A NEW FOSSIL CONOIDEAN FROM THE PLIOCENE OF ITALY, WITH COMMENTS ON THE *BELA MENKHORSTI* COMPLEX (GASTROPODA: CONIDAE)

Paolo Mariottini[1], Carlo Smriglio[2] Andrea Di Giulio[1] & Marco Oliverio[3]

[1]Dipartimento di Biologia, Università di Roma Tre, Via Marconi 446, 00146 Roma, Italy
[2]Via di Valle Aurelia 134, 00167 Roma, Italy
[3]Dipartimento di Biologia Animale e dell'Uomo, Università di Roma "La Sapienza", V.le dell'Università 32, 00185 Roma, Italy

Abstract *Based on shell characters, the complex of Mediterranean fossil and extant species related to the Recent taxon* Bela menkhorsti *van Aartsen 1988 is critically analyzed. This species is characterised morphologically with respect to both the close Recent* Bela zenetouae *(van Aartsen 1988) and the Plio-Pleistocene form, that are regarded as valid and different taxa, only for the different embryonic/larval shell development.*

We formally propose to move Feria zenetoue *to the genus* Bela *Gray 1847 and we describe the fossil form as* Bela trinacria *Mariottini & Smriglio n. sp.*

Key words Bela, *taxonomy, larval development, Mediterranean Sea, Recent, Pliocene*

Introduction

The epithet "turrids" has been largely used as a general term referring to the largest radiation of marine gastropods, traditionally included in the family-group Turridae H. & A. Adams 1853 (Tucker, 2004), and currently undergoing significant revision (Taylor *et al*., 1993; Kohn, 1998; Bouchet & Rocroi, 2005).

In the Mediterranean Sea this group of toxoglossate neogastropods includes over 100 species, classified in 25–30 genera. Supraspecific systematics is still very unstable on a global scale and this is reflected also at the regional level (Powell, 1966; Nordsieck, 1977; Sabelli *et al*., 1992; Gofas & Le Renard, 2007).

The α-taxonomy of the Recent Mediterranean species, largely based on shell characters, also suffers from a lack of comprehensive and modern revisions. Species-rich groups like *Raphitoma* or *Mangelia* are currently under revision by colleagues and significant changes to the traditional arrangements are expected (pers. comm.: F. Pusateri & R. Giannuzzi-Savelli and G. Spada, respectively).

The genus *Bela* Gray 1847 was based on *Murex nebula* Montagu 1803, whose identity is uncertain and would deserve a careful analysis. The genus has been redescribed by Powell (1966: 97) and according to such definition consists of small Recent and Tertiary turrids with an eastern Atlantic distribution, including the Mediterranean Sea. As emphasized by Powell (1966: 98), this genus has been frequently considered as a "basket" for the allocation of a wide variety of unrelated turrids. As a consequence, the number of Recent species considered as valid in the Mediterranean Sea, varies according to different authors (e.g.: Nordsieck, 1977; Sabelli *et al.*, 1992; Gofas & Le Renard, 2007).

As with other prosobranch groups, this lineage includes pairs of sister species which differ only in their larval development, and thus in their protoconch morphology. This was interpreted as a good reason to establish a "parallel" genus, viz. *Fehria* van Aartsen 1988, with type species *Ginnania taprurensis* Pallary 1904 (Figs 28a–c), characterised (and distinguished from *Bela*) by a non-planktotrophic larval development, and a paucispiral protoconch. We agree with Bouchet (1990) that most of the turrid genera erected on this basis are clearly polyphyletic and should not be used. The cases of *Bela menkhorsti* van Aartsen 1988 and *Fehria zenetoue* van Aartsen 1988 provide striking examples. The two taxa have nearly indistinguishable teleoconchs, and can be diagnosed only by their different protoconchs.

The commonly accepted interpretation is that *B. menkhorsti* was originally described as *Pleurotoma nana* by Scacchi (1836: 13). This binomen was however preoccupied by *P. nana*

Contact author : mariotpa@unirma3.it

Deshayes 1835 (a different and unrelated species). Nordsieck (1977: 45) interpreted *Pleurotoma turgida* Reeve 1844 as a synonym of *P. nana*. However, van Aartsen (1988a: 30; 1988b) considered *P. turgida* as a *nomem dubium*, despite the fact that Reeve's name (which was based on the same Aegean material of Forbes (1844): see van Aartsen (1988b)), was in fact available to replace *Pleurotoma nana* Scacchi.

Some authors (Cavallo & Repetto, 1992; Chirli, 1997 and references therein), referring to Pliocene material of the *B. menkhorsti*-complex, kept on utilizing the species name *B. turgida*, and in at least one case (Chirli, 1997: 56) considered the fossil and the Recent forms as conspecific.

P. nana has been described by Scacchi (1836) using Recent shells collected on the coast of Posillipo ("*Ad Pausilipi oram*"). Original type material of this taxon has not been found in the Sacchi collection at MZUN (Cretella *et al*., 2005). However, three shells unequivocally labelled as original Sacchi type material, are conserved at the MNHN (Figs 2a–e). Two of these specimens have a multispiral protoconch, concordant with the present interpretation of this taxon (Fig. 2c). Since specimens with both protoconch types occur sympatrically at the type locality (Figs. 2, 10), the lectotype (Figs 2a, b) designated by Peñas *et al.* (2008) for *Pleurotoma nana* Scacchi 1836 is the name-bearing type of *Bela menkhorsti* van Aartsen 1988 and fixes the names permanently according to current usage. Among the names of the Aegean turrids published by Reeve (1844) and Forbes (1844), at least *Pleurotoma turgida* (and possibly *P. fortis* Reeve 1844) have been considered as possible members of this complex. Now, after two decades of usage of van Aartsen's replacement name, it would be inappropriate to reinstate one of these names by neotype selection. Given their status as *nomina dubia* (van Aartsen, 1988b), it is here advised that any revision of these names involving neotype selections (the original types are lost: see also Jeffreys (1870:66)) takes into consideration the problems of restoring valid usage to them.

This lineage is represented in the Pliocene by a form with multispiral protoconch which has been identified as *B. turgida* by different Authors (Cavallo & Repetto, 1992; Chirli, 1997). We have studied hundreds of shells of this fossil species from the Pliocene of Altavilla (Sicily, Italy) which are in the Monterosato collection (MCZR, ex coll. Brugnone). The teleoconch is indistinguishable from that of Recent *B. menkhorsti* and *B. zenetoue*. The multispiral protoconch, although very similar to that of *B. menkhorsti,* is in fact different and supports the separation of these shells at the species level.

Abbreviations

MCZR Museo Civico di Zoologia di Roma (Roma, Italy)
MNHN Muséum National d'Histoire Naturelle (Paris, France)
MZUN Museo di Zoologia dell'Università degli Studi di Napoli Federico II (Naples, Italy).
RMNH Royal Museum of Natural History (Leiden, The Netherland).
USNM United States National Museum of Natural History (Washington D.C., USA).

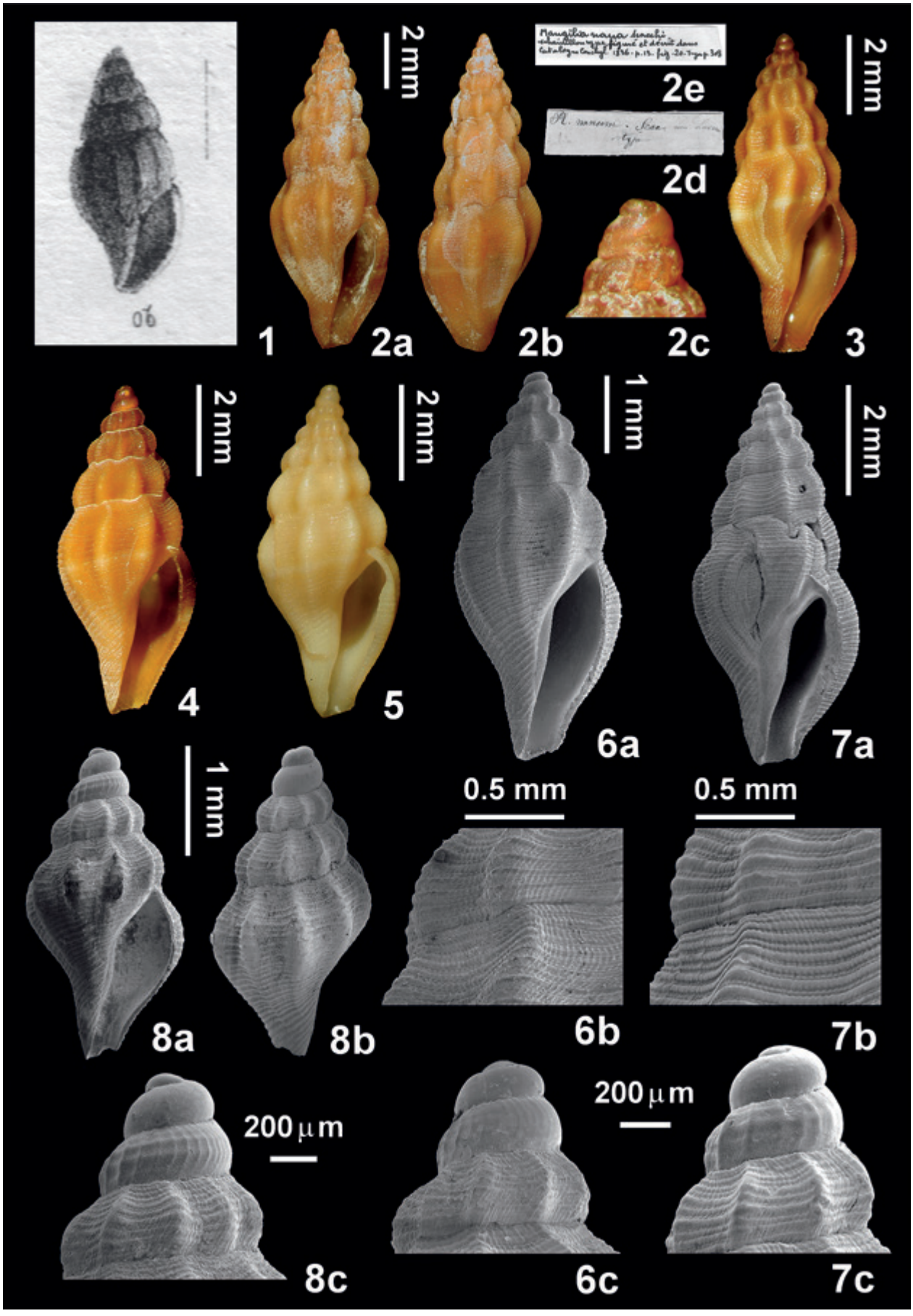
Systematics

Family Conidae Fleming 1822
Subfamily Mangeliinae Fischer 1887

Genus ***Bela*** Gray 1847

Bela 1847a: XX. Type species: *Murex nebula* Montagu 1803, by subsequent designation (Gray, 1847b).

Figures 1a–8c Shells of *Bela menkhorsti* van Aartsen 1988. 1, original drawing by Scacchi (1836: fig. 20). 2a–c, lectotype (MNHN), Posillipo (Napoli), [11.1×4.2 mm]; 2d, 2e labels accompanying the lectotype. 3, Varazze (Genova), Italy, 44°20'N 08°35'E, 20 m [6.9×2.8 mm] (CS-PM). 4, Off coast of Libya, 110–150 m [6.5×2.6 mm] (CS-PM). 5, Off coast of West Sahara, 30–60 m [7.6×3.0 mm] (FG). 6a, San Vincenzo (Livorno), Italy, 43°05'N 10°24'E, 34 m [5.3×2.1 mm] (CS-PM). 6b–c, teleoconch sculpture and protoconch of the specimen in Fig. 6a. 7a, Anzio (Roma), Italy, 41°22'N 12°36'E, 50 m [7.1×3.0 mm] (CS-PM). 7b–c, teleoconch sculpture and protoconch of the specimen in Fig. 7a. 8a–b, Off coast of Sfax, Tunisia, 90 m [2.6×1.4 mm] (CS-PM). 8c, protoconch of the specimen in Fig. 8a.


2 mm
2e
2d
1
2a
2b
2c
3
4
5
1 mm
6a
7a
8a
8b
0.5 mm
6b
7b
200 µm
8c
6c
7c

= *Fehria* van Aartsen 1988 – type species: *Ginnania taprurensis* Pallary 1904, by original designation.

Remarks The identity of *Murex nebula* Montagu 1803, is still uncertain and a neotype designation would be highly desirable to stabilize not only the species but also the genus name usage. In any case, the traditional restricted usage, which ascribes to this genus a species morphologically similar to *Pleurotoma laevigata* Philippi 1836, is here assumed. There is no doubt that the species herein studied (the *B. menkhorsti*-complex) belong in this genus. Conversely, we maintain some doubts on the attribution to this same group of *Pleurotoma brachystoma* Philippi 1844 and related species.

At variance with most caenogastropods, where the protoconch-teleoconch boundary is clearly marked by a discontinuity in sculpture, *Bela* shows a transition which appears more gradual. In fact, the last protoconch part is often scultured by collabral riblets which can mask the real boundary. We have marked in the apical views of the protoconchs (Figs 25b, 26b, 27b, 28b) the start of the teleoconch.

Bela menkhorsti van Aartsen 1988
(Figs. 1–8, 26)

Bela menkhorsti van Aartsen 1988a: 30–31, fig. 1.
Pleurotoma nana Scacchi 1836: 13, fig. 20, non Deshayes 1835.

Original description
Pleurotoma nana Testa parva ovato-ventrosa, rufo-fusca, linea pallidiore per medium ultimi anfractus decurrente; striis transversis exilissimis, costisque in lungum digestis; labro acuto. Alta lin: 3–3 ½. Ad Pausilipi oram. Fig. 20.

Type material Lectotype (MNHN) from Posillipo (Naples, Italy, Figs. 2a, b), and two paralectotypes in the same lot.

Type locality Coast of Posillipo, Naples, Italy.

Material examined Varazze (Genova), Italy, 44°20′N 08°35′E, 20 m: 13 sh – San Vincenzo (Livorno), Italy, 43°05′N 10°24′E, 34 m: 27 sh – Anzio (Rome), Italy, 41°22′N 12°36′E, 50 m: 73 sh – Posillipo (Naples), Italy, 40°47′N 14°10′E, 3 m depth: 1 sh – Marina di Camerota (Salerno), Italy, 39°58′N 15°21′E, 30 m: 11 sh – Carini (Palermo), Italy, 38°12′N 13°28′E, 150 m: 2 sh – Off coast of Libya, 110–150 m: 8 sh – Off coast of West Sahara, 30–60 m: 7 sh.

Distribution *Bela menkhorsti* is known from the entire Mediterranean Sea, and from the neighbouring Atlantic.

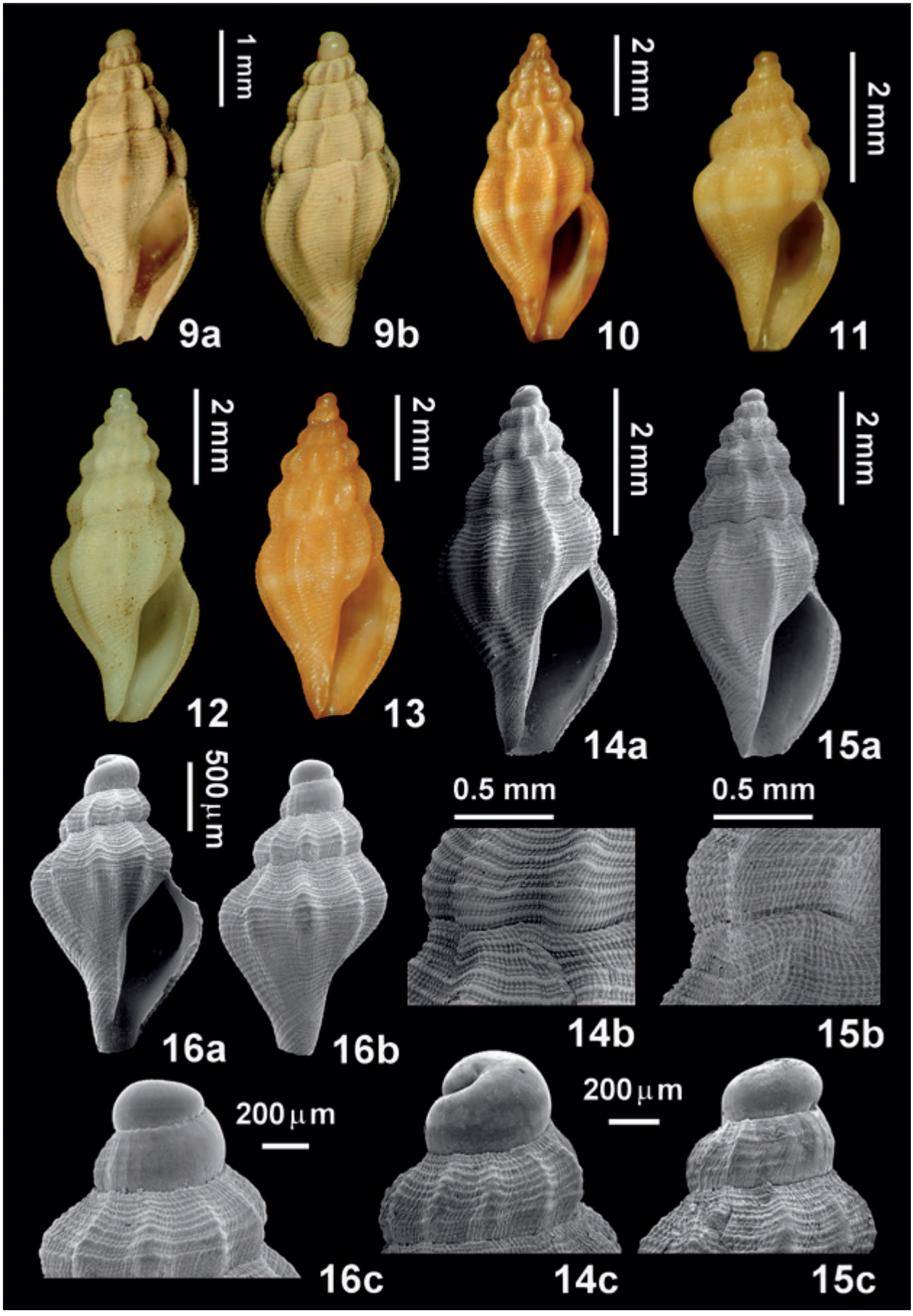
Remarks *Bela menkhorsti* is characterised by a biconical, elongate-fusiform, solid shell with a multispiral protoconch (530–540 µm max. diam.; 2.0–2.2 whorls), indicating a planktotrophic larval development. Outline of shell and teleoconch sculpture are indistinguishable from those of *B. zenetouae* (and of the Pliocene samples: see below). On the contrary, the protoconch shows useful diagnostic features at the species level. The multispiral protoconch of *B. menkhorsti* is completely different from the paucispiral one of B. zenetouae (see below). Protoconch dimensions (diameter and number of whorls) are different between the Recent and fossil samples. Shell color is identical in *B. menkhorsti* and *B. zenetouae.*

Bela zenetouae (van Aartsen 1988)
(Figs. 9–16, 27)

Fehria zenetouae van Aartsen 1988a: 30–31, fig. 4.

Original description
Shell of a slender nearly biconical form. Whorls 5, only slightly convex. Embryonic whorls: 1 peg-like, smooth, rather convex initially. Sculpture:

Figures 9a–16c Shells of *Bela zenetouae* (van Aartsen 1988). 9a–b, paratype AD13136, Haifa Bay, Israel, 50–65 m [4.2×2.0 mm] (JvA). 10, Marechiaro-Posillipo (Napoli), Italy, 40°47′N 14°10′E, beached [7.7×3.5 mm] (CS-PM). 11, Scilla (Reggio Calabria), Italy, 38°15′N 15°41′E, 40 m [4.4×2.4 mm] (CS-PM). 12, Sfax, Tunisia, 30 m [6.9×2.8 mm] (CS-PM). 13, West Sahara, 30–60 m [7.6×3.0 mm] (FG). 14a, Egadi Islands (Trapani), Italy, 37°56′N 12°13′E, 50 m [5.5×2.5 mm] (CS-PM). 14b–c, teleoconch sculpture and protoconch of the specimen in Fig. 14a. 15a, Sfax, Tunisia, 30 m [6.5×2.6 mm] (CS-PM). 15b–c, teleoconch sculpture and protoconch of the specimen in Fig. 15a. 16a–b, Scilla (Reggio Calabria), Italy, 38°15′N 15°41′E, 40 m [2.1×1.2 mm] (CS-PM). 16c, protoconch of the specimen in Fig. 16a.


1 mm
9a
9b
2 mm
10
2 mm
11
2 mm
12
2 mm
13
2 mm
14a
2 mm
15a
500 µm
16a
16b
0.5 mm
14b
0.5 mm
15b
200 µm
16c
200 µm
14c
15c

consisting of about 9 well rounded, rather broad ribs extending up to the siphonal canal. Spiral sculpture apparently consisting of rows and small dotswhich are produced by the crossing of the spiral ribs and the growth lines. The strength of the spirals is variable and neither of regular alternation nor of equal strength thoughout. The last whorl, including the canal, occupied 0,75 of the total height, whereas the mouth is abouth half the total height of the shell. The outer lip shows a shallow sinus, characteristic for the genus and is sharp and smooth inside. The inner lip clearly delimitated on the body whorl.
Height: 4.5 – 6.0 mm. Breadth: 2.1 – 2.5 mm.

Type material Holotype (RMNH); 41 paratypes (BMNH, RMNH, USNM and van Aartsen collection).

Type locality Bay of Haifa, Israel.

Material examined Haifa Bay, Israel, 50–65 m: paratype AD13136 – Sfax, Tunisia, 15 m: 6 sh – West Sahara, 30–60 m: 5 sh – Scilla (Reggio Calabria), Italy, 38°15′N 15°41′E, 40 m: 2 sh – Egadi Islands (Trapani), Italy, 37°56′N 12°13′E, 50 m: 2 sh – Posillipo (Napoli), Italy, 40°47′N 14°10′E, beached.

Distribution The distribution of *B. zenetouae* seems nearly completely overlapping that of *B. menkhorsti*, encompassing the entire Mediterranean Sea and the neighbouring Atlantic.

Remarks B. zenetouae is very similar to *B. menkhorsti*, being diagnosed by its paucispiral protoconch of 1.2 whorls (vs. 2.0–2.2 whorls). Since *Fehria zenetouae* is evidently more closely related to *Bela menkhorsti* than to *Ginnania taprurensis* (the reason why we place it in *Bela*), then the most parsimonious scheme should include *Ginnania taprurensis* within *Bela*.

***Bela trinacria* Mariottini & Smriglio** n. sp.
(Figs. 17–24, 25)

Type material Holotype and paratypes A–G from the type locality (ex Brugnone, in Monterosato collection, #16986, two vials, with two handwritten labels) in MCZR, (Rome, Italy).

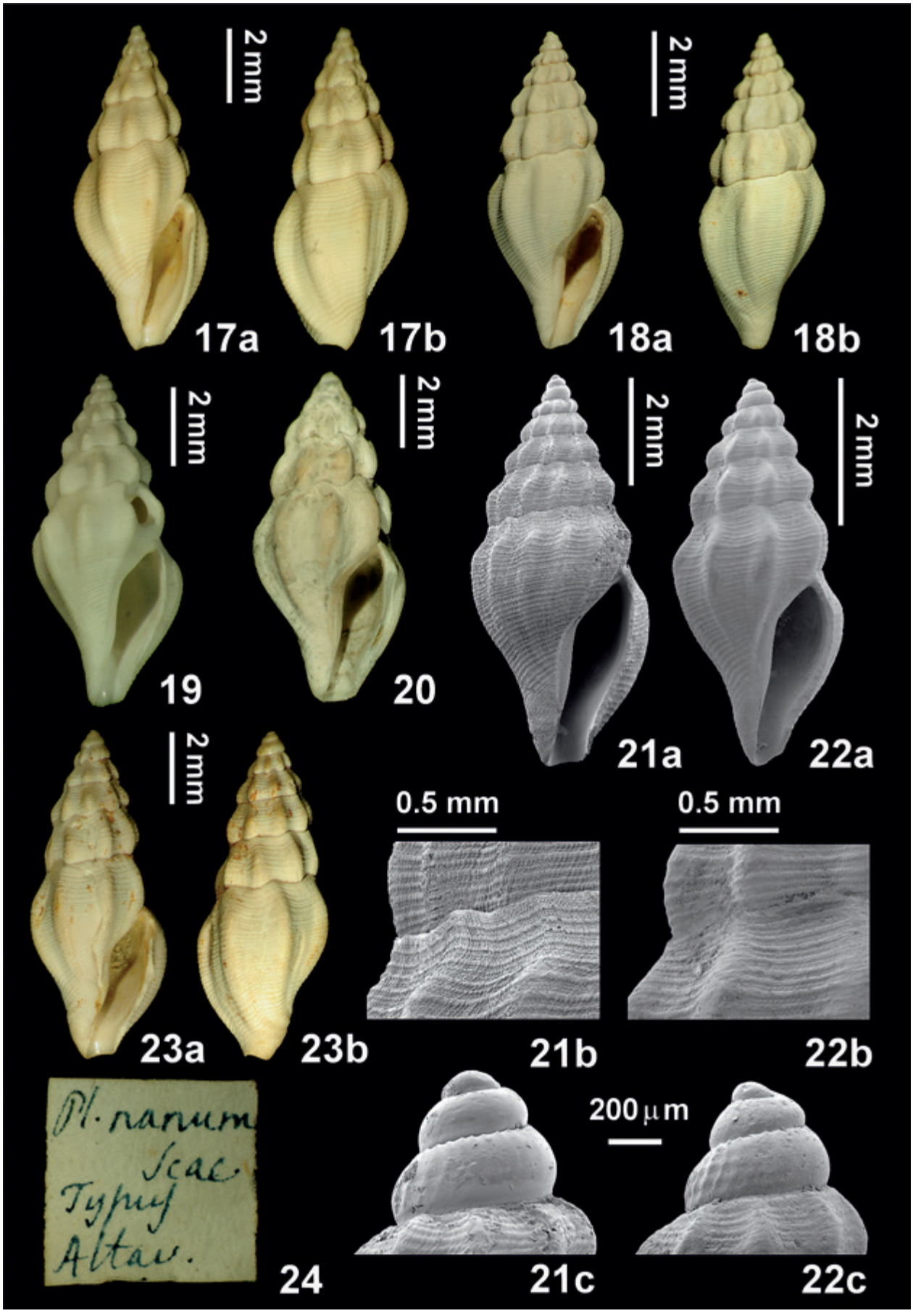
Type locality Altavilla (Palermo, Sicily), Italy, 38°02′N 13°33′E. Pliocene.

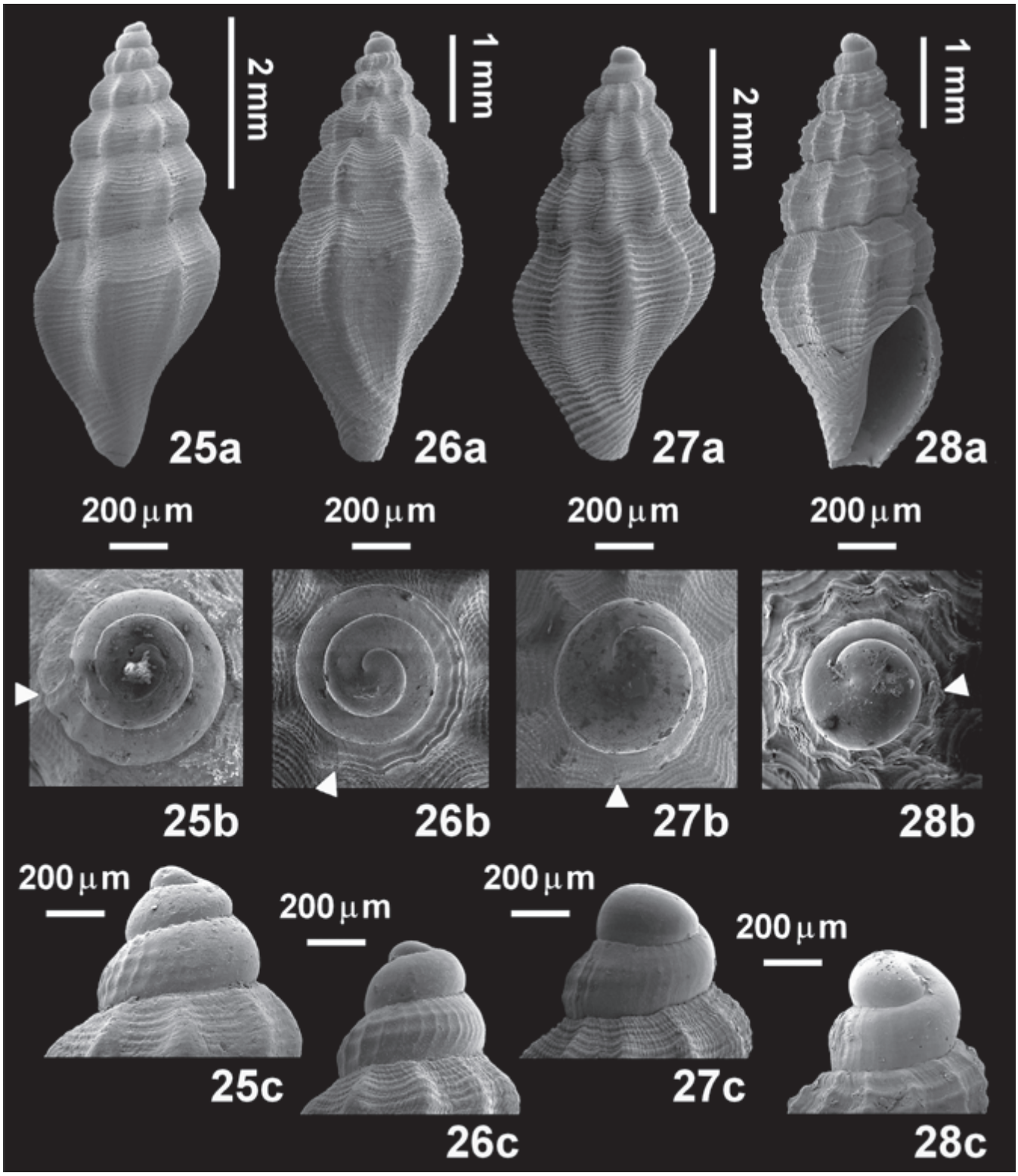
Material examined The type material and Guidonia (RM), Italy, 42°00′N 12°43′E, Pliocene: 3 sh – Terre Rosse (SI), Italy, 43°26′N 11°01′E, Pliocene: 2 sh.

Description Shell small, of medium size for the genus, height 8.5 mm and width 3.5 mm, biconical, elongate-fusiform, solid.

Protoconch multispiral, dome shaped, of 2.75 strongly convex whorls. First 2.3 apical whorls smooth; last part with reticulate sculpture of oblique axial costae crossed by spiral ribs of about equal width. Maximum diameter of protoconch 0.63 mm. Protoconch-teleoconch transition not well marked. *Teleoconch* of 5.3 whorls, weakly angulate at about half of the spire, sutural ramp slightly concave, whorl sides gently convex. Last whorl about ⅔ of shell length. Axial sculpture of 7–8 prominent, slightly opisthocline, flexuous and narrowly rounded axial ribs, regularly spaced, with broader interspaces. Axial ribs fading out on the shoulder slope and at about half of the base. Spiral sculpture of numerous very fine threads, densely alternating with interspaces of variable size. Each interspace consists of one to three rows of rounded tiny granules, axially connected by a very fine threadlet. Aperture narrow, ovate, about half of the shell height. Siphonal canal short, narrow and open. Inner lip with a moderately developed parietal callus. Outer lip variced. Anal sinus marked, arcuate on shoulder slope.

Figures 17a–24 Shells of *Bela trinacria* n. sp. 17a–b, holotype, Pliocene of Altavilla (Palermo), Italy, 38°02′N 13°33′E, [8.5×3.7 mm] (MCZR). 18a–b, paratype A, Pliocene of Altavilla (Palermo), Italy, 38°02′N 13°33′E, [7.2×3.0 mm] (MCZR). 19, Pliocene of Guidonia (Roma), Italy, 42°00′N 12°43′E, [8.2×3.6 mm] (MCZR). 20, Pliocene of Terre Rosse (Siena), Italy, 43°26′N 11°01′E, [8.7×3.9 mm] (MCZR). 21a, paratype G, Pliocene of Altavilla (Palermo), Italy, 38°02′N 13°33′E, [7.2×3.2 mm] (MCZR). 21b–c, teleoconch sculpture and protoconch of the specimen in Fig. 21a. 22a, paratype F, Pliocene of Altavilla (Palermo), Italy, 38°02′N 13°33′E, [5.2×2.1 mm] (MCZR). 22b–c, teleoconch sculpture and protoconch of the specimen in Fig. 22a. 23a–b, paratype D, Pliocene of Altavilla (Palermo), Italy, 38°02′N 13°33′E, [8.5×3.5 mm] (MCZR). 24, original label in Brugnone's handwriting (MCZR).


2 mm
17a
17b
18a
18b
19
20
21a
22a
23a
23b
0.5 mm
21b
22b
Pl. naranum
Scac.
Typus
Altav.
24
200 µm
21c
22c



Figures 25a–28c Shells of *Bela* spp. 25a, *Bela trinacria* n. sp. Paratype F, specimen of Fig. 22a. 26 b–c, protoconch of specimen of Fig. 22a. 26a, *Bela menkhorsti* van Aartsen, 1988. Specimen of Fig. 6a. 26b, protoconch of the specimen in Fig. 6a. 26c, protoconch of the specimen in Fig. 8a. 27a, *Bela zenetouae* (van Aartsen 1988). Specimen of Fig. 14a. 27b, protoconch of the specimen in Fig. 14a. 28a, *Bela taprurensis* (Pallary, 1904). Sfax, Tunisia, 34°47′N 10°53′E, 15 m [6.3×2.1 mm] (CS-PM). 28b–c, protoconch of the specimen in Fig. 28a. Arrowheads of Figs 25b, 26b, 27b and 28b indicate protoconch/teleoconch transitions.

Table 1 Shell morphological features of the adults in the three turrids analyzed.

	Species		
Shell parameters	***B. trinacria***	***B. menkhorsti***	***B. menkhorsti***
Protoconch diameter size (in m)	600–700	530–540	580–600
Protoconch number of whorls	2.7–2.8	2.0–2.2	1.2
Protoconch sculpture	2.3–2.4 apical smooth, remaining reticulated	1.6–1.8 apical smooth, remaining reticulated	smooth
Teleoconch axial folds (last whorl)	7–8	8	9
Shell length/width ratio	2.2–2.6	2–2.7	1.8–2.5
mean (std.dev.)	2.35 (0.06)	2.39 (0.05)	2.65 (0.07)
Shell length range (in mm)	7–9	7–10	7–8
Shell color	withish [brownish]	yellowish-brown or reddish-brown, white band on the middle of the last whorl	yellowish-brown, reddish-brown, white band on the middle of the last whorl, albino

Etymology This species is named after the ancient land name of Sicily (Trinacria), used as a noun in apposition.

Distribution It is known from several Pliocene outcrops (in Piedmont, Tuscany, Latium and Sicily).

Remarks Variability of the paratypes – protoconch: no. whorls 2.7–2.8; maximum diameter 0.60–0.70 mm. Teleoconch: shell length 7.2–8.8 mm, width 3.0–3.8 mm. Outer lip varied, according to the stage of growth, whether the lip coincides with an axial rib or an interspace. Colour of most shells whitish, one paratype pale brownish.

The new species is very similar to the Recent *B. menkhorsti*. It is diagnosed by the larger size of the protoconch (diameter 0.60–0.70 mm vs. 0.53–54 mm; 2.7–2.8 whorls vs. 2.0–2.2 whorls). The teleoconch is also nearly indistinguishable from that of *B. zenetouae*, from which it is clearly diagnosed by the totally different protoconch (multispiral vs. paucispiral). Morphological features of the three species dealt with herein are summarised in Table 1.

Discussion

Loss of planktotrophy has been a common phenomenon in the evolution of the caenogastropods (Oliverio, 1997; Duda & Palumbi, 1999). In fact, the transition from the Pliocene to the Pleistocene, accompanied by the increasing effect of the glacial cycles onto the Mediterranean Sea, is marked by a number of biological transitions in larval development of marine prosobranchs, where speciation events were associated with (and possibly driven by) the loss of planktotrophy (Oliverio, 1995a, 1996). In several cases anagenetic transformations resulted in a Pleistocene-Recent species without a planktotrophic phase, with the disappearance of the Pliocene planktotrophic ancestor. A turrid example is found in the genus *Clathromangelia*, with the Lower Pliocene *C. quadrillum* (planktotrophic) which gave rise to the Pleistocene-Recent non-planktotrophic *C. granum* (Oliverio, 1995b). In many other instances a planktotrophic ancestor split into two living descendants: one with planktotrophic development, the other without a planktotrophic phase. The *B. menkhorsti* complex belong to the latter type of events, and the evident sister-species relationship of *B. menkhorsti* and *B. zenetouae* makes the use of the genus *Fehria* phylogenetically erroneous, as already pointed out by Bouchet (1990).

Furthermore, the smaller number of protoconch whorls in the Recent planktotrophic *B. menkhorsti* (2–2.1) compared to the Pliocene *B. trinacria* (2.7–2.8), recalls a phenomenon already known in other turrid lineages (e.g.: the *Comarmordia gracilis* Montagu 1803 lineage: B. Sabelli pers. comm.), which show a decrease

in the length of planktotrophic phase in the transition Pliocene-Pleistocene. Gathering more data on this phenomenon (possibly expanding the observation also to other families hosting "developmental species-pairs") would probably yield interesting indications on the mechanisms driving the evolution of larval development in the caenogastropods.

Acknowledgements

We would like to express our gratitude to Alberto Zilli (MCZR, Roma) and Virginie Héros (MHNH, Paris) for the help with type and other historical material under their care. Jacobus J. van Aartsen (Leiden), Giuseppe Fasulo (Napoli), Emilio Rolán (Vigo), Roberto Ardovini (Rome) and Carlo Chirli (Prato) are acknowledged for sending samples and other information on *Bela* spp. Two anonymous reviewers provided useful suggestions. Work partly funded by PNRA (2004/XX POLARTOX).

References

Bouchet P 1990 Turrid genera and mode of development: the use and abuse of protoconch morphology. *Malacologia* **32**: 69–77.

Bouchet P & Rocroi J-P 2005 Classification and Nomenclator of Gastropod Families. *Malacologia* **47**: 1–397.

Duda TF & Palumbi JRSR 1999 Developmental shifts and species selection in gastropods. *Proceedings of the National Academy of Science, USA* **96**: 10272–10277.

Cavallo O & Repetto G 1992 *Conchiglie fossili del Roero.* Associazione Naturalistica Piemontese Amici del Museo "F. Eusebio". Studio Grafico Athena, Alba. 129 pp.

Chirli C 1997 *Malacofauna Pliocenica Toscana. Superfamiglia Conoidea.* Vol 1. B.M.B., Firenze. 92 pp.

Cretella M, Crovato C, Crovato P, Fasulo G, & Toscano F 2005 The malacological work of Arcangelo Scacchi (1810–1893). Part II: a critical review of Scacchian taxa. *Bollettino Malacologico* **40**: 114–131.

Forbes E 1844 Report on the Mollusca and Radiata of the Aegean Sea, and on their distribution, considered as bearing on Geology. *Reports of the British Association for the Advancement of Science* (**1843**): 130–193.

Gofas S. & Le Renard J 2007 (eds) *Check List of European Marine Mollusca*. http://www.somali.asso.fr/clemam/index.clemam.html [downloaded 03.2007].

Gray JE 1847a On the classification of the British Mollusca by W. E. Leach, M. D. *Annals and Magazine of Natural History* Ser. 1, Vol 20: 267–273.

Gray JE 1847b A. list of the genera of Recent Mollusca, their synonyma and types. *Proceedings of the Zoological Society of London* **15**: 129–219.

ICZN 1999 *International Code of Zoological Nomenclature,* fourth edition XXIX+306 pp. International Trust for Zoological Nomenclature, Padova.

Jeffreys JG 1870 Mediterranean Mollusca. *Annals and Magazine of Natural History* Ser. 4, Vol. 6: 65–86.

Kohn A 1998 Superfamily Conoidea. In Beesley PL, Ross GJB & Wells A (eds) *Mollusca: The Southern Synthesis. Fauna of Australia.* Vol 5: 846–854. CSIRO Publishing, Melbourne.

Nordsieck F 1977 *The Turridae of the European Seas*. La Conchiglia, Roma. 131 pp.

Oliverio M 1995a Contrasting developmental strategies and speciation in N.E. prosobranchs: a preliminary analysis. In Taylor J. D. (ed.) *Origin and evolutionary radiation of the Mollusca*: 261–266. Oxford University Press.

Oliverio M 1995b The systematics of the radulaless gastropod genus *Clathromangelia* (Conoidea, Turridae). *Zoologica Scripta* **24**: 193–201.

Oliverio M 1996 Life-histories, speciation and biodiversity in Mediterranean prosobranch gastropods. *Vie et Mileu* **46**: 163–169.

Oliverio M 1997 Global biodiversity and life-history evolution in prosobranchs gastropods. *Iberus* **16**: 73–79.

Peñas A, Rolán E & Ballesteros M 2008 Segunda adición a la fauna malacológica del litoral de Garraf (NE de la Península Ibérica). *Iberus* **26**: 15–42.

Powell AWB 1966 The molluscan families Speightiidae and Turridae. *Bulletin of the Auckland Institute and Museum* **5**: 1–157.

Reeve LA 1843–1846 Monograph of the genus *Pleurotoma. Conchologia Iconica* 1 [Pleurotoma – januari 1844].

Sabelli B, Giannuzzi-Savelli R, & Bedulli D 1992 *Catalogo annotato dei Molluschi marini del Mediterraneo*. Vol. 2. Libreria Naturalistica Bolognese, Bologna. 150 pp.

Scacchi A 1836 *Catalogus Conchyliorum Regni Neapolitani quae usque adhuc reperit A. Scacchi.* Typis Filiatre-Sebetii, Neapoli. 18 pp.

Taylor JD, Kantor YI & Sysoev AV 1993 Foregut anatomy, feeding mechanisms, relationships and classification of the Conoidea (=Toxoglossa) (Gastropods). *Bulletin of the Natural History Museum of London (Zoology)* **59**: 125–170.

Tucker JK 2004 Catalog of Recent and fossil turrids (Mollusca: Gastropoda). *Zootaxa* **682**: 1–1295.

Van Aartsen JJ 1988a European Mollusca: notes on less well-known species. XII. *Bela menkhorsti* nom. nov. = *Pleurotoma nana* Scacchi, 1836 not Deshayes, 1835 and *Fehria* (nov. gen.) *zenetouae* nov. spec. *La Conchiglia* **20** (232–233): 30–31.

Van Aartsen JJ 1988b Nomenclatural notes, 7. Forbes' Aegean Turrida. *Bollettino Malacologico* **24**: 141–144.