

Additions to the gastropod fauna of the Pliocene of Estepona, southwestern Spain, 1. Two new vetigastropod records

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Zeidora ligustica Bellardi, 1878, and *Bogia labronica* (Bogi, 1984) are added to the list of gastropods known from the Pliocene of the Estepona Basin. Both are extremely uncommon and rarely cited in the literature. For *Z. ligustica* this is the first record outside Italy; for *B. labronica* this is the first fossil record.

Key words: Fissurellidae, Lepetellidae, *Zeidora*, *Bogia*, Estepona, Spain, Pliocene.

in part, in a series of monographs by the senior author and co-authors, and published in the journal "Palaeontos", e.g. Landau et al., 2003). The Vetigastropoda were described and illustrated by Landau et al. (2003), but inevitably, with further collecting new records appear. In this paper we discuss two species, viz. *Zeidora ligustica* Bellardi, 1878, and *Bogia labronica* (Bogi, 1984). Both species are extremely uncommon in the Estepona assemblages. *Zeidora ligustica* is rarely reported in the fossil literature, and this is the first record outside Italy. This is the first fossil record for *Bogia labronica*.

INTRODUCTION

The Pliocene Estepona assemblages of south-western Spain are probably the most diverse molluscan Pliocene assemblages in Europe, with over 800 gastropod species present (BL, personal observation). This fauna has been dealt with,

MATERIAL AND METHODS

The material described herein was collected from the sandy lens (SA of Landau et al., 2003: text-fig. 1) and represents a very near shore intertidal habitat, with numerous small species in a good state of preservation. This assemblage was dated as early Piacenzian by Guerra Merchán et al. (2002).

The material is housed in the Naturhistorisches Museum Wien, Vienna, Austria and in the personal collection of Andre Jansen, Bovenkarspel, The Netherlands.

Abbreviations: NHMW, Naturhistorisches Museum Wien, Vienna, Austria; EsVeSA, Estepona Velerín Sandy lens (Andre Jansen collection); SA, sandy lens, Velerín, Estepona. Our classification follows Bouchet et al. (2005).

SYSTEMATIC PALAEOLOGY

Clade Vetigastropoda

Superfamily Fissurelloidea Fleming, 1822

Family Fissurellidae Fleming, 1822

Subfamily Emarginulinae Children, 1834

Tribe Emarginulini Children, 1834 (= Zeidoridae Naef, 1913)

Genus *Zeidora* A. Adams, 1860

Zeidora A. Adams, 1860: 301. Type species, by monotypy: *Zeidora calceolina* A. Adams, 1860. Recent, Korea Strait.

Crepiemarginula Seguenza, 1880: 273. Type species, by monotypy: *Crepiemarginula reticulata* Seguenza, 1880 (= *Zeidora seguenzae* Watson, 1883, not A. Adams). Pliocene, Italy.

Legrandia Beddome, 1883:169. Type species, by original designation: *Legrandia tasmanica* Beddome, 1883. Recent, Tasmania. Not *Legrandia* Hanley, 1872, nomen nudum.

Zeidora ligustica Bellardi, 1878 (Figs 1-11)

Zeidora ligustica Bellardi, 1878: 876, fig. 14 (Piacenzian Zinola? Zanclean Zinola?).

Crepiemarginula reticulata Seguenza, 1880: 273. Not A. Adams, 1860.

Zeidora seguenzae Watson, 1883: 28. Nomen novum for *Crepiemarginula reticulata* Seguenza, 1880, not A. Adams, 1860.

Zeidora ligustica Bell. – Sacco, 1896: 18, figs 44, 45 (Piacenzian Zinola? Zanclean Zinola?).

Material. — Maximum diameter 8.0 mm. EsVeSA (4), NHMW 2014/0423/0001 (1), all SA.

Discussion. — *Zeidora ligustica* Bellardi, 1878, was originally described from the classic Italian outcrop of Zinola, Savona. The age of this deposit is late Zanclean to early Pia-

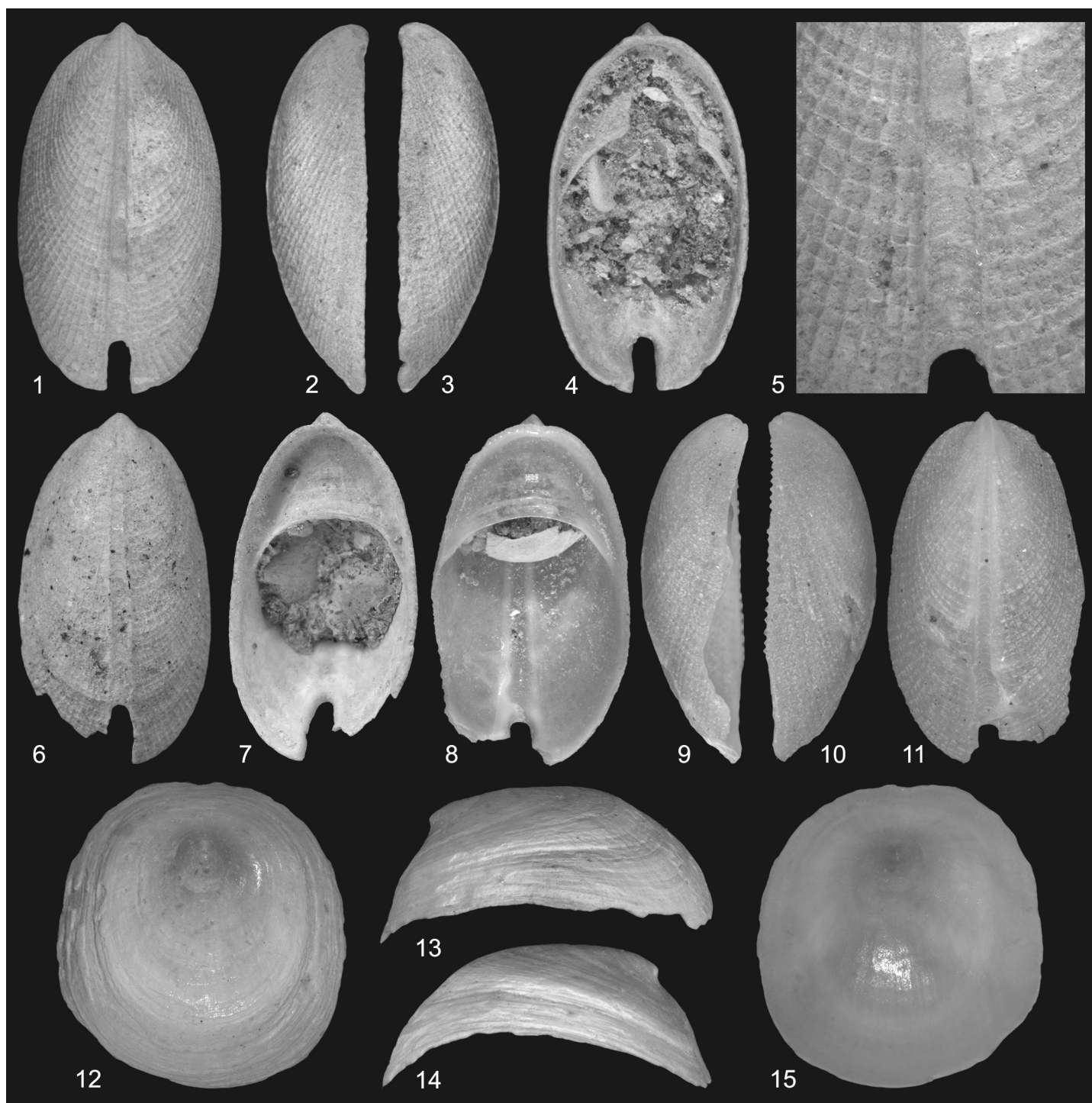
cenizian (Bernasconi & Robba, 1984; Bernasconi, 1989). The species is characterised by its small, very elongate emarginulid shell. The dorsum bears a finely reticulate sculpture, the anal slit is of moderate depth and the selenizone wide, crossed by curved incremental growth scars. The beak-like apex extends past the posterior margin, but does not curl around it. The shelf is relatively broad, its edge horizontal in the mid-section, bearing a horseshoe-shaped scar, deeper on the left. We have not found any other record for this species outside Italy, nor have we found any fossil record after Sacco (1896).

In the Recent Atlantic the genus is represented by *Z. naufraga* Watson, 1883, which seems to be an amphiatlantic species. The type is from the northwest of Culebra Island, near Puerto Rico, Caribbean (Watson, 1883), and it is recorded from the Azores by Pérez Fanfarte (1947) and the Atlantic coast of Portugal and the Mediterranean by Gianuzzi-Savelli et al. (1994).

Watson (1883) pointed out that Seguenza's name *Crepiemarginula reticulata* was a junior homonym of A. Adams, 1860, and renamed the Italian fossil species *Zeidora seguenzae*. According to Watson (1883) Seguenza's fossil specimen differed from *Z. naufraga* in that "the fossil specimen is much higher in front, much lower behind, where it is also much broader and rounder, with a less pinched-in apex; it is more widely ribbed, the scores on the scar are wider apart and coarser. Internally the edge is more coarsely crimped, and the septum is very much larger, being much more prolonged forward, and is horizontal instead of oblique; the old cleft-scar, too, is not raised on a projecting ridge, and does not form any internal furrow" (Watson, 1883: 28).

With more specimens of both the fossil and the Recent species at hand, these differences need to be re-evaluated.

Figs 1-11. *Zeidora ligustica* Bellardi, 1878. **1-5**, EsVeSA1, maximum diameter 8.0 mm, width 4.6 mm; **6-7**, NHMW 2014/0423/0001, maximum diameter 7.2 mm, width 3.9 mm; **8-11**, EsVeSA2, height 5.9 mm, width 3.2 mm. **Figs 12-15.** *Bogia labronica* (Bogi, 1984), EsVeSA 10, maximum diameter 3.4 mm, width 3.1 mm. All, Velerín sands, Estepona, early Piacenzian, early Upper Pliocene. (all photos, except 6, 7, Ronald Pouwer; 6-7 Bernard Landau).



The oblique shelf in the extant *Z. naufraga* is clearly illustrated by Fasulo & Sorbi (1977: pl. 1, bottom left), but it is more horizontal in the specimen illustrated by Giannuzzi-Savelli et al. (1994: fig. 88, bottom), similar to the fossil specimens. The depth of the fissure is somewhat variable; in the specimen illustrated by Giannuzzi-Savelli et al. (1994: fig. 88, bottom) it is relatively shallow, whereas in the shell illustrated by Fasulo & Sorbi (1977: pl. 1, top right) it is deeper, like in the fossil specimens. Both species have a finely reticulated sculpture, with any differences being minor. Of all the differences mentioned by Watson, the most consistent one is the narrower apex in *Z. naufraga*, which curls around the posterior margin, whereas in *Z. ligustica* the posterior portion is broader and the apex extends past the posterior margin, but does not curl around it (see Figs 2, 3, 9, 10, and Watson, 1883: pl. 4 fig. 3).

The genus has a long history in Europe. The earliest record is for *Zeidora gruelli* R. Janssen, 1984, from the Lower Oligocene Rupelian of Germany. This species differs from both *Z. ligustica* and *Z. naufraga* in having a broader shell, whereas its base is more regularly oval, the shelf is horizontal, as in *Z. ligustica*, but narrower, and the apical beak extends only very slightly past the posterior margin and does not curl, as in *Z. naufraga*. Lozouet (1999) also described two species from the late Oligocene of southwestern France, viz. *Z. lacipidinae* and *Z. virodunensis*, both of which differ from *Z. ligustica* in having a much narrower shelf.

Further species occurs in the Caribbean, viz. *Z. bigelowi* Pérez Farfante, 1947, which differs from *Z. naufraga* in having a broader apical beak, a more rectangular outline to the base and a much deeper anal slit. Espinosa et al. (2005) recently described two very small species living in the waters around Cuba, viz. *Z. milerae* and *Z. neritica* Espinosa, Ortea & Fernández-Garcés, 2005. Apart from differing in size, both species have a much narrower shelf than *Z. ligustica*, *Z. naufraga* or *Z. bigelowi*. Species in the genus *Zeidora* have also been recorded in the Recent southern Atlantic (Simone & Cunha, 2014) as well as the Red Sea and the Pliocene of the Philippines (Helwerda & Wesselingh, 2014).

Zeidora was listed by Landau et al. (2011) as a Mediterranean Pliocene-Pleistocene Molluscan Unit 1 (MPPMU1) genus. These are genera that are only found in the Mediter-

anean fossil assemblages during this ecostratigraphic unit, which was in place in the time interval roughly equivalent to the Zanclean to early Piacenzian, a time when typical tropical conditions occurred. However, it may well be that the genus is found in later assemblages, as *Z. naufraga* is found in the Mediterranean today, albeit rarely. Unlike the rest of the MPPMU1 genera listed by Landau et al. (2011), *Zeidora* is not a thermophilic genus, as a large species was recently described from the Recent seas of Antarctica (Aldea et al., 2011).

Distribution. — Pliocene: late Zanclean-early Piacenzian, Italy (Bellardi, 1878); early Piacenzian, Estepona (this paper).

Clade Vetigastropoda

Superfamily Lepetelloidea Dall, 1882

Family Lepetellidae Dall, 1882

Genus *Bogia* Dantart & Luque, 1994

Bogia Dantart & Luque, 1994: 300.

Type species, by monotypy: *Cocculina labronica* Bogi, 1984. Recent, Tyrrhenian Sea.

Note. — For the classification of *Bogia* Dantart & Luque (1994) argued that *Cocculina labronica* Bogi, 1984, had a pseudococculinid-type protoconch, with a long and narrow apical fold and a fused tip, but preferred not to include it in any family, as the character of the protoconch sculpture did not resemble that of any of the described genera of cocculinids or pseudococculinids.

Bogia labronica (Bogi, 1984) (Figs 12-15)

Cocculina labronica Bogi, 1984: 156, fig. 1, pl. 1 figs 1, 2.

Lepetella labronica (Bogi, 1984) – Giannuzzi-Savelli et al., 1994: 36, fig. 36.

Bogia labronica (Bogi, 1984) – Dantart & Luque, 1994: 301, figs 89-93. Portalatina, 2008: 149, fig. 2E, F. Perna, 2013: 11, 3 figs.

Material. — Maximum diameter 3.4 mm. EsVeSA (1), SA.

Discussion. — *Bogia labronica* (Bogi, 1984) is characterised by its small, fragile, cap-shaped shell, with a strongly arched base. The protoconch consists of about half a whorl, with a long and narrow apical fold and a fused tip, sculptured by about a dozen axial ribs and micropustules near the apex.

This species is represented by a single specimen from the Velerín sands. Unfortunately the protoconch is abraded, but the high-arched side profile of the species is so characteristic it cannot be mistaken for any other cocculinid. This is the first fossil record for the species.

Distribution. — Pliocene: early Piacenzian, Estepona (this paper). Recent: Tyrrhenian Sea (Bogi, 1984; Giannuzzi-Savelli et al., 1994; Dantart & Luque, 1994; Portalatina, 2008), Croatia (La Perna, 2013).

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