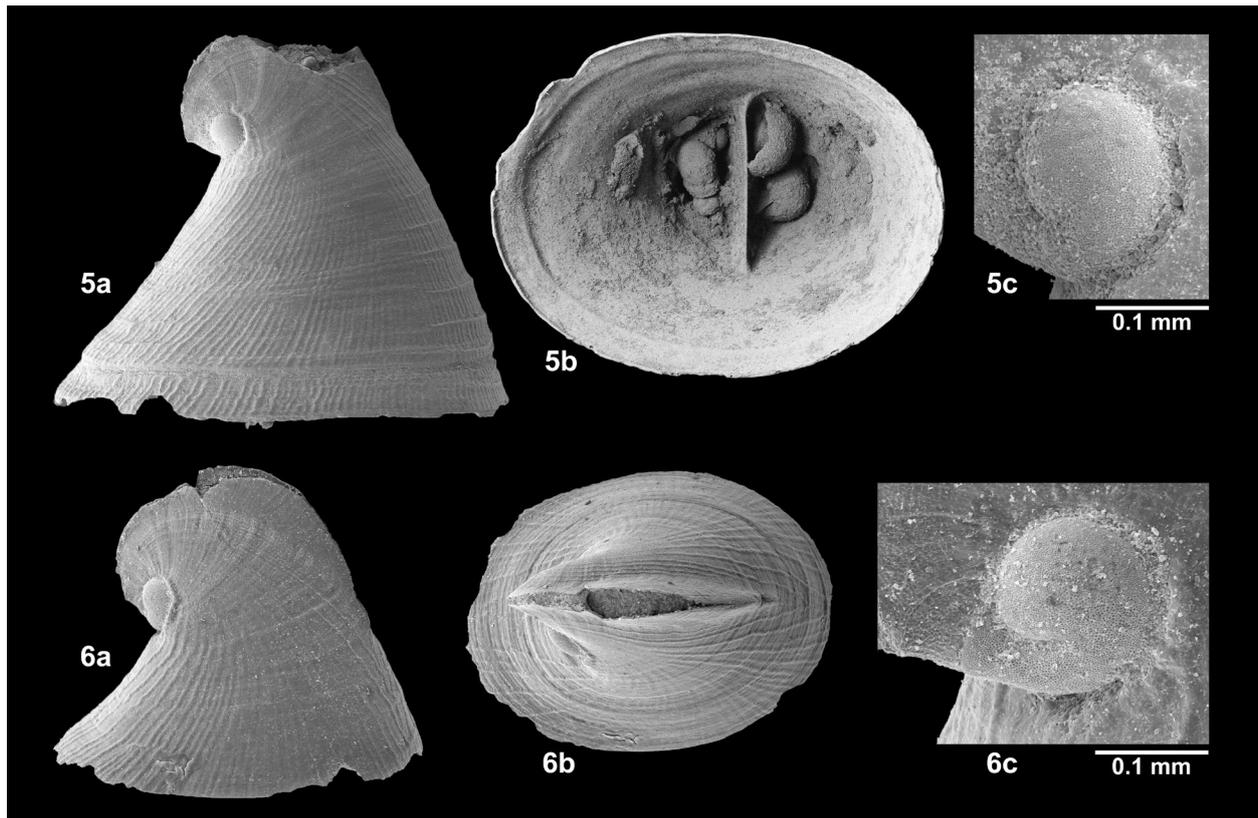
Type species (by original designation): *Puncturella profundifundi* Jeffreys, 1877.

Profundisepta bipolar spec. nov.

Figs 5-6

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Type material (9 shells). — **Mid Atlantic Ridge.** Holotype (SEM sample; Figs 5a-c); 48°21.3'N, 27°9.1'W; depth 2162 m; 18.vi.1990, box core, JGOFS-IV/T90-108; RMNH.MOL.453814.



Figs 5-6. *Profundisepta bipolar* spec. nov., Mid Atlantic Ridge, JGOFS-IV/T90-108. **5a-c.** Holotype, RMNH.MOL.453814, H 1.6 mm, L 1.8 mm, W 1.4 mm. **5a.** Side view. **5b.** Basal view. **5c.** Protoconch diameter 0.19 mm. **6a-c.** Paratype, RMNH.MOL.453815, H 1.1 mm, L 1.2 mm, W 0.9 mm. **6a.** Side view. **6b.** Apical view. **6c.** Protoconch diameter 0.20 mm.

Paratypes: • 1 shell (SEM sample; Figs 6a-c), same locality as holotype, RMNH.MOL.453815; • 7 shells; same locality as holotype; RMNH.MOL.453816.

Type locality. — Mid Atlantic Ridge, 48°21.3'N, 27°9.1'W; depth 2162 m.

Etymology. — The name refers to the two sets of spiral cordlets drawn to either anterior or posterior sides as if they were magnetic poles.

Description. — Small (length 1.8 mm, height 1.6 mm, width 1.4 mm), fragile, conical shell with elevated conical outline, radiating smooth cordlets, oblong aperture, lanceolate apical foramen with near vertical septum inside. Colour white.

Protoconch: placed obliquely to length axis, posterior to foramen. Protoconch $\frac{3}{4}$ whorl, compact, lip without terminal rim; sculpture with shallow pits (diameter 1-3 μ m) loosely arranged in hexagonal pattern; maximum diameter protoconch 200 μ m.

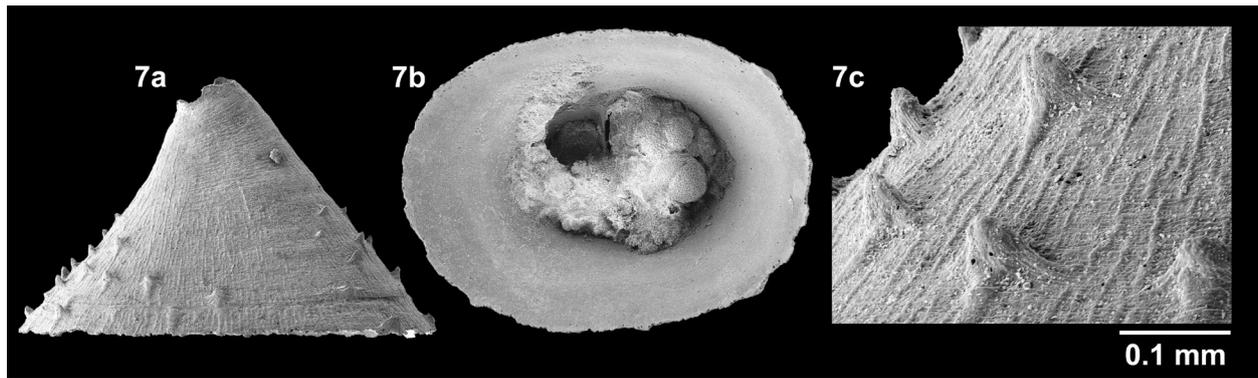
Teleoconch: Anterior outline slightly convex; posterior slightly concave; base oblong, more convex anteriorly. Foramen elongated lanceolate. Sculpture with many fine, smooth, slightly irregularly spaced radial cordlets, occasionally bifurcating or merging or intercalated; radiating abapically from the anterior shell face; curved towards pos-

terior shell face; cordlets diverging left and right of foramen. Irregular fine co-marginal growth lines. Internally smooth with imprint of growth stages. Septum present at apical interior of shell, placed at about 40% from anterior end, obliquely descending from posterior end foramen, straight basal margin, curved towards anterior at union with internal shell. Margin of aperture sharp; apertural plane flat. Soft parts unknown.

Variability: Adult length up to 2.0 mm; 100-150 radial cordlets.

Distribution. — Only known from type locality.

Remarks. — The generic placement is based on its similarity to the type species *P. profundus*; it shares the conical teleoconch with apical lanceolate foramen and the protoconch that is retained in the adult stage. Most previously known species in *Profundisepta* have granular axial sculpures; the fine spiral cordlets diverging around the foramen are unique (Simone & Cunha, 2014; Barrio González, 2015; Hoffman & Freiwald, 2023). *P. alicei* Dautzenberg & H. Fischer, 1896 from the Azorean seamounts has a similar outline but its teleoconch is smooth. Only empty shells of the present species have been found, all in the same sample at 2162 m in bioclastic sand.



Figs 7a-c. *Fissurisepta* sp., Mid Atlantic Ridge, JGOFS-IV/T90-108, RMNH.MOL.453817, juvenile shell, H 1.2 mm, L 1.9 mm, W 1.4 mm. 7a. Side view. 7b. Basal view. 7c. External sculpture near posterior margin.

Genus *Fissurisepta* Seguenza, 1863

Type species (designated by Woodring, 1928, Miocene mollusks from Bowden, Jamaica, 2: 454): *Fissurisepta papillosa* Seguenza, 1863.

Fissurisepta sp.

Fig. 7

Material examined (1 shell). — **Mid Atlantic Ridge.** 48°21.3'N, 27°9.1'W; depth 2162 m; 18.vi.1990, box core, JGOFS-IV/T90-108; RMNH.MOL.453817.

Remarks. – Generic placement is based on the similarity to the type species (Seguenza, 1863; Hoffman & Freiwald, 2018) or to *Fissurisepta granulosa* Jeffreys, 1883 (Hoffman et al. 2011). The present species is undescribed, but only one juvenile fragmentary shell is available, making a formal description unreliable. The shell has a characteristic sculpture of raised spines with three roots (one oriented towards the margin and two along growth lines) in a quinquex arrangement on the abapical half of the dorsum, which has numerous fine, irregular, discontinuous as well as branched, axial riblets and fine irregular growth lines. The central foramen is oval in shape. The apertural plane is flat with a sharp margin. The inner shell is smooth with a steeply raised oblique septum.

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