



## Two new species of *Teretia* (Gastropoda: Raphitomidae) from West Africa

### Dos nuevas especies de *Teretia* (Gastropoda: Raphitomidae) de África occidental

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#### ABSTRACT

Two new species from West Africa of the genus *Teretia* Norman, 1888 are described and figured. The new species are compared with those previously known from the study area, while two peculiar shells may represent additional new species but are not described as new based on single specimens. A new combination is proposed as *Teretia strongyla* for *Mangilia sericifila strongyla*, Dall, 1927.

#### RESUMEN

Se describen e ilustran dos nuevas especies del género *Teretia* Norman, 1888 recolectadas en África Occidental. Las nuevas especies son comparadas con las previamente conocidas en el área de estudio. Dos conchas peculiares más, podrían representar otras nuevas especies pero no reciben nombre debido a ser ejemplares únicos. Se propone la nueva combinación *Teretia strongyla* para *Mangilia sericifila strongyla*, Dall, 1927.

#### INTRODUCTION

The genus *Teretia* Norman, 1888 belongs to the family Raphitomidae Bellardi, 1875 (BOUCHET ET AL., 2011). Authors usually indicated that it includes species from the Miocene and Pliocene of Europe and Recent species from Europe south to Angola. There are however real *Teretia* from other areas hidden under other generic names in the literature, such as *Acrobela acus*, described by BARNARD (1958) from South African part of the Indian Ocean or *Mangilia sericifila strongyla*, described by DALL (1927) from the Atlantic coast of the USA.

Recently, MORASSI & BONFITO (2015) reviewed the fossil occurrences of the

genus and have extended its range describing four Recent species from the Indo-Pacific region.

Eastern Atlantic representatives of this genus are usually reduced to a single common and widespread species, for which some authors (e.g. POWELL, 1966) use the name *Teretia anceps* (Eichwald, 1830), while others (e.g. BOUCHET & WARÉN, 1980, HERNÁNDEZ ET AL. 2011) separate it from this taxon (based on a Miocene fossil) and use the name *Teretia teres* (Forbes, 1844), generally employed for the Recent species in the current literature. The rare *Teretia thaumastopsis* (Dautzenberg & Fischer, 1896), doubtfully included in *Teretia* by

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BOUCHET & WARÉN (1980), was moved by KANTOR & SYSOEV (1989) to the genus *Teretiopsis*.

*Teretia teres* is reported from Norway to the Canary Islands and the coast of Sahara, but not cited from tropical West African waters in papers dealing with the fauna of this area (DAUTZENBERG, 1891, 1910, 1912; NICKLÉS, 1950, KNUDSEN, 1952, BERNARD, 1984; ARDOVINI & COSSIGNANI, 2004). While studying samples of *Teretia* from different locations along West African coasts down to Angola, we have identified two new species of this genus which are described and figured in the present work.

#### Abbreviations

MNCN Museo Nacional de Ciencias Naturales, Madrid, Spain  
 MNHN Muséum national d'Histoire naturelle, Paris, France

MHNS Museo de Historia Natural University of Santiago de Compostela, Spain

UB University of Bergen, Norway

NMSA KwaZulu-Natal Museum, South Africa

CCS collection of Cedric Simbile, France

CFD collection of Francisco Deniz, Gran Canaria, Spain

CHO collection of JM Hernández Otero (†), Gran Canaria, Spain

CJH collection of Juan Horro, Vigo, Spain

CMS collection of Manuel Suárez, Ferrol, Spain

CPR collection of Peter Ryall, Maria Rain, Austria

CSG collection Sandro Gori, Livorno, Italy

sp shell with soft parts

s shell, empty

juv juvenile

## TAXONOMIC PART

### Family RAPHITOMIDAE Bellardi, 1875

#### Genus *Teretia* Norman, 1888

Type species (o.d.): *Pleurotoma anceps* Eichwald, 1830 (Miocene of Poland).

#### *Teretia teres* (Reeve, 1844) (Figs.1A-D, 2A-D)

*Pleurotoma teres* Forbes, 1844: 190 (*nomem nudum*); Reeve, 1844: pl. 19 fig. 161.

**Material examined:** 3 s, 240 m. Norway (CJH); 4 s, off Cedeira, Galicia, Spain, 150 m. (CJH); 7 sp, 77 s and 72 juv, different samples off NW Spain between 102 and 1102 m (MNCN); 1 s, off Sesimbra, Portugal (CJH); 24 s, different places in Canaries (CHO); 3 s, Gran Canaria (CSG); 2 s, Western Sahara, 60 m (CPR); 2 s, Western Sahara, 80 m (CSG); 1 s, Mauritania, 60 m (CJH); 2 s. Alborán Sea, (MHNS); 1 s, off Menorca (CJH); 12 s, Gorgona and Capraia, Italy (CSG); 1 s, Sardegna, Italy, 80 m (CJH); 3 s., Fiumicino, Italy, 400 m (CJH); 35 s and 43 juv, Pescara, Italy, 90 m (CJH); 6 s, Sicily (MHNS); 2 s, Saronikos, Grecia (CMS).

This is a well known species which has been described and figured in many works, like BUCQUOY, DAUTZENBERG & DOLLFUS, 1883; PARENZAN, 1970; BOUCHET & WARÉN, 1980; BOGI, COPPINI & MARGELLI, 1986; POPPE & GOTO, 1991; SEGERS, SWINNEN & DE PRIX, 2009; HERNÁNDEZ ET AL, 2011; GOFAS, MORENO & SALAS, 2011 and others.

**Distribution:** Atlantic Ocean from Norway to the Canaries and West

Sahara and throughout the Mediterranean Sea.

**Remarks:** According to TUCKER (2004: 65, 991), most records and authors have considered this species as synonym of *T. anceps*. BOUCHET & WARÉN (1980) treated it as different and explained the reasons for this view. In other works, specially dealing with fossils, it is usual to keep them as different species. For example, BALUK (2003) and BRUNETTI &

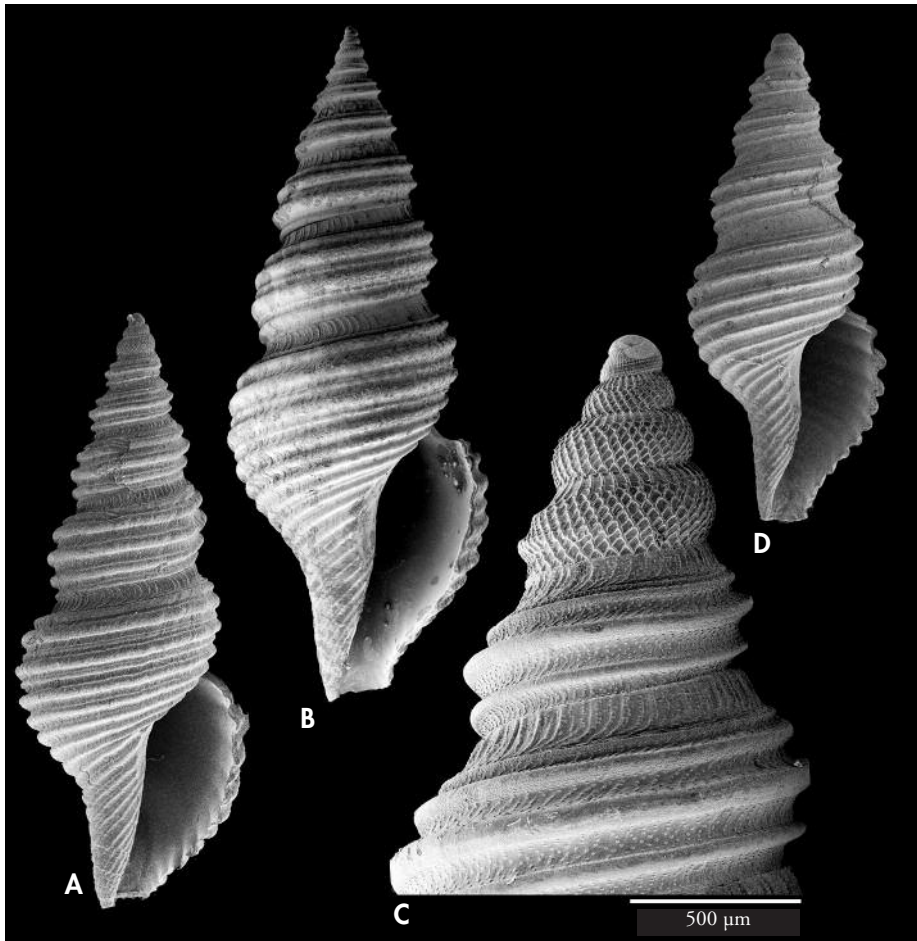


Figure 1. *Teretia teres* (Forbes, 1844). A: shell, 6.67 mm (CJH), Alborán Island; B: shell, 8.05 mm (CFD), Gran Canaria I.; C: protoconch of another shell from Gran Canaria; D: shell, 5.3 mm (MNHS), Italy.

Figura 1. *Teretia teres* (Forbes, 1844). A: concha, 6,67 mm (CJH), Isla de Alborán; B: concha, 8,05 mm (CFD), Gran Canaria; C: protoconcha de otra concha de Gran Canaria; D: concha, 5,3 mm (MNHS), Italia.

VECCHI, 2003 showed figures with a rather different spiral sculpture.

*Teretia teres* shows certain degree of variability, shown on Figs. 1 and 2. After examining nearly two hundred specimens, we noticed differences in some characters, especially in the size and number of whorls of the protoconch, number of spiral ribs, size of the subsutural ramp and colour, but we have not find a clear border to separate different

variations. We could not exclude that more than one species could be included in *T. teres*, a hypothesis to be checked by DNA analysis are regarding which the present work is not conclusive. Therefore, we accept within the intraspecific degree of variation, as does all current literature, all living east Atlantic and Mediterranean shells which agree with its features in spite of those little variations.

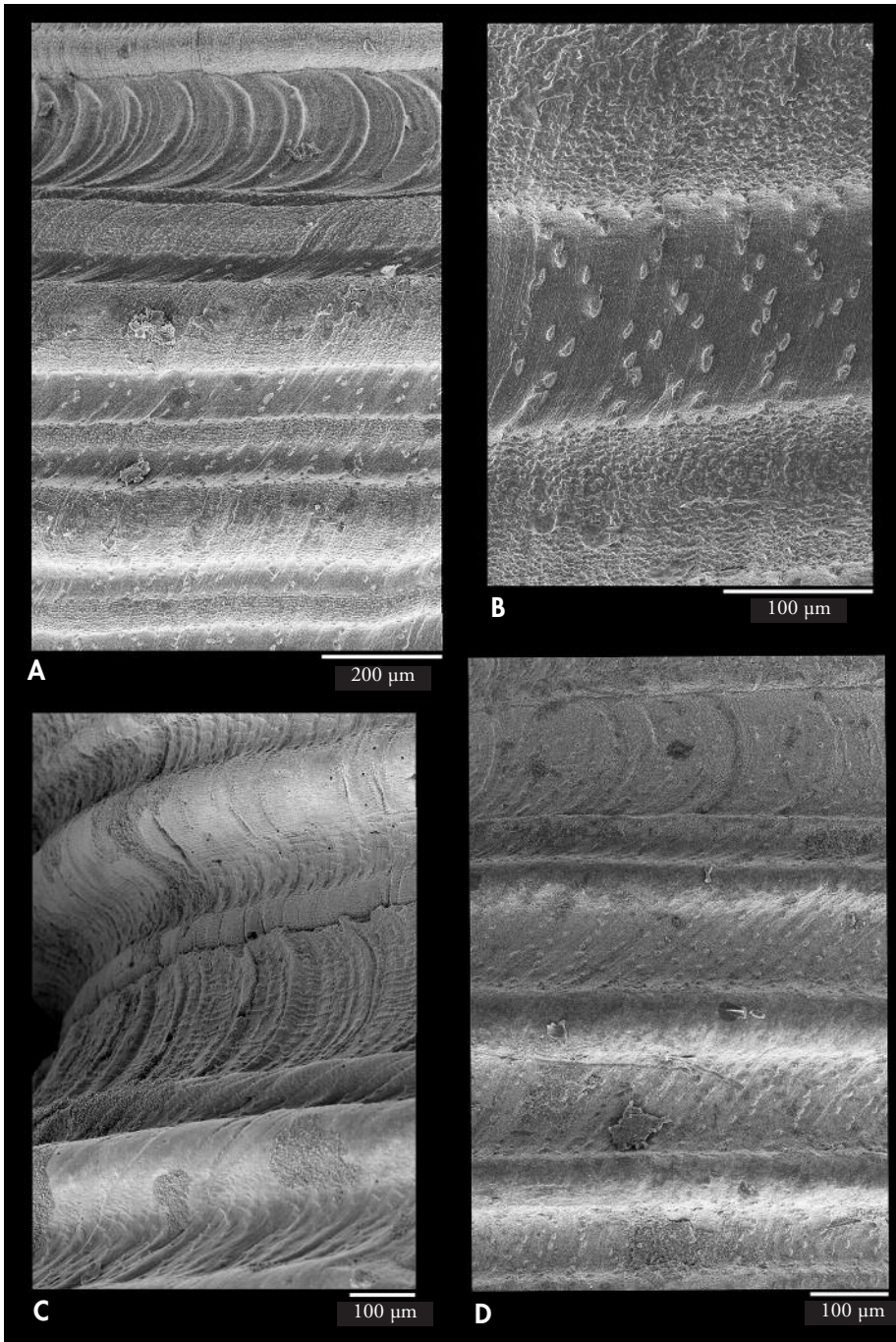


Figure 2. *Teretia teres* (Forbes, 1844), microsculpture. A, B: Alborán, same shell as figure 1A; C: Gran Canaria, same shell as figure 1B; D: Italy, same shell as figure 1D.

*Figura 2. Teretia teres* (Forbes, 1844), microescultura. A, B: Mar de Alborán, misma concha que la figura 1A; C: Gran Canaria, misma concha que la figura 1B; D: Italia, misma concha que la figura 1D.



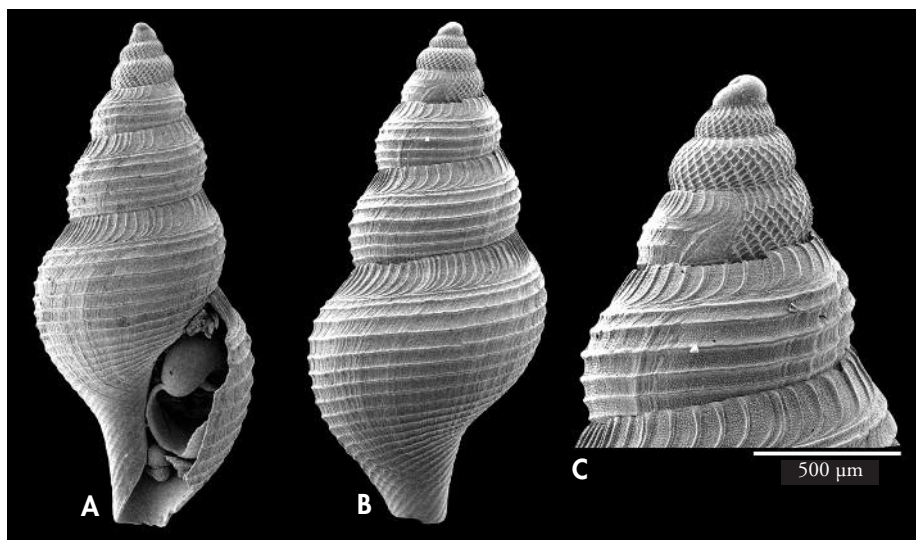


Figure 3. *Mangilia (sericifila, var.?) strongyla*, Dall, 1927. A-B: Syntype, 4.05 mm, from off Cumberland Island, Georgia (30.975°N, 79.6417°W, 538 m), dredged R/V Albatross 5.V.1886, USNM n° 10794. C-D Protoconch of the same syntype. SEM images by Raye Germon; modified from original image plate composed by Yolanda Villacampa. Information provided with the permission of the National Museum of Natural History, Smithsonian Institution, 10th and Constitution Ave. N.W., Washington, DC 20560-0193. (<http://www.nmnh.si.edu/>).

Figura 3. *Mangilia (sericifila, var.?) strongyla*, Dall, 1927. A-B: sintipo, 4,05 mm, de la isla de Cumberland, Georgia (30,975°N, 79,6417°W, 538 m), dragado B/O Albatross 5.V.1886, USNM n° 10794. C-D Protoconcha del mismo sintipo. Imágenes SEM de Raye Germon; modificado de la lámina original compuesta por Yolanda Villacampa. Información proporcionada con el permiso del Museo Nacional de Historia Natural, Smithsonian Institution, 10th and Constitution Ave. N.W., Washington, DC 20560-0193. (<http://www.nmnh.si.edu/>)

### *Teretia strongyla* (Dall, 1927) n. comb. (Fig. 3A-C)

*Mangilia (sericifila, var.?) strongyla*, Dall, 1927: 27.

**Type material:** One specimen off Georgia and a dozen off Fernandina. USNM n° 107943, image of a syntype available in the Internet: <<http://collections.nmnh.si.edu/search/iz/?irn=372317>>

**Remarks:** Dall described this species as a doubtful variety of his own *Mangilia sericifila*, writing: "shell resembling *sericifila* in size and general aspect, but with the whorls evenly rounded and covered with spiral sculpture of equal and equally distributed close set small threads". *M. sericifila*, is fide BOUCHET & WARÉN (1980) synonym of *Pleurotomella bureaui* (Dautzenberg & Fischer, 1897), which is easy to separate from this species.

This shell clearly belongs in *Teretia*, according to its typical protonconch,

multispiral with diagonally cancellate sculpture and its also typical teleoconch of rounded whorls, with subsutural ramp marked by crescentiform ridges and sculpture of spiral ridges.

It cannot be confused with *T. teres* nor with any other east Atlantic or fossil European *Teretia* due to its wider shell and the more abundant and thinner spiral ribs with much wider interspaces.

It is the only western Atlantic species of the genus.

*Teretia candela* n. sp. (Figs. 4A-G, 5A-C)

**Type material:** Holotype (Figs. 4A, 4E) in MNCN (15.05/200005). Paratypes in the following collections: MNHN (1 s) from type locality; MHNS (100628, 1 s), Takoradi Ghana, 45 m; (1 s) Miamia, Ghana, 15-20 m; (2 s) Palmeirinhas, Angola, 30-35 m; (1 s) Baia do Baba, Angola, 20-25 m; (2 s) Luanda, Angola, 100 m.; CSG (4 s), West Sahara, 40-60 m, CJH (1 s), Mauritania, 50 m. (1 s), Luanda, Angola, 45 m; CFD (2 s), from type locality; CPR (3 s), off Miamia, Ghana, 20-40 m; CCS (2 s) off Wigombe, Gabon, 16-18 m; UB (3 s), continental shelf of Angola, at 120 m at 12° 21'S.

**Other material examined:** CHO (2 s), Canaries (2 s); West Sahara (10 s), Mauritania (8 s), 30-40 m; CPR (7 s), Miamia, Ghana, 10-20 m; CCS (2 s) off Wigombe, Gabon, 16-18 m; MHNS (5 s), Luanda, Angola, 10-30 m.

**Type locality:** West Sahara, West Saharian fishing grounds, 60-80 m.

**Etymology:** Named after Candela, the younger daughter of the senior author.

**Description:** Shell (Figs. 4A-D) elongate and slender, with a high spire. Protoconch multispiral (Figs. 5A-C) of  $3 \frac{3}{4}$  -  $4 \frac{1}{4}$  whorls, with diagonally cancellate sculpture. Teleoconch of  $4 \frac{1}{2}$  - 6 rounded whorls with deep, straight sutures, a broad, slightly concave subsutural ramp (Figs. 4E-G) marked by low crescent ridges and sculpture of 3 strong angulated, not rounded, spiral cords (thinner and more numerous on the last whorl) conferring the shell a somewhat scalariform shape. No axial sculpture, only fine growth lines. Whole surface covered with very small close and dense protuberances. Near the base, the spiral cordlets are thinner.

Aperture oval, siphonal canal open, sinus deep, U-shaped, comprised in the subsutural band. Outer lip thin, crenulated. Columella slightly sinuous. Colour always very light, uniformly white or almost white, old shells tending to yellowish or light brownish.

Dimensions: The holotype is 7.11 mm in height; the paratypes 3.11-7.41 mm.

Animal: Not studied.

**Distribution:** Known from the Canary Islands, where it is very rare; more abundant in West Sahara and Mauritania; also found in Ghana, Gabon and Angola. It is possibly more homogeneously distributed along the West African coast, its present scattered distribution probably due to its small size, rarity and deep habitat, mostly from 40-60 to 120 m, unfrequently sampled shallower.

**Remarks:** We have observed some latitudinal variation in the size of *Teretia candela* n. sp., the northern specimens being larger and with  $4 \frac{1}{4}$  teleoconch

whorls, whereas the Angolan ones are smaller in average and usually with just  $3 \frac{1}{2}$  to 4 whorls. However, all other features are similar, so we conservatively keep them as conspecific.

As previously mentioned, there is certain degree of variability in this species as well as in *Teretia teres* of Eastern Atlantic and Mediterranean waters. Due to this variability, at first sight the specific value of *Teretia candela* n. sp. could be questioned as a simple morph. However, it is easy to separate from all the European and West African specimens of *T. teres* using some constant features always present in the new species which we have not found in a single specimen of *T. teres*. These are:

- narrower profile with less rounded whorls. This can be even measured; the L/W relation is higher in *T. candela* n. sp. (2.42 - 3.41, average 2.89) than in *T. teres* (2.31 to 2.82, average 2.53). There is also some variation in the proportion of part of the shell occupied by the last whorl, smaller in *T. candela* (average 58% instead of 63%).

- size of the subsutural ramp, which occupies a larger part of the whorl, usually more than 1/3.

- size and shape of spiral ribs, which are angulated, not rounded, thinner than in *T. teres*, less homogeneous and with wider interspaces.

- colour always uniform, without brown flames and/or uniform brown colour, as it is often seen in *T. teres*.

- especially, the microsculpture (Figs. 4E-G): *T. candela* n. sp. always presents very abundant and dense small protu-

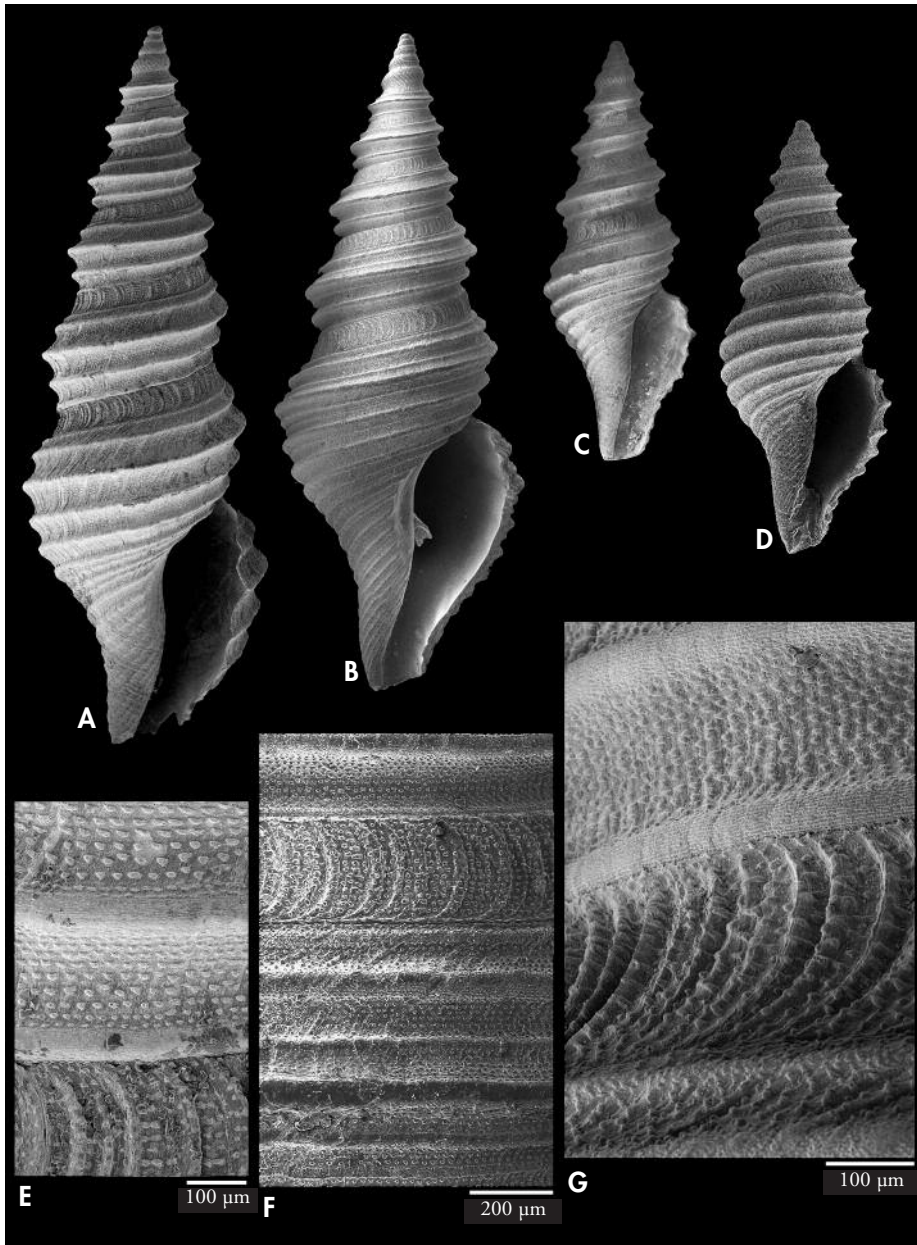


Figure 4. *Teretia candela* n. sp. A: holotype, 7.11 mm (MNCN), West Saharian fishing grounds; B: paratype, 6.46 mm (CFD), same locality; C: shell 3.76 mm, Ghana (CPR); D: paratype, 4.32 mm, Luanda, 100 m (MHNS); E: microsculpture of the holotype; F: microsculpture of the paratype in figure B; G: microsculpture of another paratype, from Luanda, Angola.

Figura 4. *Teretia candela* n. sp. A: holotipo, 7,11 mm (MNCN), Banco Sahariano; B: paratipo, 6,46 mm (CFD), la misma localidad; C: concha, 3,76 mm, Ghana (CPR); D: paratipo, 4,32 mm, Luanda, 100 m (MHNS); E: microescultura del holotipo; F: microescultura del paratipo de la figura B, Banco Sahariano; G: microescultura de otro paratipo, de Luanda, Angola.

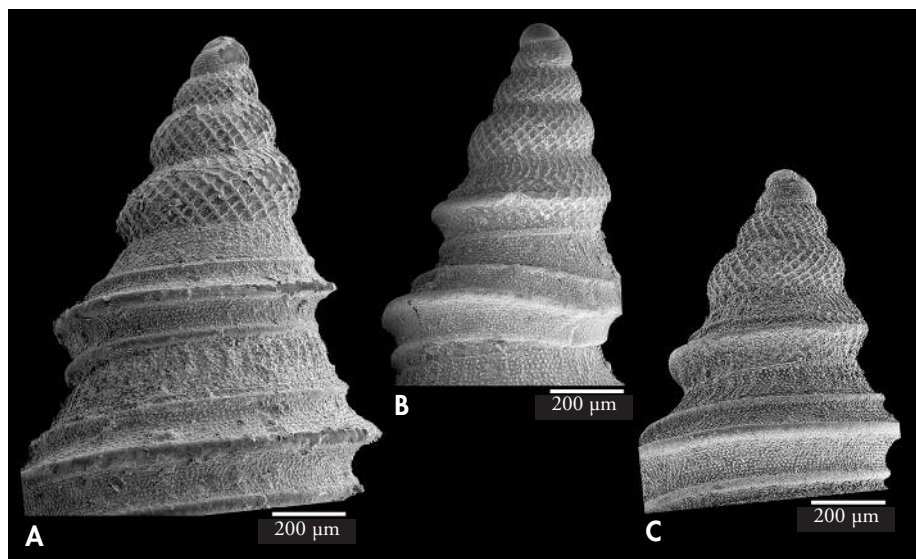


Figure 5. *Teretia candelae* n. sp. A: protoconch of the paratype in figure 4B, from West Saharian fishing grounds; B: protoconch of a shell from Mauritania; C: protoconch of the paratype in figure 4D, Luanda, Angola.

Figura 5. *Teretia candelae* n. sp. A: protoconcha del paratipo de la figura 4B, del Banco Sahariano; B: protoconcha de una concha de Mauritania; C: protoconcha del paratipo de la figura 4D, Luanda, Angola.

berances or tubercles on its surface, something not matched in a single shell of *T. teres*. BRUNETTI & VECCHI, (2003) have noticed that the Mediterranean fossil species *T. turritelloides* (Bellardi, 1847) and *T. elegantissima* (Foresti, 1868), but not *T. monterosatoi* (Cipolla, 1914), have a well developed microscopic sculpture of pustules or granules on shell surface, while *Teretia anceps* and *T. teres* have a smooth surface. MORASSI & BONFITO (2015) suggested that it was a mistake and wrote that "In contrast to this statement, under SEM the surface of *T. teres* is seen to be covered by a microscopic sculpture of granules", and figured images of a *T. teres* from Ionian Sea showing it. Whereas it is true that *T. teres* is not completely smooth, the protuberances are much less abundant, much more spaced, and restricted to the concave parts of the spiral sculpture, so that even the most sculptured ones, like the one they figured, can easily be separated from *T. candelae*.

The two species also have different ranges: the northern distribution limit of

*T. candelae*, Canaries and West Sahara, meets the southern limit of *T. teres*. Along that area it is possible to find both species, but we have seen no northern *T. candelae* and no real *T. teres* in the southern part.

The fossil species *Teretia turritelloides* (Bellardi, 1847) and *Teretia elegantissima* (Foresti, 1868) referred in BRUNETTI & VECCHI (2003) as shells with similar microsculpture are clearly different in other characters. The first one differs specially by its central spiral cord which is wider and more prominent as a keel, and rounded, not angulated and by the wider shell profile, with smaller relation L/W; The second species differs from *T. candelae* n. sp. by its larger and acute keel, unique in the entire genus.

Comparison with other fossil species described by VERA-PELÁEZ (2002) show clear differences: *Teretia pollicinarum* has a more elevate subsutural ramp and the spiral cords have narrower interspaces; and *T. pentacarinifera* present wider spiral ribs.



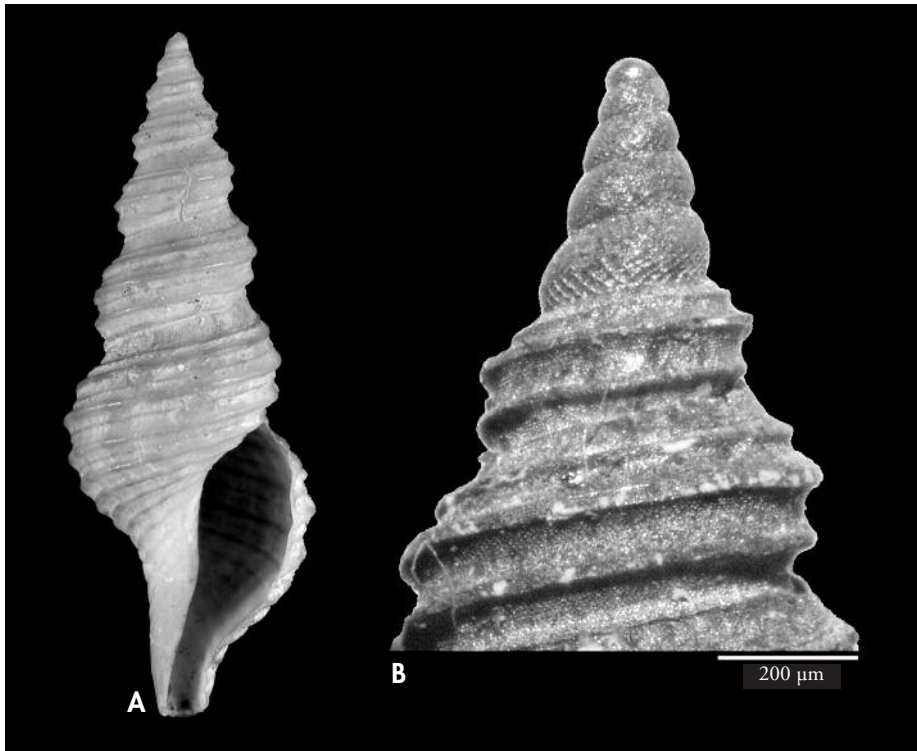


Figure 6. *Teretia acus* (Barnard, 1958). A: shell, 10.3 mm (NMSA V4438); B: protoconch (NMSA 53907).

Figura 6. *Teretia acus* (Barnard, 1958). A: concha, 10,3 mm (NMSA V4438); B: protoconcha (NMSA 53907).

We agree with KILBURN (1986), that the South African *Acrobelia acus* Barnard, 1958, should be placed in the genus *Teretia*. We were unable to study the type material, but we could examine specimens from NMSA identified by Dick Kilburn (Fig 6A-B) and they are easy to separate from *T. candela*. They have an overall appearance with more rounded and wider whorls and

with more rounded spirals, somewhat closer to *T. teres*, and it has a different protoconch size, which is less than 100 µm in the first whorl while the smallest seen in *T. candela* is around 150 µm and an average of about 200 µm, and which is 400 µm high and has 4 ½ whorls while *T. candela* are between 500-600 µm and do not reach 4 ½ whorls.

### *Teretia hoisaeteri* n. sp. (Figs. 7A-E)

**Type material:** Holotype (Figs. 7A, 7C) in MNCN (15.05/00006). Paratypes in the following collections: 1 s in MHNS (100628), from type locality, UB (3 s, continental shelf of Angola, 60 m, at 7° 35'S).

**Other material examined:** Only known from the type material.

**Type locality:** Off Luanda, Angola, between 60 and 120 m.

**Etymology:** Named after Tore Høisaeter, from Bergen University, who shared with us the findings that allowed us to describe this species.

*Description:* Shell (Figs. 7A-B) elongate, with a high spire. Protoconch (Fig. 7C) multispiral of about 4 whorls, with diagonally cancellate sculpture. Teleoconch of 3 ½ whorls with straight sutures, a very broad and almost flat subsutural ramp covered by microtubercles, and devoid of any spiral or axial sculpture, followed by four angulated spiral cords, the two adapical very small, the third much more prominent, rather like a peripheral keel, and the most abapical less prominent, just above the suture (cords thinner and more numerous on the last whorl). No axial sculpture. Aperture oval, siphonal canal open, sinus deep, U-shaped, comprised in the subsutural band. Outer lip thin. Columella sinuous. Colour uniformly white or almost white, always very light.

Dimensions: Holotype is 3.18 mm in height; the largest shell seen measures 5.5 mm.

Animal: Not studied.

*Distribution:* Only known from type locality.

*Remarks:* The scarce number of shells examined from this new species, and their smaller size compared with other species in the genus, suggest the possibility that they were slightly juvenile; in this case some of the mentioned features (like the number of whorls) may need revision.

It is not difficult to separate it from *T. candela* n. sp., the most similar species, which also lives in its range, according to the following characteristics:

- in spite of its smaller teleoconch, *T. hoisaeteri* n. sp. has a larger protoconch, with about 650  $\mu$ m in its widest part;
- the subsutural ramp is less concave and wider than in *T. candela* and occu-

pies almost the upper half of each whorl;

- it has no axial curved ridges at all in the subsutural band;

- it seems to have fewer spirals on first glance, because most of them, except the central two, are much less marked, sometimes almost indistinguishable.

Compared with *T. teres*, this species has:

- a less prominent spiral sculpture with less cords on the spire and upper half of the last whorl,

- in the lower half of the last whorl the cords are smaller but much more numerous

- the microsculpture shows many microtubercles in *T. hoisaeteri*, which are almost unappreciable in *T. teres*.

- finally the curved ribs on the subsutural ramp of *T. teres* do not exist in *T. hoisaeteri*.

Comparison with already mentioned *Teretia turritelloides* (Bellardi, 1847) [syntype figured by FERRERO MORTARA ET AL. (1981: pl. 18, fig. 6)], shows certain resemblance, but also differs in the following features:

- *T. hoisaeteri* has a wider profile,
- its protoconch is also wider and higher,

- although its peripheral ridge is more prominent, almost like a keel, it is smaller than in *T. turritelloides*,

- Subsutural ramp of *T. turritelloides* shows the usual crescentic ridges, lacking in the present species.

Comparison of *T. hoisaeteri* with the fossil species described by VERA-PELÁEZ show that it has lesser and narrower spiral cords.

### *Teretia* spp. (Figs. 8 A-E, 9 A-D)

Among the specimens studied, we have found two very peculiar shells that present remarkably unique characteristics, not found in any other shell, whose specific value is not possible to evaluate with only one shell of each morph.

One of them (Fig. 8A-E) is a 5.61 mm specimen from Luanda, Angola, taken at

100 m depth. The overall appearance of this shell is closer to *Teretia teres* than to any other specimen found to the south of Mauritania, as for its shape, subsutural ramp and spiral cords, but it has a protoconch smaller (around 200  $\mu$ m width) than all the other shells we have examined, and it also has the typical microsculpture of

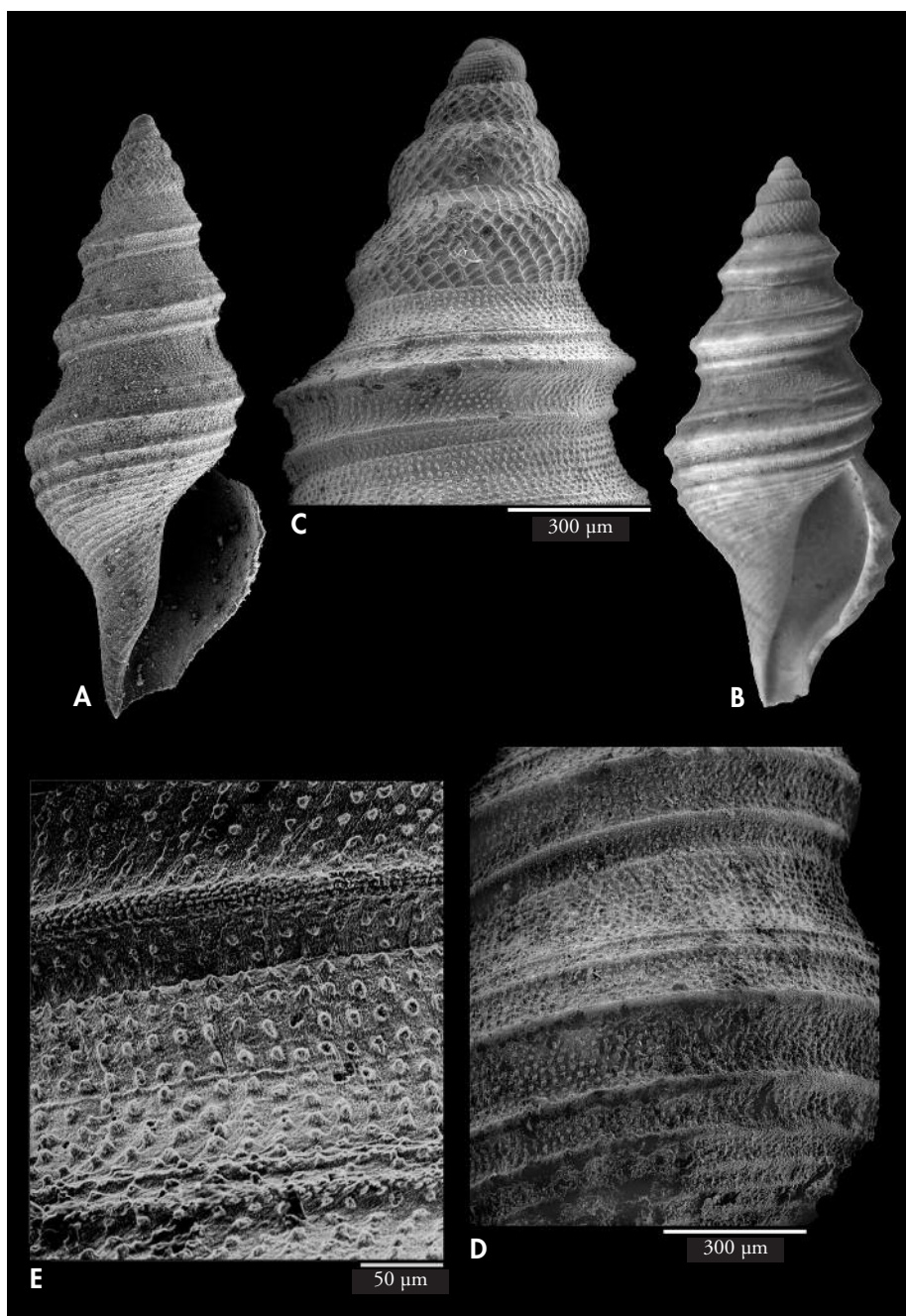


Figure 7. *Teretia hoisaeteri* n. sp. A: holotype, 3.18 mm (MNCN), Luanda, Angola; B: paratype, 5.5 mm (UB), Luanda, Angola; C: protoconch of the holotype; D, E: microsculpture and detail from the holotype.

*Figura 7. Teretia hoisaeteri* n. sp. A: holotipo, 3,18 mm (MNCN), Luanda, Angola; B: paratipo, 5,5 mm (UB), Luanda, Angola; C: protoconcha del holotipo; D, E: microescultura y detalle del holotipo.

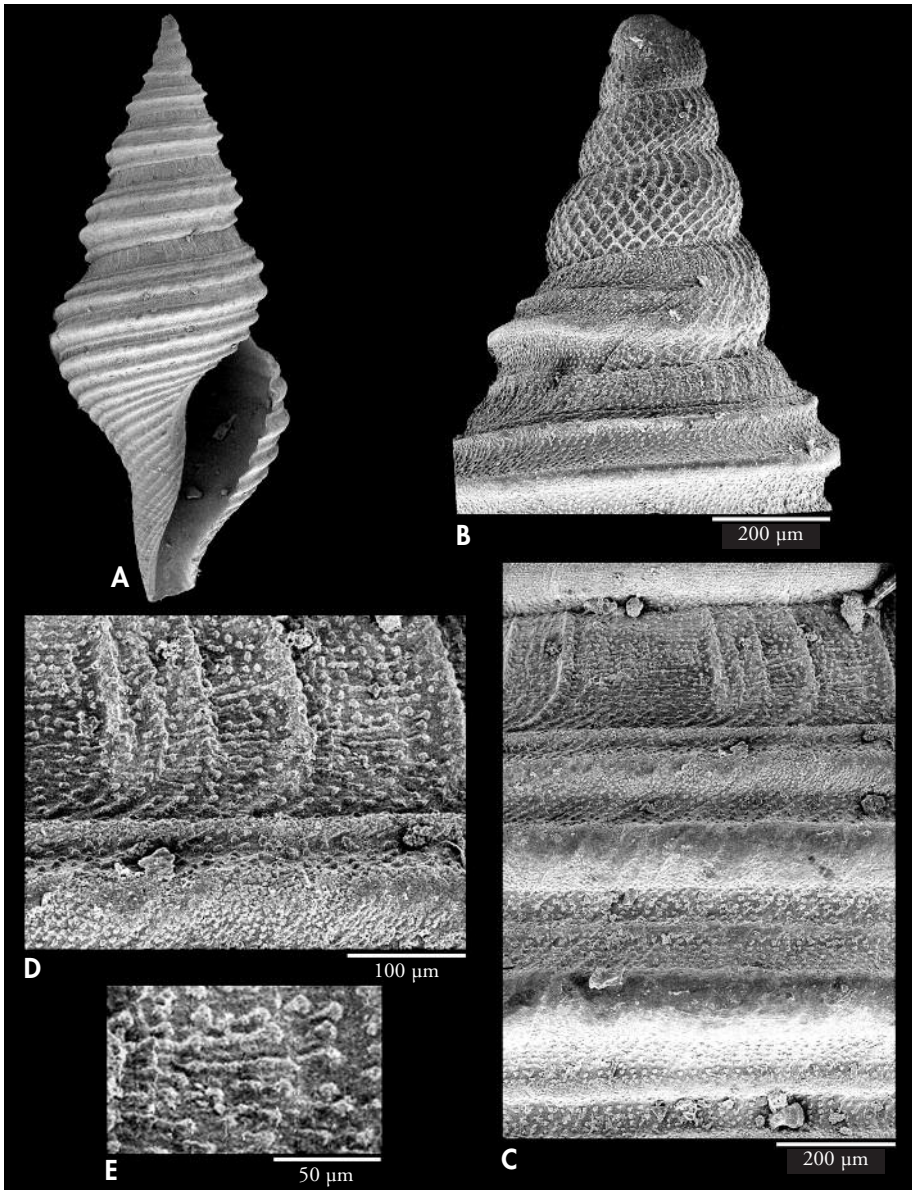


Figure 8. *Teretia* sp 1. A: shell, 5.61 mm (CJH), Luanda, Angola, 100 m; B: protoconch; C: sculpture; D, E: detail of the microsculpture.

Figura 8. *Teretia* sp 1. A: concha, 5,61 mm (CJH), Luanda, Angola, 100 m; B: protoconcha; C: escultura; D, E: detalle de la microescultura.

*Teretia candelae*, with very numerous and dense microtubercles covering its whole surface, but different in some areas like in the subsutural ramp where they form

spiral lines (Figs. 8D-E) very different from the usual dense microtubercles.

The other one (Fig. 8A-D) is a 6.28 mm specimen from Saharian Fishing



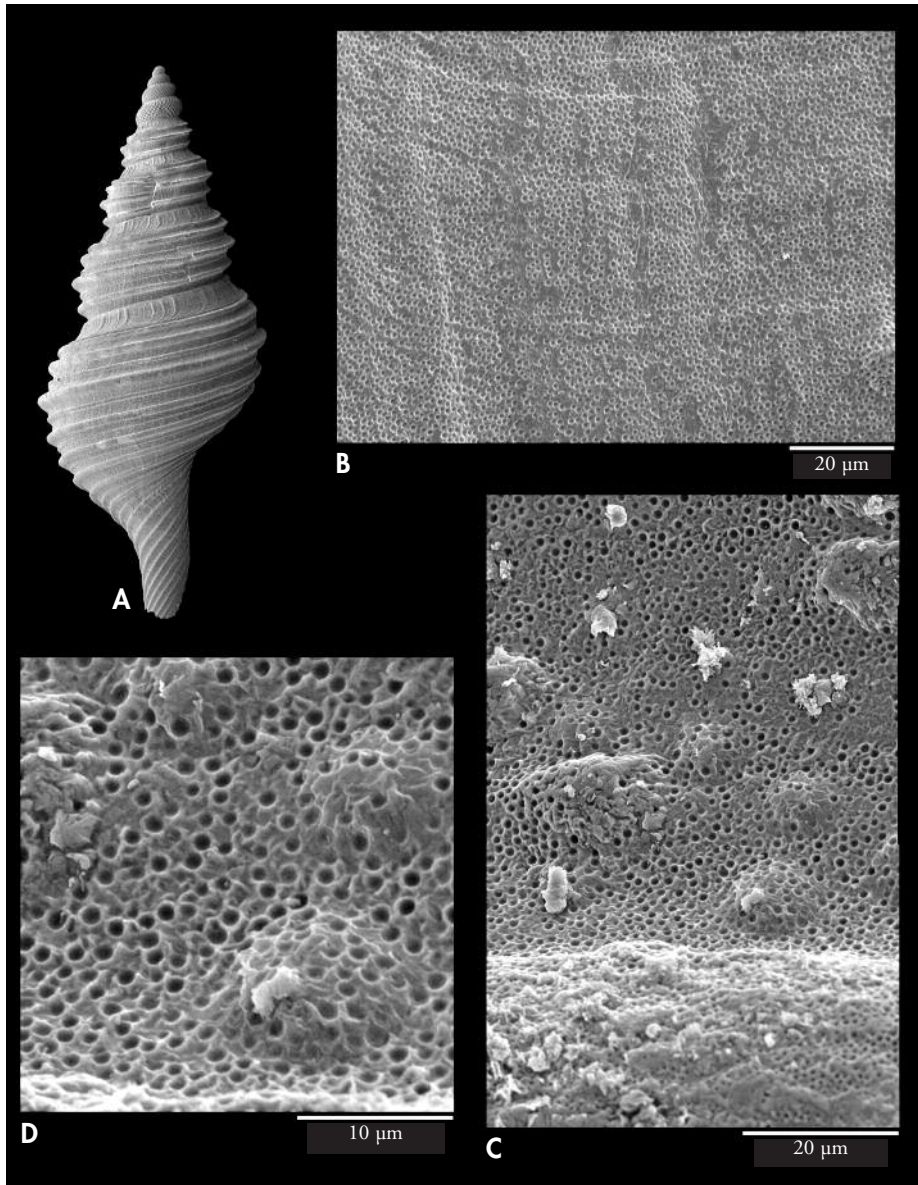


Figure 9. *Teretia* sp 2. A: shell, 6.28 mm (CFD) Saharian Fishing Bank, 60-80 m; B: sculpture of the subsutural area; C, D: detail of the microsculpture.

*Figura 9. Teretia* sp 2. A: concha, 6,28 mm (CFD) Banco de Pesca Sahariano, 60-80 m; B: escultura del área subsutural; C, D: detalle de la microescultura.

Bank, at 60-80 m. This shell is like an ordinary *Teretia teres*, but, surprisingly, its microsculpture shows a unique surface of very small micro pits which

we have not found in any other shell after examining a very large sample of all morphs at SEM. We show it in three magnifications (Figs. 8B-D).

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Quanta 200 set; and to our friends and collectors Francisco Deniz, Sandro Gori, Peter Ryall, Manuel Suárez, Cedric Simbile and the late José María Hernández for loaning shells and photographs. To Marco Oliverio and Serge Gofas by their critical reading of the work and their help with the literature.

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