The Pliocene Gastropoda (Mollusca) of Estepona, southern Spain. Part 17: Borsoniidae (part), Drilliidae, Fusiturridae, Horaiclavidae, Pseudomelatomidae (part), and Turridae (Gastropoda, Conoidea)

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In this paper we review the Drilliidae, Fusiturridae, Horaiclavidae, Turridae from the early Late Pliocene Estepona assemblages and include some member of the Borsoniidae and Pseudomelatomidae omitted in the previous part of this series. One species is added to the Borsoniidae, six species are included in the Drilliidae, two in the Fusiturridae, two in the Horaiclavidae, one new genus is described in the Pseudomelatomidae: *Kantoria* nov. gen. and six species added, one of which is new: *K. castoris* nov. sp., and three to the Turridae. *Spirotropis alejandroi* Vera-Peláez, 2022 is considered a junior subjective synonym of *Spirotropis monterosatoi* (Locard, 1897). *Fusiturris smoothi* Vera Peláez, 2022 is considered a junior subjective synonym of *F. minima* Vera-Peláez, 2002.

Key words: southern Spain, Upper Pliocene, Gastropoda, Borsoniidae, Drilliidae, Fusiturridae, Horaiclavidae, Pseudomelatomidae, Turridae, Conoidea

Introduction

In this paper we continue to revise the gastropods found in the Pliocene assemblage of Estepona in south-western Spain (see Landau & Micali, 2021, p. 160 for summary of papers related to this series). Previous parts relating to families in Conoidea are: Clavatulidae (Landau & Harzhauser, 2022a); Borsoniidae, Clathurellidae, Mitromorphidae, Pseudomelatomidae (Landau & Harzhauser, 2022b); and Raphitomidae (Landau *et al*., 2022).
In this part we review the Drilliidae, Fusiturridae, Horaiclavidae and add a few species belonging to the Borsoniidae and Pseudomelatomidae that were omitted by Landau & Harzhauser (2022b). This work revises the monograph on the Turridae from Estepona by Vera-Peláez (2002). The limitations of that work were discussed by Landau & Harzhauser (2022b, p. 103), and will not be repeated here.
We note that an alternative revision of the Estepona turrids is being presented by Jose Luís Vera-Peláez (2022a, b, c, d; amongst other papers by the same author in the same publication Pliocénica 6-7). Although the date of publication on the front cover states 20th May 2022, this publication was not available before January 2023 (see Landau & Harzhauser, 2023). Date of publication 31st of December 2022 for that volume has been accepted by WoRMS (Philippe Bouchet, personal communication BL 26/01/2023).
Therefore, any names introduced by Landau & Harzhauser (2022a, 2022b) and Landau *et al*. (2022) predate Pliocénica 6-7. We have refrained from reviewing new turrid taxa introduced in Pliocénica 6-7, except those directly relating to the present paper. This paper was already submitted and reviewed in November 2022. Changes made to include references and comments on Vera-Peláez (2022a, b, c, d) were made post review stage.

Age of the deposits

The Estepona assemblages are dated as earliest Piacenzian, early Late Pliocene, an age corroborated by the assemblage of Euthecosomata (A.W. Janssen,

2004). They form part of the Mediterranean ecostratigraphic unit MPPMU1 of Raffi & Monegatti (1993) and Monegatti & Raffi (2001), which includes the Zanclean and lowest Piacenzian (see Landau *et al*., 2011, text-fig. 9). For further discussion, see Landau & Micali (2021, p. 160).

Material and methods

The material described herein was collected from several localities around Estepona by the senior author (BL; 1997–2020) and by Henk Mulder (2008–2022), to whom we are extremely grateful for his tireless efforts and generosity in making his collection available to us. For a map of localities see Landau *et al*. (2003, p. 4, text-fig. 1). The material is housed in the Natural History Museum Vienna (NHMW).
For further discussion on methodology see Landau & Harzhauser (2022a, 2022b). We use the word turrids to group the species of all families that were previously included in the Turridae.

Abbreviations:
CO: Velerín conglomerates; **PA**: Rio del Padrón; **VC**: Velerín carretera; **VA**: Velerín Antena; **PQ**: Parque Antena; **EL**: El Lobillo; see Landau *et al*. (2003, p. 4, text-fig. 1).
NHMW Natural History Museum Vienna (Austria)
MMPE Museo Municipal de Paleontología de Estepona (Málaga).

Protoconch measurements:
dp = diameter protoconch, **hp** = height protoconch, **dp/hp** = diameter/height protoconch, **dV1** = diameter first protoconch whorl, **dn** = diameter nucleus.

Systematic palaeontology

Family Borsoniidae Bellardi, 1875 (continued)

For borsoniids the shells are categorised as small (<10 mm), medium (10-25 mm), large (>25-40 mm), very large (>40 mm); breadth is described as very broad (SL/MD <2.0), broad (SL/MD 2.0-2.5), moderately broad, (SL/MD = >2.5-2.7), moderately slender (SL/MD = >2.7-3.3), slender (SL/MD >3.3).

Correction to Landau & Harzhauser, 2022b, p. 106

Turbinella elegans D'Ancona, 1872, is a primary homonym of *Turbinella elegans* Dunker, 1844 (*in* Küster & Kobelt), the next available name is *Aphanitoma pliocenica* Vera-Peláez, 2002: https://www.molluscabase.org/aphia.php?p=taxdetails&id=1617373.
We are grateful to Philippe Bouchet for drawing our attention to this.

Genus *Carinotropis* Bernasconi & Robba, 1984

Type species – *Carinotropis nitida* Bernasconi & Robba, 1984, by original designation, Pliocene, Italy.

1984 *Carinotropis* Bernasconi & Robba, p. 284.

Note – Originally described in the subfamily Clavinae Casey, 1904 (now considered a synonym of Drilliidae Olsson, 1964), *Carinotropis* Bernasconi & Robba, 1984 was transferred to the family Borsoniidae Bellardi, 1875 by Kilburn (1986, p. 654).

Carinotropis minima (Montanaro, 1937)
Plate 1, fig. 1

1889 *Drillia Michelottii* var. A. Pantanelli, p. 86 (*nomen nudum*).
*1937 *Drillia Michelottii* var. *minima* (Pant.) Montanaro, p. 152 [122], pl. 7 [10], figs 10-12.
1984 *Carinotropis nitida* Bernasconi & Robba, p. 284, pl. 3, fig. 6, pl. 4, figs 1-3.
1990 *Ceritoturris nitida* (Bernasconi & Robba, 1984) – Della Bella & Tabanelli, p. 270, fig. 12.
1996 *Carinotropis nitida* Bernasconi & Robba, 1984 – Vera-Peláez, p. 340, text-figs 14a, b, 18b, 20a, 21, pl. 21, figs 1, 3, 5-7.
1997 *Carinotropis nitida* Bernasconi & Robba, 1984 – Chirli, p. 40, pl. 11, figs 3-5.
2002 *Carinotropis nitida* Bernasconi & Robba, 1984 – Vera-Peláez, p. 194, pl. 2, fig. J, pl. 10, figs I, J.
2007 *Carinotropis minima* (Montanaro, 1937) – Della Bella & Scarponi, p. 21, figs 17-28.
2008 *Carinotropis minima* (Montanaro, 1937) – Chirli & Richard, p. 62, pl. 12, fig. 4.
2022d *Carinotropis nitida* Bernasconi & Robba, 1984 – Vera-Peláez, p. 272, pl. 2, fig. 7 (fig. 17 on plate description; *lapsus*), pl. 6, figs 7-8.

Material and dimensions – Maximum height 6.4 mm, width 2.4 mm. **CO**: NHMW 2020/0171/0486 (2). **VC**: NHMW 2020/0171/0487 (1), NHMW 2020/0171/0488 (2).

Description – Shell small, moderately slender, turriculate. Protoconch multispiral, tall conical, composed of four whorls with small nucleus: post nuclear whorls sharply carinate, microsculpture of very fine randomly placed pustules (dp = 310 μm, hp = 465 μm, dp/hp = 0.67). Junction with teleoconch sharply delimited. Teleoconch of up to five whorls, sharply angled at shoulder placed mid-whorl, whorl profile concave above shoulder, straight sided to weakly convex below, separated by weakly impressed undulating suture. Axial sculpture of broad, rounded orthocline ribs, 10-12 on penultimate whorl, roughly equal in width to their interspaces, weakly developed over subsutural ramp, stronger below periphery, forming horizontally elongated short spinous tubercles at shoulder. Single spiral cord develops on later whorls between shoulder and abapical suture. Last whorl about 57% of total height

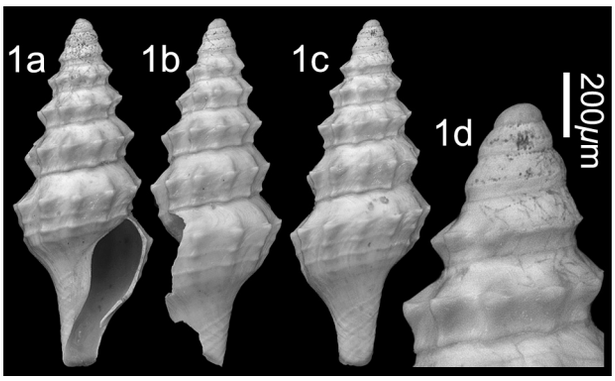

Plate 1. *Carinotropis minima* (Montanaro, 1937); 1. NHMW 2020/0171/0487, height 5.9 mm, width 2.1 mm, 1d, detail of protoconch (digital image). Velerín carretera, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

with concave, smooth subsutural ramp, sharply angled at spinous shoulder, convex below, moderately constricted at base; spiral sculpture of shoulder and basal cords, and third cord between. Aperture about 42% of total height, small, pyriform; anal canal asymmetrically U-shaped with apex at lower half of subsutural ramp; siphonal canal moderate length, slightly twisted abaxially. Columella smooth, columellar and parietal callus poorly developed, forming narrow callus rim.

Discussion – Della Bella & Scarponi (2007) noted that *Carinotropis nitida* Bernasconi & Robba, 1984 was a subjective junior synonym of *Drillia michelottii* var. *minima* (Pant.) Montanaro, 1937, originally described from the Tortonian Upper Miocene of Italy. *Carinotropis michelottii* (Bellardi, 1847) also from Tortonian Upper Miocene of Italy, differs in being larger, the shoulder is delimited by a grouping of pustules, but is not sharply carinate, and weaker axial sculpture. It is unclear if Della Bella & Scarponi intended to separate the two taxa at specific level (as done in the figure captions) or subspecies level (as done in the text), however, as both forms are present in the same Tortonian deposits, we consider the two distinct at full species level.
In the Italian assemblages *C. nitida* is associated with lower circalittoral and upper bathyal assemblages (Della Bella & Scarponi, 2007, p. 22). In Estepona it is uncommon in all deposits.

Distribution – Upper Miocene: Proto-Mediterranean, Italy (Montanaro, 1937). Lower Pliocene: central Mediterranean, Italy (Bernasconi & Robba, 1984; Della Bella & Tabanelli, 1990; Chirli, 1997; Della Bella & Scarponi, 2007). Upper Pliocene: western Mediterranean, Estepona Basin, Spain (Vera-Peláez, 1996, 2002, 2022d), France (Chirli & Richard, 2008).

Family Drilliidae Olsson, 1964

For drilliids the shells are categorised as small (<15 mm), medium (15-30 mm), large (>35 mm); breadth is described as broad (SL/MD <3), moderately slender (SL/MD = 3-3.2), slender (SL/MD >3.2).

Genus *Crassopleura* Monterosato, 1884

Type species – *Pleurotoma maravignae* Bivona, 1838, by monotypy, Pleistocene, Italy.

1884 *Crassopleura* Monterosato, p. 127.

***Crassopleura maravignae* (Bivona, 1838)**
Plate 2, figs 1-5

1835 *Pleurotoma elegans* Scacchi, p. 8, pl. 1, fig. 18 (*non* Defrance, 1826).
1837 *Pleurotoma incrassata* Dujardin, p. 292, pl. 20, fig. 28 (*non* G.B. Sowerby, I 1834).
*1838 *Pleurotoma Maravignae* Bivona, Ant. *in* Bivona And., p. 13, pl. 1, fig. 12.
1839 *Pleurotoma Maravignae* Biv. – Calcara, p. 8, pl. 1, fig. 3.
1841 *Pleurotoma elegans* Scacchi – Calcara, p. 54.
1843 *Clavatula crebricostata* Hinds, p. 21.
1844 *Pleurotoma elegans* Scacchi – Philippi, p. 168, pl. 26, fig. 5.
1847 *Raphitoma incrassata* Duj. – Bellardi, p. 108, pl. 4, fig. 27.
1852 *Pleurotoma subincrassata* d'Orbigny, p. 62 (*nom. nov. pro. P. incrassata* Dujardin, 1837, *non* G. B. Sowerby, I 1834).
1853 *Pleurotoma incrassata* Duj. – Hörnes, p. 383, pl. 40, fig. 14.
1854 *Pleurotoma Hybrida* Millet, p. 161 (*nomen nudum*).
1862 *Pleurotoma incrassatum* Duj. – Brugnone, p. 20, pl. 1, fig. 12.
1865 *Pleurotoma hybrida* Millet, p. 588, p. 161 (*non* Grateloup, 1845).
1877 *Drillia incrassata* (Duj.) – Bellardi, p. 140, pl. 5, fig. 1.
1879 *Drillia incrassata* var. *rhodanica* Fontannes, p. 46, pl. 4, fig. 10.
1891 *Pleurotoma* (*Drillia*) *incrassata* Duj. – Hoernes & Auinger, p. 327, pl. 42, figs 12-15.
1904 *Drillia* (*Cymatosyrinx*) *incrassata* var. *acutespirata* Sacco, p. 46.
1904 *Drillia* (*Cymatosyrinx*) *incrassata* var. *magnocostulata* Sacco, p. 47.
1904 *Drillia* (*Cymatosyrinx*) *incrassata* var. *miominor* Sacco, p. 47, pl. 12, figs 47, 48.
1904 *Drillia* (*Cymatosyrinx*) *incrassata* var. *dertomagna* Sacco, p. 47.
1904 *Drillia* (*Crassopleura*) *maravignae* Bivona – Kobelt, p. 225, pl. 81, figs 12, 13.
1914 *Drillia* (*Cymatosyrinx*) *incrassata* Dujardin – Cipolla, p. 122, pl. 12, fig. 10.
1914 *Drillia* (*Cymatosyrinx*) *incrassata* mut. *Maravig-*

nae Biv. – Cipolla, p. 123, pl. 12, fig. 11.
1914 *Drillia* (*Cymatosyrinx*) *incrassata* var. *miominor* Sacco – Cipolla, p. 123, pl. 12, fig. 12.
1915 *Drillia incrassata* (Dujardin) – Harmer (*partim*), p. 222, pl. 27, fig. 28.
1937 *Drillia* (*Cymatosyrinx*) *incrassata* var. *minor* Montanaro, p. 159, pl. 7, figs 41-43.
1938 *Drillia* (*Cymatosyrinx*) *subincrassata* Peyrot, p. 275.
1943 *Clavus* (*Crassopleura*) *maravignae* (Bivona) – Wenz, p. 1397, fig. 3948.
1954 *Clavus* (*Crassopleura*) *maravignae* Bivona, 1838 – Glibert, p. 33, pl. 1, fig. 12, pl. 5, fig. 4.
1964 *Clavus* (*Crassopleura*) *maravignae* Bivona, 1838 – Brébion, p. 553.
1966 *Crassopleura maravignae* (Bivona, 1838) – Powell, p. 93, pl. 14, fig. 12.
1977 *Crassopleura maravignae* (Bivona, 1938 [*sic*]) – Nordsieck, p. 11, pl. 1, fig. 3.
1979 *Crassopleura maravignae* (Bivona, 1838) – Bogi *et al*., p. 6, unnumbered fig.
1984 *Crassopleura incrassata* (Dujardin, 1837) – Bernasconi & Robba, p. 270, pl. 2, fig. 1.
1984 *Crassopleura maravignae* (Bivona, 1838) – Van Aartsen *et al*., p. 43, fig. 207.
1985 *Crassopleura maravignai* [*sic*] (Bivona, 1838) – Orlando & Palazzi, p. 44, pl. 8, figs 130-131.
1996 *Crassopleura incrassata* (Dujardin, 1837) – Vera-Pelàez, p. 371, text-figs 16a-d, 19a-d, 21a, b, 26, pl. 25, figs 1-12.
1997 *Crassopleura incrassata* (Dujardin, 1837) – Chirli, p. 43, pl. 12, figs 2-5.
1999 *Crassopleura maravignae* (Bivona, 1838) – Ardovini & Cosignani, p. 67, 68, unnumbered fig. top row right.
2001 *Crassopleura incrassata* (Dujardin, 1837) – Cachia *et al*., p. 61, pl. 9, fig. 6.
2002 *Crassopleura incrassata* (Dujardin, 1837) – Vera-Pelàez, p. 197, pl. 3, figs D, E, F, pl. 11, figs I, J.
2003 *Crassopleura maravignae* (Bivona Ant. in Bivona And., 1838) – Scarponi & Della Bella, p. 21, figs 2, 3, 14.
2010 *Crassopleura maravignae* (Bivona Ant. in Bivona And., 1838) – Sosso & Dell'Angelo, p. 44, p. 60 unnumbered fig. bottom left.
2011 *Crassopleura maravignae* (Bivona Ant. in Bivona And., 1838) – Landau *et al*., p. 36, pl. 18, fig. 12.
2020 *Crassopleura maravignae* (Bivona Ant. in Bivona And., 1838) – Landau *et al*., p. 77, pl. 67, figs 1-2.
2022c *Crassopleura maravignae* (Bivona Ant. *in* Bivona And., 1838) – Vera-Peláez, p. 188, pl. 5, figs 20-22.
2022c *Crassopleura incrassata* (Dujardin, 1837) – Vera-Peláez, p. 189, pl. 5, figs 19, 23-26.

non 1878 *Pleurotoma incrassata* Duj. – Nyst, pl. 3, fig. 10 [= *Crassopleura nysti* (Harmer, 1915)].
non 1882 *Pleurotoma incrassata* Duj. – Nyst, p. 45 [= *Crassopleura nysti* (Harmer, 1915)].
non 1915 *Drillia incrassata* var. *dertomagna* Sacco – Harmer, p. 223, pl. 27, fig. 29 [= *Crassopleura nysti* (Harmer, 1915)].
non 1915 *Drillia incrassata* var. *miominor* Sacco – Harmer, p. 223, pl. 27, fig. 30 [= *Crassopleura nysti* (Harmer, 1915)].
non 1915 *Drillia incrassata* var. *nysti* Harmer, p. 224, pl. 27, fig. 31 [= *Crassopleura nysti* (Harmer, 1915)].
non 1915 *Drillia incrassata* var. *crassa* (A. Bell) – Harmer, p. 224, pl. 27, fig. 32 [= *Crassopleura nysti* (Harmer, 1915)].
non 1953 *Drillia incrassata* Duj. – Csepreghy-Meznerics, p. 8, pl. 1, figs 5, 6 [= *'Crassopleura' sigmoidea* (Bronn, 1828)].

Material and dimensions – Maximum height 13.5 mm, width 5.2 mm. **CO**: NHMW 2020/0171/0032-0036 (5), NHMW 2020/0171/0037 (29). **EL**: NHMW 2020/0171/0038 (6).

Description – Shell small, solid, broad fusiform, with tall, conical spire. Protoconch multispiral, conical, of 3.5 smooth, convex whorls, with small nucleus (dp = 740 μm, hp = 1110 μm, dp/hp = 0.67, dn = 140 μm, dV1 = 305 μm). Junction with teleoconch sharply delimited by sinusigera. Teleoconch of up to seven whorls with almost vertical, weakly concave subsutural ramp, poorly delimited by weak shoulder, convex below, separated by superficial, undulating suture. Axial sculpture of narrow, opisthocline sinuous ribs (T2= 9-10, TL= 14-19), narrow over subsutural ramp, slightly swollen towards lower suture. Spiral sculpture restricted to 3 or 4 flattened cords over siphonal fasciole. Last whorl 51-53% total height, subsutural ramp slightly concave, broadly and weakly rounded below, not constricted at base, ribs weakening at periphery, extending over base in most specimens; base not delimited; siphonal fasciole weakly delimited, flattened, bearing broad spiral cords. Aperture 32-33% total height, ovate; outer lip strongly thickened by broad labial varix; anal sinus shallow, symmetrically U-shaped, occupying entire subsutural ramp, with apex mid-ramp; siphonal canal very short and broad, straight, unnotched. Columella straight, smooth. Columellar and parietal callus thickened, sharply delimited, forming moderately broad callus rim; well-developed tuberculose parietal pad developed adapically delimiting medial border of anal canal. Colour patten is preserved consisting of a single narrow orange horizontal stripe running at about two-thirds whorl height.

Discussion – As discussed by Scarponi & Della Bella (2003, p. 22), the correct name for this species is *Crassopleura maravignae* (Bivona 1838), Dujardin's (1837) name *Pleurotoma incrassata* being a primary homonym of *P. incrassata* G. B. Sowerby I, 1834. The argument put forward by Vera-Peláez (2022c, p. 189) that the name *incrassata* was available because today Dujardin's and Sowerby's species are considered distinct genera is incorrect, as the names are primary homonyms (ICZN 1999, Art. 57.2).
Some specimens with fewer ribs resemble specimens of *'Crassopleura' sigmoidea* (Bronn, 1828), but can be dif-

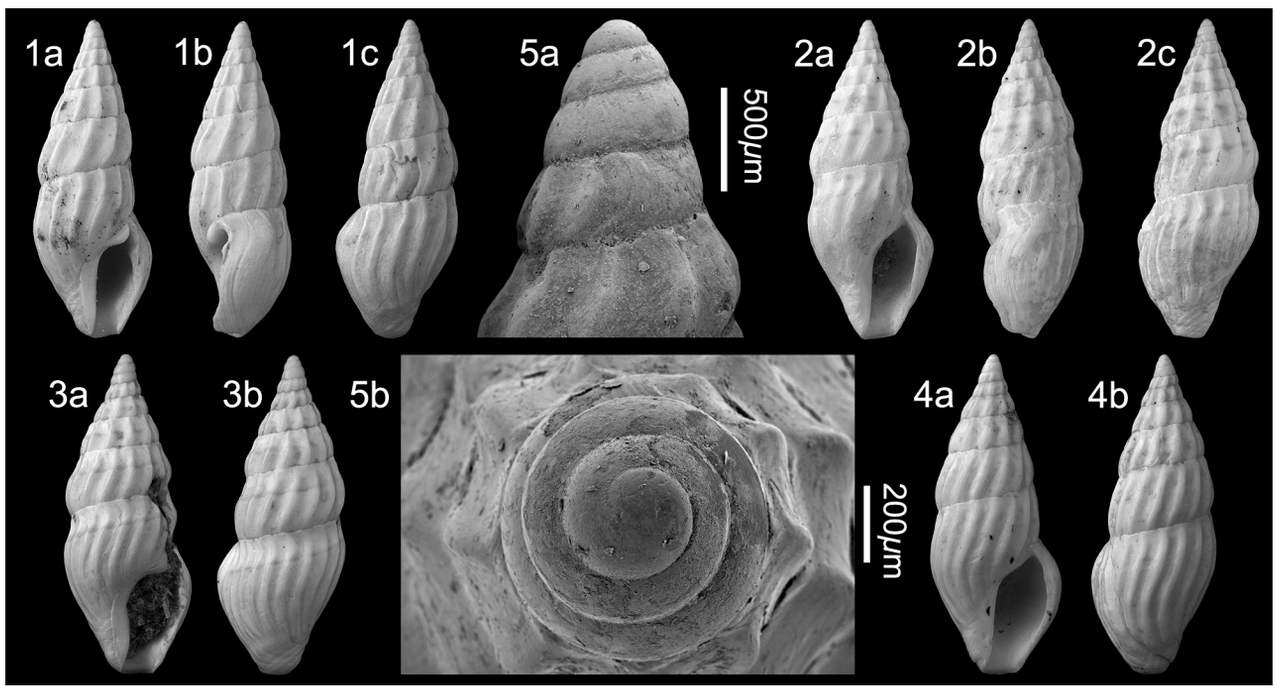

Plate 2. *Crassopleura maravignae* (Bivona, 1838); 1. NHMW 2020/0171/0032, height 9.1 mm, width 3.4 mm; 2. NHMW 2020/0171/0033, height 10.5 mm, width 4.1 mm; 3. NHMW 2020/0171/0034, height 8.3 mm, width 3.2 mm; 4. NHMW 2020/0171/0035, height 9.5 mm, width 3.7 mm; 5. NHMW 2020/0171/0036, 5a, detail of protoconch, 5b, detail or teleoconch microsculpture (1-4, digital images, 5, SEM image). Velerín conglomerates, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

ferentiated in that the anal sinus is evenly U-shaped and does not produce a notch on the parietal wall. Scarponi & Della Bella (2003) considered this difference to be of generic significance and placed Bronn's species in the genus with quotation marks, but this is not followed here.

Crassopleura maravignae (Bivona 1838) is widespread from the Middle Miocene to present-day European assemblages, although there are small differences between populations. Glibert (1954, p. 33) commented that the Middle Miocene specimens from the Loire Basin were slightly slenderer than those from the Holocene of the Mediterranean and that the ribs were less serrated and more oblique. The Estepona populations have 14-19 ribs on the last whorl. Vera-Peláez (2022c) illustrated this variability choosing to separate the form with a greater number of ribs as *C. maravignae* and the form with fewer ribs *C. incrassata*.

Scarponi & Della Bella (2003, p. 23) noted that the most common Mediterranean Pliocene form had a similar number of ribs (14-18), and Landau *et al*., (2020) counted 15-20 ribs for the Upper Miocene specimens from north-western France, all slightly fewer than present-day specimens (21-25). However, the older Atlantic Middle Miocene population from the Loire Basin had anything between 15 and 30 axial ribs per whorl (Glibert, 1954, p. 33). The colour pattern preserved in the Estepona specimens is also seen in some, but not all, extant shells. Some references to *Crassopleura maravignae* (as *Pleurotoma* or *Drillia incrassata*) (Nyst, 1878, 1882; Harmer, 1915) are not this species, but *Crassopleura nysti* (Harmer, 1915) (Marquet, 1998a, b). Specimens from the Middle Miocene of the Paratethyan Sea are provisionally included pending revision of this group.

In Estepona *C. maravignae* is found in the shallow water assemblages, which agrees with its ecological distribution in the Italian Pliocene (Scarponi & Della Bella, 2003, p. 22) and its distribution today in infra- and circalittoral habitat at depths of 30-100 m (Bombace, 1970; Sabelli & Spada, 1977).

Distribution – Middle Miocene: Atlantic (Langhian), Loire Basin, France (Dujardin, 1837; Glibert, 1954); Paratethys: Austria (Hörnes, 1853; Hoernes & Auinger, 1891), Hungary (Hoernes & Auinger, 1891), Romania (Hoernes & Auinger, 1891); Proto-Mediterranean, Italy (Bellardi, 1877). Upper Miocene (Tortonian and Messinian): Atlantic, NW France (Millet, 1854, 1865; Glibert, 1954; Brébion, 1964; Landau *et al*., 2020); Proto-Mediterranean, Italy (Bellardi, 1877; Montanaro, 1937). Lower Pliocene: ?NSB, Coralline Crag, England (Harmer, 1915); Atlantic, Guadalquivir Basin, S. Spain (Landau *et al*., 2011); western Mediterranean, NE Spain (Gili & Martinell, 1993), S. France (Fontannes, 1879); central Mediterranean, Italy (Chirli, 1997; Scarponi & Della Bella, 2003; Sosso & Dell'Angelo, 2010). Upper Pliocene: western Mediterranean, Estepona Basin, S. Spain (Vera-Pelàez, 1996, 2002, 2022c), central Mediterranean, Italy (Calcara, 1839, 1841; Bellardi, 1877; Cipolla, 1914; Bernasconi & Robba, 1984). Present-day: Eastern Atlantic frontage from Norway to the Madeira, Azores, Morocco, and into the Mediterranean (Nordsieck, 1977), central Mediterranean (Bogi *et al*., 1979; Orlando & Palazzi, 1985; Ardovini & Cossignani, 1999; Cachia *et al*., 2001).

***Crassopleura sigmoidea* (Bronn, 1828)**
Plate 3, figs 1-3

*1828 *Pleurotoma sigmoidea* Bronn, p. 535 [= *Murex harpula* var. *in* Brocchi, 1814; *non Turriclavus harpulus* (Brocchi, 1814)].
1831 *Pleurotoma sigmoidea* Bronn, p. 47.
1847 *Raphitoma sigmoidea* Bronn (*Pleurotoma*) – Bellardi, p. 109, pl. 4, fig. 29.
1877 *Drillia sigmoidea* (Bronn) – Bellardi, p. 144, pl. 5, fig. 4.
1904 *Drillia* (*Cymatosyrinx*) *sigmoidea* var. *pliomagna* Sacco, p. 47, pl. 12, figs 49-50.
1910 *Drillia* (*Cymatosyrinx*) *sigmoidea* Brn. – Cerulli-Irelli, p. 242 [50], pl. 35 [4], figs 53, 54.
1914 *Drillia* (*Cymatosyrinx*) *sigmoidea* Bronn – Cipolla, p. 124 [20], pl. 12 [2], fig. 14.
1915 *Drillia sigmoidea* (Bronn) – Harmer, p. 225, pl. 27, figs 24, 25.
1937 *Drillia* (*Cymatosyrinx*) *sigmoidea* Brn. – Montanaro, p. 158 [128], pl. 7 [10], figs 37-40.
1954 *Clavus* (*Elaeocyma*) *sigmoidea* (Bronn) – Glibert, p. 34, pl. 5, fig. 5.
1955 *Drillia* (*Cymatosyrinx*) *sigmoidea* (Bronn 1831) [*sic*] – Rossi-Ronchetti, p. 327, fig. 176.
1967 *Clavus* (*Cymatosyrinx*) *sigmoideus* (Bronn) – Pelosio, p. 158 [58], pl. 45, figs 15, 16.
1973 *Clavus* (*Cymatosyrinx*) *sigmoideus* (Bronn) – Caprotti & Vescovi, p. 177, pl. 2, figs 23, 24.
1974 *Elaeocyma sigmoidea* (Bronn, 1831) [*sic*] – Malatesta, p. 420, pl. 31, fig. 3.
1976 *Clavus sigmoideus* (Bronn) – Caprotti, p. 46, pl. 16, figs 23, 24.
1978 *Pleurotoma sigmoidea* Bronn – Pinna & Spezia, p. 158, pl. 46, fig. 3.
1984 *Crassopleura sigmoidea* (Bronn, 1831) [*sic*] – Bernasconi & Robba, p. 272, pl. 2, figs 2, 3.
1990 *Cerodrillia* (*Cerodrillia*) *sigmoidea* (Bronn, 1831) [*sic*] – Della Bella & Tabanelli, p. 267, figs 1, 2.
1992 *Cerodrillia* (*Cerodrillia*) *sigmoidea* (Bronn, 1831) [*sic*] – Cavallo & Repetto, p. 134, fig. 358.
1996 *Crassopleura sigmoidea* (Bronn, 1831) [*sic*] – Vera-Peláez, p. 376, text-figs 16e, f, 19e, f, 21d, 27, pl. 26, figs 1-11.
1997 *Crassopleura sigmoidea* (Bronn, 1831) [*sic*] – Chirli, p. 44, pl. 12, figs 6-9.
2002 *Crassopleura sigmoidea* (Bronn, 1831) [*sic*] – Vera-Peláez, p. 197, pl. 3, figs A, B, C, pl. 11, figs K, L.
2003 "*Crassopleura*" *sigmoidea* (Bronn, 1831) [*sic*] – Scarponi & Della Bella, p. 23, figs 4a-5, 15, 15a.
2008 *Crassopleura sigmoidea* (Bronn, 1831) [*sic*] – Chirli & Richard, p. 57, pl. 11, fig. 5.
2010 "*Crassopleura*" *sigmoidea* (Bronn, 1831) [*sic*] – Sosso & Dell'Angelo, p. 45, 60 unnumbered fig. bottom row centre.
2011 *Crassopleura sigmoidea* (Bronn, 1831) [*sic*] – Chirli & Linse, p. 193, pl. 71, fig. 3.
2011 "*Crassopleura*" *sigmoidea* (Bronn, 1831) [*sic*] – Landau *et al*., p. 36, pl. 18, fig. 13.
2013 "*Crassopleura*" *sigmoidea* (Bronn, 1831) [*sic*] – Landau *et al*., p. 276, pl. 46, fig. 5.
2018 *Crassopleura sigmoidea* (Bronn, 1831) [*sic*] – Brunetti & Cresti, p. 88, fig. 345.
2022c *Crassopleura sigmoidea* (Bronn, 1831) [*sic*] – Vera-Peláez, p. 189, pl. 5, figs 7-9.

non 1953 *Drillia incrassata* Duj. – Csepreghy-Meznerics, p. 8, pl. 1, figs 5, 6 [*non* Dujardin, 1837 = *Crassopleura maravignae* (Bivona Ant. *in* Bivona And., 1838)].
non 1962 *Drillia sigmoidea* Bronn – Strausz, p. 69, pl. 19, fig. 11.
non 1966 *Drillia sigmoidea* Bronn, 1831 [*sic*] – Strausz, p. 426, pl. 19, fig. 11.

Material and dimensions – Maximum height 13.3 mm, width 4.4 mm. **CO**: NHMW 2020/0171/0039 (39). **VC**: NHMW 2020/0171/0040-0042 (4), NHMW 2020/0171/0043 (50+). **EL**: NHMW 2020/0171/0044 (13).

Description – Shell small, solid, broad fusiform, with tall, conical spire. Protoconch multispiral, conical, of 3.5 smooth, convex whorls, with small nucleus. Junction with teleoconch sharply delimited by sinusigera (dp = 765 μm, hp = 960 μm, dp/hp = 0.80, dn = 235 μm, dV1 = 305 μm). Teleoconch of up to six whorls with almost vertical, concave subsutural ramp, poorly delimited by weak to moderately developed shoulder, convex below, separated by superficial, undulating suture. Axial sculpture of narrow, opisthocline sinuous ribs (T2= 7-8, TL= 10-12), narrow over subsutural ramp, swollen and elevated on lower half of whorl. Spiral sculpture restricted to a few weak cords over siphonal fasciole. Last whorl 53-55% total height, with concave subsutural ramp, rounded at shoulder, convex below, weakly to moderately constricted at base, ribs weakening at periphery, not extending, or weakening over base; base not delimited. Aperture 35-34% total height, ovate; outer lip thickened by broad labial varix, sharp edged, with deep notch at adapical end formed by anal sinus; anal sinus broad, deep, symmetrically U-shaped occupying entire subsutural ramp, strongly distorting adapical profile of outer lip, with apex mid-ramp; siphonal canal very short and broad, straight, unnotched. Columella straight, smooth. Columellar and parietal callus thickened, sharply delimited, forming moderately broad callus rim; well-developed tuberculose parietal pad developed adapically delimiting medial border of anal canal. Colour patten is preserved consisting of a single narrow orange horizontal stripe running at about two-thirds whorl height.

Discussion – Tucker (2004, p. 905) correctly pointed out that the date of authorship should be 1828, in which Bronn (p. 535) named Brocchi's (1814, p. 421) *Murex harpula* var. That variety is accompanied by the description "*glaberrima, nitida, costellis flexuosis, cauda sulcata*", which qualifies as a valid description. Bronn (1831, p. 47) repeats the reference to Brocchi without further description.

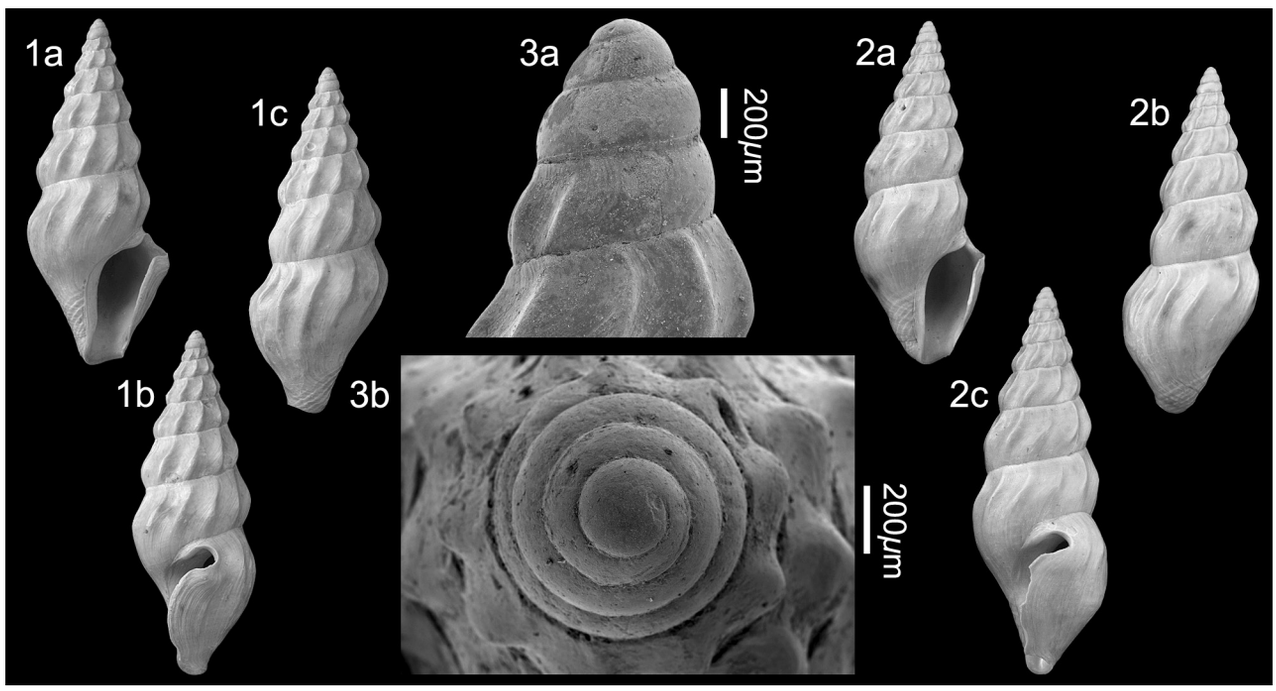

Plate 3. *Crassopleura sigmoidea* (Bronn, 1828); 1. NHMW 2020/0171/0040, height 11.6 mm, width 4.6 mm; 2. NHMW 2020/0171/0041, height 12.0 mm, width 4.2 mm; 3. NHMW 2020/0171/0042, 3a, detail of protoconch, 3b, detail or teleoconch microsculpture (1-2, digital images, 3, SEM image). Velerín carretera, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

Crassopleura sigmoidea is relatively constant in shape, although the ribs vary slightly in thickness and whether they continue, albeit weakened, over the base or end at the periphery of the last whorl. Similar to *Crassopleura maravignae* (Bivona, 1838), with which it co-occurs in the Estepona assemblages, *C. sigmoidea* differs in being slenderer, in having a more concave subsutural ramp, in having fewer axial ribs (T2= 7-8, TL= 10-12 vs T2= 9-10, TL= 14-19 for the Estepona populations), and the anal sinus forms a deep notch at the adapical end of the outer lip, not seen in *C. maravignae*. We note that a similar colour pattern consisting of a narrow orange band running at about two thirds whorl height is preserved in both species.

In Estepona *C. sigmoidea* is found in both the shallow and deeper water assemblages, agreeing with its wide infralittoral to bathyal ecological distribution given by Scarponi & Della Bella (2003, p. 24).

Paratethyan records have been excluded. Both Csepreghy-Meznerics (1953, pl. 1, figs 5, 6) and Strausz (1962, 1966, pl. 19, fig. 11) refer to the same single specimen that differs from *C. sigmoidea* is having a much shallower anal sinus.

Distribution – Middle Miocene: Proto-Mediterranean, Karaman Basin, Turkey (Landau *et al*., 2013). Upper Miocene: Atlantic (Tortonian): Cacela Basin, Portugal (Landau *et al*., 2013); Proto-Mediterranean, Italy (Bellardi, 1847, 1877; Montanaro, 1937; Bernasconi & Robba, 1984). Lower Pliocene: Atlantic, Guadalquivir Basin, S. Spain (Landau *et al*., 2011); western Mediterranean, NE Spain (Gili & Martinell, 1993); central Mediterranean, Italy (Bellardi, 1877; Sacco, 1904; Pelosio, 1967; Cavallo & Repetto, 1992; Bernasconi & Robba, 1984; Chirli, 1997; Sosso & Dell'Angelo, 2010; Brunetti & Cresti, 2018); central Mediterranean, Italy (Scarponi & Della Bella, 2003). Upper Pliocene: North Sea Basin, Red Crag, England (Harmer, 1915); western Mediterranean, Estepona Basin, Spain (Vera-Peláez, 1996, 2002, 2022c), France (Chirli & Richard, 2008); central Mediterranean, Italy (Bellardi, 1877; Caprotti & Vescovi, 1973; Malatesta, 1974; Caprotti, 1976; Scarponi & Della Bella, 2003). Lower Pleistocene: central Mediterranean, Italy (Cerulli-Irelli, 1910); eastern Mediterranean, Rhodes Island (Chirli & Linse, 2011).

Genus *Nitidiclavus* Bernasconi & Robba, 1984

Type species – *Mangilia maitreja* von Koenen, 1872, by original designation, Miocene, Germany.

1984 *Nitidiclavus* Bernasconi & Robba, p. 274.

***Nitidiclavus exiguus* (Della Bella & Tabanelli, 1990)**
Plate 4, figs 1-2

1984 *Nitidiclavus maitrejus* (Semper *in* von Koenen, 1872) – Bernasconi & Robba, p. 275, pl. 2, figs 4-7 [*non Nitidiclavus maitrejus* (von Koenen, 1872)].

*1990 *Cerodrillia* (*Cerodrillia*) *exigua* Della Bella & Tabanelli, p. 267, figs 3-6.

1992 *Cerodrillia* (*Cerodrillia*) *exigua* Della Bella & Tabanelli, 1990 – Cavallo & Repetto, p. 134, fig. 357.
1996 *Nitidiclavus maitrejus* (Semper *in* von Koenen, 1872) – Vera-Peláez, p. 383, text-figs 17c, 28, pl. 27, figs 1-7 [*non Nitidiclavus maitrejus* (von Koenen, 1872)].
1997 *Cerodrillia exigua* Della Bella & Tabanelli, 1990 – Chirli, p. 41, pl. 11, figs 6, 7.
2002 *Nitidiclavus maitrejus* (Semper *in* von Koenen, 1872) – Vera-Peláez, p. 197, pl. 3, figs G, H, pl. 11, figs M, N [*non Nitidiclavus maitrejus* (von Koenen, 1872)].
2003 *Nitidiclavus exiguus* (Della Bella & Tabanelli, 1990) – Scarponi & Della Bella, p. 20, figs 1, 13.
2008 *Nitidiclavus exiguus* (Della Bella & Tabanelli, 1990) – Chirli & Richard, p. 57, pl. 11, fig. 4.
2018 *Nitidiclavus exiguus* (Della Bella & Tabanelli, 1990) – Brunetti & Cresti, p. 88, fig. 344.
2022c *Nitidiclavus exigua* (Della Bella & Tabanelli, 1990) – Vera-Peláez, p. 186, pl. 5, figs 13, 14, 17.

Material and dimensions – Maximum height 7.9 mm, width 2.9 mm. **CO**: NHMW 2020/0171/0473 (1). **VC**: NHMW 2020/0171/0565 (1).

Description – Shell small, broad fusiform, with relatively tall, conical spire. Protoconch multispiral, dome-shaped, of 2.5-2.74 smooth, convex whorls, with small nucleus (dp = 700 μm, hp = 655 μm, dp/hp = 1.07). Junction with teleoconch sharply delimited. Teleoconch of five whorls with poorly delimited, slightly concave subsutural ramp, convex below, separated by weakly impressed, undulating suture. Axial sculpture of narrow, slightly opisthocline ribs, narrow over subsutural ramp, swollen and slightly arched on lower half of whorl, some ribs varicose. Spiral sculpture restricted to a few weak cords over siphonal fasciole. Last whorl 57-60% of total height, slightly concave at subsutural ramp, rounded below, moderately constricted at base, ribs weakening over base; base not delimited. Aperture 38-39% of total height, ovate, outer lip sharp; anal sinus broad, very shallow V-shaped, with apex at shoulder; siphonal canal short, broad, straight, not notched at tip. Columella straight, smooth. Columellar and parietal callus thickened, sharply delimited, forming narrow callus rim.

Discussion – As pointed out by Scarponi & Della Bella (2003, p. 21), the specimens illustrated as *Nitidiclavus maitrejus* (von Koenen, 1872) by Bernasconi & Robba (1984, pl. 2, figs 4-7) from the Lower Pliocene of Italy are not conspecific with *N. maitrejus*, originally described from the Miocene of the North Sea Basin (Germany). The Italian Pliocene specimens represent *Nitidiclavus exiguus* (Della Bella & Tabanelli, 1990), originally placed in the genus *Cerodrillia* Bartsch & Rehder, 1939, but species in that genus have a deep U-shaped anal sinus constricted medially by a thickened parietal pad.
However, in view of the error in determination of the Italian specimens by Bernasconi & Robba, Scarponi & Della Bella (2003) 'corrected' the type species of *Nitidiclavus* to *N. exiguus*. This is acceptable under Art. 70.3 "*the author may select, and thereby fix as type species, the species that will, in his or her judgment, best serve stability and universality*" (ICZN, 1999). Unfortunately, whilst choosing a new type, those authors did not refer to Art.70.3.2 (ICZN, 1999), which is specifically required by that article in this case: "*….the author must refer to this Article and cite together both the name previously cited as type species and the name of the species selected*" (ICZN, 1999). Subsequent authors have continued to consider *Mangilia maitreja* the type species (*e.g.* Lozouet, 2017, p. 26). In order to promote stability, and notwithstanding Bernasconi & Robba's misidentification, under Art. 70.3 we hereby declare the type species of *Nitidiclavus* to be *Mangilia maitreja*.
Although never speciose, the genus has a long history in Europe, present since the late Oligocene in the Atlantic of France and possibly the Paratethys of Hungary (Lozouet, 2017). In the Miocene it is present in the North Sea Basin and Proto-Mediterranean. For comparison with congeners see Lozouet (2017, p. 27).

Distribution – Upper Miocene: Proto-Mediterranean, Italy (Della Bella & Tabanelli, 1990). Lower Pliocene: western Mediterranean, NE Spain (Gili & Martinell,

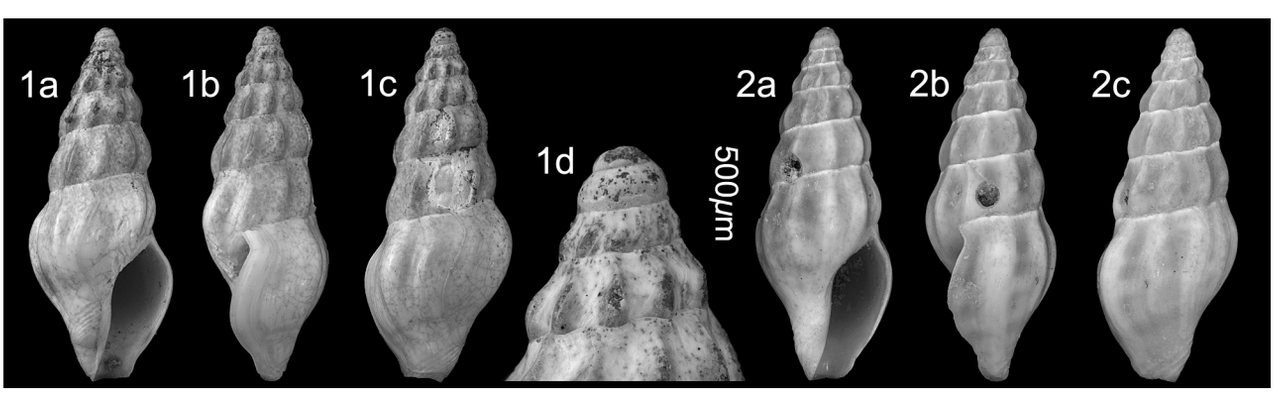

Plate 4. *Nitidiclavus exiguus* (Della Bella & Tabanelli, 1990); 1. NHMW 2020/0171/0473, height 7.1 mm, width 2.8 mm. Velerín conglomerates. 2. NHMW 2020/0171/0565, height 7.9 mm, width 2.9 mm (digital images). Velerín carretera, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

1993); central Mediterranean, Italy (Bernasconi & Robba, 1984; Della Bella & Tabanelli, 1990; Chirli, 1997; Scarponi & Della Bella, 2003; Brunetti & Cresti, 2018). Upper Pliocene: western Mediterranean, Estepona Basin, Spain (Vera-Peláez, 1996, 2002, 2022c), France (Chirli & Richard, 2009); central Mediterranean, Italy (Cavallo & Repetto, 1992; Scarponi & Della Bella, 2003).

Genus *Spirotropis* Sars, 1878

Type species – *Pleurotoma carinata* Bivona, 1838 [= *Spirotropis confusa* (G. Seguenza, 1880)], by monotypy, Pliocene or Pleistocene, Italy.

1878 *Spirotropis* Sars, p. 242. Sars established *Spirotropis* with *Pleurotoma carinata* Bivona, 1838, as type species by monotypy. *Pleurotoma carinata* Bivona, 1838, is a junior homonym of *Pleurotoma carinata* Deshayes, 1834, and *P. carinata* Gray, 1834. Warén (1975) argued that Sars had misidentified his present-day material as *P. carinata* Bivona, which is a distinct fossil species, and he established the name *Spirotropis sarsi* Warén, 1975, for the extant species. R. Janssen (1993, p. 252-255) showed that *Spirotropis sarsi* is a junior subjective synonym of *Spirotropis confusa* (Seguenza, 1880) [*Drillia confusa* Seguenza, 1880].

***Spirotropis monterosatoi* (Locard, 1897)**
Plate 5, figs 1-8

*1897 *Pleurotoma monterosatoi* Locard, p. 209, pl. 9, figs 22-26.
1905 *Spirotropis monterosatoi* (Locard) – Kobelt, p. 298, pl. 87, figs 7, 8.
1977 *Spirotropis monterosatoi* (Locard, 1897) – Nordsieck, p. 12, pl. 22, fig. 12.
1980 *Spirotropis monterosatoi* (Locard, 1897) – Bouchet & Warén (*partim*), p. 16, fig. 57 only [not fig. 53, 55, 56 = *Spirotropis confusa confusa* (Seguenza, 1880); not 52 = *Spirotropis confusa sarsi* Warén, 1975].
1993 *Spirotropis monterosatoi* (Locard, 1897) – R. Janssen, p. 255, pl. 5, fig. 24.
1996 *Spirotropis modiola* [*sic*] (De Cristofori & Jan, 1832) – Vera-Peláez, p. 329, text-figs 14f-h, 18, 18c, 20d, pl. 22, figs 1-4, 7, 9, 11 [*non Spirotropis modiolus* (De Cristofori & Jan, 1832)].
1996 *Spirotropis monterosatoi* (Locard, 1897) – Vera-Peláez, p. 334, text-figs 14i-m, 18k, 19, 20, 20c, pl. 22, figs 5, 6, 8, 10, 12-14.
1999 *Spirotropis monterosatoi* (Locard, 1897) – Ardovini & Cossignani, p. 67, 71, unnumbered fig top row middle.
2002 *Spirotropis modiola* [*sic*] (Cristofori & Jan, 1832) – Vera-Peláez, p. 193, pl. 2, figs K, L, pl. 10, figs M, N [*non Spirotropis modiolus* (De Cristofori & Jan, 1832)].
2002 *Spirotropis monterosatoi* (Locard, 1897) – Vera-Peláez, p. 193, pl. 2, figs M, N, pl. 10, figs K, L.
2014 *Spirotropis monterosatoi* (Locard, 1897) – Gofas *et al*., p. 542, figs 4P, Q.
2022d *Spirotropis alejandroi* Vera-Peláez, p. 266, pl. 4, figs 5-8, 10, 11, pl. 6, figs 3, 4.

Material and dimensions – Maximum height 12.0 mm, width 5.2 mm. **VC**: NHMW 2020/0171/0526-0533 (8), NHMW 2020/0171/0534 (25).

Description – Shell small, broadly turriculate, with a tall, strongly gradate spire, pagodiform in profile. Protoconch bulbous, of 1.5-1.75 convex whorls, with medium-sized nucleus, last quarter whorl shouldered (dp = 815-865 μm, hp = 915-980 μm, dp/hp = 0.88-0.89, dn = 415-425 μm, dV1 = 640-670 μm). Teleoconch of up to six sharply angular whorls, with shoulder placed just above mid-whorl delimited by strongly elevated, sharp-edged laminar carina extending somewhat adapically, whorl profile concave above and below shoulder, separated by weakly impressed, linear suture. Spiral sculpture absent, except for a few very weak cords over siphonal fasciole. Axial sculpture absent. Surface covered in very fine, close-set growth lines, arcuate over subsutural ramp, opisthocline and sinuous below. Last whorl 51-57% of total height, with concave subsutural ramp, sharply angled at shoulder, convex below, strongly constricted at base. Aperture 37-44% of total height, narrow pyriform, outer lip sharp; anal sinus broad, very deep symmetrically U-shaped, with apex mid-ramp; siphonal canal moderate length, straight, rounded at tip. Columella smooth, twisted. Columellar and parietal callus weakly thickened, sharply delimited, forming very narrow callus margin; small parietal pad formed adapically.

Discussion – R. Janssen (1993) revised the genus *Spirotropis* Sars, 1878 in the European Neogene to present-day faunas. According to that author, *Spirotropis monterosatoi* (Locard, 1897) differed from *S. modiolus* (De Cristofori & Jan, 1832**)** by its larger size (9.5-15.5 mm, mean 11.45 vs 6.4-9.5 mm, mean 7.71) a larger protoconch (dp: 0.85-1.075 mm, mean 1.518 vs 0.8-0.9 mm, mean 0.859; dn: 0.675-0.8 mm, mean 0.471 vs 0.525-0.575, mean 0.543) and a different growth ratio (H/n whorls 1.357-1.722, mean 1.518 vs 0.966-1.357, mean 1.172). Moreover, the carina is sharp and directed upwards and the adapical half of the whorl is deeply excavated. Both species have a protoconch of 1.5-1.75 whorls.
In the deeper-water deposits at Velerín carretera this is the most abundant turrid. Most fully adult specimens are between 10-12 mm in height. The protoconch is somewhat variable (dp =820-920 μm, dn = 390-420 μm, hp = 825-880 μm), but within the range for *S. monterosatoi* given by R. Janssen (1993), and the growth rate (1.69-1.80, mean 1.749) just over the range for *S. monterosatoi* given by R. Janssen (1993). The upturned central carina is strongly developed in most specimens (Pl. 5, figs 1, 2, 4, 6). Some specimens approximate to *S. modiolus* (Pl. 5, figs 1, 2, 4, 6), but the shell morphometrics are those of *S. monterosatoi*.

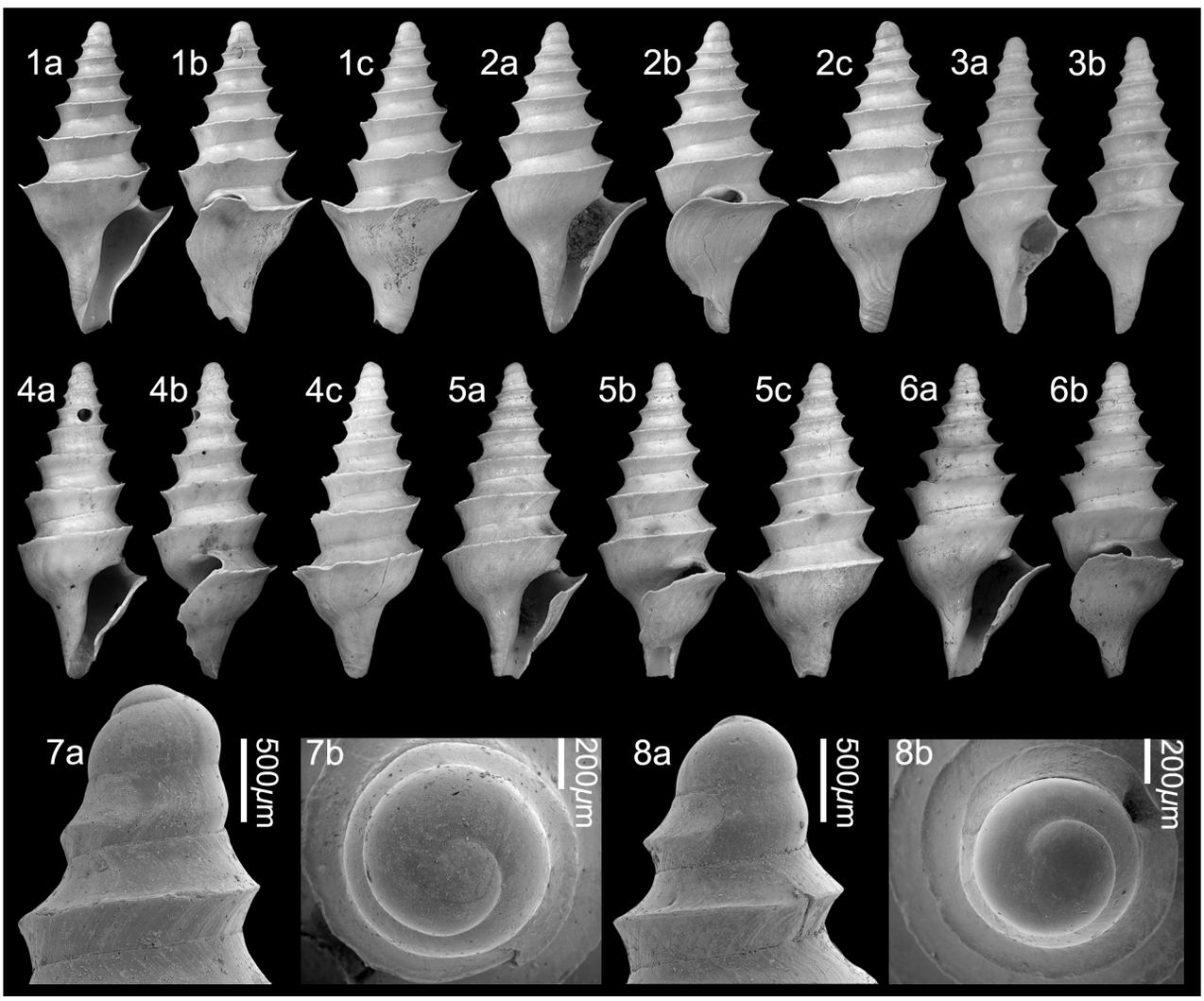

Plate 5. *Spirotropis monterosatoi* (Locard, 1897); 1. NHMW 2020/0171/0526, height 9.9 mm, width 4.7 mm; 2. NHMW 2020/0171/0527, height 10.7 mm, width 5.0 mm; 3. NHMW 2020/0171/0528, height 11.3 mm, width 4.1 mm; 4. NHMW 2020/0171/0529, height 11.0 mm, width 4.2 mm; 5. NHMW 2020/0171/0530, height 11.1 mm, width 4.8 mm; 6. NHMW 2020/0171/0531, height 10.2 mm, width 4.7 mm (digital images); 7. NHMW 2020/0171/0532, detail of protoconch; 8. NHMW 2020/0171/0533, detail of protoconch (SEM images). Velerín carretera, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

Vera-Peláez (2022d) considered these specimens distinct from *S. monterosatoi* and erected the taxon *S. alejandroi* Vera-Peláez, 2022 for the species from the Estepona deeper water assemblages. That author considered the Estepona specimens to be smaller, with a smaller protoconch and a slightly less developed carina. In our opinion, these are insufficient differences to erect a new taxon, and the carina in some of the Estepona specimens (Pl. 5, fig. 6) is just as strong as that of the specimen of *S. monterosatoi* illustrated by Vera-Peláez (2022d, pl. 4, fig. 9)

Vera-Peláez (2002) recorded both *S. monterosatoi* and *S. modiola* [*sic*] from the Estepona assemblages. A single incomplete specimen of *S. modiola* [*sic*] from Padrón was illustrated (2002, pl. 2, figs K, L), height 8.75 mm. However, in his thesis (1996) more specimens were illustrated. The exact locality of his material is unclear, as in the materials section he includes Parque Antena, Guadalmansa and Padrón (1996, p. 329), but in the legend for Plate 22 (figs 1, 2) the locality is given as Velerín carretera. Vera-Peláez (2022d, p. 264, pl. 4, figs 1, 2) recorded one specimen of *S. modiolus* from El Padrón and one from Parque Antena. Again, the Padrón specimen is illustrated which we assume to mean it is the better preserved of the two. In any case, none of the specimens figured are complete, and we suspect that incomplete or immature specimens of *S. monterosatoi* were identified as *S. modiolus*, as they have between 4.5-5.5 teleoconch whorls. Moreover, the carina is relatively high placed, and the adapical portion markedly excavated, as in *S. monterosatoi*. Although we cannot comment with absolute certainty, but we suspect *S. modiolus* does not occur in the Estepona assemblages. For comparison with other Neogene and extant congeners see (R. Janssen, 1993).

Distribution – Upper Pliocene: western Mediterranean, Estepona Basin, Spain (Vera-Peláez, 1996, 2002).

Present-day: Atlantic, Iberian Basin between S. Spain and Morocco (Locard, 1897; Kobelt, 1905; Bouchet & Warén, 1980; R. Janssen, 1993), western Mediterranean (Gofas *et al*., 2014), central Mediterranean (Ardovini & Cossignani, 1999).

Genus *Stenodrillia* Korobkov, 1955

Type species – *Pleurotoma allioni* Foresti, 1876, by original designation. Miocene-Pliocene, Italy.

1955 *Stenodrillia* Korobkov, p. 392.

***Stenodrillia allioni* (Bellardi *in* Seguenza, 1875)**
Plate 6, figs 1-3

1814 *Murex oblongus* var. *exquisite transversim striata* – Brocchi, p. 430, pl. 9, fig. 19.
1832 *Pleurotoma dubia* De Cristofori & Jan, p. 9 (*non* Defrance, 1824).
1847 *Pleurotoma brevirostrum* Sow. – Bellardi, p. 79, pl. 4, fig. 9 (*non* J. de C. Sowerby, 1823).
1875 *Drillia Allioni* Bellardi *in* Seguenza, p. 206 (*nomen nudum*).
*1876 *Drillia Allioni* Foresti, p. 27 (= *Pleurotoma brevirostrum* Bellardi, 1847, *non* J. de C. Sowerby, 1823).
1877 *Drillia Allionii* [*sic*] Bell. – Bellardi, p. 91, pl. 3, fig. 17.
1879 *Drillia Allionii* [*sic*] Bellardi – Fontannes, p. 45, pl. 4, fig. 6.
1896 *Drillia Allionii* [*sic*] Bell. – Cossmann, p. 83, pl. 6, figs 3, 5.
1904 *Drillia Allionii* [*sic*] var. *pliosubaspirata* Sacco, p. 44, pl. 12, figs 10, 11 (= var. A of Bellardi, 1877).
1914 *Drillia Allionii* [*sic*] Bellardi – Cipolla, p. 117 [13], pl. 12 [1], fig. 5.
1914 *Drillia Allionii* [*sic*] var. *Altavillensis* Cipolla, p. 118 [14], pl. 12 [1], fig. 6.
1937 *Drillia Bellardii* var. *elongata* Montanaro, p. 148 [118], pl. 6 [10], fig. 57 (not figs 54-56 = *Stenodrillia bellardii* (Desmoulins, 1842)).
1954 *Turricula* (*Knefastia*) *allioni* (Bellardi) – Glibert, p. 13, pl. 2, fig. 12.
1959 *Turricula* (*Knefastia*) *allionii* [*sic*] (Bellardi) – Ruggieri & Curti, p. 121, pl. 28, figs 162-164.
1966 *Stenodrillia allionii* [*sic*] (Bellardi, 1877) [*sic*] – Powell, p. 37, pl. 3, fig. 21.
1967 *Clavus* (*Drillia*) *allionii* [*sic*] (Bellardi) – Pelosio, p. 157 [57], pl. 45, figs 8-11.
1967 *Turricula* (*Knefastia*) *allionii* [*sic*] (Bellardi, 1877) [*sic*] – Palla, p. 996, pl. 75, fig. 4.
1971 *Clavus* (*Drillia*) *allionii* [*sic*] (Bellardi, 1877) [*sic*] – Pinna, p. 429, pl. 76, fig. 11.
1973 *Turricula* (*Knefastia*) *allionii* [*sic*] (Bellardi) 1877 [*sic*] – Caprotti & Vescovi, p. 177, pl. 2, fig. 21.
1974 *Stenodrillia allionii* [*sic*] (Bellardi, in Seguenza, 1875) – Malatesta, p. 409, pl. 31, fig. 16.
1976 *Turricula allionii* [*sic*] (Bellardi) – Caprotti, p. 46, pl. 16, fig. 21.
1978 *Pleurotoma dubia* De Cristofori & Jan, 1832 – Pinna & Spezia, p. 157, pl. 51, fig. 4.
1981 *Drillia allionii* [*sic*] (Bellardi in Seguenza, 1875) – Ferrero Mortara *et al*., p. 67, pl. 10, fig. 11.
1984 *Stenodrillia bellardii* (Desmoulins, 1842) – Bernasconi & Robba (*partim*), p. 306, pl. 7, figs 3, 4 (not fig. 5) [*non Stenodrillia bellardii* (Desmoulins, 1842)].
1986 *Turricula* (*Knefastia*) *allioni* (Bellardi) – Martinell & Domenèch, p. 119, pl. 1, fig. 8.
1992 *Stenodrillia bellardii* (Desmoulins, 1842) – Cavallo & Repetto, p. 134, fig. 353 [*non Stenodrillia bellardii* (Desmoulins, 1842)].
1996 *Stenodrillia allionii* [*sic*] (Bellardi, 1877) [*sic*] – Vera-Peláez, p. 150, text-figs 1g, h, 2 b, 4, pl. 4, figs 1-12.
1997 *Stenodrillia bellardii* (Des Moulins, 1842) – Chirli, p. 104, pl. 29, figs 10-12 [*non Stenodrillia bellardii* (Desmoulins, 1842)].
2002 *Stenodrillia allionii* [*sic*] (Bellardi *in* Seguenza, 1875) – Vera-Peláez, p. 181, pl. 1, figs H, I, pl. 9, figs E, F.
2003 *Stenodrillia allionii* [*sic*] (Bellardi in Seguenza, 1875) – Scarponi & Della Bella, p. 40, figs 42-44, 56.
2008 *Stenodrillia allionii* [*sic*] (Bellardi in Seguenza, 1875) – Chirli & Richard, p. 59, pl. 11, figs 9-11.
2010 *Stenodrillia allionii* [*sic*] (Bellardi in Seguenza, 1875) – Sosso & Dell'Angelo, p. 45, unnumbered fig. p. 61 middle row left.
2018 *Stenodrillia allionii* [*sic*] Bellardi in Seguenza, 1875 [*sic*] – Brunetti & Cresti, p. 88, fig. 353.
2022b *Stenodrillia allionii* [*sic*] (Bellardi in Seguenza, 1875) – Vera-Peláez, p. 153, pl. 3, figs 16-20.

non 1891 *Pleurotoma* (a. *Drillia Allionii*) [*sic*] Bell. – Hoernes & Auinger, p. 315, pl. 39, figs 2-17
non 1912 *Drillia Allionii* [*sic*] Bell. – Friedberg, p. 214, pl. 13, fig. 16.
non 1937 *Drillia Allionii* [*sic*] Bell. – Montanaro, p. 147 [117], pl. 6 [10], figs 50, 51.
non 1953 *Drillia allionii* [*sic*] Bellardi, 1877 – Csepreghy-Meznerics, p. 7, pl. 1, figs 9-10.
non 1954 *Drillia allionii* [*sic*] Bell. – Strausz, p. 33, 66, 110, pl. 4, fig. 77.
non 1960 *Drillia* (*Stenodrillia*) *allionii* [*sic*] Bellardi, 1877 – Kojumdgieva *in* Kojumdgieva & Strachimirov, p. 201, pl. 48, fig. 6.
non 1962 *Drillia allionii* [*sic*]Bell. – Strausz, p. 68, pl. 11, figs 6-10.
non 1966 *Drillia allionii* [*sic*] Bell. – Strausz, p. 422, pl. 11, figs 6-10.
non 1971 *Drillia* (*Stenodrillia*) *allionii* [*sic*] Bell – Eremija, p.43, pl. 13, figs 8-9.
non 1972 *Drillia allionii* [*sic*] Hoernes et Auinger – Csepreghy-Meznerics, p. 32, pl. 15, fig. 7.
non 1985 *Drillia* (*Stenodrillia*) *allionii* [*sic*] (Bellardi, (1875) 1877) – Atanacković, p.168, pl. 37, fig. 5.

non 1998 *Clavus* (*Drillia*) *allionii* [*sic*] Bellardi [*sic*] – Schultz, p. 76, pl. 30, figs 11, 12.

Material and dimensions – Maximum height 32.9 mm, width 9.5 mm. **CO**: NHMW 2020/0171/0368 (35). **VC**: NHMW 2020/0171/0369-0371 (4), NHMW 2020/0171/0372 (50+).

Description – Shell medium sized, solid, slender fusiform, with tall, gradate spire. Protoconch multispiral, tall, conical, of four smooth whorls, with small nucleus (dp = 880 μm, hp = 1715 μm, dp/hp = 0.51, dn = 185 μm, dV1 = 330 μm). Junction with teleoconch sharply delimited by sinusigera. Teleoconch of ten shouldered whorls, with moderately broad, concave subsutural ramp, rounded at shoulder, convex below, separated by weakly impressed, linear suture. Axial sculpture predominant, consisting of rounded, opisthocline axial ribs only developed at shoulder and weakening towards abapical suture, 7-8 on penultimate whorl, slightly narrower than their interspaces. Spiral sculpture on first teleoconch whorl of two weaker cords over subsutural ramp, three below, adapical forming shoulder cord, abapically cords on ramp more numerous and weaker, subobsolete on last three whorls, single secondary spiral intercalated between primaries from sixth or seventh whorl. Prominent sinuous growth lines cover entire surface, comma-shaped and more prominent over subsutural ramp. Last whorl 51-54% of total height, relatively short, profile and sculpture as described above, moderately rounded below shoulder and constricted at base; axials subobsolete over base, cords continue over base, slightly stronger over siphonal fasciole. Aperture 36-41% of total height, subquadrate; outer lip thin, sharp edged, smooth within; anal sinus broad, deep, symmetrically U-shaped, occupying entire ramp, apex mid-ramp; siphonal canal medium length, straight, not notched. Columella weakly excavated, slightly twisted abapically. Columellar and parietal callus weakly thickened, sharply delimited, forming narrow callus rim.

Discussion – Authorship of this species has usually been attributed to Bellardi in Seguenza (1875, p. 206). Tucker (2004, p. 55) considered this a *nomen nudum* and passed authorship to Foresti (1876, p. 27). However, the name appeared in Seguenza to replace *Pleurotoma brevirostum* Bellardi 1847 (*non* J. de C. Sowerby, 1823). Bellardi (1847, p. 79, pl. 4, fig. 9) gave a detailed Latin description and a clear illustration of a specimen from the Italian Pliocene, which, in our opinion, is valid.
Stenodrillia allioni (Bellardi *in* Seguenza, 1875) has frequently been confused or synonymised in the literature with *Stenodrillia bellardii* (Desmoulins, 1842) (Bernasconi & Robba, 1984, p. 305; Lozouet, 2017, p. 30). Scarponi & Della Bella (2003, p. 41) separated the two, stating that *S. allioni* differed from *S. bellardii* in; 1) having a more strongly developed subsutural ramp without axial sculpture, 2) in having a wider and better developed anal sinus, 3) weaker ribs, 4) finer and weaker spiral threads, 5) protoconch of three whorls as opposed to four in *S. bellardii*, 6) larger nucleus. Those authors noted that transitional forms did not occur, and considered *S. bellardii* an exclusively Miocene species, whereas *S. allioni* is predominantly Pliocene. We accept this position herein and consider the Pliocene Mediterranean forms to represent *S. allioni*. We exclude Paratethyan records which

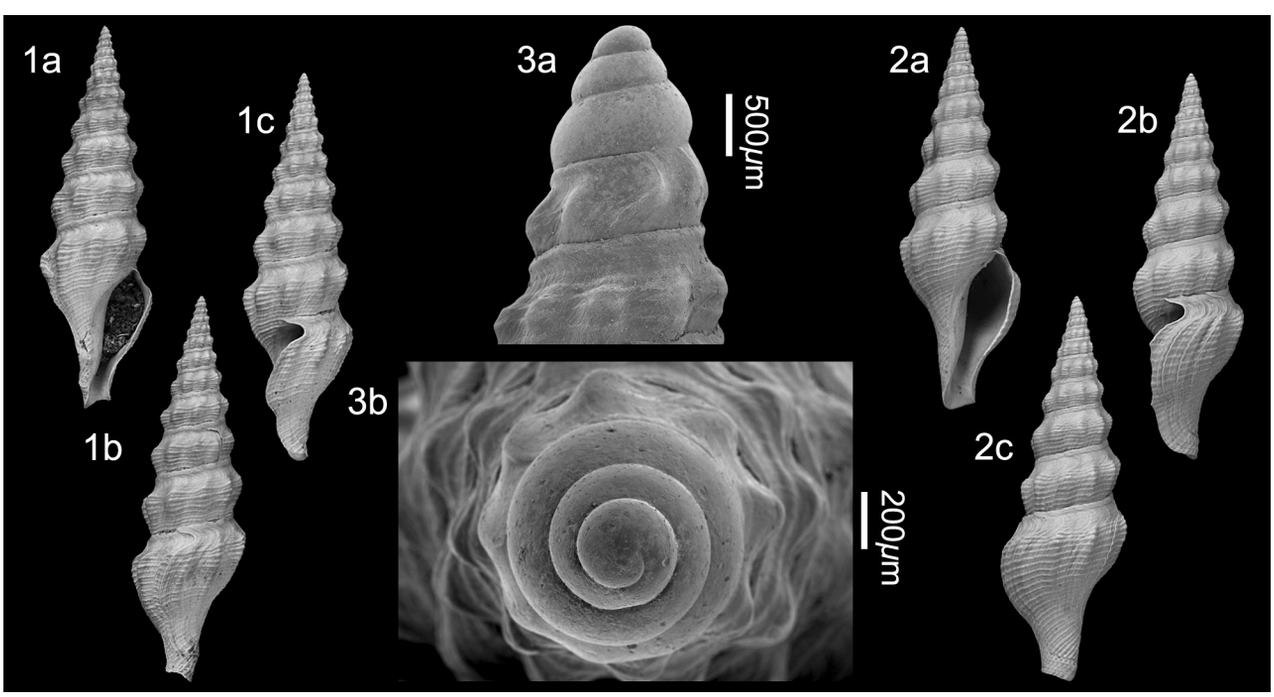

Plate 6. *Stenodrillia allioni* (Bellardi *in* Seguenza, 1875); 1. NHMW 2020/0171/0369, height 32.9 mm, width 9.5 mm; 2. NHMW 2020/0171/0370, height 26.3 mm, width 8.2 mm (digital images); 3. NHMW 2020/0171/0371, detail of protoconch (SEM image). Velerín carretera, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

represent another species; most times S. *bellardii*, but in some cases a *Crassispira* species.

Distribution – Upper Miocene: Proto-Mediterranean (Tortonian): Po Basin, Italy (Bellardi, 1877; Montanaro, 1937; Bernasconi & Robba, 1984). Lower Pliocene: western Mediterranean, NE Spain (Gili & Martinell, 1993), France (Fontannes, 1879; Cossmann, 1896; Martinell & Domenèch, 1986); central Mediterranean, Italy (Bellardi, 1877; Sacco, 1904; Glibert, 1954; Pelosio, 1967; Bernasconi & Robba, 1984; Chirli, 1997; Scarponi & Della Bella, 2003; Sosso & Dell'Angelo, 2010; Brunetti & Cresti, 2018). Upper Pliocene: western Mediterranean, Estepona Basin, Spain (Vera-Peláez, 1996, 2002, 2022b), France (Chirli & Richard, 2008); central Mediterranean, Italy (Cipolla, 1914; Ruggieri & Curti, 1959; Pinna, 1971; Caprotti & Vescovi, 1973; Malatesta, 1974; Caprotti, 1976; Cavallo & Repetto, 1992; Scarponi & Della Bella, 2003).

Genus *Turriclavus* Bernasconi & Robba, 1984

Type species – *Murex harpula* Brocchi, 1814, by original designation, Pliocene, Italy.

1984 *Turriclavus* Bernasconi & Robba, p. 281.

***Turriclavus harpula* (Brocchi, 1814)**
Plate 7, figs 1-3

*1814 *Murex harpula* Brocchi, p. 421, pl. 8, fig. 12.
1840 *Pleurotoma Philippii* Bellardi & Michelotti, p. 10, pl. 1, fig. 8.
1862 *Pleurotoma harpula* (Br.) var. B – Brugnone, p. 26, pl. 1, fig. 19.
1882 *Pleurotoma harpula* Brocchi – S.V. Wood, p. 5, pl. 1, fig. 4.
?1898 *Pleurotoma* (*Raphitoma*) *scalariforme* Brugnone – Almera & Bofill, p. 44, pl. 3, fig. 2 [*non Sorgenfreispira scalariforme* (Brugnone, 1862)].
1904 *Raphitoma*? *harpula* (Br.) – Sacco, p. 56, pl. 14, figs 45-47.
1914 *Peratotoma* (*Amblyacrum*) *harpula* Brocchi – Cipolla, p. 172 [68], pl. 14 [3], fig. 23.
1915 *Raphitoma harpula* (Brocchi) – Harmer, p. 255, pl. 30, figs 1-2.
1937 *Daphnella* (*Raphitoma*) *harpula* (Br.) – Montanaro, p. 187 [157], pl. 8 [11], figs 63, 64.
1937 *Daphnella* (*Raphitoma*) *harpula* var. *peracutecostata* Montanaro, p. 189 [159], pl. 8 [11], figs 68-70.
1955 *Cythara* (*Mangelia*) (*Mangelia*) *harpula* (Brocchi 1814) – Rossi Ronchetti, p. 300, fig. 160.
1967 *Cythara* (*Mangelia*) *harpula* (Brocchi) – Pelosio, p. 165 [65], pl. 46, figs 4-7.
1974 *Bela harpula* (Brocchi, 1814) – Malatesta, p. 426, pl. 31, fig. 21.
1978 *Murex harpula* Brocchi, 1814 – Pinna & Spezia, p. 149, pl. 38, fig. 3.
1984 *Turriclavus harpula* (Brocchi, 1814) – Bernasconi & Robba, p. 282, pl. 3, figs 3-5.
1992 *Turriclavus harpula* (Brocchi, 1814) – Cavallo & Repetto, p. 132, fig. 352.
1996 *Turriclavus harpula* (Brocchi, 1814) – Vera-Peláez, p. 395, text-figs 16g, h, 30, pl 28, figs 1, 2.
1997 *Raphitoma harpula* (Brocchi, 1814) – Chirli, p. 78, pl. 22, figs 7-10.
2002 *Turriclavus harpula* (Brocchi, 1814) – Vera-Peláez, p. 198, pl. 3, figs I, J, pl. 12, figs A, B.
2003 *Turriclavus harpula* (Brocchi, 1814) – Scarponi & Della Bella, p. 26, figs 9-11, 18.
2010 *Turriclavus harpula* (Brocchi, 1814) – Sosso & Dell'Angelo, p. 44, unnumbered fig. p. 60 bottom row right.
2013 *Turriclavus harpulus* (Brocchi, 1814) – Landau *et al*., p. 279, pl. 46, fig. 10.
2018 *Turriclavus harpulus* (Brocchi, 1814) – Brunetti & Cresti, p. 88, fig. 346.
2022c *Turriclavus harpulus* (Brocchi, 1814) – Vera-Peláez, p. 184, pl. 5, figs 1-2.

?*non* 1831 *Fusus* (*Murex*) *harpula* Broc. – Dubois de Montpéreux, p. 31, pl. 1, figs 47, 48.
?*non* 1854 *Pleurotoma harpula* Brocc. – Hörnes, p. 376, pl. 40, fig. 12.
non 1937 *Daphnella* (*Raphitoma*) *harpula* var. *mutabilis* May. – Montanaro, p. 188 [158], pl. 8 [11], fig. 65.
non 1937 *Daphnella* (*Raphitoma*) *harpula* var. *brachystoma* (Phil.) – Montanaro, p. 188 [158], pl. 8 [11], fig. 66-67.
non 1963 *Cythara* (*Mangelia*) *harpula* (Br.) – Venzo & Pelosio, p. 128, pl. 46, figs 24, 26.
non 1963 *Cythara* (*Mangelia*) *harpula* f. *turricolata* Venzo & Pelosio, p. 129, pl. 46, fig. 25.
non 1963 *Cythara* (*Mangelia*) *harpula* f. *tumida* Venzo & Pelosio, p. 129, pl. 46, fig. 31.
?*non* 1968 *Raphitoma* (*R.*) *harpula* (Brocc.) – Stancu & Andreescu, p. 464, pl. 6, fig. 70.

Material and dimensions – Maximum height 16.9 mm, width 5.9 mm. **CO**: NHMW 2020/0171/0267 (1). **VC**: NHMW 2020/0171/0268-0270 (3), NHMW 2020/0171/0271 (6). **EL**: NHMW 2020/0171/0647 (1).

Description – Shell medium sized, relatively fragile, slender fusiform, high spired. Protoconch multispiral conical, composed of three convex whorls with small nucleus, last half whorl with comma-shaped axial riblets (dp = 710 μm, hp = 880 μm, dp/hp = 0.81, dn = 260 μm, dV1 = 415 μm). Teleoconch of six weakly shouldered convex whorls, with broad, strongly inclined, weakly concave, poorly delimited ramp subsutural, convex below, separated by narrowly impressed linear suture. Axial sculpture of narrow, opisthocline ribs, subobsolete over subsutural ramp, 10-13 on penultimate whorl, separated by wide interspaces. Spiral sculpture of very weak cords, 4-5 on penultimate whorl, subobsolete in axial interspaces, slightly spinous over ribs. Last whorl 56-61% of total height, with concave subsutural ramp, rounded below, moderately constricted at base; sculpture subobsolete over base, 7-8 slightly

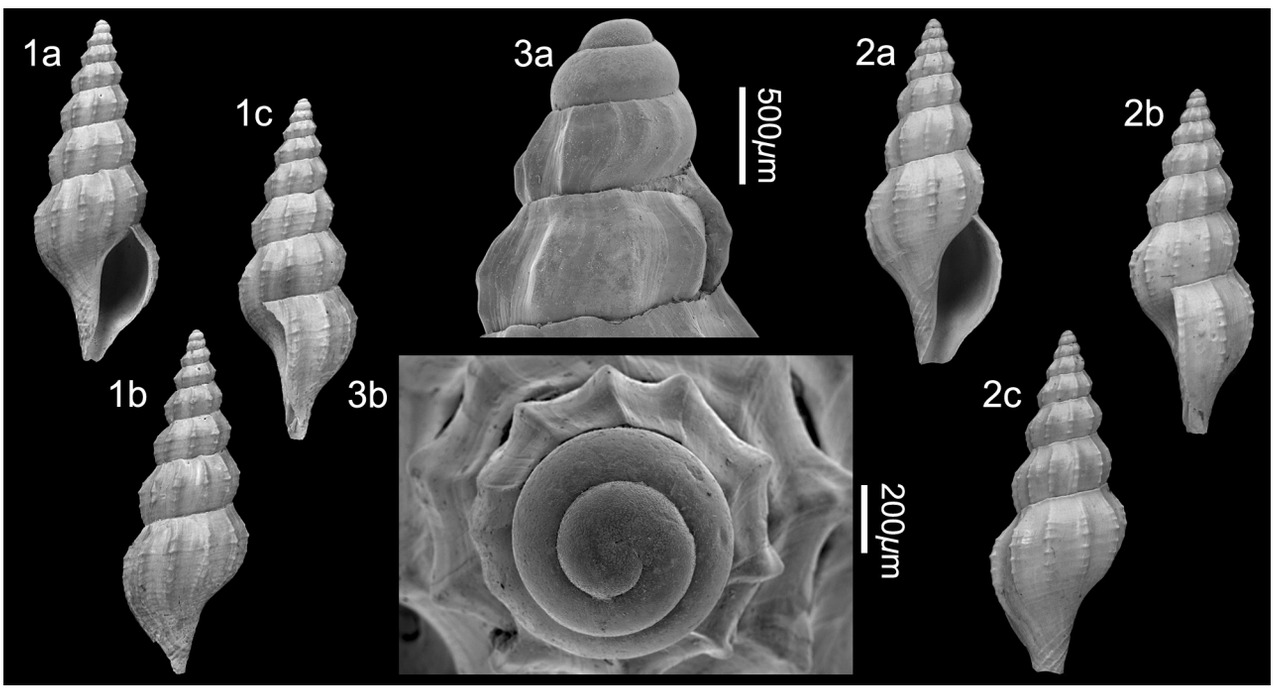

Plate 7. *Turriclavus harpula* (Brocchi, 1814); 1. NHMW 2020/0171/0268, height 13.7 mm, width 5.2 mm; 2. NHMW 2020/0171/0269, height 12.6 mm, width 5.0 mm (digital images); 3. NHMW 2020/0171/0270, detail of protoconch (SEM image). Velerín carretera, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

stronger narrow cords over siphonal fasciole. Aperture 38-41% of total height, ovate; outer lip not thickened by varix, smooth within; anal sinus not developed; siphonal canal moderate length, bet adaxially, not notched. Columella shallowly excavated. Columellar and parietal callus forming very narrow callus edge.

Discussion – We have been advised that *harpula* was used by Brocchi as a noun in apposition, and therefore should not be conjugated (Ronald Janssen review 05/01/2023). Very characteristic shell and the only member of the genus in the Mediterranean Pliocene. Vera-Peláez (2002, p. 198) place in their chresonymy *Pleurotoma* (*Raphitoma*) *scalariforme* Brugnone from the Pliocene of NE Spain illustrated in Almera & Bofill (1898, p. 44, pl. 3, fig. 2). The figures provided by those authors are rather schematic and could also represent a species of *Bela* Leach, 1847species. Therefore, the synonymy is included with hesitation. In any case, *Pleurotoma scalariforme* Brugnone [= *Sorgenfreispira scalariforme* (Brugnone, 1862)] is certainly not a synonym of *Turriclavus harpula* (Brocchi, 1814), as stated by Vera-Peláez (2002, p. 198). *Turriclavus mutabilis* (Mayer, 1858) from the Lower Miocene of the Aquitaine Basin, France differs in having more angular whorls, the ribs are less numerous, more lamellar, and strongly depressed.

Distribution – Middle Miocene: Proto-Mediterranean (Serravallian): Karaman Basin, Turkey (Landau *et al*., 2013). Upper Miocene: Proto-Mediterranean (Tortonian): Po Basin, Italy (Bellardi, 1877; Sacco, 1904; Montanaro, 1937). Lower Pliocene: North Sea Basin, Coralline Crag, England (Harmer, 1915); western Mediterranean, NE Spain (Gili & Martinell, 1993); central Mediterranean, Italy (Bellardi, 1877; Pelosio, 1967; Bernasconi & Robba, 1984; Chirli, 1997; Scarponi & Della Bella, 2003; Sosso & Dell'Angelo, 2010; Brunetti & Cresti, 2018). Upper Pliocene: North Sea Basin, Red Crag, England (Wood, 1882; Harmer, 1915); western Mediterranean, Estepona Basin, Spain (Vera-Peláez, 2002, 2022c); central Mediterranean, Italy (Sacco, 1904; Cipolla, 1914; Malatesta, 1974; Cavallo & Repetto, 1992).

Family Fusiturridae Abdelkrim, Aznar-Cormano, Fedosov, Kantor, Lozouet, Phuong, Zaharias & Puillandre, 2018

Note – Based on molecular data, Abdelkrim *et al*. (2018) erected Fusiturridae as a monotypic family that has a restricted distribution in the Mediterranean and West Africa, but a long geological history first appearing in the Palaeocene.

Genus *Fusiturris* Thiele, 1929

Type species – *Pleurotoma undatiruga* Bivona Ant. in Bivona And., 1838, by monotypy, Pleistocene, Italy.

1929 *Fusiturris* Thiele, p. 361.

1929 *Tyrrhenoturris* Coen, p. 297. Type species (by subsequent designation Powell, 1942): *Pleurotoma undatiruga* Bivona Ant. in Bivona And., Pleistocene, Italy.

Note – Scarponi & Della Bella (2003, p. 36-37) suggested that the position of the anal sinus placed on the lower portion of the shoulder in contact with the carina placed this species in the genus *Comitas* Finlay, 1926. Today *Comitas* is primarily a South-West Pacific and Antipodean genus associated with cooler waters (Powell, 1966, p. 29), but we have ascribed species to that genus herein. The deeply U-shaped peripheral sinus is also a feature of *Fusiturris* Thiele, 1929 (Powell, 1966, p. 49; Abdelkrim *et al*., 2018, p. 2363). The protoconch in extant *Fusiturris* species is multispiral, whereas the species placed here in the genus have paucispiral protoconchs. However, as seen repeatedly in turrids, protoconch type is not a reliable generic character.

***Fusiturris intermedia* (Bronn, 1831)**
Plate 8, figs 1-2.

*1831	*Pleurotoma intermedia* Bronn, p. 45.
1840	*Pleurotoma Fusoidea* Bon. Bellardi & Michelotti, p. 8, pl. 1, fig. 6.
1845	*Pleurotoma Saint-Ferriolii* Calcara, p. 33, pl. 4, fig. 17.
1847	*Pleurotoma intermedia* Bronn – Bellardi, p. 54, pl. 3, fig. 14.
1854	*Pleurotoma intermedia* Bronn – Hörnes, p. 359, pl. 39, fig. 9.
1867	*Pleurotoma intermedia* Bronn – Pereira da Costa, p. 231, pl. 27, fig. 3.
1877	*Surcula intermedia* (Bronn) – Bellardi, p. 53, pl. 2, fig. 9.
1879	*Surcula intermedia* var. *rarisulcata* – Fontannes, p. 43, pl. 4, fig. 7.
1898	*Pleurotoma* (*Drillia*) *Emporitanum* Almera & Bofill, p. 37; pl. 2, fig. 10.
1904	*Surcula intermedia* var. *miopercostata* Sacco, 43, pl. 11, figs 49, 50.
1904	*Surcula intermedia* var. *taurocarinata* Sacco, 43, pl. 11, fig. 51.
1912	*Surcula intermedia* Bronn – Friedberg, p. 208, pl. 13, fig. 9.
1914	*Surcula intermedia* (Bronn) – Cipolla, p. 132 [28], pl. 12 [1], fig. 25.
1914	*Surcula intermedia* var. *Saint-Ferrioli* [*sic*] Calcara – Cipolla, p. 133 [29], pl. 12 [1], fig. 26.
1959	*Turris* (*Turris*) *intermedia saint-ferrioli* [*sic*] (Calcara) – Ruggieri & Curti, p. 116, pl. 26, figs 152-154, pl. 27, figs 155, 156.
1960	*Surcula* (*Surcula*) *intermedia* (Bronn, 1831) – Kojumdgieva *in* Kojumdgieva & Strachimirov, p. 204, pl. 48, figs 15, 16.
1966	*Surcula intermedia* Bronn, 1831 – Strausz, p. 415, pl. 17, fig. 13.
1974	*Turricula* (*subgenus?*) *intermedia* (Bronn, 1831) – Malatesta, p. 407, pl. 31, fig. 15.
1982	*Turricula* (*Surcula*) *intermedia* (Bronn, 1831) – Martinell, p. 98, pl. 1, figs 1, 2.
1984	*Turricula* (*Surcula*) *intermedia* (Bronn, 1831) – Ruggieri & Davoli, p. 67, pl. 5, fig. 23.
1993	*Turricula* (*Surcula*) *intermedia* (Bronn, 1831) – González Delgado, p. 32, pl. 2, figs 11, 12.
1996	*Fusiturris intermedia* (Bronn, 1831) – Vera-Peláez, p. 189, pl. 9, figs 1-7, 10.
1997	*Turricola* [*sic*] *intermedia* (Bronn, 1831) – Chirli, p. 99, pl. 28, figs 7-9.
2001	*Fusiturris intermedius* (Bronn, 1831) – Silva, p. 527, text-fig. 3.184, pl. 24, figs 1-4.
2002	*Fusiturris intermedia* (Bronn, 1831) – Vera-Peláez, p. 186; pl. 1, figs P, Q.
2003	*Comitas intermedia* (Bronn, 1831) – Scarponi & Della Bella, p. 37, figs 36-37, 53.
2003	*Turricula* (*Surcula*) *intermedia* (Bronn, 1837 [*sic*]) – Bałuk, p. 43, pl. 10, figs 9-10.
2011	*Comitas intermedia* (Bronn, 1831) – Chirli & Linse, p. 192, pl. 71, fig. 2.
2011	*Comitas intermedia* (Bronn, 1831) – Landau *et al*., p. 38, pl. 21, fig. 3.
2014	*Fusiturris intermedia* (Bronn, 1831) – Brunetti, p. 68, bottom figures.
2021	*Fusiturris intermedia* (Bronn, 1831) – Kovács & Vicián, p.149, pl. 4, figs 26-29.
2022a	*Fusiturris intermedia* (Bronn, 1831) – Vera-Peláez, p. 135, pl. 1, figs 24, 25.
non 1872	*Pleurotoma intermedia* Bronn – Von Koenen, p. 225 [= *Fusiturris aquensis* (Grateloup, 1832)].

Material and dimensions – Maximum height 28.6 mm, width 8.1 mm. **CO**: NHMW 2020/0171/0457 (1), NHMW 2020/0171/0646 (1).

Description – Shell medium sized, slender fusiform, with tall spire. Protoconch small, paucispiral, two smooth whorls with large nucleus. Teleoconch of up to nine roundly angled whorls, separated by superficial, weakly undulating suture. Whorls with steep, broad, concave subsutural ramp delimited by elevated, roundly angled shoulder placed just above mid-whorl, bearing 8-9 roundly pointed tubercles that continue below as opisthocline ribs, weakening towards suture. Spiral sculpture of fine wavy grooves, variable in number, covers entire surface. Last whorl 63% of total height, with very steep subsutural ramp, roundly angular at shoulder, weakly rounded below, moderately constricted at base; shoulder tubercles fading towards aperture, axial ribs sinuous, narrowing and weakening over base. Base delimited by slight rounded angulation; siphonal fasciole not delimited, flattened. Aperture 49% of total height, aperture elongate, outer lip simple, smooth within; anal sinus deep, asymmetrically U-shaped, with apex at shoulder; siphonal canal long, very narrow, open, unnotched, slightly bend to left. Columella straight, twisted at siphonal canal. Columellar callus weakly thickened forming narrow callus rim.

Discussion – Both *Fusiturris intermedia* (Bronn, 1831) and *F. dimidiata* (Brocchi, 1814) are widespread in the Mediterranean Pliocene and adjacent Atlantic. *Fusiturris dimidiata* differs in having a well-defined subsutural ramp delimited by a sharper carina, the tubercles are horizontally elon-

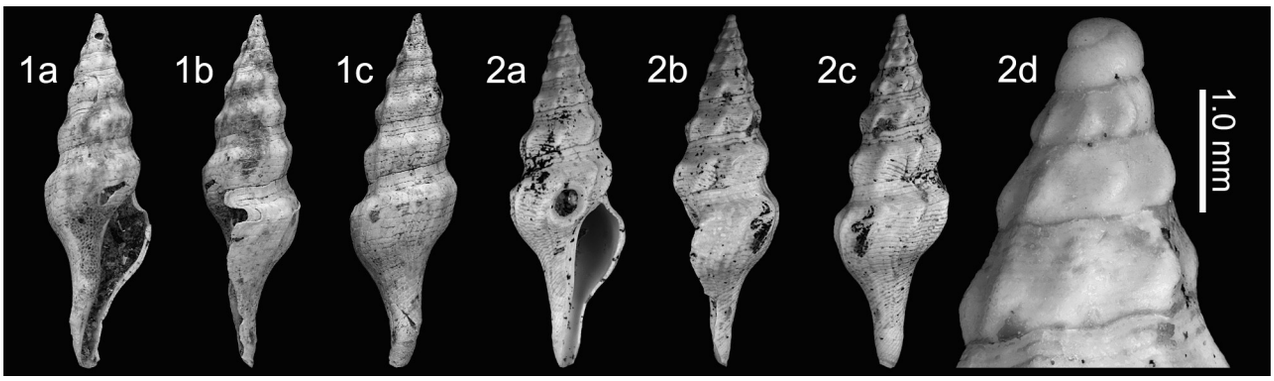

Plate 8. *Fusiturris intermedia* (Bronn, 1831); 1. NHMW 2020/0171/0457, height 28.6 mm, width 8.1 mm; 2. NHMW 2020/0171/0646, height 21.5 mm, width 6.8 mm (digital images). Velerín conglomerates, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

gated and restricted to the carina and do not continue as ribs to the suture as they do in *F. intermedia*, the anal sinus is placed on the lower portion of the subsutural ramp in *Fusiturris intermedia* rather than at the carina, and the siphonal canal is slightly longer in *Fusiturris dimidiata*.
Fusiturris intermedia is quite variable in profile, and the rather slenderer Paratethyan specimens are provisionally included in the chresonymy, although they might represent a distinct species.
In the Estepona deposits this species is exceptionally uncommon and found only in the shallow water deposits. In Italy it is commoner in circalittoral assemblages, but also present in infralittoral deposits (Scarponi & Della Bella, 2003, p. 37).

Distribution – Middle Miocene: Paratethys, Austria (Hörnes, 1854), Bulgaria (Kojumdgieva & Strachimirov, 1960), Hungary (Strausz, 1966), Poland (Friedberg, 1912; Bałuk, 2003), Romania (Hoernes & Auinger, 1891); Proto-Mediterranean, Italy (Bellardi, 1877; Sacco, 1904). Upper Miocene: Atlantic, Cacela Basin, Portugal (Pereira da Costa, 1867); Proto-Mediterranean, Italy (Bellardi, 1877; Ruggieri & Davoli, 1984). Lower Pliocene: Atlantic, Guadalquivir Basin, S. Spain (González Delgado, 1993; Landau *et al*., 2011); western Mediterranean, NE Spain (Almera & Bofill, 1898; Martinell, 1982; Gili & Martinell, 1993), France (Fontannes, 1879); central Mediterranean, Italy (Chirli, 1997; Scarponi & Della Bella, 2003; Brunetti, 2014). Upper Pliocene: Atlantic, Mondego Basin, Portugal (Silva, 2001); western Mediterranean, Estepona Basin, southern Spain (Vera-Peláez, 2002, 2022a); central Mediterranean, Italy (Bellardi, 1877; Cipolla, 1914; Ruggieri & Curti, 1959; Malatesta, 1974; Scarponi & Della Bella, 2003). Lower Pleistocene: eastern Mediterranean, Rhodes Island (Chirli & Linse, 2011).

Fusiturris minima Vera-Peláez, 2002

Plate 9, figs 1-8

1996 *Turricula dimidiata* (Brocchi, 1814) – Vera-Peláez, p. 135, pl. 1, figs 1-9 [*non Fusiturris dimidiata* (Brocchi, 1814)].

?2002 *Fusiturris dimidiata* (Brocchi, 1814) – Vera Peláez, p. 183, pl. 1, figs V, W [*non Fusiturris dimidiata* (Brocchi, 1814)].

*2002 *Fusiturris minima* Vera Peláez, p. 184; pl. 1, figs Z, A', pl. 9, figs K, L [spelled *Fusiturris minuma* on plate text p. 243; *lapsus*].

2022a *Fusiturris minima* Vera Peláez, 2002 – Vera-Peláez, p. 132, pl. 1, figs 17-18.

2022a *Fusiturris smoothi* Vera Peláez, p. 134, pl. 1, figs 26-32.

Material and dimensions – Maximum height 28.0 mm, width 8.6 mm. **CO**: NHMW 2020/0171/0454-0455 (2), NHMW 2020/0171/0456 (3). **VC**: NHMW 2020/0171/0446-0449 (4), NHMW 2020/0171/0450 (22), NHMW 2020/0171/0451-0452 (2). **PQ**: NHMW 2020/0171/0453 (11). **EL**: NHMW 2020/0171/0618 (3).

Description – Shell medium-sized, of medium thickness, slender fusiform, with tall gradate spire. Protoconch paucispiral, of two smooth, convex whorls, with medium-sized nucleus, last quarter whorl with comma-shaped axial riblets (dp = 785 μm, hp = 955 μm, dp/hp = 0.82, dn = 345 μm, dV1 = 680 μm). Teleoconch of up to seven sharply carinate angular whorls, with broad, concave subsutural ramp delimited by thickened, weakly tubercular to smooth shoulder cord, concave above and below carina. Axials only developed at shoulder cord, about twelve small, sharp tubercles on first teleoconch whorl, abapically tubercles weaken, obsolete at shoulder of last two whorls in some specimens. Spiral sculpture of regular, narrow, flattened cords above and below slightly thickened, elevated shoulder cord, separated by narrow, superficial grooves. Last whorl profile and sculpture as described above, weakly convex below shoulder carina, moderately constricted at base, spirals continue slightly strengthened over siphonal fasciole. Aperture narrow, elongate; outer lip sharp, not thickened, smooth within; anal sinus very broad, deep symmetrically U-shaped, occupying entire ramp, with apex at just adapical to shoulder; siphonal canal very long, straight, narrow. Columella straight, smooth. Columellar and parietal callus moderately thickened, sharply delimited, forming narrow callus rim.

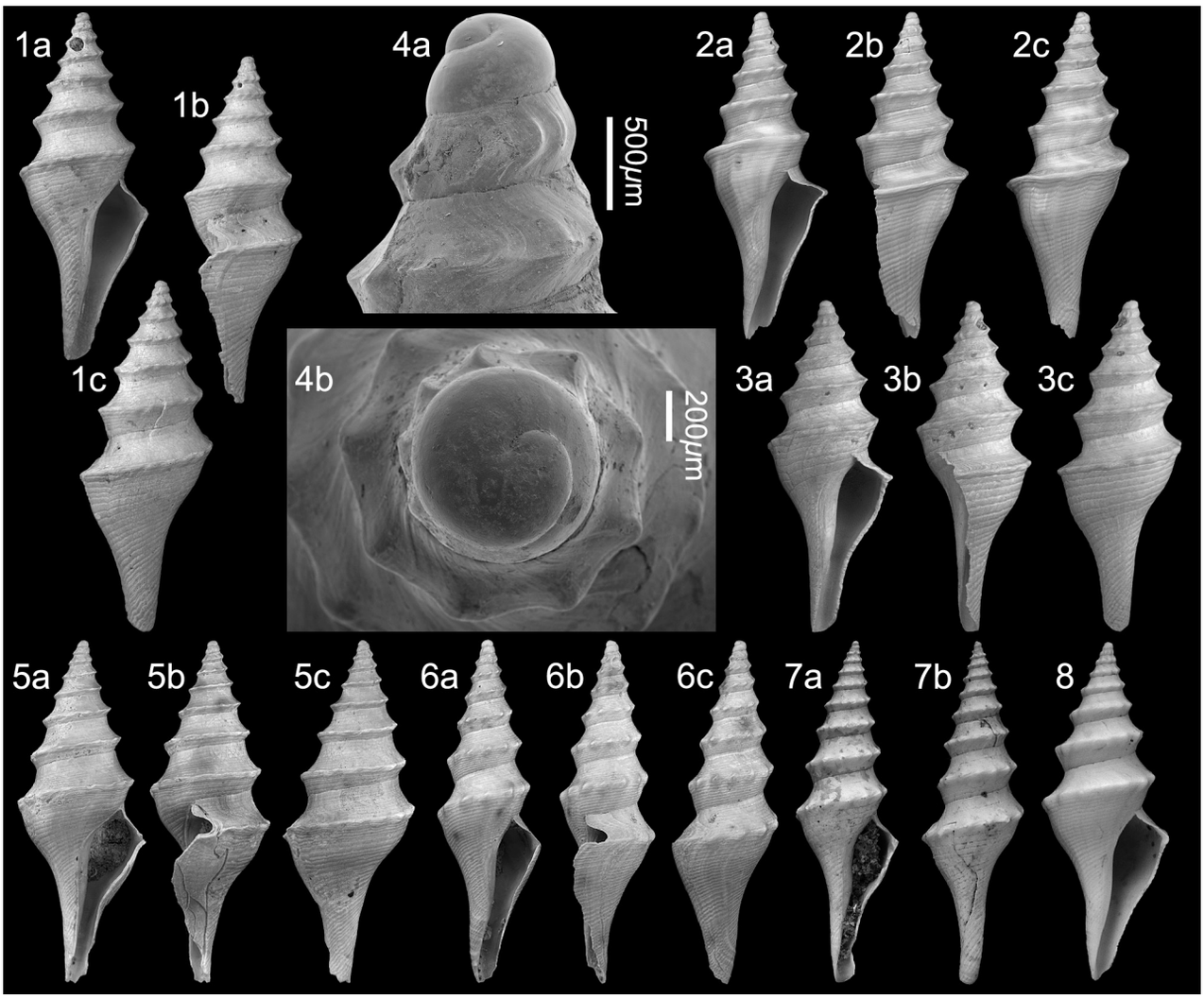

Plate 9. *Fusiturris minima* Vera Peláez, 2002; 1. NHMW 2020/0171/0446, height 16.2 mm, width 6.1 mm; 2. NHMW 2020/0171/0447, height 14.8 mm, width 5.7 mm; 3. NHMW 2020/0171/0448, height 14.1 mm, width 5.1 mm (digital images); 4. NHMW 2020/0171/0449, detail of protoconch (SEM image); 5. NHMW 2020/0171/0451, height 18.4 mm, width 6.7 mm; 6. NHMW 2020/0171/0452, height 18.8 mm, width 5.4 mm. Velerín carretera. 7. NHMW 2020/0171/0454, height 27.7 mm, width 8.1 mm; 8. NHMW 2020/0171/0456, height 21.1 mm, width 7.8 mm (digital images). Velerín conglomerates, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

Discussion – According to the original description, *Fusiturris minima* Vera Peláez, 2002 differs from *F. dimidiata* (Brocchi, 1814) in being smaller (12.9-22.0 mm; average height 17.0 mm vs 33.3-48.0 mm; average height 38.0 mm), with a narrower spire. The teleoconch sculpture is variable; the carina finely tubercular or smooth, the spiral sculpture is stronger and more irregular. According to Vera-Peláez (2002, p. 186) the main difference is in the protoconch, which is equal in height, but almost twice as wide as that of *F. dimidiata* and the nucleus is larger and slightly flattened. However, the protoconch morphometrics given in that same work do not fit the discussion (*F. minima*: hp = 0.51-0.75 mm, average 0.62 mm; dp = 0.65-0.75, average 0.69. *F. dimidiata*: hp = 0.60-0.75 mm, average 0.67 mm, hp/dp = 0.90; dp = 0.50-0.55, average 0.52, hp/dp = 0.99). That is, the protoconch is only about 25% larger in *F. minima* and the difference in height/diameter only 10%.

Nevertheless, *Fusiturris minima* is distinct from *F. dimidiata*, which we have not found in the Estepona assemblages. Vera-Peláez (2002, pl. 1, figs V, W; 2022a, pl. 1, figs 21-23) illustrated a single specimen from a slightly different locality of Velez-Málaga, a locality not included in the material studied herein. That specimen is larger than any specimen of *F. minima* found in the Estepona assemblages (32.8 mm height vs. maximum of 28 mm for *F. minima*). In the distribution table (2002, p. 240) no specimens of *F. dimidiata* are recorded for the Estepona Basin either.

Comparing specimens of *F. minima* from Estepona with specimens of *F. dimidiata* from various Italian Pliocene localities they differ in being about half maximum size, the apical angle is broader and not narrower (as stated by Vera-Peláez), the whorl profile is more strongly biconcave in *F. minima* due to the sharp carina, more elevated

than in *F. dimidiata*, and the tubercles on the carina fade in most specimens of *F. minima* after the earliest teleoconch whorls, leaving a smooth carina. Even in specimens in which subobsolete tubercles develop, they are always weaker and more irregular than in *F. dimidiata*.
Vera-Peláez (2022a, p. 134) described a new form from the Estepona deeper water assemblages as *Fusiturris smoothi*. As correctly noted by that author, the protoconch and early teleoconch whorls are identical to those of *F. minima*. The two forms differ only in the weaker development of the peripheral carina and tubercles developed on it. In the material at hand from Velerín carretera are specimens comparable to *F. smoothi* which, in our opinion, is an extreme morphotype of *F. minima*.
In the Italian assemblages *F. dimidiata* has a wide bathymetric range from infralittoral to bathyal (Scarponi & Della Bella, 2003, p. 36). *Fusiturris minima* is found predominantly in the deeper water deposits.

Distribution – Upper Pliocene: western Mediterranean, Estepona Basin, southern Spain (Vera-Peláez, 2002, 2022a).

Family Horaiclavidae Bouchet, Kantor, Sysoev & Puillandre, 2011

Genus *Haedropleura* Bucquoy, Dautzenberg & Dollfus, 1883

Type species – *Pleurotoma septangularis* Montagu, 1803, by original designation, present-day, Mediterranean.

1883 *Haedropleura* Bucquoy, Dautzenberg & Dollfus, p. 85, 110.

***Haedropleura bucciniformis* (Bellardi, 1847)**
Plate 10, figs 1-4

*1847 *Raphitoma bucciniformis* Bellardi, p. 110, pl. 4, fig. 22.
1877 *Bela bucciniformis* Bell. – Bellardi, p. 149, pl. 5, fig. 8.
1910 *Bela* (*Haedropleura*) *bucciniformis* (Bellardi) – Cerulli-Irelli, p. 51 [243], pl. 5 [36], fig. 1.
1981 *Bela bucciniformis* (Bellardi, 1847) – Ferrero Mortara *et al*., p. 74, pl. 17, fig. 2.
1992 *Bela* (*Bela*) *bucciniformis* (Bellardi, 1847) – Cavallo & Repetto, p. 140, fig. 375.
1996 *Haedropleura septangularis* (Montagu) – Vera-Peláez (*partim*), p. 389, pl. 27, fig. 10 only.
1997 *Haedropleura secalina* (Philippi, 1844) – Chirli (*partim*), p. 37, pl. 9, fig. 12 only [*non Haedropleura secalina* (Philippi, 1844)]
1997 *Bela bucciniformis* (Bellardi, 1847) – Chirli, p. 51, pl. 9, fig. 12, pl. 14, figs 3-5.
2002 *Haedropleura septangularis* (Montagu, 1803) – Vera-Peláez, p. 201, pl. 3, fig. K [*non Haedropleura septangularis* (Montagu, 1803)].
2002 *Haedropleura septangularis* (Montagu, 1803) – Vera-Peláez, p. 201, pl. 3, fig. K [*non Haedropleura septangularis* (Montagu, 1803)].
2002 *Bela bucciniformis* (Bellardi, 1847) – Vera-Peláez, p. 210, pl. 4, figs A', B'.
2003 *Haedropleura bucciniformis* (Bellardi, 1847) – Scarponi & Della Bella, p. 54, figs 83a, b, 90.
2011 *Haedropleura bucciniformis* (Bellardi, 1847) – Landau *et al*., p. 36, pl. 19, fig. 6.
2011 *Haedropleura bucciniformis* (Bellardi, 1847) – Scarponi *et al*., p. 42, figs 13-18, 61-63.
2022c *Haedropleura bucciniformis* (Bellardi, 1847) – Vera-Peláez, p. 179, pl. 4, figs 5, 6.

non 1970 *Bela* (*Bela*) *bucciniformis* (Bellardi) – Greco, p. 291, pl. 4, figs 2, 3 [= *Haedropleura* sp.].

Material and dimensions – Maximum height 13.5 mm, width 5.2 mm. **CO**: NHMW 2020/0171/0458-0459 (2), NHMW 2020/0171/0460 (6). **VC**: NHMW 2020/0171/0463 (3). **EL**: NHMW 2020/0171/0461 (1), NHMW 2020/0171/0462 (4), NHMW 2020/0171/0645 (1).

Description – Shell small, fusiform, bucciniform, with moderately tall, conical spire. Protoconch multispiral, conical, of 2.75 smooth, convex whorls, with small nucleus (dp = 670 μm, hp = 745 μm, dp/hp = 0.90, dn = 150 μm, dV1 = 300 μm). Junction with teleoconch sharply delimited. Teleoconch of five whorls with very poorly delimited, slightly concave subsutural ramp, convex below, separated by weakly impressed, linear suture. Axial sculpture of prominent, rounded, orthocline ribs aligned vertically, 8-10 on penultimate whorl, about half width of their interspaces, slightly narrower over subsutural ramp. Spiral sculpture restricted to extremely fine subobsolete spiral grooves and a few weak cords over siphonal fasciole. Last whorl about 56% of total height, slightly concave at subsutural ramp, broadly and weakly rounded below, weakly constricted at base, ribs weakening at periphery, persisting over base; base not delimited. Aperture small, about 33% of total height, ovate, outer lip thickened by varix; anal sinus hardly developed; siphonal canal very short and broad, straight, not notched at tip. Columella straight, smooth. Columellar and parietal callus thickened, sharply delimited, forming narrow callus rim; small parietal pad developed adapically delimiting medial border of anal canal. Colour pattern preserved of narrow, equidistant orange-brown horizontal bands, three on spire whorls, on last whorl four above insertion of outer lip, five over base and siphonal fasciole.

Discussion – *Haedropleura bucciniformis* (Bellardi, 1847) is similar to *H. secalina* (Philippi, 1844) and *H. septangularis* (Montagu, 1803), but is distinguished by its more cylindrical profile, giving it a bucciniform shell shape, the axial ribs are more numerous on the early whorls and usually aligned vertically, the spiral sculpture is slightly stronger, the aperture is smaller, and the colour pattern of fine horizontal stripes is not seen in other European Plio-Pleistocene congeners. The syntype of *Bela*

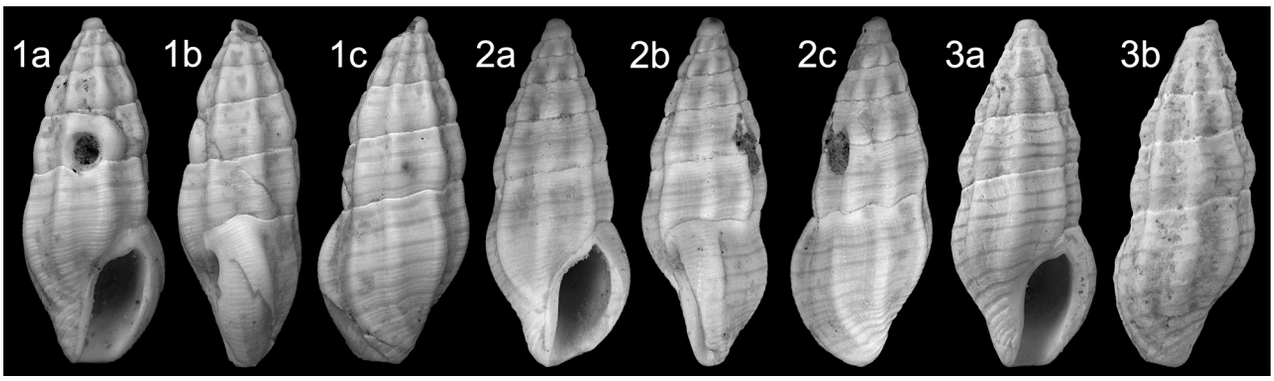

Plate 10. *Haedropleura bucciniformis* (Bellardi, 1847); 1. NHMW 2020/0171/0458, height 7.1 mm, width 2.8 mm; 2. NHMW 2020/0171/0459, height 7.0 mm, width 2.8 mm. Velerín conglomerates, Velerín. 3. NHMW 2020/0171/0461, height 6.9 mm, width 2.8 mm (digital images). 3. NHMW 2020/0171/0645, height 6.2 mm, width 2.6 mm (SEM image). El Lobillo, Estepona, Lower Piacenzian, Upper Pliocene.

bucciniformis does not have the apex preserved (Ferrero-Mortara *et al*., 1981, pl. 17, fig. 2). Scarponi & Della Bella (2003, fig. 90) and Scarponi *et al*. (2011, figs 61-62) illustrated the protoconch of this species based on an Upper Pliocene, Piacenzian specimen from La Serra (Siena). One Estepona specimen has a similar protoconch, too poor to illustrate.

Interestingly, a shell from the Upper Pliocene of Sicily with a similar teleoconch was illustrated by Greco (1970, pl. 4, figs 2, 3) under the name *Bela* (*Bela*) *bucciniformis*. It differs in having a paucispiral protoconch with a bulbous nucleus, suggesting a species reproducing by direct development. It seems therefore that this represents a paucispiral sister species to *H. bucciniformis* analagous to the *H. septangularis*/*H. secalina* sister pair (see below). Unfortunately, Greco's specimen was not adressed in the revision of the genus in the Plio-Pleistocene Mediterranean by Scarponi *et al*. (2011). We suspect that the specimen illustrated as *H. septangularis* by Vera-Peláez (1996, pl. 27, fig. 10; 2002 pl. 3, fig. K) from El Padrón with aligned axial ribs is a small specimen of *H. bucciniformis*. However, both species occur in the Estepona assemblages.

Distribution – Lower Pliocene: Atlantic, Guadalquivir Basin, S. Spain (Landau *et al*., 2011). central Mediterranean, Italy (Bellardi, 1847, 1877; Cavallo & Repetto, 1992; Chirli, 1997; Scarponi & Della Bella, 2003; Scarponi *et al*., 2011). Upper Pliocene: western Mediterranean, Estepona Basin, southern Spain (Vera-Peláez, 2002, 2022c); central Mediterranean, Italy (Bellardi, 1847, 1877; Scarponi & Della Bella, 2003; Scarponi *et al*., 2011). Lower Pleistocene: central Mediterranean, Italy (Cerulli-Irelli, 1910; Scarponi *et al*., 2011).

***Haedropleura septangularis* (Montagu, 1803)**

Plate 11, figs 1-3

*1803	*Murex septangularis* Montagu, p. 268, pl. 9, fig. 5.
1835	*Pleurotoma heptagona* Scacchi, p. 8, pl. 1, fig. 17.
1904	*Bela* (*Haedropleura*) *septangularis* (Mont.) – Sacco, p. 47, pl. 12, figs 51-52.
?1915	*Haedropleura septangularis* (Montagu) – Harmer, p. 251, pl. 27, fig. 27, pl. 29, figs 3, 4.
1954	*Haedropleura septangularis* f. *secalina* Philippi, 1844 – Glibert, p. 52, pl. 6, fig. 12a [*non Haedropleura secalina* (Philippi, 1844)].
1954	*Haedropleura septangularis* f. Montagu, 1803– Glibert, p. 53, pl. 6, fig. 12b.
1966	*Haedropleura septangularis* (Montagu, 1803) – Powell, p. 83, pl. 12, fig. 18.
1977	*Bellaspira septangularis* (Montagu, 1803) – Nordsieck, p. 13 (*partim*), pl. 1, fig. 6.
1984	*Haedropleura secalina* (Philippi, 1844) – Bernasconi & Robba, p. 279, pl. 3, fig. 2 [*non Haedropleura secalina* (Philippi, 1844)].
1984	*Haedropleura septangularis* (Montagu, 1803) – Fretter & Graham, p. 510, fig. 350.
1988	*Haedropleura septangularis* (Montagu, 1803) – Graham, p. 426, fig. 176.
?1992	*Haedropleura septangularis* (Montagu, 1803) – Cavallo & Repetto, p. 132, fig. 351.
1996	*Haedropleura septangularis* (Montagu) – Vera-Peláez (*partim*), p. 389, text- pl. 27, figs 8-10 = *Haedropleura secalina* (Philippi, 1844).
1997	*Haedropleura septangularis* (Montagu, 1803) – Chirli, p. 37, pl. 10, figs 5-7.
2002	*Haedropleura septangularis* (Montagu, 1803) – Vera-Peláez, p. 201, pl. 3, fig. K.
2003	*Haedropleura septangularis* (Montagu, 1803) – Scarponi & Della Bella, p. 55, figs 85-87, 92.
2010	*Haedropleura septangularis* (Montagu, 1803) – Micali, p. 3, fig. 1.
2011	*Haedropleura septangularis* (Montagu, 1803) – Landau *et al*., p. 36, pl. 19, fig. 6 (on plate nrs. 6 and 7 inverted *lapsus*).
2011	*Haedropleura septangularis* (Montagu, 1803) – Chirli & Linse, p. 171, pl. 59, fig. 3.
2011	*Haedropleura septangularis* (Montagu, 1803) – Scarponi *et al*., p. 40, figs 1-6, 49-54.
2018	*Haedropleura septangularis* (Montagu, 1803) –

Ceulemans *et al*., p. 99, pl. 2, figs 8, 9.

2022c *Haedropleura septangularis* (Montagu, 1803) – Vera-Peláez, p. 179, pl. 4, figs 5-6.

non 1896 *Haedropleura septangularis* Montg. – Cossmann, p. 92, pl. 6, figs 14, 15 [= *Haedropleura secalina* (Philippi, 1844)].

non 1910 *Bela* (*Haedropleura*) *septangularis* (Montagu) – Cerulli-Irelli, p. 51 [243], pl. 4 [35], figs 55-57 [= *Haedropleura secalina* (Philippi, 1844)].

?*non* 1915 *Haedropleura septangularis* (Montagu) – Harmer, p. 251, pl. 27, fig. 27, pl. 29, figs 3, 4 [?= *Haedropleura secalina* (Philippi, 1844)].

non 1966 *Haedropleura septangularis* Montagu, 1803 – Strausz, p. 434, pl. 20, figs 3-4 [?= *Haedropleura adami* (Friedberg, 1912)].

non 1970 *Haedropleura septangularis* (Montagu) – Greco, p. 291, pl. 5, figs 1, 4 [= *Haedropleura secalina* (Philippi, 1844)].

non 1999 *Haedropleura septangularis* (Montagu, 1803) – Ardovini & Cossignani, p. 67, fig. 125 [= *Haedropleura secalina* (Philippi, 1844)].

non 2002 *Haedropleura septangularis* (Montagu, 1803) – Vera-Peláez, p. 201, pl. 3, fig. K [= *Haedropleura bucciniformis* (Bellardi, 1847)].

Material and dimensions – Maximum height 9.4 mm, width 3.6 mm. **CO**: NHMW 2020/0171/0464 (1), NHMW 2020/0171/0465 (2). **EL**: NHMW 2020/0171/0466 (1), NHMW 2020/0171/0467 (10), NHMW 2020/0171/0648 (1).

Description – Shell small, solid, fusiform. Protoconch multispiral, elevated dome-shaped, composed of 3-3.25 smooth, convex whorls with small nucleus (dp = 785 μm, hp = 875 μm, dp/hp = 0.90, dn = 145 μm, dV1 = 275 μm). Junction with teleoconch marked by beginning of axial sculpture. Teleoconch of five weakly convex whorls, swollen in abapical half, with periphery placed just above suture; subsutural ramp and shoulder hardly developed. Suture impressed, undulating. Axial sculpture of raised, rounded, arched, flexuous ribs, 7-8 on penultimate whorl, broadening on abapical half of whorl, some ribs varicose. Weak spiral sculpture of fine flattened cords separated by narrow grooves covering entire surface, slightly more prominent over siphonal fasciole. Last whorl profile slightly concave at poorly delimited subsutural ramp, convex below, weakly constricted at base; ribs persist over base weakening towards aperture; base not delimited. Aperture small, ovate, moderately wide, outer lip strongly thickened by labial varix, sharp edged; anal sinus very shallow U-shape with apex at shoulder; siphonal canal short, wide, not notched at tip. Columella moderately excavated in upper half, straight below. Columellar and parietal callus not thickened, forming poorly delimited, narrow callus rim. Siphonal fasciole hardly developed.

Discussion – Scarponi & Della Bella (2003, p. 55), Micali (2010, p. 4) and Scarponi *et al*. (2011, p. 40) discussed the confusion surrounding *Haedropleura septangularis* (Montagu, 1803) and *H. secalina* (Philippi, 1844). They form a species pair; *H. septangularis* has a multispiral protoconch of about 2.5-3.25 whorls with sigmoid axial riblets on the last half whorl, whereas *H. secalina* has a paucispiral protoconch of 1.5-2.0 whorls covered with micropustular sculpture to a variable degree. Their teleoconch shells are difficult to separate consistently and rather variable. According to Scarponi & Della Bella (2003) in *H. secalina* the ribs are weaker but more numerous than in *H. septangularis* (9-11 vs 7-8), and more flexuous according to Micali (8-10 vs 7; 2010, p. 4), who gave a lower rib count for both species. Further congeners occur in the Italian Plio-Pleistocene assemblages: *H. parva* Scarponi, Della Bella & Ceregati, 2011 from the Zanclean and Piacenzian of Tuscany (Italy) is a very small species with a paucispiral protoconch, *H. formosa* Scarponi, Della Bella & Ceregato, 2011 from the Zanclean to Calabrian of Italy is larger than *H. septangularis*, with a larger, taller multispiral protoconch, and fewer axial ribs. Vera-Peláez (2022c, p. 180, pl. 4, figs 7-9) recorded *H. formosa* from the Velerín conglomerates based on an abraded specimen with the protoconch not preserved. Better preserved material would be necessary to confirm this record in the Estepona assemblages.

The Estepona specimen figured here is typical teleoconch sculpture for *H. septangularis* with strong flexuous ribs. The specimen from Estepona illustrated by Vera-Peláez

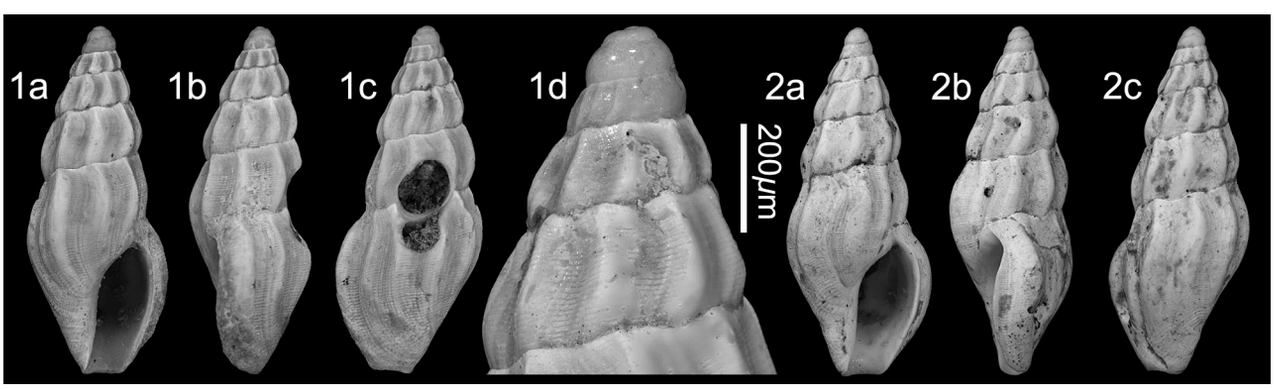

Plate 11. *Haedropleura septangularis* (Montagu, 1803); 1. NHMW 2020/0171/0464, height 8.0 mm, width 3.1 mm. Velerín conglomerates, Velerín. 2. NHMW 2020/0171/0466, height 8.4 mm, width 3.5 mm (digital images); 3. NHMW 2020/0171/0648, height 8.7 mm, width 3.4 mm (SEM image). El Lobillo, Estepona, Lower Piacenzian, Upper Pliocene.

(2002, pl. 3, fig. K) has straight orthocline ribs aligned down the spire axially, and represented *H. bucciniformis* (Bellardi, 1847).
Landau *et al*. (2020) described another similar *Haedropleura* species pair from the Upper Miocene of NW France; *H. gallica* Landau, Van Dingenen & Ceulemans, 2020 with a paucispiral, non-planktotrophic protoconch and *H. ligeriana* Landau, Van Dingenen & Ceulemans, 2020 with a multispiral planktotrophic one. The teleoconchs of this species pair differ from *H. septangularis* is having weaker axial sculpture that does not persist onto the last whorl in most specimens. Moreover, the multispiral protoconch of *H. ligeriana* is more depressed, lower dome-shaped than in *H. septangularis*.

Distribution – Middle Miocene: Atlantic, Loire Basin (Glibert, 1954). Lower Pliocene: Atlantic, NW France (Brébion, 1964; Ceulemans *et al*., 2018), Guadalquivir Basin (Landau *et al*., 2011); western Mediterranean, NE Spain (Gili & Martinell, 1993); central Mediterranean, Italy (Cavallo & Repetto, 1992; Chirli, 1997; Scarponi & Della Bella, 2003; Scarponi *et al*., 2011). Upper Pliocene: ?North Sea Basin, Red Crag, England (Harmer, 1915), western Mediterranean, Estepona Basin, Spain (Vera-Peláez, 2002, 2022c); central Mediterranean, Italy (Sacco, 1904; Scarponi & Della Bella, 2003; Scarponi *et al*., 2011). Lower Pleistocene: eastern Mediterranean, Rhodes Island (Chirli & Linse, 2011). ?Upper Pleistocene: North Sea Basin, England (Harmer, 1915); Atlantic, Ireland (Harmer, 1915). Present-day: northeastern Atlantic frontage, Norway to Madeira and Canaries (Fretter & Graham, 1984), rare in the Mediterranean (Micali, 2010).

Genus *Micropleurotoma* Thiele, 1929

Type species – *Pleurotoma spirotropoides* Thiele, 1925, by original designation, present-day, deep-water, East Africa.

1929 *Micropleurotoma* Thiele, p. 362.

***Micropleurotoma microtropina* Vera-Peláez, 2022**

1996 *Micropleurotoma spirotropoides* (Thiele, 1929) – Vera-Peláez, p. 345, pl. 21, figs 2, 4, 8, 9 [*non Micropleurotoma spirotropoides* (Thiele, 1929)].
2002 *Micropleurotoma spirotropoides* (Thiele, 1929) – Vera-Peláez, p. 192, pl. 2, fig. I, pl. 10, figs G, H [*non Micropleurotoma spirotropoides* (Thiele, 1929)].
*2022d *Micropleurotoma microtropina* Vera-Peláez, p. 270, pl. 5, figs 10-16, pl. 6, figs 5, 6.

Discussion – See Vera-Peláez (2022d, p. 272). This species has not been recognised in the material at hand.

Distribution – Upper Pliocene: western Mediterranean, Estepona Basin, Spain (Vera-Peláez, 1996, 2002, 2022d).

Family Pseudomelatomidae Morrison, 1965 (continued from Landau & Harzhauser, 2022b)
(= Crassispirinae McLean, 1971, Strictispirinae, Strictispiridae McLean, 1971, Zonulispirinae McLean, 1971)

For pseudomelatomids the shells are categorised as small (<15 mm), medium (15-30 mm), large (>35 mm); breadth is described as broad (SL/MD <3), moderately slender (SL/MD = 3-3.2), slender (SL/MD >3.2).

Genus *Ingaunoturricula* Bernasconi & Robba, 1984

Type species – *Drillia accinellii* Hornung, 1920, by monotypy, Pliocene, Italy.

1984 *Ingaunoturricula* Bernasconi & Robba, p. 309.

Note – We place this genus in the family Pseudomelatomidae Morrison, 1965 based on the position of the anal sinus placed on the subsutural ramp.

***Ingaunoturricula accinellii* (Hornung, 1920)**
Plate 12, figs 1-2

*1920 *Drillia accinellii* Hornung, p. 74, pl. 2, fig. 3.
1920 *Drillia accinellii* var. Hornung, p. 74, pl. 2, fig. 4.
1984 *Ingaunoturricula accinellii* (Hornung, 1920) – Bernasconi & Robba, p. 310, pl. 7, fig. 6, pl. 9, fig. 5.
1997 *Ingaunoturricola* [*sic*] *occinelli* [*sic*] (Hornung, 1920) – Chirli, p. 103, pl. 29, figs 8-9.
2018 *Ingaunoturricula accinellii* (Hornung, 1920) – Sosso *et al*., p. 345, figs 71-79.
2018 *Ingaunoturricula accinellii* (Hornung, 1920) – Brunetti & Cresti, p. 88, fig. 350.
2018 *Ingaunoturricula* cf. *accinellii* (Hornung, 1920) – Brunetti & Cresti, p. 88, fig. 351.

Material and dimensions – Height 8.0 mm, width 3.1 mm. **VC**: NHMW 2020/0171/0591-0592 (2), NHMW 2020/0171/0593 (1). **CO**: NHMW 2020/0171/0653 (1). **EL**: NHMW 2020/0171/0654 (1).

Description – Shell small, fusiform-biconic. Protoconch multispiral, of 3.5 whorls, with a small nucleus, bearing fine granular microsculpture (dp = 630 μm, hp = 805 μm, dp/hp = 0.78). Teleoconch of up to five whorls subcarinate convex whorls, with periphery just below mid-whorl, separated by narrowly incised weakly undulating suture. Axial sculpture of low, narrow ribs, 9-10 on last whorl, about one-third width of their interspaces, weakening over subsutural ramp towards adapical suture. Spiral sculpture of smooth, narrow spiral cords overrunning ribs, three on first teleoconch whorl, the adapical placed just below suture, second cord placed mid-whorl delimiting broad subsutural ramp, third placed between second cord and suture forming periphery. Abapically one, later two secondary threads appear on subsutural ramp. Last

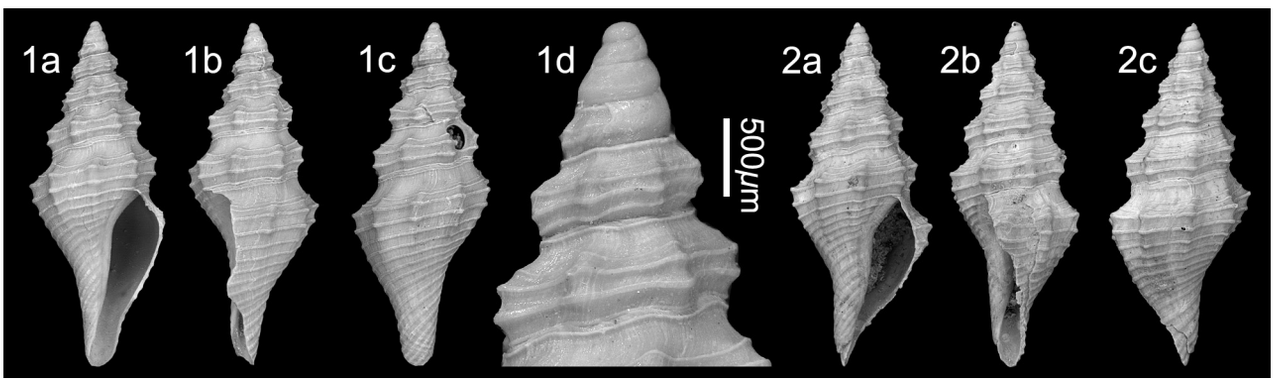

Plate 12. *Ingaunoturricula accinellii* (Hornung, 1920); 1. NHMW 2020/0171/592, height 7.7 mm, width 2.9 mm, 1d, detail of protoconch; 2. NHMW 2020/0171/0593, height 8.0 mm, width 3.1 mm (digital images). Velerín carretera, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

whorl 64-67% of total height, with broad, weakly concave subsutural ramp bearing 1-2 secondary cords, sharply angled at shoulder cord, tapering inwards below, weakly constricted at base; two slightly stronger cords mid-whorl, about 16 further subequal cords below over base and fasciole; siphonal fasciole relatively long, poorly delimited. Aperture about 50% of total height, elongate, outer lip not thickened; anal sinus L-shaped, relatively shallow, with apex at suture; siphonal canal relatively long and broad, bent slightly to left, unnotched. Columella weakly excavated in upper third, straight below, slightly twisted at fasciole. Columellar and parietal callus forming narrow rim.

Discussion – The specimens from Estepona differ slightly from the lectotype illustrated by Bernasconi & Robba (1884, pl. 9, fig. 5) and Sosso *et al*. (2018, figs 71-75) from Rio Torsero, western Liguria, Italy. In that specimen the carina is stronger and secondary spiral cords develop between the primaries and rapidly become almost equal in strength, so that the appearance is one of numerous, close-set cords. Other specimens from Italy like the two specimens illustrated by Chirli (1997, pl. 29, figs 8, 9) from the Pliocene of Siena and the two by Brunetti & Cresti (2018, figs 250-251) from Orciano Pisano have a sculpture far more like that of the Estepona specimens with a weaker carina and far less developed secondary cords giving the aspect of fewer, wider spaced spirals.

Distribution – Lower Pliocene: central Mediterranean, Italy (Hornung, 1920; Bernasconi & Robba, 1984; Chirli, 1997; Sosso *et al*., 2018; Brunetti & Cresti, 2018). Upper Pliocene: western Mediterranean, Estepona Basin, Spain (this paper).

Genus *Kantoria* nov. gen.

ZooBank registration – https://zoobank.org/NomenclaturalActs/9b48fcfc-2f06-4655-af67-202a5485252d

Type species – *Pleurotoma coquandi* Bellardi, 1847, Pliocene, Italy.

Species included – *Pleurotoma lamarckii*, Michelotti, 1847 [appearances of name in Bellardi, 1839 and Sismonda, 1842 are *nomina nuda*], Pliocene, Italy; *Pleurotoma coquandi* Bellardi, 1847; *Pleurotoma coquandi sensu* Hörnes, 1853, Miocene, Austria; *Knefastia sinuslata* Vera-Peláez, 2002, Pliocene, Spain; *Comitas catherinae* Vera-Peláez, 2022, Pliocene, Spain; *Kantoria castoris* nov. sp., Pliocene, Spain.

Etymology – Named after Yuri I. Kantor (A.N. Severtsov Institute of Ecology and Evolution, Russian Academy of Sciences, Moscow), in recognition of his contributions in conoidean systematics. *Kantoria* genus feminine.

Description – Medium to large sized species with slender, fusiform shells, high turreted spire and long straight, narrow siphonal canal, unnotched at tip, whorls strongly carinate, axial sculpture reduced to rounded or sharp tubercles at the shoulder, spiral sculpture weak or subobsolete, last whorl moderately to strongly constricted at base, paucispiral protoconch of about two smooth whorls, anal sinus very broad U-shaped.

Discussion – Generic placement of a small number of European species including *Pleurotoma lamarckii* Michelotti, 1847 and *Pleurotoma coquandi* Bellardi, 1847 has been controversial. Bernasconi & Robba (1984, p. 301-303) placed them in the genus *Comitas* Finlay, 1926 based on Powell's (1966) discussion of the genus "*elongately-fusiform shell armed with axials, the adapical suture unmarginated and a paucispiral, 2 whorled, smooth protoconch, subcarinated on the last whorl*" (1984, p. 303). In their discussion of *P. coquandi* commented that the protoconch was similar to that of the type species.
Scarponi & Della Bella (2003, p. 39) rejected placement of these species in *Comitas* based on the anal sinus characters of that genus, which they said "*intersected or was contiguous with the carina*" [translated from Italian], and placed them in the genus *Turricula* Schumacher, 1817, again based on the position of the anal sinus which they said was "*placed on the shoulder*" [translated from Italian].
Powell (1966, p. 28) noted that it was not always easy to

ascribe species to one or other of these genera based on shell characters alone, but that in *Comitas* the adult sculpture consisted of long fold-like axials crossed by weak spirals, whereas in *Turricula* sculpture was composed of strong spirals and strong, relatively short axials often forming nodules at the periphery.

In our opinion, the Pliocene species have little in common with the clavatulid genus *Turricula* [type species *Turricula javana* (Linné, 1767), present-day, Indo-Pacific], which has a typical clavatulid outline with a subcylindric adapical part of the last whorl. The anal sinus in *Pleurotoma coquandi* Bellardi, 1847 is rather broad U-shaped, placed on the subsutural ramp, with the apex just below mid-ramp. In *Turricula* the sinus is far deeper and narrower (see Powell, 1966, pl. 1, fig. 6). The genus *Surcula* H. & A. Adams, 1853 which has also been used for these species, is an unnecessary substitute name for *Turricula* Schumacher, 1817, by H. & A. Adams (1853, p. 88).

The antipodean pseudomelatomid genus *Comitas* is also a poor fit. A specimen at hand of the type species from the Lower Miocene of North Otago, New Zealand, shows a far larger, more solid species, the ribs are low and not nodular at the shoulder, the last whorl and siphonal canal are broader, and the canal is not as long as it is in the European species. The anal sinus is broader than in *Turricula*, but not as broad as it is in the European species, with the apex closer to the suture, whereas in *P. coquandi* the sinus is very broad U-shaped taking up almost the whole width of the subsutural ramp, with the apex mid ramp. In our opinion, similarities between *Comitas* and these European species are superficial. Specimens of *P. lamarckii* at hand from San Gimignano, Siena, Italy have the same shaped sinus as *K. coquandi*.

Vera-Peláez (2002) included *C. coquandi* and a new species in the pseudomelatomid genus *Knefastia* Dall, 1919 (*Knefastia olivacea* (G. B. Sowerby I, 1834, type by original designation, present-day, eastern Pacific). *Knefastia* is speciose in the tropical American Neogene and includes large, relatively to very broad, robust shells, with broad, rounded ribs and coarse spiral sculpture, quite unlike the species discussed herein.

We therefore erect the genus *Kantoria* nov. gen. for these species.

Lozouet (2017) included several slender fusiform species with a broad U-shaped anal sinus from the French Atlantic Oligocene in the drilliid genus *Pleurofusia* de Gregorio, 1890 (type species *Pleurotoma* (*Pleurofusia*) *longirostropis* de Gregorio, 1890, Eocene, Alabama). However, members of that genus have well-developed spiral sculpture.

***Kantoria coquandi* (Bellardi, 1847)**

Plate 13, figs 1-3

*1847	*Pleurotoma Coquandi* Bellardi, p. 59, pl. 3, fig. 13.
1862	*Pleurotoma Coquandi* Bell. – Brugnone, p. 7, pl. 1, fig. 3.
1877	*Surcula Coquandi* Bell. – Bellardi, p. 65, pl. 2, fig. 15.
1974	*Turricula coquandi* (Bellardi, 1847) – Malatesta, p. 404, pl. 31, fig. 14.
1981	*Surcula coquandi* (Bellardi, 1847) – Ferrero Mortara *et al*., p. 64, pl. 9, fig. 9.
1984	*Comitas coquandi* (Bellardi, 1847) – Bernasconi & Robba, p. 302, pl. 6, figs 4-6.
1988	*Turricola* [*sic*] *coquandi* (Bellardi, 1847) – Chirli, p. 23, pl. 11, fig. 10.
1995	*Comitas coquandi* (Bellardi, 1847) – Forli & Dell'Angelo, p. 16, pl. 1, fig. 4.
1996	*Comitas* (*Comitas*) *coquandi* (Bellardi, 1847) – Vera-Peláez (*partim*), p. 141, pl. 2, figs 7, 8.
1997	*Turricola* [*sic*] *coquandi* (Bellardi, 1847) – Chirli, p. 97, pl. 28, figs 1-3.
2002	*Comitas* (*Comitas*) *coquandi* (Bellardi, 1847) – Vera-Peláez, p. 179, pl. 1, figs C, D.
2003	*Turricula coquandi* (Bellardi, 1847) – Scarponi & Della Bella, p. 38, figs 39, 40, 54.
2010	*Turricula coquandi* (Bellardi, 1847) – Sosso & Dell'Angelo, p. 45, 61 unnumbered fig. top row left.
2018	*Turricula coquanti* [*sic*] (Bellardi, 1847) – Brunetti & Cresti, p. 88, fig. 352.
2022b	*Comitas coquandi* (Bellardi, 1847) – Vera-Peláez, p. 146, pl. 2, figs 15-16, pl. 3, figs 1-3.
non 1853	*Pleurotoma Coquandi* Bell. – Hörnes, p. 361, pl. 39, fig. 8.
non 1966	*Surcula* (*S.*) *coquandi* (Bellardi, 1847) – Strausz, p. 415, pl. 17, fig. 13.

Material and dimensions – Maximum height 27.6 mm, width 9.2 mm. **CO**: NHMW 2020/0171/0401 (1). **EL**: NHMW 2020/0171/0402 (1), NHMW 2020/0171/0496 (1), NHMW 2020/0171/0649 (2). **PA**: NHMW 2020/0171/0650 (1).

Description – Shell medium sized, moderately slender fusiform, with tall gradate spire and very long siphonal canal. Protoconch paucispiral, composed of two smooth, convex whorls, with medium-sized nucleus (dp = 990 μm, hp = 1000 μm, dp/hp = 0.99, dn = 355 μm, dV1 = 740 μm). Junction with teleoconch sharply delimited by sinusigera. Teleoconch of up to eleven whorls, separated by narrowly impressed, superficial, linear suture. Early whorls with broad, concave subsutural ramp, delimited by tuberculate carina placed at about one-third of whorl height; tubercles rounded to weakly spinous (T2 = 8, TP = 9-12). Fine spiral sculpture covers entire whorl, subobsolete over ramp, slightly stronger below suture. Last whorl 59-61% of total height, with broad, concave subsutural ramp, delimited by coarsely tubercular shoulder carina, convex below, moderately constricted at base, weak to subobsolete spirals continue over base and siphonal fasciole. Aperture 46-49% of total height, ovate, outer lip thin, not thickened by varix, smooth within; anal sinus moderately deep, very broad occupying entire ramp, apex mid-ramp; siphonal canal very long, straight. Columella straight, smooth. Columellar and parietal callus weakly thickened, moderately delimited, forming narrow callus margin.

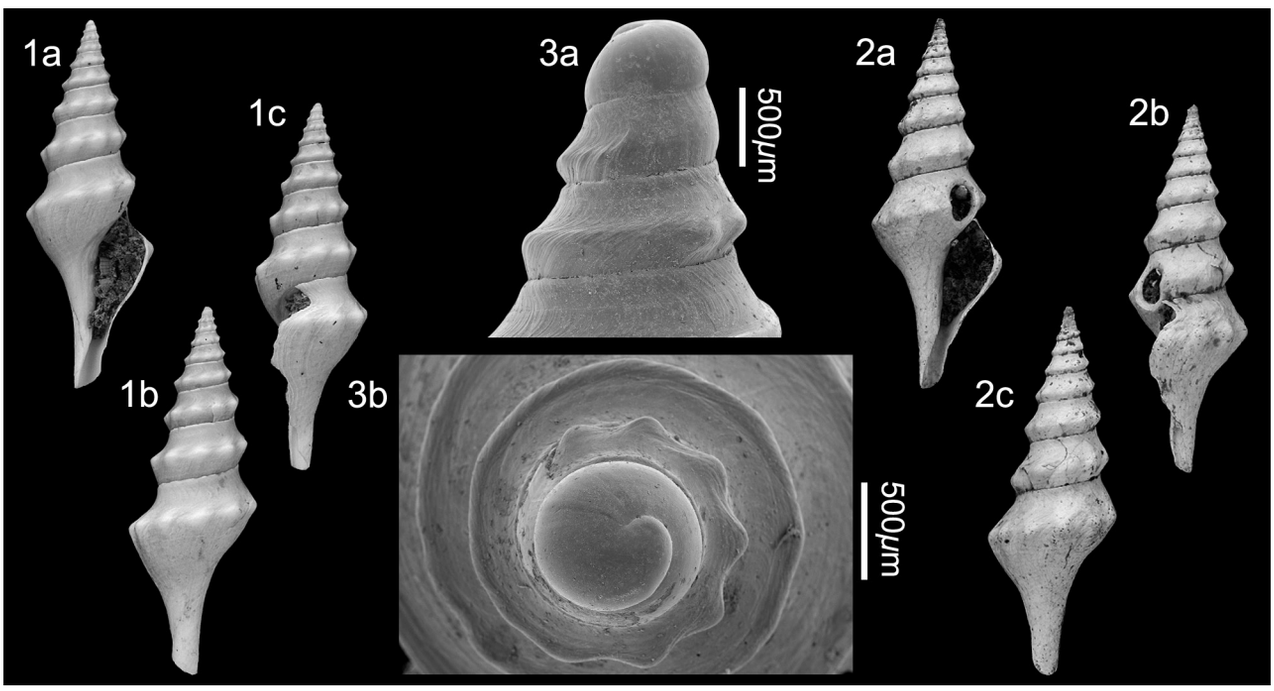

Plate 13. *Kantoria coquandi* (Bellardi, 1847); 1. NHMW 2020/0171/0401, height 27.6 mm, width 9.2 mm; Velerín conglomerates, Velerín. 2. NHMW 2020/0171/0402, height 26.0 mm, width 8.4 mm (digital images); 3. NHMW 2020/0171/0496, detail of protoconch (SEM image). El Lobillo, Estepona, Lower Piacenzian, Upper Pliocene.

Discussion – Two closely similar species occur in the Italian Pliocene: *Kantoria coquandi* and *K. lamarckii* (Michelotti, 1847). Typical forms of *K. coquandi* differ in having a weaker shoulder carina and weaker ribs, often subobsolete spiral sculpture, and a more rounded aperture. The protoconch has about two whorls in both species and the early whorls are similar. No specimens attributable to *K. lamarckii* occur in the Estepona Pliocene and we accept Scarponi & Della Bella's comment that the two are easily separable in the Italian assemblages.
Scarponi & Della Bella (2003, p. 39) went on to note that *K. coquandi* was rather variable in the Italian Pliocene assemblages. The Spanish specimens are somewhat smaller than those from Italy and the siphonal canal seems a little shorter. However, few specimens from Estepona are available and we provisionally consider them conspecific. In Italy it is found in predominantly infra- and circalittoral deposits. In Estepona the species is uncommon, and little variability is seen in the material at hand that originates from the shallower water deposits.
Bellardi (1877, p. 66) doubted that the Viennese specimen illustrated by Hörnes (1854, pl. 39, fig. 8) was conspecific with his Italian Pliocene species. Indeed, the Paratethyan species differs in its broader spire, higher number of spire whorls, distinct spiral cords and slightly broader siphonal canal. Paratethyan records are therefore excluded from the chresonymy.

Distribution – Lower Pliocene: central Mediterranean, Italy (Bellardi, 1877; Chirli, 1988, 1997; Scarponi & Della Bella, 2003; Sosso & Dell'Angelo, 2010; Brunetti & Cresti, 2018). Upper Pliocene: western Mediterranean, Estepona Basin, southern Spain (Vera-Peláez, 2002, 2022b), central Mediterranean, Italy (Malatesta, 1974; Scarponi & Della Bella, 2003).

***Kantoria catherinae* (Vera-Peláez, 2022)**
Plate 14, figs 1-3

1996	*Comitas recticosta* (Bellardi, 1847) – Vera-Peláez (*partim*), p. 145, pl. 3, figs 4-5 only.
2002	*Comitas recticosta* (Bellardi, 1847) – Vera-Peláez, p. 179, pl. 1, figs A, B.
2022b	*Comitas catherinae* Vera-Peláez, p. 144, pl. 1, figs 11-18.

Material and dimensions – **VC**: NHMW 2020/0171/0576, height 29.4 mm, width 10.1 mm; NHMW 2020/0171/0577, height 24.3 mm, width 8.5 mm; NHMW 2020/0171/0617, height 21.3 mm, width 7.7 mm; NHMW 2020/0171/0621, height 25.9 mm, width 9.2 mm (incomplete), NHMW 2020/0171/0579 (4).

Description – Shell medium sized, broad fusiform, with tall conical spire and long siphonal canal. Protoconch paucispiral, composed of two smooth, convex whorls, with large nucleus (dp = 905 μm, hp = 1000 μm, dp/hp = 0.91, dn = 475 μm, dV1 = 710 μm). Junction with teleoconch sharply delimited by sinusigera. Teleoconch of up to seven whorls, separated by narrowly impressed, linear suture. Early whorls with broad, concave subsutural ramp, broad, rounded, elevated opisthocline ribs develop abruptly at shoulder, nine on early whorls, 10-11 on last whorl, weak-

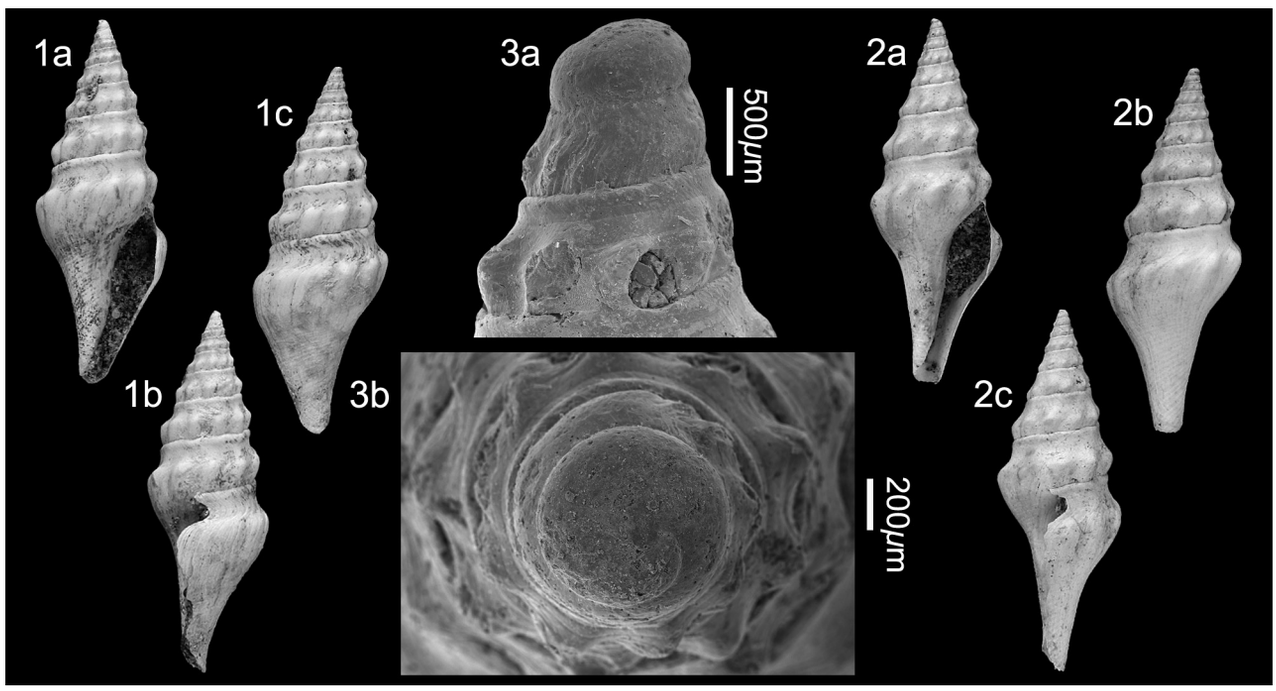

Plate 14. *Kantoria catherinae* (Vera-Peláez, 2022); 1. NHMW 2020/0171/0576, height 29.4 mm, width 10.1 mm; 2. NHMW 2020/0171/0577, height 24.3 mm, width 8.5 mm (digital images); 3. NHMW 2020/0171/0617, height 21.3 mm, width 7.7 mm, detail of protoconch (SEM image). Velerín carretera, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

ening just above abapical suture. Ribs weakly tubercular at shoulder. Spiral sculpture of moderately developed and delimited subsutural cord and extremely weak and fine spiral threads only seen in juvenile specimens; adult specimens some subobsolete threads occasionally visible towards abapical suture. Last whorl about 62% of total height, with very broad, smooth, deeply concave subsutural ramp, sharply angled at tubercular shoulder, ribs weaken and disappear before base; base weakly to moderately constricted; weak spirals over base, strengthening slightly over siphonal fasciole. Aperture 47% of total height, ovate, outer lip thin, not thickened by varix, smooth within; anal sinus moderately deep, very broad U-shaped, occupying entire ramp, apex mid-ramp; siphonal canal very long, straight. Columella straight, smooth. Columellar and parietal callus weakly thickened, moderately delimited, forming narrow callus margin.

Discussion – *Kantoria catherinae* (Vera-Peláez, 2022) is somewhat similar to *Kantoria coquandi* (Bellardi, 1847), but that species is far slenderer, with the axial sculpture hardly developed. *Kantoria lamarckii* (Michelotti, 1847) has a slenderer whorl profile like *K. coquandi*, but is sharply carinate, the ribs developed only adjacent to the carina and has stronger spiral sculpture. *Kantoria sinuslata* (Vera-Peláez, 2002) differs also in having the axial sculpture much reduced and in the character of its early whorls, which are smoothly and sharply carinate. *Kantoria castoris* nov. sp. is also closely similar but differs in its whorl profile (see below).

Vera Peláez (1996, pl. 3, figs 4, 5; 2002, pl. 1, figs A, B) illustrated a specimen from Velerín as *Comitas recticosta* (Bellardi, 1847) that might represent this new species. It differs from the specimens illustrated herein in being slightly slenderer. It is not *Pleurotoma recticosta* Bellardi, 1847 (syntype figured by Ferrero Mortara *et al*., 1981, pl. 9, fig. 8; not 13 as stated in plate caption; *lapsus*) described from the Italian Lower Pliocene (see also Cavallo & Repetto, 1991, fig 343). That species differs in being more elongate, with a taller spire and longer siphonal canal, has more sharply delimited orthocline ribs as opposed to opisthocline seen in Vera Peláez's specimen, and the spiral sculpture is much stronger, composed of narrow cords of primary and secondary strength. Generic position of *P. recticosta* is also unclear. The anal sinus is narrower and deeper than that of *Kantoria* species.

Distribution – Upper Pliocene: western Mediterranean, Estepona Basin, southern Spain (Vera-Peláez, 2002).

***Kantoria sinuslata* (Vera-Peláez, 2002)**
Plate 15, figs 1-5

1996	*Comitas* (*Comitas*) *coquandi* (Bellardi, 1847) – Vera-Peláez (*partim*), p. 141, pl. 2, figs 1-5, 6, 9.
*2002	*Knefastia sinuslata* Vera-Peláez, p. 180, pl. 1, figs E, F, G, pl. 9, fig C, D.
2022b	*Leucosyrinx sinuslata* (Vera-Peláez, 2002) – Vera-Peláez, p. 150, pl. 2, figs 8-13.

Material and dimensions – Maximum height 38.5 mm, width 11.4 mm. **VC**: NHMW 2020/0171/0394-0397 (4),

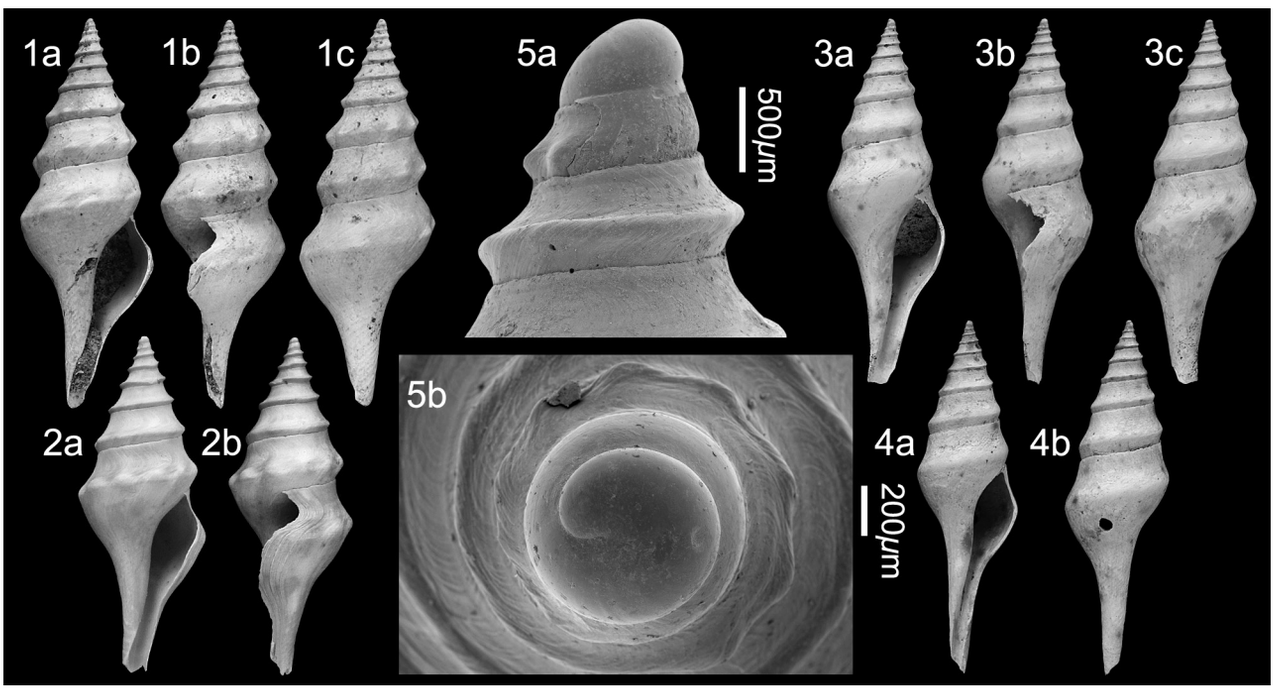

Plate 15. *Kantoria sinuslata* (Vera-Peláez, 2002); 1. NHMW 2020/0171/0399, height 35.8 mm, width 11.2 mm; 2. NHMW 2020/0171/0400, height 24.9 mm, width 9.1 mm; 3. NHMW 2020/0171/0394, height 38.1 mm, width 11.7 mm; 4. NHMW 2020/0171/0395, height 38.5 mm, width 11.4 mm (digital images); 5. NHMW 2020/0171/0397, detail of protoconch (SEM image). Velerín carretera, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

NHMW 2020/0171/0398 (14), NHMW 2020/0171/0399-0400 (2).

Description – Shell large sized, moderately slender fusiform, with tall gradate spire and very long siphonal canal. Protoconch paucispiral, composed of two smooth, convex whorls, with medium-sized nucleus (dp = 975 μm, hp = 910 μm, dp/hp = 1.07, dn = 375 μm, dV1 = 730 μm). Junction with teleoconch sharply delimited by sinusigera. Teleoconch of up to ten whorls, separated by narrowly impressed, linear suture. Early whorls with broad, concave subsutural ramp, delimited by sharp, elevated carina placed a short distance above suture; about eight small spinous tubercles developed at carina. Abapically, subsutural ramp broadens, becomes less concave; carina broadens, becoming more rounded; spinous tubercles pass to low, broad, poorly delimited tubercles mid-spire, fading completely on late adult whorls; early whorls devoid of spiral sculpture, fine, close-set spirals developed on mid-spire whorls, disappearing completely, or almost so, on last two whorls. Last whorl 63-68% of total height, with broad, weakly concave subsutural ramp, broadly rounded at shoulder, convex below, moderately constricted at base, devoid of sculpture, except growth lines. Aperture 48-53% of total height, ovate, outer lip thin, not thickened by varix, smooth within; anal sinus moderately deep, very broad occupying entire ramp, apex mid-ramp; siphonal canal very long, straight. Columella straight, smooth. Columellar and parietal callus weakly thickened, moderately delimited, forming narrow callus margin.

Discussion – *Kantoria sinuslata* (Vera-Peláez, 2002) undergoes important changes in profile and sculpture with ontogeny. Juvenile whorls are sharply carinate. As the shell becomes adult the carina widens and becomes less elevated and less sharp, so that in fully adult specimens the shoulder is marked by a low, narrowly rounded, poorly delimited carina.
Kantoria sinuslata is closely similar to *K. coquandi* (Bellardi, 1847) and they co-occur in the Estepona assemblages. According to the original description, *K. sinuslata* has a more fusiform profile, lacks spinous axial ribs that, if present, are weak and present only on the early teleoconch whorls and disappear with ontogeny [*sic*; translated from Spanish] , the subsutural ramp is wider and less concave than in *K. coquandi*, the shoulder carina is not as elevated and tends to weaken further with ontogeny whereas in *K. coquandi* the carina strengthens with ontogeny with spinous ribs developed at the carina throughout, and *K. coquandi* has well-developed spirals on the last whorl, whereas in *K. sinuslata* the spirals are obsolete on the last whorl, or almost so (Vera-Peláez, 2002, p. 181).
The most important difference between two species is the character of the early whorls: coarsely tuberculose in *K. coquandi* and sharply and smoothly carinate in *K. sinuslata*. This character easily distinguished the species in specimens of *K. sinuslata* in which tubercles develop on the last few whorls. The character of the protoconch and anal sinus are similar in both species.

Distribution – Upper Pliocene: western Mediterranean, Estepona Basin, southern Spain (Vera-Peláez, 2002, 2022b).

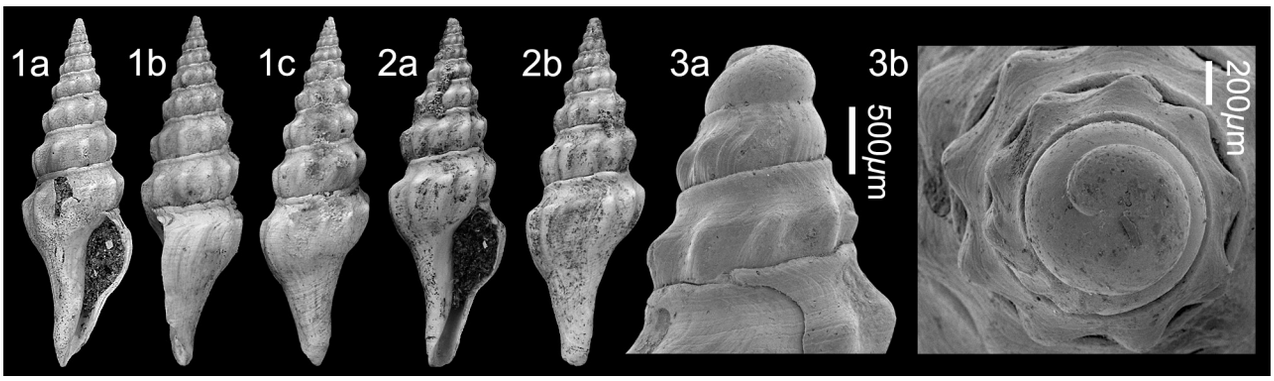

Plate 16. *Kantoria castoris* nov. sp.; 1. **Holotype** NHMW 2020/0171/0573, height 35.7 mm, width 11.0 mm; 2. **Paratype 1** NHMW 2020/0171/0574, height 33.3 mm, width 11.0 mm (digital images); 3. **Paratype 2** NHMW 2020/0171/0578, apical fragment (SEM image). Velerín conglomerates, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

***Kantoria castoris* nov. sp.**
Plate 16, figs 1-3

ZooBank registration – https://zoobank.org/NomenclaturalActs/ df8a7c2f-e6df-472f-8ac1-ade7013e24a1

Type material – Holotype NHMW 2020/0171/0573, height 35.7 mm, width 11.0 mm; paratype 1 NHMW 2020/0171/0574, height 33.3 mm, width 11.0 mm; paratype 2 NHMW 2020/0171/0578, apical fragment (incomplete); paratype 3 NHMW 2020/0171/0651, height 25.6 mm, width 8.7 mm; **Velerín conglomerates**. Paratype 4 NHMW 2020/0171/0652, height 25.1 mm, width 8.9 mm; **El Lobillo**.

Other material – Known from type series only.

Type locality – El Lobillo, Estepona, Spain.

Type stratum – unnamed beds, Lower Piacenzian, Upper Pliocene.

Etymology – Name after the Río del Castor, close to the type locality of Velerín, near Estepona, southern Spain. *Kantoria* gender feminine.

Diagnosis – *Kantoria* species with relatively broad profile, protoconch of two smooth whorls, teleoconch of eight shouldered whorls, shoulder smooth, placed relatively high, concave subsutural ramp, 11 broad, rounded ribs below shoulder, spiral sculpture weak, anal sinus broad U-shaped, siphonal canal relatively broad.

Description – Shell large sized, moderately slender fusiform, with tall gradate spire and very long siphonal canal. Protoconch paucispiral, composed of two smooth, convex whorls, with medium-sized nucleus (dp = 880 μm, hp = 930 μm, dp/hp = 0.95, dn = 335 μm, dV1 = 715 μm). Junction with teleoconch sharply delimited by sinusigera. Teleoconch of up to eight whorls, separated by narrowly impressed, undulating suture. Early whorls with broad, concave, smooth subsutural ramp, broad, rounded, elevated opisthocline ribs develop abruptly at shoulder, nine on early whorls, 11 on last whorl, weakening just above abapical suture. Ribs most prominent, but not tubercular at shoulder. Spiral sculpture of weak, poorly delimited subsutural cord and extremely weak and fine spiral threads present only below shoulder. Last whorl 57-61% of total height, with broad, smooth, concave subsutural ramp, sharply angled at shoulder by adapical end of ribs, ribs weaken and disappear before base; base moderately constricted; weak spirals below shoulder, strengthening slightly over siphonal fasciole. Aperture 43-47% of total height, ovate, outer lip thin, not thickened by varix, smooth within; anal sinus moderately deep, very broad U-shaped, occupying entire ramp, apex mid-ramp; siphonal canal very long, straight. Columella straight, smooth. Columellar and parietal callus weakly thickened, moderately delimited, forming narrow callus margin.

Discussion – *Kantoria castoris* nov. sp. is similar to *Kantoria catherinae* (Vera-Peláez, 2022). They share a relatively broad shell and short siphonal fasciole compared to the type species *K. coquandi*. However, *K. castoris* differs from *K. catherinae* in having the shoulder placed higher resulting in a different whorl profile; a more gradate spire composed of more strongly shouldered whorls, below which run longer ribs to the suture. In *K. catherinae* the whorl profile is almost conical. Spiral sculpture is weak in both species, although slightly stronger in *K. castoris*. The two seem to be separated ecologically: *K. castoris* is from the shallower water assemblage of Velerín conglomerates, whereas *K. catherinae* is from the deeper water Velerín carretera deposit. *Kantoria lamarckii* (Bellardi, 1839) and *K. coquandi* (Bellardi, 1847) both differ in their slenderer profile, sharper shoulder and longer siphonal canal.

Distribution – Upper Pliocene: western Mediterranean, Estepona Basin, southern Spain (this paper).

Genus *Compsodrillia* Woodring, 1928

Type species – *Compsodrillia urceola* Woodring, 1984, by original designation, Pliocene, Jamaica.

1928 *Compsodrillia* Woodring, p. 155.

Note – Generic assignment of the *Drillia granaria* Dujardin, 1837 species group is problematic. Glibert (1954, p. 54) placed it in the pseudomelatomid genus *Crassispira* Swainson, 1840. Powell (1966, p. 75) characterised that genus as having a paucispiral protoconch. Bernasconi & Robba (1984) illustrated the protoconch of *Drillia matheroni* Bellardi, 1877, a species closely similar to *D. granaria*, and placed it in the pseudomelatomid genus *Miraclathurella* Woodring, 1928 based on the character of its protoconch: multispiral, with the last whorl distinctly carinate below mid-whorl, with arcuate axial riblets on the last 0.25-1 whorl. Scarponi & Della Bella (2003, p. 64) placed it in the pseudomelatomid genus *Compsodrillia* Woodring, 1928 based both on protoconch and teleoconch characters, and considered *D. matheroni* closely similar to the present-day western Atlantic *Compsodrillia halipex* (Dall, 1919). In our opinion, *Compsodrillia* species from the present-day and fossil tropical western Atlantic differ in being more slender-elongate, less solid, and having a longer siphonal canal that is more clearly defined by a more strongly constricted base. Placement in the genus *Compsodrillia* is provisional.
Interestingly, Lozouet (2017, pl. 14, figs 15-17) illustrated a specimen from the Atlantic Upper Oligocene of France as *Crassispira* sp. that appears to belong to the *D. granaria* species group based on its teleoconch but seems to have a paucispiral protoconch.

***Compsodrillia matheroni* (Bellardi, 1877)**
Plate 17, fig. 1

*1877 *Drillia Matheroni* Bellardi, p. 117, pl. 4, fig. 5.
1981 *Drillia matheroni* Bellardi, 1877 – Ferrero Mortara *et al*., p. 71, pl. Ii, fig. 11.
1984 *Miraclathurella matheroni* (Bellardi, 1877) – Bernasconi & Robba, p. 317, pl. 8, fig 4, 5.
1992 *Bela* (*Bela*) *brachystoma* (Philippi, 1844) – Cavallo & Repetto (*partim*), p. 138, fig. 374 left figure only [right figure = *Bela* (*Bela*) *brachystoma* (Philippi, 1844)].
1997 *Miraclathurella matheroni* (Bellardi, 1877) – Chirli, p. 38, pl. 10, figs 8-10.
2003 *Compsodrillia matheroni* (Bellardi, 1877) – Scarponi & Della Bella, p. 64, figs 94, 101.
2022c *Miraclathurella* aff. *matheroni* (Bellardi, 1877) – Vera-Peláez, p. 167, pl. 1, fig. 17.

Material and dimensions – Height 9.3 mm, width 3.1 mm. **CO**: NHMW 2020/0171/0472 (1).

Description – Shell small, solid, moderately slender, turriform, with tall conical spire. Protoconch multispiral (incomplete in Estepona material). Teleoconch of up to seven weakly shouldered whorls, with moderate-width, steeply inclined, concave subsutural ramp, weakly angled at shoulder cord, weakly convex below, separated by narrowly impressed, undulating suture. Axial sculpture dominant, of broad, rounded opisthocline ribs, ten on last whorl, equal in width to their interspaces, weaker over subsutural ramp. Spiral sculpture of narrow cords; one narrow, non-tubercular subsutural cord delimiting ramp adapically. On early teleoconch whorls two further cords below, three on penultimate whorl, of which the upper delimits shoulder; horizontally elongated tubercles developed over intersections. Last whorl 52% of total height, with vertical, concave subsutural ramp, obtusely angled at shoulder, weakly convex below, weakly constricted at base; 7-8 primary spirals below shoulder and on base, axials persist over base; four further cords over siphonal fasciole. Aperture 32% of total height, small, ovate; outer lip strongly thickened by rounded labial varix, smooth within; anal sinus, moderately wide and deep U-shaped, occupying entire ramp, apex mid-ramp; siphonal canal very short, straight, not notched. Columella straight, smooth. Columellar and parietal callus moderately thickened, sharply delimited, forming narrow callus rim; robust parietal tubercle developed adapically.

Discussion – Bellardi (1877) described *Drillia matheroni* from the Middle Miocene of Italy. He recognised the similarity of his new species to *Pleurotoma granaria* (Dujardin, 1837) from the Atlantic Langhian Middle Miocene of the Loire Basin, France, but considered the French species to differ in having a slightly greater number of axial ribs that were thicker and more closely-spaced, separated by three spiral cords on the early teleoconch whorls and eight on the last whorl, forming small tubercles at the intersections, whereas in *D. matheroni* there were only two spiral cords on the earliest teleoconch whorls and the cords run continuously without swelling over the tubercles. In his description, Bellardi noted the Italian species as having 12-13 axial ribs, within the range given by Peyrot (1931, p. 162) for specimens from the Atlantic Lower and Middle Miocene Aquitaine Basin of France. Subse-

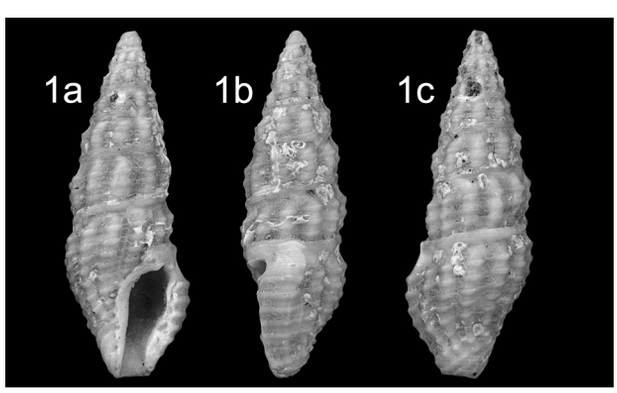

Plate 17. *Compsodrillia matheroni* (Bellardi, 1877); 1. NHMW 2020/0171/0472, height 9.3 mm, width 3.1 mm (digital image). Velerín conglomerates, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

quently opinion has been split, the two taxa considered distinct species (Bernasconi & Robba, 1984; Scarponi & Della Bella, 2003) or conspecific (Bałuk, 2003). Moreover, the Mediterranean Pliocene specimens illustrated have been considered conspecific with the Italian Middle Miocene *Compsodrillia matheroni* (Chirli, 1997; Scarponi & Della Bella, 2003).

Reviewing material at hand, we note that specimens from the Loire Basin, where *C. granaria* was originally described, have 12-17 axial ribs on the last whorl (7 specimens, NHMW coll.; Ferrière-Larçon, Indre-et-Loire). The protoconch is not preserved. Specimens from Middle Miocene Paratethys have 10-16 ribs on the last whorl (51 specimens, NHMW coll.; Lapugy, Romania). The protoconch has about three whorls, low, pointed dome-shaped, with axial riblets on the last half whorl. The same relatively low dome-shaped protoconch can also be seen in specimens from Poland (Bałuk, pl. 11, fig. 5). The holotype of *C. matheroni* from the Middle Miocene of Italy figured by Bernasconi & Robba (1984, pl. 8, fig. 4) has a taller somewhat conical multispiral protoconch. Bernasconi & Robba count 14 ribs on the last whorl and noted on the scarcity on the species in the Italian assemblages, known at the time from the single Middle Miocene holotype and two specimens from the Lower Pliocene.

Specimens from the Mediterranean Lower Pliocene of north-eastern Spain have 10-11 broad ribs (7 specimens, NHMW coll.; El Papiol, Barcelona). The protoconch is imperfectly preserved, but taller than that of the Paratethyan specimens and similar to that of the holotype of *D. matheroni* and that figured by Scarponi & Della Bella (2003, fig. 101). The two Italian specimens available to Scarponi & Della Bella have 9-10 ribs. Chirli (1997, p. 38) had four specimens at hand and described them as having 11 robust ribs. We cannot separate any of these forms based on the number of spiral cords.

In summary, the Pliocene specimens have fewer, broader ribs than those from the Atlantic Miocene or the Paratethys and a taller protoconch. They are unlikely to be conspecific. We consider the Pliocene forms to represent *C. matheroni*, with which it shares the taller protoconch and stouter ribs, although we have not seen any Pliocene specimen with 14 ribs on the last whorl. As to the Atlantic and Paratethyan Miocene specimens, we have not seen a single specimen from the Loire basin with its protoconch intact to better characterise *C. granaria*. Peyrot (1931) described the protoconch of the Aquitaine Basin specimens as having two smooth whorls. It is possible that these records represent a species complex.

In the Italian assemblages Scarponi & Della Bella (2003, p. 64) noted that the scant Italian material originated from infralittoral deposits. The single specimen from Estepona is also from the shallower water deposits of the Velerín conglomerates.

Distribution – Middle Miocene: Proto-Mediterranean, Italy (Bellardi, 1877; Bernasconi & Robba, 1984). Lower Pliocene: western Mediterranean, NE Spain (Gili & Martinell, 1993; Vera-Peláez, 2022c); central Mediterranean, Italy (Bellardi, 1877; Cavallo & Repetto, 1992; Chirli, 1997; Scarponi & Della Bella, 2003). Upper Pliocene: western Mediterranean, Estepona Basin, Spain (this paper).

Family Turridae H. Adams, & A. Adams, 1853 (1838)
Genus *Coronia* de Gregorio, 1890

Type species – Pleurotoma acutirostra Conrad, 1835, by subsequent designation (Cossmann, 1896), Eocene, Alabama.

1890 *Coronia* de Gregorio, p. 23.

Note – Murex contiguus Brocchi, 1814 and other similar European Neogene species have been placed by most recent authors in the genus/subgenus *Unedogemmula* MacNeil, 1961. Lozouet *et al*. (2001, p. 67; 2017, p. 73) attributed French Atlantic Late Oligocene and Early Miocene members of this group to the genus *Coronia* de Gregorio, 1890. Janssen & Wienrich (2007, p. 668), in their discussion of Miocene North Sea Basin member of the group compared them against the type species of *Unedogemmula*, *Pleurotoma unedo* Kiener, 1839 from the present-day Indo-Pacific, and also noted that attribution to that genus was questionable. We provisionally follow Lozouet in his use of the genus *Coronia* pending further review.

***Coronia contigua* (Brocchi, 1814)**
Plate 18, figs 1-3

*1814 *Murex contiguus* Brocchi, p. 433, pl. 9, fig. 14.
1814 *Murex turricula* Brocchi, p. 435, pl. 9, fig. 20 [*non Propebela turricula* (Montagu, 1803)].
1853 *Pleurotoma turrifera* Nyst *in* Omalius d'Halloy, p. 588 (*nomen nudum*).
1867 *Pleurotoma turricula* Brocc. – Pereira da Costa, p. 230, pl. 27, fig. 2.
1877 *Pleurotoma contigua* Brocch. – Bellardi, p. 38, pl. 1, fig. 24.
1877 *Pleurotoma turricula* Brocch. – Bellardi, p. 39, pl. 1, fig. 25 [*non Propebela turricula* (Montagu, 1803)].
1879 *Pleurotoma turricula* Brocchi – Fontannes, p. 41, pl. 4, fig. 9 [*non Propebela turricula* (Montagu, 1803)].
1896 *Pleurotoma turricula* Br. – Cossmann, p. 76, pl. 5, figs 11, 12.
1904 *Pleurotoma turricula* var. *sulcata* Sacco, p. 42, pl. 11, fig. 45 (= var. A of Bellardi, 1877).
1914 *Pleurotoma turricula* Brocchi *non* Montagu – Cipolla, p. 115 [11], pl. 12 [1], fig. 3 [*non Propebela turricula* (Montagu, 1803)].
1931 *Pleurotoma contigua* Brocchi – Peyrot, p. 76, pl. 8, figs 100, 101.
1937 *Pleurotoma contigua* Br. – Montanaro, p. 143 [113], pl. 6 [11], figs 39-43.
1954 *Turris* (*Gemmula*) *turrifera* (Nyst, 1853) – Glibert, p. 9, pl. 7, fig. 9.

1955 *Turris* (*Turris*) (*Turris*) *turricula* (Brocchi 1814) – Rossi Ronchetti, p. 313, fig. 168 [*non Propebela turricula* (Montagu, 1803)].
1955 *Turris* (*Turris*) (*Turris*) *contigua* (Brocchi 1814) – Rossi Ronchetti, p. 318, fig. 171.
1955 *Turris* (*Turris*) (*Turris*) *contigua* var. *brocchii* Rossi Ronchetti, p. 320, fig. 172.
1959 *Turris* (*Gemmula*) *turrifera* (Nyst) – Ruggieri & Curti, p. 117, pl. 29, figs 165, 166.
1963 *Turris* (*Turris*) *contigua agrannulosa* Venzo & Pelosio, p. 123, pl. 39, fig. 8.
1967 *Turris* (*Turris*) *contigua* (Brocchi) – Pelosio, p. 161 [61], pl. 45, figs 22-24, pl. 46, fig. 1.
1967 *Gemmula* (*Gemmula*) *turrifera* (Nyst, 1853) – Palla, p. 999, pl. 75, fig. 9.
1968 *Gemmula* (*Hemipleurotoma*) *contigua* (Brocchi, 1814) – Robba, p. 591, pl. 45, fig. 6.
1973 *Gemmula* (*Gemmula*) *turrifera* (Nyst) 1853 – Caprotti & Vescovi, p. 178, pl. 3, fig. 14.
1974 *Gemmula* (*Unedogemmula*) *contigua* (Brocchi, 1814) – Malatesta, p. 402, pl. 31, fig. 23.
1976 *Gemmula turrifera* (Nyst) – Caprotti, p. 48, pl. 17, fig. 14.
1978 *Murex contuguus* Brocchi, 1814 – Pinna & Spezia, p. 146, pl. 37, fig. 2.
1978 *Murex turricula* Brocchi, 1814 – Pinna & Spezia, p. 154, pl. 40, fig. 3.
1978 *Turris contigua* var. *brocchii* Rossi Rochetti, 1955 – Pinna & Spezia, p. 166, pl. 37, fig. 2.
1982 *Turris* (*Turris*) *continua* [*sic*] (Brocchi, 1814) – Martinell, p. 99, pl. 1, figs 5, 6.
1984 *Gemmula* (*Hemipleurotoma*) *contigua* (Brocchi) – Ruggieri & Davoli, p. 68, pl. 4, figs 7, 8, 12.
1984 *Gemmula* (*Unedogemmula*) *contigua* (Brocchi, 1814) – Bernasconi & Robba, p. 292, pl. 5, figs 3, 4.
1986 *Turris* (*T.*) *contigua* (Brocchi) – Martinell & Domenèch, p. 119, pl. 1, fig. 5.
1990 *Gemmula* (*Hemipleurotoma*) *contigua* (Brocchi, 1814) – Davoli, p. 89, pl. 8, figs 15-19.
1993 *Turris* (*Turris*) *contigua* (Brocchi, 1814) – González Delgado, p. 32, pl. 2, figs 15, 16.
1992 *Gemmula* (*Unedogemmula*) *contigua* (Brocchi, 1814) – Cavallo & Repetto, p. 130, fig. 342.
1996 *Gemmula* (*Gemmula*) *contigua* (Brocchi, 1814) – Vera-Peláez, p. 182, text-figs 4b, 5b, 6, pl. 7, figs 1-10.
1997 *Turris contigua* (Brocchi, 1814) – Chirli, p. 24, pl. 7, figs 1-4.
2001 *Gemmula* (*Unedogemmula*) cf. *contigua* (Brocchi, 1814) – Silva, p. 524, text-fig. 3.182, pl. 23, fig. 11.
2002 *Gemmula* (*Gemmula*) *contigua* (Brocchi, 1814) – Vera-Peláez, p. 183, pl. 1, figs M, Ñ, O, pl. 9, figs I, J.
2003 *Gemmula* (*Unedogemmula*) *contigua* (Brocchi, 1814) – Scarponi & Della Bella, p. 74, figs 113a-114b, 118.
2008 *Gemmula* (*Unedogemmula*) *contigua* (Brocchi, 1814) – Chirli & Richard, p. 61, pl. 12, fig. 2.
2009 *Gemmula* (*Unedogemmula*) *contigua* (Brocchi, 1814) – Guioli, *et al*., p. 12, pl. 1, fig. f.
2010 *Unedogemmula contigua* (Brocchi, 1814) – Sosso & Dell'Angelo, p. 45, unnumbered fig. p. 61 middle row right.
2011 *Gemmula contigua* (Brocchi, 1814) – Chirli & Linse, p. 167, pl. 57, fig.2.
2011 *Gemmula* (*Unedogemmula*) *contigua* (Brocchi, 1814) – Landau *et al*., p. 35, pl. 18, figs 10, 11.
2014 *Unedogemmula contigua* (Brocchi, 1814) – Brunetti, p. 68, top figures.
2018 *Unedogemmula contigua* (Brocchi, 1814) – Brunetti & Cresti, p. 90, fig. 357.
2022a *Unedogemmula contigua* (Brocchi, 1814) – Vera-Peláez, p. 129, pl. 1, figs 7-11, 16.

non 1872 *Pleurotoma turricula* Broc. – Von Koenen, p. 221 [= *Unedogemmula boreoturricula* (Kautsky, 1925)].
non 1848 *Pleurotoma turricula* Broc. – Wood, p. 53, pl. 4, fig. 1 [= *Unedogemmula antwerpiensis* (Vincent, 1890)].
non 1882 *Pleurotoma turricula* Broc. – Nyst, p. 42 [= *Unedogemmula antwerpiensis* (Vincent, 1890)].
non 1854 *Pleurotoma turricula* Brocc. – Hörnes, p. 350, pl. 38, fig. 11 [= *Unedogemmula annae* (Hoernes & Auinger, 1891)].
non 1915 *Pleurotoma turricula* (Brocchi) – Harmer, p. 203, pl. 26, figs 1, 2 [= *Unedogemmula antwerpiensis* (Vincent, 1890)].
non 1946 *Turris* (*Gemmula*) *turricula* (Brocchi, 1814) – Beets, p. 97 [= *Unedogemmula antwerpiensis* (Vincent, 1890)].

Material and dimensions – Maximum height 34.7 mm, width 11.2 mm. **VC**: NHMW 2020/0171/0344-0345 (2), NHMW 2020/0171/0346 (7). **CO**: NHMW 2020/0171/0347 (1), NHMW 2020/0171/0348 (2).

Description – Shell medium-sized, of medium thickness, fusiform, with regularly conical spire. Protoconch multispiral, tall, conical, of four convex whorls, with small nucleus, smooth except for last half whorls with comma-shaped axial riblets (dp = 785 μm, hp = 1070 μm, dp/hp = 0.73). Junction with teleoconch sharply delimited by sinusigera. Teleoconch of up to eight straight-sided whorls, separated by narrowly impressed, linear suture. Early whorls with two spirals cords, adapical placed just below suture, abapical placed between mid-whorl and abapical suture forming low placed shoulder, ramp between subsutural collar and shoulder weakly concave. Deeply comma-shaped axials, subobsolete, except at cords where they form small tubercles, slightly stronger at shoulder. Abapically two fine cords develop on subsutural ramp, one further cord below shoulder. Entire surface covered in fine, deeply comma-shaped axial growth lines, most evident over subsutural ramp. Last whorl about 64% of total height, with weakly concave subsutural ramp, weakly shouldered at smooth to finely tuberculose shoulder cord, convex below, strongly constricted at base; five further primary cords below shoulder with several even finer

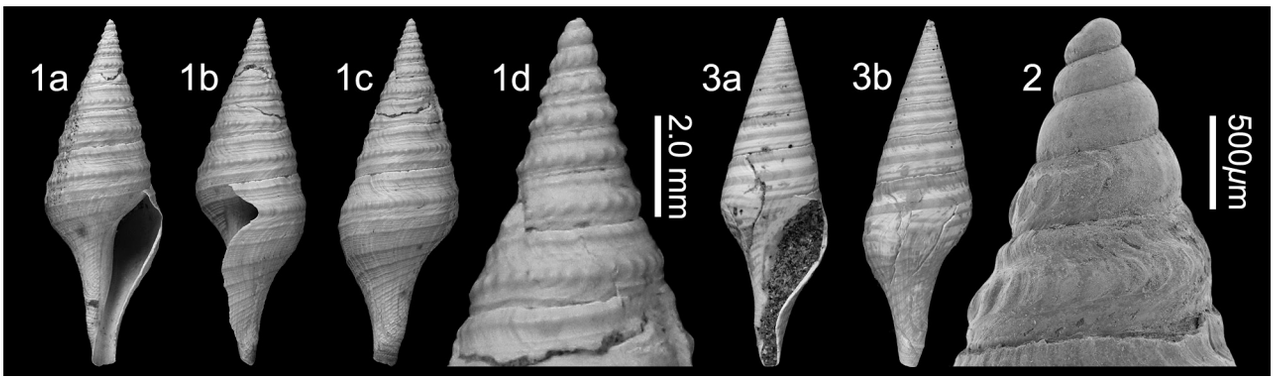

Plate 18. *Coronia contigua* (Brocchi, 1814); 1. NHMW 2020/0171/0344, height 24.7 mm, width 8.4 mm (digital image); 2. NHMW 2020/0171/0345, detail of protoconch (SEM image). Velerín carretera. 3. NHMW 2020/0171/0347, height 32.4 mm, width 9.7 mm (digital image). Velerín conglomerates, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

threads intercalated, siphonal fasciole with fine cords. Aperture about 49% of total height, elongate ovate, outer lip thin, not thickened by varix, sharp edged, smooth within; anal sinus broad, V-shaped, with apex at shoulder cord; siphonal canal very long, straight, not notched. Columella straight, smooth. Columellar and parietal callus, weakly thickened, sharply delimited, forming narrow, indented callus rim. Colour pattern almost always preserved of narrow, horizontal orange bands over cords.

Discussion – *Coronia contigua* (Brocchi, 1814) is quite variable in sculpture, the cords finely tuberculose (Pl. 18, fig. 1) to smooth (Pl. 18, fig. 3); these forms were named *Murex turricula* Brocchi, 1814, and *M. contiguus* Brocchi, 1814 respectively.
In Italian deposits this species shows a wide bathymetric distribution, from infralittoral to bathyal (Scarponi & Della Bella, 2003, p. 75). Similarly, in Estepona, where the species is uncommon, it is found on both shallow and deeper-water deposits. This species is replaced in the Pliocene North Sea Basin by *C. antwerpiensis* (Vincent, 1890) that differs primarily in its relatively taller spire, shorter last whorl and shorter siphonal canal.

Distribution – Upper Miocene: Atlantic, Aquitaine Basin, France (Peyrot, 1931), Cacela Basin, Portugal (Periera da Costa, 1867); Proto-Mediterranean, Italy (Bellardi, 1877; Montanaro, 1937; Venzo & Pelosio, 1963; Robba, 1968; Bernasconi & Robba, 1984; Ruggieri & Davoli, 1984; Davoli, 1990). Lower Pliocene: Atlantic, Guadalquivir Basin, S. Spain (González Delgado, 1993; Landau *et al*., 2011); western Mediterranean, NE Spain (Martinell, 1982; Gili & Martinell, 1993), France (Fontannes, 1879; Cossmann, 1896; Martinell & Domenèch, 1986); central Mediterranean, Italy (Pelosio, 1967; Bernasconi & Robba, 1984; Cavallo & Repetto, 1992; Chirli, 1997; Scarponi & Della Bella, 2003; Guioli, *et al*., 2009; Sosso & Dell'Angelo, 2010; Brunetti, 2014; Brunetti & Cresti, 2018). Upper Pliocene: Atlantic, Mondego Basin, Portugal (Silva, 2001); western Mediterranean, Estepona Basin, Spain (Vera-Peláez, 1996, 2002, 2022a), France (Chirli & Richard, 2008); central Mediterranean, Italy (Sacco, 1904; Cipolla, 1914; Glibert, 1954; Ruggieri & Curti, 1959; Caprotti & Vescovi, 1973; Malatesta, 1974; Caprotti, 1976; Scarponi & Della Bella, 2003). Lower Pleistocene: eastern Mediterranean, Rhodes Island (Chirli & Linse, 2011).

Genus *Gemmula* Weinkauff, 1875

Type species – *Pleurotoma gemmata* Hinds, 1843, by subsequent designation (Cossmann, 1896), present-day, Panamic Pacific.

1875 *Gemmula* Weinkauff, p. 287.
1931 *Eugemmula* Iredale, p. 226, 233. Type species (by monotypy): *Eugemmula hawleyi* Iredale, 1931, present-day, Queensland, Australia.

***Gemmula monile* (Brocchi, 1814)**
Plate 19, fig. 1

*1814 *Murex monile* Brocchi, p. 432, pl. 8, fig. 15.
1847 *Pleurotoma monilis* Brocchi – Bellardi, p. 49, pl. 2, fig. 2.
1877 *Pleurotoma monile* Brocch. – Bellardi, p. 25, pl. 1, fig. 15.
1877 *Pleurotoma monile* Brocch. var. B – Bellardi, p. 26, pl. 1, fig. 16.
1904 *Pleurotoma monile* var. *granocostata* Sacco, p. 41, pl. 11, figs 34, 35.
1904 *Pleurotoma monile* var. *denticulomarginata* Sacco, p. 41 (= var. B of Bellardi, 1877).
1937 *Pleurotoma monilis* var. *granocostata* Sacco – Montanaro, p. 145, pl. 6, fig. 44.
1955 *Turris* (*Turris*) (*Turris*) *monile* (Brocchi 1814) – Rossi Ronchetti, p. 322, fig. 173.
1967 *Gemmula* (*Gemmula*) *rotata monile* (Brocchi, 1814) – Robba, p. 663, pl. 55, figs 4-10, pl. 56, figs 1-8.
1978 *Murex monile* Brocchi, 1814 – Pinna & Spezia, p. 151, pl. 38, fig. 5.

1984 *Murex monile* Brocchi, 1814 – Bernasconi & Robba, p. 289, pl. 4, fig. 6.
1996 *Gemmula* (*Gemmula*) *monile* (Brocchi, 1814) – Vera-Peláez, p. 177, pl. 6, figs 1-6.
2002 *Gemmula* (*Gemmula*) *monile* (Brocchi, 1814) – Vera-Peláez, p. 182, pl. 1, fig. L.
2002 *Gemmula* (*Gemmula*) *granocostata* (Sacco, 1904) – Vera-Peláez, p. 183, pl. 1, fig. N.
2003 *Gemmula monile* (Brocchi, 1814) – Scarponi & Della Bella, p. 73, figs 108, 109, 116.
2010 *Gemmula monile* (Brocchi, 1814) – Sosso & Dell'Angelo, p. 45, unnumbered fig. p. 61 bottom row left.
2022a *Gemmula monile* (Brocchi, 1814) – Vera-Peláez, p. 127, pl. 1, figs 1-2.
2022a *Gemmula granulatocostata* (Sacco, 1904) – Vera-Peláez, p. 128, pl. 1, figs 3-6.

non 1854 *Pleurotoma monilis* Brocch. – Hörnes, p. 353, pl. 38, figs 14-16 [= *Gemmula badensis* (Hoernes, 1875)].

Material and dimensions – Height 25.5 mm, width 10.5 mm (incomplete). **CO**: NHMW 2020/0171/0367 (1).

Description – Shell medium sized, moderately slender fusiform, with tall, conical spire (apex and early whorls missing). Five teleoconch whorls preserved. Earliest whorl with finely beaded subsutural cord and more strongly beaded medial cord forming elevated carina, whorl smooth and concave between cords. On third preserved whorl single finer spiral cord appears just above abapical suture; on penultimate whorl one fine cord appears mid subsutural ramp, second above abapical suture; secondary spirals initially smooth, becoming finely beaded abapically. Last whorl with beaded subsutural cord, subsutural ramp moderately wide, concave, bearing single secondary cord, shoulder cord with 21 coarser beads, three well-developed, finely beaded cords below; base moderately constricted, siphonal canal relatively long and broad.

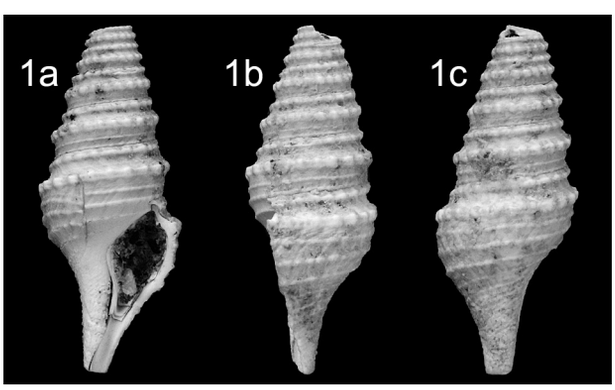

Plate 19. *Gemmula monile* (Brocchi, 1814); 1. NHMW 2020/0171/0367, height 25.5 mm, width 10.5 mm, (digital image). Velerín conglomerates, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

Discussion – Although historically placed in synonymy or as a subspecies of *Gemmula rotata* (Brocchi, 1814) (*e.g.*, Robba, 1967), it is are now considered separate a full species level (Bernasconi & Robba, 1984; Scarponi & Della Bella, 2003). *Gemmula monile* (Brocchi, 1814) differs from *G. rotata* in having a slenderer profile, with a comparatively higher spire, the carina is placed mid-whorl rather than closer to the abapical suture as in *G. rotata*, on the last whorl there are at least three well-developed spiral cords stronger than those on the fasciole, and the siphonal canal is shorter and broader. The apical whorls are missing in the material at hand from Estepona, but according to Bernasconi & Robba (1984, p. 289) the protoconch of *G. monile* is smaller than that of *G. rotata* and has stronger axial and spiral sculpture. *Pleurotoma monile* var. *granocostata* Sacco, 1904 was considered to fit within the range of variability for the species by Scarponi & Della Bella (2003, p. 73), a position followed herein. In Italy this species is found in lower circalittoral and upper bathyal deposits (Scarponi & Della Bella, 2003, p. 74). Our single specimen from Estepona and the specimen figured by Vera-Peláez are both from the shallower water deposits of Velerín conglomerates.

Distribution – Upper Miocene: Proto-Mediterranean, Italy (Bellardi, 1847; Montanaro, 1937; Bernasconi & Robba, 1984). Lower Pliocene: central Mediterranean (Bellardi, 1877; Sacco, 1904; Sosso & Dell'Angelo, 2010). Upper Pliocene: western Mediterranean, Estepona Basin, Spain (Vera-Peláez, 2002, 2022a).

***Gemmula rotata* (Brocchi, 1814)**
Plate 20, figs 1-2

*1814 *Murex rotatus* Brocchi, p. 434, pl. 9, fig. 11.
1854 *Pleurotoma rotata* Brocc. – Hörnes, p. 354, pl. 38, fig. 18.
1877 *Pleurotoma rotata* Brocch. Vars A, B, D – Bellardi (*partim*), p. 13, pl. 1, fig. 2-5.
1879 *Pleurotoma rotata* Brocchi – Fontannes, p. 40, pl. 4, fig. 5.
1896 *Pleurotoma rotata* Br. – Cossmann, p. 77, pl. 5, figs 14-16.
1904 *Pleurotoma rotata* var. *taurosuturata* Sacco, p. 40 (= var. A of Bellardi, 1877)
1904 *Pleurotoma rotata* var. *parvula* Sacco, p. 40 (= var. B of Bellardi, 1877)
1904 *Pleurotoma rotata* var. *dertobtusata* Sacco, p. 40 (= var. D of Bellardi, 1877)
1914 *Pleurotoma rotata* Brocchi – Cipolla, p. 114 [10], pl. 12 [1], fig. 1.
1937 *Pleurotoma rotata* Br. – Montanaro, p. 141 [111], pl. 6 [9], fig. 34.
1937 *Pleurotoma rotata* var. *parvula* Sacco – Montanaro, p. 142 [112], pl. 6 [9], fig. 35.
1937 *Pleurotoma rotata* var. *dertobtusata* Sacco – Montanaro, p. 142 [112], pl. 6 [9], fig. 36.
1955 *Turris* (*Turris*) (*Turris*) *rotata* (Brocchi 1814) – Rossi Ronchetti, p. 315, fig. 169.

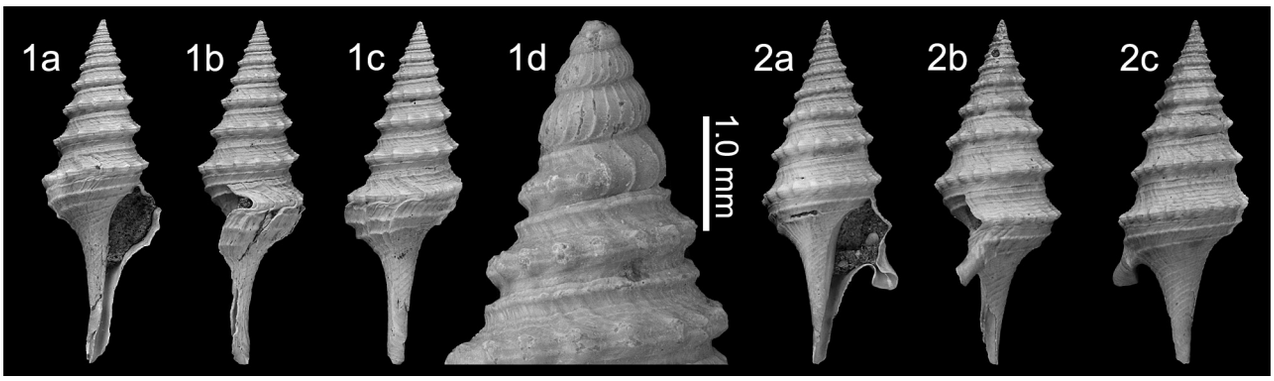

Plate 20. *Gemmula rotata* (Brocchi, 1814); 1. NHMW 2020/0171/0362, height 36.3 mm, width 11.6 mm, 1d, detail of protoconch; 2. NHMW 2020/0171/0363, height 29.6 mm, width 10.9 mm (digital images). Velerín carretera, Velerín, Estepona, Lower Piacenzian, Upper Pliocene.

1959 *Turris* (*s.s.*) *rotata* (Brocchi) – Ruggieri & Curti, p. 115, pl. 26, fig. 150 only [not fig. 151 = *G. dertocarinulata* (Sacco, 1904)]).
1963 *Turris* (*Turris*) *rotata* (Brocchi) – Venzo & Pelosio, p. 122, pl. 39, figs 6, 7.
1967 *Turris* (*Turris*) *rotata* (Brocchi) – Pelosio, p. 160 [60], pl. 45, figs 17-21.
1967 *Gemmula* (*Gemmula*) *rotata* (Brocchi, 1814) – Palla, p. 998, pl. 75, fig. 6.
1973 *Gemmula* (*Gemmula*) *rotata* (Brocchi) 1814 – Caprotti & Vescovi, p. 179, pl. 3, fig. 13.
1974 *Gemmula* (*Gemmula*) *rotata* (Brocchi, 1814) – Malatesta, p. 400, pl. 31, fig. 13.
1976 *Gemmula rotata* (Brocchi) – Caprotti, p. 48, pl. 17, fig. 13.
1978 *Murex rotatus* Brocchi, 1814 – Pinna & Spezia, p. 152, pl. 42, fig. 2.
1984 *Gemmula* (*Gemmula*) *rotata* (Brocchi, 1814) – Bernasconi & Robba, p. 287, pl. 4, figs 4, 5.
1986 *Gemmula* (*G.*) *rotata* (Brocchi) – Martinell & Domènech, p. 119, pl. 1, fig. 13.
1992 *Gemmula* (*Gemmula*) *rotata* (Brocchi, 1814) – Cavallo & Repetto, p. 130, fig. 341.
1996 *Gemmula* (*Gemmula*) *rotata* (Brocchi, 1814) – Vera-Peláez, p. 171, text-fig. 5a, pl. 5, figs 1-9.
1997 *Gemmula rotata* (Brocchi, 1814) – Chirli, p. 25, pl. 7, figs 5-7.
1998 *Turris* (*Turris*) *rotata* Brocchi [*sic*] – Schultz, p. 76, pl. 31, fig. 1.
2002 *Gemmula* (*Gemmula*) *rotata* (Brocchi, 1814) – Vera-Peláez, p. 182, pl. 1, figs J, K, pl. 9, figs G, H.
2003 *Gemmula rotata* (Brocchi, 1814) – Scarponi & Della Bella, p. 73, figs 110-112, 116.
2008 *Gemmula rotata* (Brocchi, 1814) – Chirli & Richard, p. 60, pl. 12, fig. 1.
2009 *Gemmula rotata* (Brocchi, 1814) – Zunino & Pavia, p. 359, pl. 2, fig. 6.
2010 *Gemmula rotata* (Brocchi, 1814) – Sosso & Dell'-Angelo, p. 45, unnumbered fig. p. 61 bottom row middle.
2018 *Gemmula rotata* (Brocchi, 1814) – Brunetti & Cresti, p. 90, fig. 358.
2022a *Gemmula rotata* (Brocchi, 1814) – Vera-Peláez, p. 127, pl. 1, figs 12-15.

non 1872 *Pleurotoma rotata* Broc. – Von Koenen, p. 217, pl. 2, fig. 9 [= *Gemmula zimmermanni* (Philippi, 1836)].
non 1877 *Pleurotoma rotata* Brocc. var. C – Bellardi (*partim*), p. 15 [= *Gemmula dertocarinulata* (Sacco, 1904)].

Material and dimensions – Height 39.5 mm, width 13.2 mm. **CO**: NHMW 2020/0171/0361 (13). **VC**: NHMW 2020/0171/0362-0363 (2), NHMW 2020/0171/0363 (15).

Description – Shell of medium size and thickness, pagodiform profile with tall, gradate spire. Protoconch multispiral, tall, conical, about five whorls with axial riblets on at least last three whorls (dp = 1130 μm, hp = 1550 μm, dp/hp = 0.72). Teleoconch of up to ten whorls, separated by superficial, linear suture. Spire whorls with narrow, elevated subsutural collar weakening abapically, deeply concave subsutural ramp delimited by shoulder carina placed at about one-third whorl height, bearing row of pointed tubercles, 14-17 on second whorl, 22-24 on penultimate whorl, whorl concave below to suture. Surface bearing fine, elevated spiral cords; one over subsutural collar, 5-6 over ramp, three over shoulder carina, one below. Last whorl about 62% of total height, with subsutural collar weak or subobsolete, ramp, strongly concave, shoulder carina broad bearing sharp tubercles, three sharp, narrow, elevated cords below shoulder, abapical delimiting base, further narrow, lower cords on base and siphonal fasciole, with single secondary intercalated. Aperture about 50% total height, small, ovate; outer lip simple; anal sinus deeply, symmetrically U-shaped, with apex on shoulder carina; siphonal fasciole long, straight, narrow, unnotched. Columella straight. Columellar callus weakly thickened, forming indented callus rim.

Discussion – As noted by many authors (Scarponi & Della Bella, 2003, p. 74, *inter alia*) the spire angle and number of more or less sharp tubercles is variable in this species.

Nevertheless, the synonymy with *G. monile* (Brocchi, 1814) suggested by several authors (Robba, 1967; Pelosio, 1967; Pavia, 1976) is not accepted, as *G. monile* can be reliably separated in having a narrower apical angle, the shoulder carina is placed higher, mid-whorl as opposed to in the lower third, the siphonal canal is shorter, the shoulder sculpture is weaker, with the shoulder nodules rounded and bifid rather than sharp, and the last whorl is shorter, with the three spiral cords placed mid-whorl below the shoulder more evident than in *G. rotata*. *Gemmula dertocarinulata* (Sacco, 1904) from the Upper Miocene and Pliocene central Mediterranean differs from *G. rotata* in having a scalate, but not pagodiform profile, the subsutural collar is more strongly developed and tubercular, and the tubercles on the shoulder carina are lower and deeply cut by spiral grooves making them bifid or trifid, resulting in a square rather than sharp shoulder carina.
Some of the specimens have a spoon-shaped expansion at the lower third of the outer lip (Pl. 19, fig. 2), sometimes known as a 'tertiary notch'. This is a feature of sexual dimorphism, being found in a well-developed form only in mature females of certain shell height. It is suggested that this notch is connected with reproduction (Kantor & Sysoev, 1991).
In Estepona *G. rotata* is found in both the shallow and deep-water assemblages, which agrees with the circalittoral, and upper bathyal ecological distribution given by Scarponi & Della Bella (2003, p. 74).

Distribution – Middle Miocene: Paratethys, Austria (Hörnes, 1854; Schultz, 1998); Proto-Mediterranean, Italy (Bellardi, 1877; Bernasconi & Robba, 1984; Zunino & Pavia, 2009). Upper Miocene: Proto-Mediterranean, Italy (Bellardi, 1877; Montanaro, 1937; Venzo & Pelosio, 1963; Robba, 1968; Bernasconi & Robba, 1984). Lower Pliocene: western Mediterranean, NE Spain (Gili & Martinell, 1993), France (Fontannes, 1879; Cossmann, 1896; Martinell & Domènech, 1986); central Mediterranean, Italy (Bellardi, 1877; Pelosio, 1967; Bernasconi & Robba, 1984; Cavallo & Repetto, 1992; Chirli, 1997; Scarponi & Della Bella, 2003; Sosso & Dell'Angelo, 2010; Brunetti & Cresti, 2018). Upper Pliocene: western Mediterranean, Estepona Basin, Spain (Vera-Peláez, 1996, 2002, 2022a), France (Chirli & Richard, 2008); central Mediterranean, Italy (Cipolla, 1914; Ruggieri & Curti, 1959; Caprotti & Vescovi, 1973; Malatesta, 1974; Caprotti, 1976; Bernasconi & Robba, 1984; Scarponi & Della Bella, 2003). Lower Pleistocene: central Mediterranean, Italy (Scarponi & Della Bella, 2003).

Discussion

In this paper twenty-one species are reviewed (Fig. 1). The Borsoniidae and Pseudomelatomidae were revised by Landau & Harzhauser (2022b). One species is added herein to the Borsoniidae that was omitted in that work, and six to the Pseudomelatomidae. Within the Pseudomelatomidae, *Kantoria* nov. gen. is described for a small group of well-known Mediterranean Pliocene species including *Pleurotoma lamarckii* Michelotti, 1847 and *P. coquandi* Bellardi, 1847 that have been ascribed to a variety of genera in the past, with authors always expressing some hesitation. One new species is described from the Estepona assemblages: *K. castoris* nov. sp. Six species are included in the Drilliidae, two in the Fusiturridae, two in the Horaiclavidae, and three to the Turridae.
A full synthesis of the Estepona assemblages will be prepared at the end of the series.

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References

Aartsen, J.J. van, Menkhorst, H.P.M.G. & Gittenberger, E. 1984. The marine Mollusca of the Bay of Algeciras, Spain, with general notes on *Mitrella*, Marginellidae and Turridae. *Basteria* Suppl. 2: 1-135.

Abdelkrim, J., Aznar-Cormano, L., Fedosov, A., Kantor, Y., Lozouet, P., Phuong, M., Zaharias, P. & Puillandre, N. 2018. Exon-capture based phylogeny and diversification of the venomous gastropods (Neogastropoda, Conoidea). *Molecular Biology and Evolution* 35(10): 2355-2374.

Adams, H. & Adams, A. 1853-1858. *The genera of recent Mollusca; arranged according to their organization*. London (John van Voorst), 1:1-256, pls 1-32, 1853; 257-484, 1854; 2:1-284, pls 33-96, 1855; 285-412, pls 97-112, 1856; 413-540, pls 113-128, 1857; 541-660, pls 129-138, 1858.

Almera, J. & Bofill, A. 1898. Moluscos fósiles recogidos en los terrenos pliocenos de Cataluña. Descripciones y figuras de las nuevas formas y enumeración de todas las encontradas en dichos yacimientos. *Boletín de la Comisión del Mapa Geológico de España* (2)4: i-xii, 1-223, pls 1-14, 1 map.

Ardovini, R. & Cossignani, T. 1999. *Atlante delle Conchiglie di Profundità del Mediterraneo*. L'Informatore Piceno, Ancona, Italy: 111 pp.

Atanacković, M.A. 1969. Paleontoloska i biostratigrafska analiza tortonske faune severouistocnog Potkozarja (Okolina sela Turjaka i Miljevica). *Acta Geologica Zagreb* 6: 149-222.

Bałuk, W. 2003. Middle Miocene (Badenian) gastropods from Korytnica, Poland, 4. Turridae. *Acta Geologica Polonica* 53: 29-78.

Bartsch, P. & Rehder, H.A. 1939. New turritid mollusks from Florida. *Proceedings of the United States National Museum* 87(3070): 127-138, pl. 17.

Beets, C. 1946. The Pliocene and Lower Pleistocene gastropods

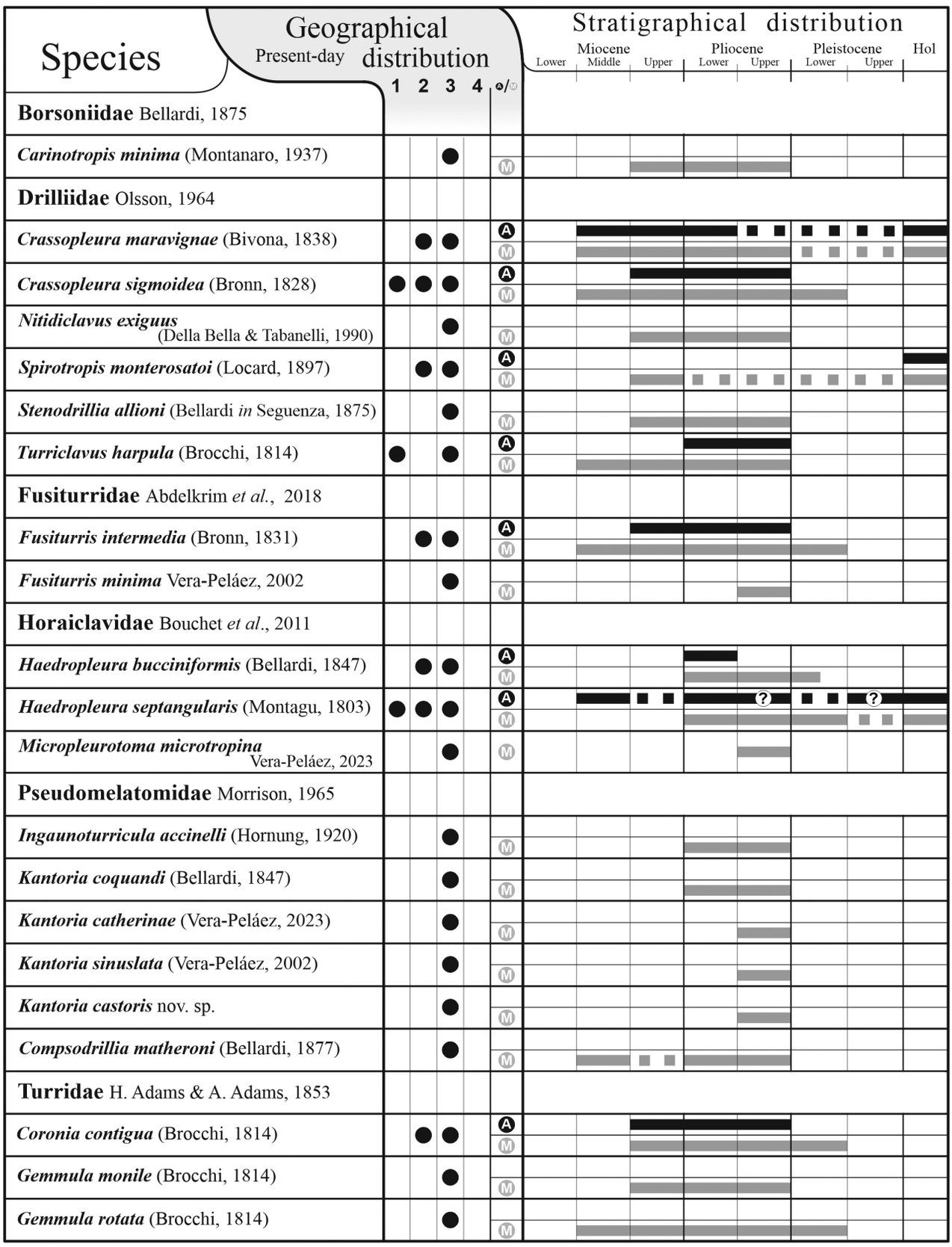

Figure 1. Geography, stratigraphy and distribution of species found in the Upper Pliocene Lower Piacenzian of the Estepona Basin, southern Spain. For Pliocene-recent geographic distribution designated by biogeographical province: 1 = Boreal-Celtic Province, 2 = French-Iberian Province, 3 = Mediterranean-Moroccan Province, 4 = Mauritanian-Senegalese Province (see Landau *et al*., 2011, p. 49, text-fig. 8). For stratigraphic distribution black signifies Atlantic distribution (A), grey Mediterranean distribution (M).

in the collections of the Geological Foundation in The Netherlands (with some remarks on other Dutch collections). *Mededeelingen van de Geologische Stichting* (C-IV-I)6: 1-166.

Bellardi, L. 1839. [Lettre relative à des fossiles récemment découverts en Piémont]. *Bulletin de la Société Géologique de France* 10: 30-31.

Bellardi, L. 1847. Monografia delle pleurotome fossili del Piemonte. *Memorie della Reale Accademia delle Scienze di Torino* (2)9: 531-650 [R. Janssen, 1993, stated that the journal issue was published in 1848, but that a separate was distributed in 1847; the title and pagination for the separate are: *Monografia delle pleurotome fossili del Piemonte*. Torino: 119 pp.].

Bellardi, L. 1875. Novae pleurotomidarum Pedimonti et Liguriae fossilium: dispositionis prodromus. *Bullettino della Società Malacologica Italiana* 1: 16-24.

Bellardi, L. 1877. I molluschi dei terreni terziarii del Piemonte e della Liguria, 2. Gasteropoda (Pleurotomidae). *Memorie della Reale Accademia delle Scienze di Torino* (2)29 (1878): 1-264 (reprint 264 pp.) (June 30, 1877).

Bellardi, L. & Michelotti, G. 1840. *Saggio orittographico sulla classe dei gasteropodi fossili dei terreni terziarii del Piemonte*. 82 pp., 8 pls. Also published in 1841 as: *Memorie della Reale Accademia delle Scienze di Torino* ser. 2, 3: 93-174, pls 2-9.

Bernasconi, M.P. & Robba, E. 1984. The Pliocene Turridae from western Liguria, 1. Clavinae, Turrinae, Turriculinae, Crassispirinae, Borsoniinae, Clathurellinae. *Bollettino Museo Regionale di Scienze Naturali di Torino* 2: 257-358.

Bivona, And., 1838. Generi e specie di molluschi descritti dal Barone Antonio Bivona e Bernardi. Lavori postumi pubblicati dal figlio Andrea dottore in medicina con note ed aggiunte. *Giornale di Scienze Lettere e Arti per la Sicilia* 61: 211-227 [stated date march 1838] 63: 319-324 [stated date September 1838] [also as reprint, 16 pp, 1 pl., tipografia del Giornale Letterario, Palermo].

Bogi, C., Coppini, M. & Margelli, A. 1979. Molluscan fauna of the central Tyrrhenian Sea. Family Turridae (first part). *La Conchiglia* 11(124/125): 6-8.

Bombace, G. 1970. *Notizie sulla malacofauna e sulla ittiofauna del coralligeno di falesia*. Quaderni di Ricerca e Sperimentazione. Unioncamare di Sicilia, Pezzino, Palermo: 77 pp.

Bouchet, P., Kantor, Y.I., Sysoev, A. & Puillandre, N. 2011. A new operational classification of the Conoidea (Gastropoda). *Journal of Molluscan Studies* 77(3): 273-308.

Bouchet, P. & Warén, A. 1980. Revision of the North-East Atlantic bathyal and abyssal Turridae (Mollusca: Gastropoda). *Journal of Molluscan Studies* Suppl. 8: 1-119.

Brébion, P. 1964. Les gastéropodes du Redonien et leur signification, 1-2. Thèse de doctorat ès-Sciences. Paris (Faculté des Sciences de l'Université de Paris: 775 pp., 15 pls (27 June 1964, unpublished).

Brocchi, G. 1814. *Conchiologia fossile subapennina, con osservazioni geologiche sugli Apennini e sul suolo adiacente*, 1-2. Milano (Stamperia Reale): 1-240 (1); 241-712 (2), 16 pls.

Bronn, H.G. 1828 [1827]. Verzeichniss der bei dem Heidelberger Mineralien-Komptoir verkäuflichen Konchylien, -Pflanzenthier- und andern Versteinerungen. *Zeitschrift für Mineralogie* 21(11-12): 529-544.

Bronn, H.G. 1831. *Italiens Tertiär-Gebilde und deren organische Einschlüsse.* Heidelberg (Karl Groos): xii + 176 pp. (part of: Bronn, H.G. 1831. Ergebnisse meiner naturhistorisch-ökonomischen Reisen. Heidelberg & Leipzig, 2 vols).

Brugnone, G.A. 1862. *Memoria sopra alcuni pleurotomi fossili dei dintorni di Palermo*. Palermo (F. Lao): 41 pp, 1 pl.

Brunetti, M.M., 2014. *Conchiglie fossili di Monte Antico.* Tipografia Sestante, Campi Bisenzio, Firenze: 118 pp.

Brunetti, M.M. & Cresti, M. 2018. *I fossili di Orciano Pisano* [The fossils of Orciano Pisano]. *Atlante iconografico* [An Iconographic Atlas]. Palermo (Edizioni Danaus): 232 pp.

Bucquoy, F., Dautzenberg, P. & Dollfus, G. 1882-1886. *Les mollusques marins du Rousillon*, 1. *Gastropodes, avec atlas de 66 planches photographées d'apres nature*. Paris (J.B. Baillière & Dautzenberg): 1-84 (1882), 85-196 (1883), 197-342 (1884), 343-418 (1885), 419-570 (1886).

Cachia, C., Mifsud, C. & Sammut, P.M. 2001. *The Marine Mollusca of the Maltese Islands Part Three Sub-Class Prosobranchia to Sub-Class Pulmonata, Order Basommatophora.* Backhuys Publishers, Leiden, 266 pp.

Calcara, P. 1839. *Ricerche Malacologiche*. Palermo (G. Pedone): 16 pp.

Calcara, P. 1841. *Memoria sopra alcune conchiglie fossili rinvenute nella contrada di Altavilla*. Palermo (Stamp d'Antonio Muratori): 86 pp.

Calcara, P. 1845. Description de quelques nouvelles espèces de coquilles fossiles et vivantes de la Sicile, avec l'addition de cinq nouvelles espèces de Polypiers. *Revue Zoologique, par la Société Cuvierienne* 8: 280-282.

Caprotti, E. 1976. Malacofauna dello stratotipo piacenziano (Pliocene de Castell'Arquato). *Conchiglie* 12: 1-56.

Caprotti, E. & Vescovi, M. 1973. Neogastropoda ed Euthyneura dello stratotipo piacenziano (Castell'Arquato, Piacenza). *Natura, Atti della Società Italiana di Scienze Naturali e del Museo Civico di Storia Naturale di Milano* 64: 156-193.

Casey, T.L. 1904. Notes on the Pleurotomidae with descriptions of some new genera and species. *Transactions of the Academy of Science of St. Louis* 14: 123-170.

Cavallo, O. & Repetto, G. 1992. Conchiglie fossili del Roero. Atlante iconografico. *Associazione Naturalistica Piemontese Memorie* (Associazione Amici del Museo 'Federico Eusebio') 2: 1-251.

Cerulli-Irelli, S. 1910. Fauna malacologica mariana, 4. (Dentaliidae), Stenogyridae, Gadiniidae, Actaeonidae, Tornatinidae, Scaphandridae, Bullidae, Ringiculidae, Philinidae, Umbrellidae, Conidae, Pleurotomidae. *Paleontographia Italica* 16: 215-262.

Ceulemans, L., Van Dingenen, F. & Landau, B.M. 2018. The lower Pliocene gastropods of Le Pigeon Blanc (northwest France). Part 5 - Neogastropoda (Conoidea) and Heterobranchia (*fine*). *Cainozoic Research* 18: 85-172.

Chirli, C. 1988. *Malacofauna pliocenica di Poggibonsi, Cava delle Piaggiole*. Poggibonsi (Lalli Ed.): 89 pp.

Chirli, C. 1997. *Malacofauna Pliocenica Toscana* 1. *Superfamiglia Conoidea.* Firenze (C. Chirli): 129 pp.

Chirli, C. & Linse, U. 2011. *The Pleistocene marine Gastropods of Rhodes Island (Greece).* Firenze (C. Chirli): 448 pp., 90 pls.

Chirli, C. & Richard, C. 2008. *Les mollusques plaisanciens de la Côte d'Azur.* Tavarnelle (C. Chirli): 128 pp.

Cipolla, F. 1914. Le pleurotomidi del Pliocene di Altavilla (Palermo). *Palaeontographia Italica* 20: 105-181.

Cleevely, R.J. 1974. The Sowerbys, the Mineral Conchology, and their fossil collections. *Journal of the Society for the Bibliography of Natural History* 6: 418-481.

Coen, G. 1929. Gen. *Pleurotoma* Lamarck 1799 nov. sub. gen. *Tyrrhenoturris* (con una tavola). *Atti della Societa Italiana di Scienze Naturali e del Museo Civico di Storia Naturale in Milano* 68(3-4): 297.

Conrad, T.A. 1832-1835. *Fossil shells of the Tertiary formations of North America, illustrated by figures drawn on stone from nature*. Philadelphia (Judah Dobson, W.P. Gibbons): viii + 56 pp., 18 pls [published in parts, see Moore (1963) for a list of the parts and publication dates].

Cossmann, M. 1896. *Essais de paléoconchologie comparée. Deuxième livraison*. Paris (The author and Société d'Éditions Scientifiques): 180 pp., 8 pls.

Cossmann, M. & Peyrot, A. 1909-1935 (after 1924 continued by A. Peyrot). Conchologie néogénique de l'Aquitaine. *Actes de la Société Linnéenne de Bordeaux* 63: 73-293 (1909); 64: 235-400 (1910), 401-445 (1911); 65: 51-98 (1911). 99-333 (1912); 66: 121-232 (1912), 233-324 (1913); 68: 5-210, 361-435 (1914); 69: 157-365 (1917); 70: 5-180 (1918), 181-491 (1919) 73: 5-321 (1922); 74: 257-342 (1923); 75: 71-318 (1924); 77: 51-256 (1925); 78: 199-256 (1926); 79: 5-263 (1928); 82: 73-126 (1931); 83: 5-116 (1931); 84: 5-288 (1933); 85: 5-71 (1933); 86: 257-353 (1935).

Also published as a 6 volume book with different pagination as Édition in-8°, *Extrait des Actes de la Société Linnéenne de Bordeaux ('Ouvrages couronnés par l'Académie des Sciences, Arts et Belles-Lettres de Bordeaux'*) 1: 1-220 (1909); 221-428 (1911); 429-718 (1912); 2: 1-204 (1913); 205-496 (1914); 3: 1-384 (1917); 385-695 (1919); 4: 1-322 (1922); 323-610 (1924); 5: 1-206 (1927); 207-465 (1928); 6: 1-294 (1931); 295-541 (1932).

Cristofori, J. De & Jan, G. 1832. *Catalogus in IV sectiones divisus rerum naturalium in Museo Exstantium Josephi de Christofori et Georgio Jan Plurinum Acad. Scient. et Societ. Nat. Cur. Sodalium ecc. Sectio II. Pars I. Conchylia fossilia ex formatione telluris tertiaria in collectione nostra exstantia*. Parma (Carmignani): 16 pp.

Csepreghy-Meznerics, I. 1953. Mittelmiozäne Pleurotomen aus Ungarn. *Annales Historico-Naturales Musei Nationalis Hungaraci* (s.n.) 4: 5-22.

Csepreghy-Meznerics, I. 1972. La faune tortonienne-inferieure des gisements tufiques de la Montagne de Bükk: Gastropodes, 2. *Az Egri Múzeum Évkonyve* (*Annales Musei Agriensis*) 8-9 (1970-1971): 26-46.

Dall, W.H. 1919. Descriptions of new species of mollusks of the family Turritidae from the west coast of America and adjacent regions. *Proceedings of the United States National Museum* 56 (2288): 1-86, pls 1-24.

D'Ancona, C. 1872. Malacologia pliocenica Italiana descrita ed illustrata. *Memoria del Reale Comitato Geologico d'Italia* 2: 173-264, 8 pls.

Davoli, F. 1990. La collezione di 'Fossili Miocenici di Sogliano' di Ludovico Foresti: Revisione ed illustrazione. *Atti della Societa dei Naturalisti e Matematici di Modena* 121: 27-109.

Defrance, M.J.L. 1816-1830. *In:* Cuvier, F. (ed.). *Dictionnaire des sciences naturelles, dans lequel on traite méthodiquement des différens êtres de la nature, considérés soit en eux-mêmes, d'après l'état actuel de nos connoissances, soit relativement à l'utilité qu'en peuvent retirer la médecine, l'agriculture, le commerce et les arts. Suivi d'une biographie des plus célèbres naturalistes. Ouvrage destine aux médecins, aux agriculteurs, aux commerçans, aux artistes, aux manufacturiers, et à tous ceux qui ont intérêt à connoître les productions de la nature, leurs caractères génériques et spécifiques, leur lieu natal, leurs proprieties et leurs usages*, Strasbourg (F.G. Levrault) & Paris (Le Normant): 60 pp., 12 unnumbered volumes of plates.

Della Bella, G. & Scarponi, D. 2007. *Molluschi marini del Plio-Pleistocene dell'Emilia-Romagna e della Toscana. Superfamiglia Conoidea*. *Vol. 2-Conidae 1*. Ancona (Museo Geologico Giovanni Capellini): 93 pp.

Della Bella, G. & Tabanelli, C. 1990. Turridae (Gastropoda, Neogastropoda): annotazioni e proposte di sistematica per alcune specie fossili. *Bollettino Malacologico* 25: 265-272.

Deshayes, G.P. 1824-1837. *Description des coquilles fossiles des environs de Paris*. Paris, published by the author. Vol 1 (Bivalvia): pp. 1-80, pls 1-11 [1824], 81-170, pls 12-29 [1825], 171-238, pls 30-36 [1829], 239-322, pls 37-46 [1830], 323-392 [1832]; vol. 2: pp. 1-80, pls 1-8 [1824], 81-146, pls 9-17 [1825], 147-290, pls 18-40 [1832], 291-426, pls 41-61 [1833], 427-498, pls 62-78 [1834], 499-780, pls 79-106 [1835], 781-814 [1837].

Desmoulins, C. 1842. Révision de quelques espèces de pleurotomes. *Actes de la Société Linnéenne de Bordeaux* 12: 109-181.

Dubois de Montpereux, F. 1831. *Conchyliologie fossile et aperçu géognostique des formations du plateau Wolhyni-Podolien*. Berlin (Schropp and Companie): 76 pp.

Dujardin, F. 1837. Mémoire sur les couches du sol en Touraine et description des coquilles de la craie et des faluns. *Mémoire de la Société Géologique de la France* 2: 211- 311.

Eremija, M.I. 1971. Paleontoloski privaz faune iz drugomediteranskih naslaga severozapadno od doboja. *Bulletin du Muséum d'Histoire Naturelle Belgrade* série A, 26: 1-49, 15 pls.

Ferrero Mortara, E.L., Montefameglio, L., Pavia, G. & Tampieri, R. 1981. Catalogo dei tipi e degli esemplari figurati della collezione Bellardi e Sacco, 1. *Museo Regionale di Scienze Naturali di Torino, Cataloghi* 6: 1-327.

Finlay, H.J. 1926. New shells from New Zealand Tertiary beds: Part 2. *Transactions of the New Zealand Institute* 56: 227-258, pls 55-60.

Fontannes, F. 1879-1880. *Les invertébrés du bassin tertiaire du Sud-Est de la France. Les mollusques pliocènes de la Vallée du Rhône et du Roussillon*, 1. *Gastéropodes des formations marines et saumatres.* Paris (Georg, Lyon & F. Savy): viii + 276 pp., 12 pls (pp. 1-76 published in 1879, remainder in 1880).

Foresti, L. 1876. Cenni geologici e paleontologici sul Pliocene antico di Castrocaro. *Memoire della Accademia delle Scienze dell'Instuto di Bologna* serie 3, 6: 1-56, 1 pl.

Forli, M. & Dell'Angelo, B. 1995. Segnalazione di gasteropodi poco frequenti per il Pliocene toscano. *Notiziario CISMA* 17: 15-19.

Fretter, V. & Graham, A. 1984. The Prosobranch Molluscs of

Britain and Denmark. Part 8 - Neogastropoda. *Journal of Molluscan Studies* Suppl. 15: 435-556.

Friedberg, W. 1911-28. *Mięczaki mioceńskie ziem Polskich (Mollusca Miocaenica Poloniae)*, 1. *Ślimaki i łódkonogi*, 1. *Gastropoda et Scaphopoda*. Lwow (Muzeum Imienia Dzieduszyckich): 631 pp. (issued in parts: 1, 1-112, pls 1-5 (1911); 2, 113-240, pls 6-14 (1912); 3, 241-360, pls 15-20 (1914); 4, 361-440, pls 21-26 (1923); 5, 441-631, pls 27-38 (1928). Reprinted 1951-55 with slightly different title and pagination, Warszawa (Wydawnictwa Geologiczne).

Gili, C. & Martinell, J. 1993. Paleobiogeography of turrid gastropods in the Pliocene of Catalonia. *Acta Geologica Polonica* 38: 349-358.

Glibert, M. 1954. Pleurotomes du Miocène de la Belgique et du Bassin de la Loire. *Mémoires de l'Institut Royal des Sciences Naturelles de Belgique* 129: 1-75.

Gofas, S., Salas, C., Rueda, J.L., Canoura, J., Farias, C. & Gil, J. 2014. Mollusca from a species-rich deep-water *Leptometra* community in the Alboran Sea. *Scientia Marina* 78(4): 537-553.

González Delgado, J.A. 1993. Estudio sistemático de los gasterópodos del Plioceno de Huelva (SW de España), 5. Neogastropoda (Volutacea, Connacea [*sic*]). *Studia Geologica Salmanticensia* 28: 7-69.

Graham, A. 1988. Molluscs: prosobranch and pyramidellid gastropods. In Kermack, D.M. & Barnes, R.S.K. (Eds.) *Synopsis of the British Fauna* (New Series). No. 2 (Second Edition). E.J. Brill/Dr. W. Backhuys for the Linnean Society of London and the Estuarine and Brackish-Water Sciences Association, Leiden, New York, København and Köln, pp. vii + 652.

Grateloup, J.P.S. de 1828-35. Tableau des coquilles fossils qu'on rencontre dans les terrains calcaire tertiaires (faluns) des environs de Dax, dans le Département des Landes, 1-12. *Bulletins d'Histoire Naturelle de la Société Linnéenne de Bordeaux* 2(9): 72-109 (1828a) (1); 2(10): 123-158 (1828b) (2); 2(10): 192-204 (1828c) (3). *Actes de la Société Linnéenne de Bordeaux* 5(27): 192-204 (1832a) (4); 5(29): 263-282 (1832b) (5); 5(30): 314-344 (1832c) (6); 6(32): 31-48 (1833a) (7); 6(33): 90-100 (1833b) (8); 6(34): 159-164 (1833c) (9); 6(35): 188-212 (1834a) (10); 6(37): 270-320 (1834b) (11); 7(39): 101-114 (1835) (12).

Grateloup, J.P.S. de 1845-1847. *Conchyliologie fossile des terrains tertiaires du Bassin de l'Adour (environs de Dax),* 1. *Univalves. Atlas.* Bordeaux (Th. Lafargue): pls. 1-45 (1840); i-xx, 12 pp.; pls. 46-48 (1846). [Note: For dates of the plates we follow Lesport *et al*. (2012). All plates published 1845, except plates 2, 4, 11 (1847).]

Gray, J.E. 1834. Alphabetical list of the figures of Mollusca. *In*: Griffith, E. & Pidgeon, E. (Eds.) *The Animal Kingdom Arranged in Conformity with its Organization by the Baron Cuvier with Additional Descriptions of all the Species Hitherto Named and Many not Before Noticed. The Mollusca and Radiata. Vol. 12*. Whittaker, and Co., London, pp. 595-601.

Gray, J.E. 1847. On the classification of the British Mollusca by W E Leach. *Annals and Magazine of Natural History* (1) 20: 267-273.

Greco, A. 1970. La malacofauna pliocenica di contrada Cerausi presso Serradifalco (Caltanissetta). *Geologica Romana* 9: 275-314.

Gregorio, A. de 1890. Monographie de la faune éocènique de l'Alabama. *Annales de Géologie et de Paléontologie* 7, 8. 1-316, pls 4-46.

Guioli, S, Repetto, G. & Gabba, F. 2009. Fossili marini del Pliocene di Volpedo (Piemonte, Italia). Collezioni del civico Museo di Scienze naturali di Voghera e del civico Museo archeologico di Casteggio e dell'Oltrepo Pavese. *Rivista Piemontese di Storia Naturale* 30: 3-24.

Harmer, F.W. 1914-1925. The Pliocene Mollusca of Great Britain, being supplementary to S.V. Wood's monograph of the Crag Mollusca, 1. *Monographs of the Palaeontographical Society*, 1(1): 1-200 (1914); 1(2): 201-302 (1915), 1(3): 303-461 (1918), 1(4): 463-483 (1919), 2(1): 485-652 (1920), 2(2): 653-704 (1921), 2(3): 705-856 (1923), 2(4): 857-900 (1925).

Hinds, R.B. 1843. On new species of *Pleurotoma*, *Clavatula*, and *Mangelia*. *Proceedings of the Zoological Society of London* 11: 36-46.

Hörnes, M. 1851-1870. Die fossilen Mollusken des Tertiär-Beckens von Wien. *Abhandlungen der Kaiserlich-Königlichen Geologischen Reichsanstalt*, 3-4: 1-42, pl. 1-5 (1851), 43-208, pl. 6-20 (1852), 209-296, pl. 21-32 (1853), 297-382, pl. 33-40 (1854), 383-460, pl. 41-45 (1855), 461-736, pl. 46-52 (1856) (3); 1-479, pls 1-85 (1870) (4).

Hoernes, R. 1875. Die Fauna des Schliers von Ottnang. *Jahrbuch der kaiserlich-königlichen geologischen Reichsanstalt* 25(4): 333-431.

Hoernes, R. & Auinger, M. 1879-91. Die Gasteropoden der Meeres-Ablagerungen der ersten und zweiten Miocänen Mediterran-Stufe in der Österreichisch-Ungarischen Monarchie. *Abhandlungen der Kaiserlich-Königlichen Geologischen Reichsanstalt*, 12: 1-382, 50 pls. Published in parts: 1-52, pls 1-6 (1879); 53-112, pls 7-12 (1880); 113-152, pls 13-16 (1882); 153-192, pls 17-22 (1884); 193-232, pls 23-28 (1885); 233-282, pls 29-36 (1890); 283-330, pls 37-42 (1891); 331-382, pls 43-50 (1891).

Hornung, A. 1920. Gastéropodes fossiles du Rio Torsero (Cériale). Pliocène inférieur de la Ligurie. *Annali del Museo Civico di Storia Naturale Giacomo Doria* 49 [ser. 3, 9]: 70-92, pl. 2.

International Commission on Zoological Nomenclature (ICZN) 1999. *International Code of Zoological Nomenclature. Fourth Edition*. London (International Trust for Zoological Nomenclature): xxix + 306 pp.

Iredale, T. 1931. Australian molluscan notes. Nº I. *Records of the Australian Museum* 18: 201-235.

Janssen, A.W. 2004. Holoplanktonic molluscan assemblages (Gastropoda, Heteropoda, Thecosomata) from the Pliocene of Estepona (Spain, Malaga). *Palaeontos* 5: 103-131.

Janssen, R. 1993. Taxonomy, evolution and spreading of the turrid genus *Spirotropis* (Gastropoda: Turridae). *In*: Janssen, A.W., & Janssen, R. (eds). Proceedings of the Symposium Molluscan Palaeontology, 11th International Malacological Congress, Siena, Italy, 30th August-5th September 1992. *Scripta Geologica* Special Issue 2: 237-261.

Janssen, R. & Wienrich, G. 2007. Turridae. *In*: G. Wienrich (ed.), *Die Fauna des marinen Miozäns von Kevelaer (Niederrhein). Vol. 4, Gastropoda*. 71 pp. Backhuys Publishers BV, Leiden.

Kantor, Y.I. & Sysoev, A.V. 1991. Sexual dimorphism in the

apertural notch of a new species of *Gemmula* (Gastropoda: Turridae). *Journal of Molluscan Studies* 57: 205-209).

Kautsky, F. 1925. Das Miocän von Hemmoor und Basbeck-Osten. *Abhandlungen der Preussischen Geologischen Landesanstalt* 97: 1-225.

Kiener, L.C. 1839-1842. Spécies général et iconographie des coquilles vivantes. Vol. 5. Famille des Canalifères. Première partie. Genres Cérite (*Cerithium*), Adanson, pp. 1-104, pl. 1-32 [pp. 1-32 (1841), 33-104 (1842); pl. 1-32 (1841)]; Pleurotome (*Pleurotoma*), Lamarck, pp. 1-84, pl. 1-27 [pp. 1-16 (1839), 17-84 (1840), pl. 1-27 (1839)]; Fuseau (*Fusus*), Lamarck, pp. 1-62, pl. 1-30, 17bis [pp. 1-62 (1840); pl. 2-7, 12, 15-17, 17bis, 22-23, 25 (1839); pl. 1, 8-11, 13-14, 18-21, 24, 26-30: (1840)]. Paris, Rousseau & J.B. Baillière.

Kilburn, R.N. 1986. Turridae (Mollusca: Gastropoda) of southern Africa and Mozambique. Part 3. Subfamily Borsoniinae. *Annals of the Natal Museum* 27: 633-720.

Kobelt, W. 1887-1908. Iconographie der schalentragenden europäischen Meeresconchylien. 1: 1-171 pl. 1-28 [1887]. Part 2: 1-16 pl. 29-32 [1888] 17-40 pl. 33-38 [1889] 41-104 pl. 39-50 [1900] 105-139 pl. 51-58 [1901]. Part 3: 1-24 pl. 59-62 [1902] 25-200 pl. 63-78 [1903] 201-272 pl. 79-84, 86-87 [1904] 273-406 [1905]. Part 4: 1-80 pl. 99-114 [1906] 81-172 pl. 115-126 [1908].

Koenen, A. von 1872. Das Miozän Nord-Deutschlands und seine Mollusken-Fauna, 1. Einleitung und Palaeontologische Beschreibung der Syphonostomen Gastropoden. *Schriften der Gesellschaft zur Beförderung der Gesammten Naturwissenschaften zu Marburg* 10: 139-262.

Kojumdgieva, E.M. & Strachimirov, B. 1960. *Les fossiles de Bulgarie, 7. Tortonien*. Sofia (Académie des Sciences de Bulgarie): 317 pp.

Korobkov, I.A. 1955. *Spravochnik i Metodicheskoe Rukovdstvo po Tretichnym Molljuskam Plastinichatozhabernye. Gastropod.* Gosudarstvennii Nauchno-Teknicheskii Issledovanie Nefti, Gorno-toplivnoi Literatury, Brjukhonogie, Leningrad, 795 pp. [I also examined a French translation published by Bureau de Recherches Gélogiques et Minières, Service d'Information Géologique, Paris.].

Kovács, Z. & Vicián, Z. 2021. Middle Miocene Conoidea (Neogastropoda) assemblage of Letkés (Hungary), Part II. (Borsoniidae, Cochlespiridae, Clavatulidae, Turridae, Fusiturridae). *Földtani Közlöny* 151(2): 137-158.

Küster, H.C. & Kobelt, W. 1844-1876. Die geschwäntzen unbewehrten Purpurschnecken. Erste Hälfte: *Turbinella* und *Fasciolaria*. In Abbildungen nach der Natur mit Beschreibungen. Mollusca Gasteropoda: Purpuracea: Purpurschnecken; Dritte Abtheilung. *Systematisches Conchylien-Cabinet von Martini und Chemnitz*, ed.2, 3(3[1]): 1-164, pls. 1-31, 9a, 9b, 13b, 14[a], 41, 42. Published in parts: pp. 1-40, pls 1-6, 11, [41-42?] [1844; author Küster]; pls 7, 9, 10, 14 [1845; author Küster]; pls 13-13b [1855; author Küster]; pp. 41-64, pls 9a, 9b, 12, 14[a], 15, 16 [1873; author Kobelt]; pp. 65-88, pls 8, 17-21 [1874; author Kobelt]; pp. 89-120, pls 22, 26, 28 [1875; author Kobelt]; pp. 121-164, pls 27, 29, 30-32 [1876; author Kobelt].

Landau, B.M. & Harzhauser, M. 2022a. The Pliocene Gastropoda (Mollusca) of Estepona, southern Spain. Part 14: Clavatulidae. *Cainozoic Research* 22: 45-72

Landau, B.M. & Harzhauser, M. 2022b. The Pliocene Gastropoda (Mollusca) of Estepona, southern Spain. Part 15: Borsoniidae, Clathurellidae, Mitromorphidae, Pseudomelatomidae. *Cainozoic Research* 22: 103-156.

Landau, B.M. & Harzhauser, M. 2023. On the date of publication of Pliocénica 6-7. *Cainozoic Research* 23: 3-4

Landau, B.M. & Harzhauser, M. & Giannuzzi-Savelli, R. 2022. The Pliocene Gastropoda (Mollusca) of Estepona, southern Spain. Part 16: Raphitomidae. *Cainozoic Research* 22: 157-240.

Landau, B.M., Harzhauser, M., İslamoğlu, Y. & Silva, C.M. da 2013. Systematics and palaeobiogeography of the gastropods of the middle Miocene (Serravallian) Karaman Basin, Turkey. *Cainozoic Research* 11-13: 3-584.

Landau, B.M., Marquet, R. & Grigis, M. 2003. The early Pliocene Gastropoda (Mollusca) of Estepona, southern Spain. Part 1: Vetigastropoda. *Palaeontos* 3: 1-87, pls 1-19.

Landau, B.M. & Micali, P. 2021. The Pliocene Gastropoda (Mollusca) of Estepona, southern Spain. Part 13: Murchisonelloidea and Pyramidelloidea. *Cainozoic Research* 21: 159-351.

Landau, B., Silva, C.M. da & Mayoral, E. 2011. The lower Pliocene gastropods of the Huelva Sands Formation, Guadalquivir Basin, southwestern Spain. *Palaeofocus* 4: 1-90.

Landau, B.M., Van Dingenen, F. & Ceulemans, L. 2020. The upper Miocene gastropods of northwestern France, 5. Conoidea. *Cainozoic Research* 20: 3-107.

Leach, W.A. 1947 see Gray, J.E. 1847.

Lesport, J.F., Cluzaud, A. & Verhecken, A. 2012. Les publications du Docteur Jean-Pierre Sylvestre de Grateloup sur les mollusques fossiles du Bassin d'Aquitaine (S.-O. France): dates de parutions et commentaires. *Bulletin de la Societé Linéenne de Bordeaux* (n.s.) 40: 417-485.

Linné, C. 1767. *Systema naturae per regna tria naturae: secundum classes, ordines, genera, species, cum characteribus, differentiis, synonymis, locis. Ed. 12. 1., Regnum Animale.* 1 & 2. Holmiae [Stockholm], Laurentii Salvii. pp. 1-532 [1766] pp. 533-1327 [1767].

Locard, A. 1897-1898. Expéditions scientifiques du Travailleur et du Talisman pendant les années 1880, 1881, 1882 et 1883. *Mollusques testacés. Paris, Masson.* vol. 1 [1897]: 1-516, pls 1-22; vol. 2 [1898]: 1-515, pls 1-18.

Lozouet, P. 2017. Les Conoidea de l'Oligocène supérieur (Chattien) du bassin de l'Adour (Sud-Ouest de la France). *Cossmanniana* 19: 3-180.

Lozouet, P., Lesport, J.F. & Renard, P. 2001. Révision des Gastropoda (Mollusca) du stratotype de l'Aquitanien (Miocène inf.): site de Saucats 'Lariey', Gironde, France. *Cossmanniana* (hors série 3): 189 pp.

MacNeil, F.S. 1961 [1960]. Tertiary and Quarternary Gastropoda of Okinawa. *United States Geological Survey Professional Paper* 339: iv + 148 pp., 21 pls. [Dated 1960; published 17 March 1961].

Malatesta, A. 1974. Malacofauna pliocenica Umbra. *Memorie per Servire alla Carta Geologica d'Italia* 13: 1-498.

Marquet, R. 1998a. The Pliocene turrid gastropods of Belgium, 2. Conidae (genera *Asthenotoma, Comarmondia, Cytharella, Mangelia, Lusitanops, Raphitoma* and *Philbertia*). *Bulletin de l'Institut Royal des Sciences Naturelles de Belgique, Sciences de la Terre* 68: 263-287.

Marquet, R. 1998b. *De Pliocene gastropodenfauna van Kallo*

(Oost-Vlaanderen, België). Antwerpen (Belgische Vereniging voor Paleontologie v.z.w.): 1-246.

Martinell, J. 1982. Estudio de los Conacea (Neogastropoda, Gastropoda) del Plioceno de l'Empordà (Catalunya). Descriptiva y sistemàtica. *Iberus* 2: 95-119.

Martinell, J. & Domènech, R. 1986. Malacofauna du Pliocène marin de Saint-Isidore (Bassin du Var, Alpes-maritimes). *Geobios* 19: 117-121.

Mayer, C. 1858. Description de coquilles fossiles des étages supérieurs des terrains tertiaires (suite) (1). *Journal de Conchyliologie* 7: 73-89, pls 3-4.

McLean, J.H. 1971. A revised classification of the family Turridae, with the proposal of new subfamilies, genera, and subgenera from the eastern Pacific. *The Veliger* 14(1): 114-130.

Micali, P. 2010. Nota sul genere *Haedropleura* B.D.D., 1883 nel Mediterraneo. *Malacologia Mostra Mondiale* 67: 3-5.

Michelotti, G. 1847. Description des fossiles des terrains miocènes de l'Italie septentrionale. *Natuurkundige Verhandelingen van de Hollandsche Maatschappij der Wetenschappen te Haarlem* (2)3: 408 pp. Also as: Ouvrage publié par la société Hollandaise des Sciences, et accompagné d'un atlas de 17 planches. Leiden (A. Arns & Compie): 408 pp.

Millet de la Turtaudière, P.A. 1854. *Paléontologie de Maine-et-Loire*. Angers (Cosnier et Lachèse): 187 pp.

Millet de la Turtaudière, P.A. 1865. *Indicateur du Maine-et-Loire ou indications par commune de ce que chacune d'elles renferme*, 2. Angers (Cosnier et Lachèse): 616 pp.

Monegatti, P. & Raffi, S. 2001. Taxonomic diversity and stratigraphic distribution of Mediterranean Pliocene bivalves. *Palaeogeography Palaeoclimatology Palaeoecology* 165: 171-193.

Montagu, G. 1803. *Testacea Britannica, or natural history of British shells, marine, land and the fresh-water, including the most minute: systematically arranged and embellished with figures*. London (Romsey): xxxvii + 606 pp.

Montanaro, E. 1937. Studi monografici sulla malacologia Miocenica Modenese, 1. I molluschi Tortoniani di Montegibbio. *Palaeontographia Italica* 37 (nuova serie 5): 115-191.

Monterosato, T.A. di 1884. *Nomenclatura generica e specifica di alcune conchiglie mediterranee.* Palermo (Virzi): 152 pp.

Moore, E.J. 1963. Miocene mollusks from the Astoria Formation in Oregon. *United States Geological Survey Professional Paper* 419: 1-109, 33 pls.

Morrison, J.P.E. 1965. On the families of Turridae. *The American Malacological Union, Annual Reports for 1965*: 1-2.

Nordsieck, F. 1977. *The Turridae of the European seas*. Roma (Ed. la Piramide): 131 pp.

Nyst, P.H. 1878. Conchyliologie des terrains tertiaires de la Belgique, 1 Terrain Pliocène Scaldisien. *Annales du Musée Royal d'Histoire Naturelle de Belgique, série Paléontologique*, 3: atlas, 28 pls.

Nyst, P.H. 1882. Conchyliologie des terrains tertiaires de la Belgique, 1. Terrain Pliocène Scaldisien. *Annales du Musée Royal d'Histoire Naturelle de Belgique, série Paléontologique* 3: text, 1-263.

Olsson, A.A. 1964. *Neogene Mollusks from northwestern Ecuador*. New York (Paleontological Research Institution, Ithaca): 256 pp.

Omalius d' Halloy, J.B.J. d' 1862. *Albrégé de Géologie*, 7th edition. F.J. Leiner, Paris, 626 pp. [This edition contains lists of fossils by Nyst; the list contains names only and all are *nomina nuda*].

Orbigny, A. d' 1852. *Prodrome de paléontologie stratigraphique universelle des animaux mollusques et rayonnés, faisant suite au cours élémentaire de paléontologie et de géologie stratigraphique*, 3. Paris (Victor Masson): 1-196, index 1-189.

Orlando, V.E. & Palazzi, F. 1985. Malacofauna del Golfo di Castellamare (Sicilia). *Il Naturalista Siciliano* serie 4, 9: 29-77.

Palla, P. 1967. Gasteropodi pliocenici della Bassa Val d'Elsa (Toscana Occidentale). *Rivista Italiana di Paleontologia e Stratigrafia* 73: 931-1020.

Pantanelli, D. 1889. Pleurotomidi del Miocene superiore di Montegibbio. *Bullettino della Società Malacologica Italiana* 14: 82-98.

Pavia, G. 1976. I molluschi del Pliocene inferiore di Monteu Roero (Alba, Italia NW). *Bollettino della Società Paleontologica Italiana* 14: 99-175.

Pelosio, G. 1967. La malacofauna dello stratotipo del Tabianiano (Pliocene inferiore) de Tabiano Bagni (Parma). *Bollettino della Società Paleontologica Italiana* 5: 101-183.

Pereira da Costa, F.A. 1866-1867. Molluscos fosseis. Gasteropodes dos depositos terciarios de Portugal. *Memória Commissão Geologica de Portugal* 4(1): 1-116 (1866); (2): 117-252 (1867).

Peyrot, 1931 – *In*: Cossmann & Peyrot (1909-1935).

Peyrot, A. 1938. Les mollusques testacés univalves des depots Helvétiens du Bassin Ligérien. Catalogue critique, descriptive et illustré. *Actes de la Société Linnéenne de Bordeaux* 89: 5-361.

Philippi, R.A. 1836. *Enumeratio Molluscorum Siciliae cum Viventium tum in Tellure Tertiaria Fossilium quae in Itinere suo Observavit Auctor*. Berolini, Berlin, xiv + 268 pp., 12 pls.

Philippi, R.A. 1844. *Enumeratio molluscorum Siciliae cum viventium tum in tellure tertiaria fossilium, quae in itinere suo observavit. Vol. 2*. Halle [Halis Saxorum]: Eduard Anton. iv + 303 pp., pls 13-28.

Pereira da Costa, F.A. 1866-1867. Molluscos fosseis. Gasteropodes dos depositos terciarios de Portugal. *Memória Commissão Geologica de Portugal* 4(1): 1-116 (1866); (2): 117-252 (1867).

Pinna, G. 1971. I tipi delle specie di Gasteropodi terziari istituite da Guiseppe De Cristofori e Giorgo Jan nel 1832 conservate nelle collezioni del Museo Civico di Storia Naturale di Milano. *Atti della Società Italiana di Scienze Naturali Museo Civico di Storia Naturale di Milano* 112(4): 421-446.

Pinna, G. & Spezia, L. 1978. Catalogo dei tipi del Museo Civico di Storia Naturale di Milano, 5. I tipi dei Gasteropodi fossili. *Atti della Società Italiana di Scienze naturali Museo Civico di Storia naturale* 119: 125-180.

Powell, A.W.B. 1942. The New Zealand Recent and fossil Mollusca of the family Turridae with general notes on turrid nomenclature and systematics. *Bulletin of the Auckland Institute and Museum* 2: 1-188.

Powell, A.W.B. 1966. The molluscan families Speightiidae and Turridae. An evaluation of the valid taxa both Recent and fossil, with lists of characteristic species. *Bulletin of the Auckland Institute and Museum* 5: 1-184.

Raffi, S. & Monegatti, P. 1993. Bivalve taxonomic diversity throughout the Italian Pliocene as a tool for climatic-oceanographic and stratigraphic inferences. *Ciências da Terra* 12, 45-50.

Robba, E. 1967. Studio biometrico di "*Gemmula* (*Gemmula*) *rotata* (Brocchi". *Rivista Italiana di Paleontologia e Stratigrafia* 73: 637-676.

Robba, E. 1968. I molluschi del Molluschi del Tortoniano-tipo (Piemonte). *Rivista Italiana di Paleontologia e Stratigrafia* 74: 457-646.

Rossi-Ronchetti, C. 1955. I tipi della 'Conchiologia Fossile Subapennina' di G. Brocchi, 2. Gastropodi, Scafopodi. *Rivista Italiana di Paleontologia e Stratigrafia, Memorie* 5: 91-343.

Ruggieri, G. & Curti, G. 1959. La malacofauna pliocenica di Altavilla (Palermo), 2. *Atti dell'Academia di Scienze Lettere e Arti di Palermo* 18: 99-129.

Ruggieri, G. & Davoli, F. 1984. Malacofauna di Casa Nova Calisese (Sogliano, Forli). *Palaeontographia Italica* 73 (ns 43): 41-85.

Sabelli, B. & Spada, G. 1977. Guia illustrata all'identificazione delle conchiglie del Mediterraneo. *Conchiglie* Suppl. 13: 2pp.

Sacco, F. 1904. I molluschi dei terreni terziari del Piemonte e della Liguria, 30. Aggiunte e correzioni (con 1400 figure). Considerazioni generali. Indice generale dell'opera. Torino (C. Clausen): 203 + xxxvi pp., 31 pls.

Sars, G.O. 1878. *Bidrag til Kundskaben om Norges arktiske Fauna. I. Mollusca Regionis Arcticae Norvegiae*. Oversigt over de i Norges arktiske Region Forekommende Bløddyr. Brøgger, Christiania. xiii + 466 pp., pls 1-34 & I-XVIII.

Scacchi, A. 1835. Notizie intorno alle conchiglie ed a' zoofiti fossili che si trovano nelle vicinanze di Gravina in Puglia. *Annali Civili del Regno delle Due Sicilie* 6: 75-84; 7: 5-18, 2 pl.

Scarponi, D. & Della Bella, G. 2003. *Molluschi marini del Plio-Pleistocene dell'Emilia-Romagna e della Toscana. Conoidea*, 1. *Drilliidae e Turridae*. Bologna (Museo Geologico Giovanni Capellini): 96 pp.

Scarponi, D. & Della Bella, G. & Ceregato, A. 2011. The genus *Haedropleura* (Neogastropoda, Toxoglossa = Conoidea) in the Plio-Quaternary of the Mediterranean basin. *Zootaxa* 2796: 37-55.

Schultz, O. 1998. *Tertiärfossilien Österreichs, Wirbellose, niedere Wirbeltiere und marine Säugetiere; schöne, interessante, häufige und wichtige Makrofossilien aus den Beständen des Naturhistorischen Museums Wien und Privatsammlungen; eine Bilddokumentation*. Wien (Golschneck-Verlag): 159 pp.

Schumacher, C.F. 1817. *Essai d'un nouveau système des habitations des vers testacés*. Copenhagen (Schultz): 287 pp.

Seguenza, G. 1875. Studii stratigrafici sulla formazione pliocenica dell'Italia meridionale (*partim*). *Bullettino del Reale Comitato Geologico d'Italia* (1875), 18-31 (1-2); 82-89 (3-4); 145-153 (5-6); 204-211 (7-8); 276-283 (9-10); 340-345 (11-12).

Seguenza, G. 1880. Le formazioni terziarie nella provincia di Reggio (Calabria). *Memorie della Classe di Scienze Fisiche Matematiche e Naturali della Regia Accademia del Lincei* 3(6):1-445.

Silva, C.M. da 2001. Gastrópodes pliocénicos marinhos de Portugal: sistemática, paleoecologia, paleobiologia, paleogeografia. Dissertação de doutoramento. Lisboa (Faculdade de Ciências da Universidade de Lisboa): 747 pp. (unpublished).

Sismonda, E. 1842 *Synopsis Methododica Animalium Invertebratorum Pedemontii Fossilium*. Augustae Taurinorum, Torino, 44 pp.

Sosso, M. & Dell'Angelo, B. 2010. *I fossili del Rio Torsero*. Prato (Editing Marginalia, Cartotectonica Beusi srl): 95 pp.

Sosso, M., Dell'Angelo, B. & Tavano, M.L. 2018. I tipi della collezione Hornung depositati nel Museo Civico di Storia Naturale "G. Doria" di Genova (Mollusca, Gastropoda). *Annali del Museo Civico di Storia Naturale "G. Doria"* 111: 325-356.

Sowerby, G.B.I. 1833-1834. Characters of new species of shells from the collection formed by Mr. Cuming on the western coast of South America and among the islands of the South Pacific Ocean. *Proceedings of the Zoological Society of London* 1833: 16-22, 34-38 [17 May]; 52-56 [24 May]; 70-74 [20 September]; 82–85 [8 September]; 134-139. [16 April 1834].

Sowerby, J. 1812-1845, continued by J. de C. Sowerby. *The mineral conchology of Great Britain; or coloured figures and descriptions of those remains of testaceous animals or shells, which have been preserved at various times and depths in the earth*. London (Sowerby), 1-7 (for authorship, collation and dates of parts see Cleevely, 1974, and *Bulletin of Zoological Nomenclature* 1987, 44: 64-67).

Stancu, I. & Andreescu, E. 1968. Fauna tortoniana din regiunea Rugi-Delinesti (Bazinul Caransebesului). *Studii şi cercetări de Geologie, Geofizică, Geografie, Seria Geologie* 13: 455-471.

Strausz, L. 1954. Várpalotai Felsó-Mediterrán Csigák (Les gastropods du Mediterranéen Supérieur (Tortonien) de Varpalota). *Geologica Hungarica* 25: 1-150.

Strausz, L. 1962. *Magyarországi Miozén-Mediterrán Csigák Határozója*. Budapest (Akadémiai Kiadó): 370 pp.

Strausz, L. 1966. *Die Miozän-Mediterranen Gastropoden Ungarns*. Budapest (Akadémiai Kiadó): 692 pp.

Swainson, W. 1840. *A treatise on malacology or shells and shell-fish*. London (Longman): viii + 419 pp.

Thiele, J. 1925. Gastropoden der Deutschen Tiefsee-Expedition. II Teil. *Wissenschaftliche Ergebnisse der Deutschen Tiefsee-Expedition auf dem Dampfer "Valdivia" 1898-1899* 17(2): 35-382, pls 13-46 [reprints paginated 1–348, pls 1–34].

Thiele, J. 1929-1935. *Handbuch der systematischen Weichtierkunde*, 1-2. Jena (Fischer); 1(1): 1-376 (1929); 1(2): 377-778 (1931); 2(3): 779-1022 (1934); 2(4) 1023-1154 (1935).

Tucker, J.K. 2004. Catalog of Recent and fossil turrids (Mollusca: Gastropoda). *Zootaxa* 682: 1-1295.

Venzo, S. & Pelosio, G. 1963. La malacofauna Tortoniana del Colle di Vigoleno (Preappenino Piacentino). *Palaeontographia Italica* 58: 43-213.

Vera-Peláez, J.L. 1996 [1997?]. *Turridae (Mollusca, Gastropoda) del Plioceno malacitano*. Tesis doctoral (2 vols). Departamento de Ecología y Geología. Facultad de Ciencias. Universidad de Málaga: 864 pp, 39 figs, 59 pls (unpubished) [work dated in text by Vera-Peláez, J.L. 2002 variably as 1996 or 1997, but in references as 1996. Copy of thesis available dated 1996 on front page. The figure numbers quoted under each species do not match the figure captions].

Vera-Peláez, J.L. 2002. Revisión de la familia Turridae, excepto Clavatulinae (Gastropoda, Prosobranchia) en el Plioceno de las cuencas de Málaga y Vélez Málaga (Málaga, S España) con la descripción de 26 especies nuevas. *Pliocénica, Publicaciones del Museo Municipal Paleontológico de Estepona* 2: 176-262.

Vera-Peláez, J.L. 2022a. Revisión de las familias Turridae y Fusiturridae (Neogastropoda, Conoidea) en las cuencas pliocénicas de Andalucía. *Pliocénica* 6-7: 122-138 [publication date 31st December 2022 not 20th May 2022].

Vera-Peláez, J.L. 2022b. Las familias Pseudomalatomidae [*sic*] y Pseudotomidae Bellardi, 1847 (Pseudomelatomoidea, Caenogastropoda) en el Plioceno de Málaga (España). *Pliocénica* 6-7: 139-158 [publication date 31st December 2022 not 20th May 2022].

Vera-Peláez, J.L. 2022c. Revisión de Crassispiridae Morrison, 1966 (Pseudomelatomoidea) y Drillidae (Turrina, Caenogastropoda) en el Neógeno de España con la propuesta de ocho nuevas especies. *Pliocénica* 6-7: 159-194 [publication date 31st December 2022 not 20th May 2022].

Vera-Peláez, J.L. 2022d. Las familia Borsoniidae (Conoidea, Gastropoda) en el Neógeno del sur de la Península Ibérica con la propuesta de seis nuevas especies. *Pliocénica* 6-7: 249-278 [publication date 31st December 2022 not 20th May 2022].

Vincent, É. 1890. Observations sur des fossiles recueillis à Anvers. *Annales de la Société Royale Malacologique de Belgique* 25: XCIII-XCVIII.

Warén A. 1975. *Spirotropis sarsi*, new name for *Spirotropis carinata* Sars, 1878 (Gastropoda: Prosobranchia). *Sarsia* 59: 49-52.

Weinkauff, H.C. 1875. Ueber eine kritische Gruppe des Genus *Pleurotoma* Lam. sensu stricto. *Jahrbücher der Deutschen Malakozoologischen Gesellschaft* 2: 285-292, pl. 9.

Wenz, W. 1938-1944. Gastropoda. Teil 1: Allgemeiner Teil und Prosobranchia. xii + 1639 pp. In: Schindewolf, O.H. (Ed.) *Handbuch der Paläozoologie*, Band 6. Bornträger, Berlin. Lief. 1, 1-240 [March 1938]; 3, 241-480 [October 1938]; 4, 481-720 [July 1939]; 6, 721-960 [August 1940]; 7, 961-1200 [October 1941]; 8, 1201-1506 [October 1943]; 9, 1507-1639, i-xii [November 1944].

Wood, S.V. 1848. A Monograph of the Crag Mollusca, or, descriptions of shells from the middle and upper tertiaries of the east of England. Part 1. Univalves. *Monograph of the Palaeontographical Society of London* 1: xii + 1-208, 21 pls.

Wood, S.V. 1882. Third supplement to the Monograph of the Crag Mollusca, comprising testacea from the upper tertiaries of the east of England. Univalves and bivalves. *Monograph of the Palaeontographical Society of London* 36, 1-24, 1 pl.

Woodring, W.P. 1928. *Miocene mollusks from Bowden, Jamaica*, 2. *Gastropods and discussion of results*. Washington (Carnegie Institution of Washington, DC): 564 pp.

Zunino, M. & Pavia, G. 2009. Lower to Middle Miocene mollusc assemblages from the Torino hills (NW Italy): synthesis of new data and chronostratigraphical arrangement. *Rivista Italiana di Paleontologia e Stratigrafia* 115: 349- 370.