

The genus *Heteroninella* (Gastropoda, Turbinidae) from the Lower Pliocene of Estepona, southern Spain

Bernard Landau¹ & Pierre Lozouet²

¹International Health Centres, Avenida Infante de Henrique 7, Areias São João, P-8200-261 Albufeira, Portugal; e-mail: bernie.landau@sapo.pt

²Muséum national d'Histoire naturelle, 55 rue de Buffon, F-75005 Paris, France; e-mail: lozouet@mnhn.fr

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A species of the turbinid genus *Heteroninella* Magne, 1941 is described from the Velerín Conglomerates (Zanclean, Pliocene) near Estepona (southern Spain); this constitutes the first record of this genus from the Neogene of Europe. Originally, *Heteroninella bertarellii* (Andreoli & Marsigli, 1997) was placed in the trochid genus *Gibbula* Risso, 1826.

KEY WORDS: Pliocene, Spain, Gastropoda, Turbinidae, *Heteroninella*.

Introduction

The Lower Pliocene (Zanclean) deposits exposed at Velerín are beginning to yield a wealth of interesting and new, endemic species. Although some have been described recently (Muñiz Solís, 1995; Landau & Marquet, 1999, 2000), none are more unusual than the species discussed in the present paper. Originally, we considered this to be a new species; however, it has since turned out that it is undoubtedly the same shell as that described by Andreoli & Marsigli (1997), from the vicinity of Serre di Rapolano (Siena, Italy), under the name of *Gibbula bertarellii*. Andreoli & Marsigli's description was based on a juvenile shell and an incomplete adult specimen. The species is obviously extremely rare in Italy, and for this reason we consider it useful to offer a new description here of the complete adult shell.

The Málaga Basin is located in the western sector of the Internal Zones of the Betic Cordillera. The sea gateway, which extended from the Mediterranean to the Atlantic during the Late Miocene (Tortonian) had shrunk to a small basin in the Pliocene, extending from the present Málaga-Torremolinos area inland in an E-W direction for about 30 km. The Pliocene series consists of conglomerates and sands, which give way laterally to bluish grey marls and clays, topped by yellowish-white sands (Sanz de Galdeano & Lopez Garrido, 1991). Although these deposits comprise a variety of facies, ranging from coarse sands, representing nearshore or beach deposits, to fine clayey sands deposited at relatively greater depths, the gastropod species discussed herein is found only in a coarse conglomerate (the Velerín Conglomerates). This conglomerate, which must have been

deposited relatively rapidly or in storm conditions, contains the richest fauna; a curious admixture of large and small, both waterworn and perfectly preserved, shells in between boulders and lumps of mudstone of varying sizes.

Systematic palaeontology

Abbreviations — Below, the following abbreviations are used:

AA	apical angle;
H	height;
MNHN	Muséum national d'Histoire naturelle, Paris;
W	width.

Superfamily Trochoidea Rafinesque, 1815

Family Turbinidae Rafinesque, 1815

Subfamily Turbininae Rafinesque, 1815

Genus *Heteroninella* Magne, 1941

Type species — *Turbo parkinsoni* de Basterot, 1825, by original designation.

Heteroninella bertarellii (Andreoli & Marsigli, 1997)
Figures 1a-d, 2/1-3

*1997 *Gibbula bertarellii* Andreoli & Marsigli, p. 19, pl. 1.

Material — Three specimens (MNHN-PL 15297A, PL 15297B, PL 15297C, leg. B. Landau); six, three subadult

and four incomplete specimens (B. Landau Colln, Albufeira); one complete, repaired adult specimen (R. Marquet Colln, Antwerp); and a single complete, adult specimen (Vera-Peláez Colln, Málaga). All material is from the Velerín Conglomerates, near Velerín (Estepona, southern Spain).

Diagnosis — Large species of *Heteroninella*, with very strong elevated spiral sculpture, separated by deeply excavated interspaces and with a wide, deep umbilicus.

Description — Shell large, trochiform, with convex whorls. Protoconch and early teleoconch whorls eroded in all specimens available. Five teleoconch whorls preserved in fully-adult specimens, convex, with the periphery just above the suture. Suture deeply impressed and narrowly canaliculate. Ornament on spire whorls consisting of three strong, raised, regularly spaced spiral cords, with a fourth appearing just above the abaxial suture on the penultimate whorl.

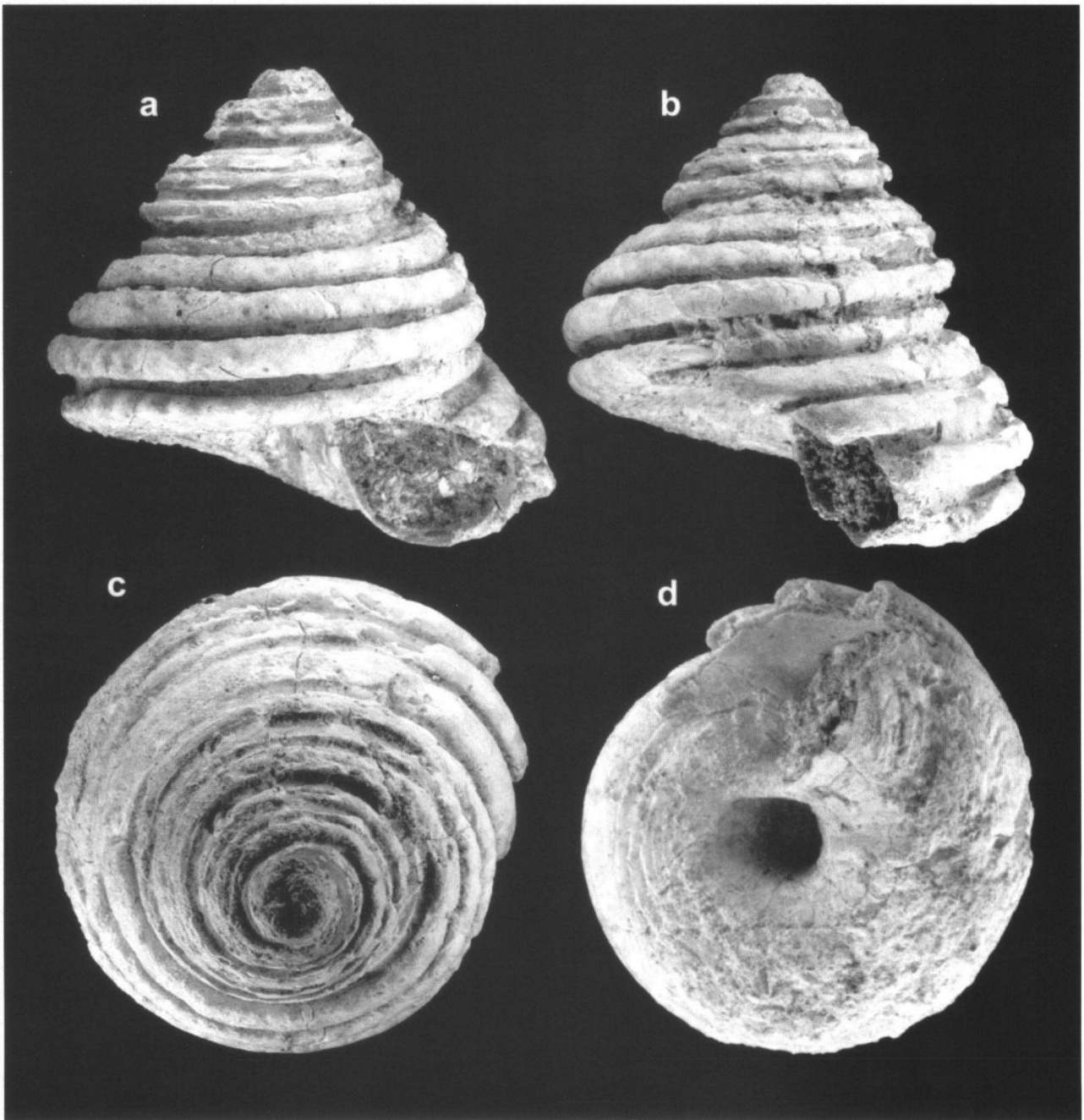


Figure 1. *Heteroninella bertarellii* (Andreoli & Marsigli, 1997), MNHN PL 15297A in various aspects; original height = 56.3 mm; Velerín Conglomerates (Lower Pliocene, Zanclean), Velerín (Estepona, Spain).

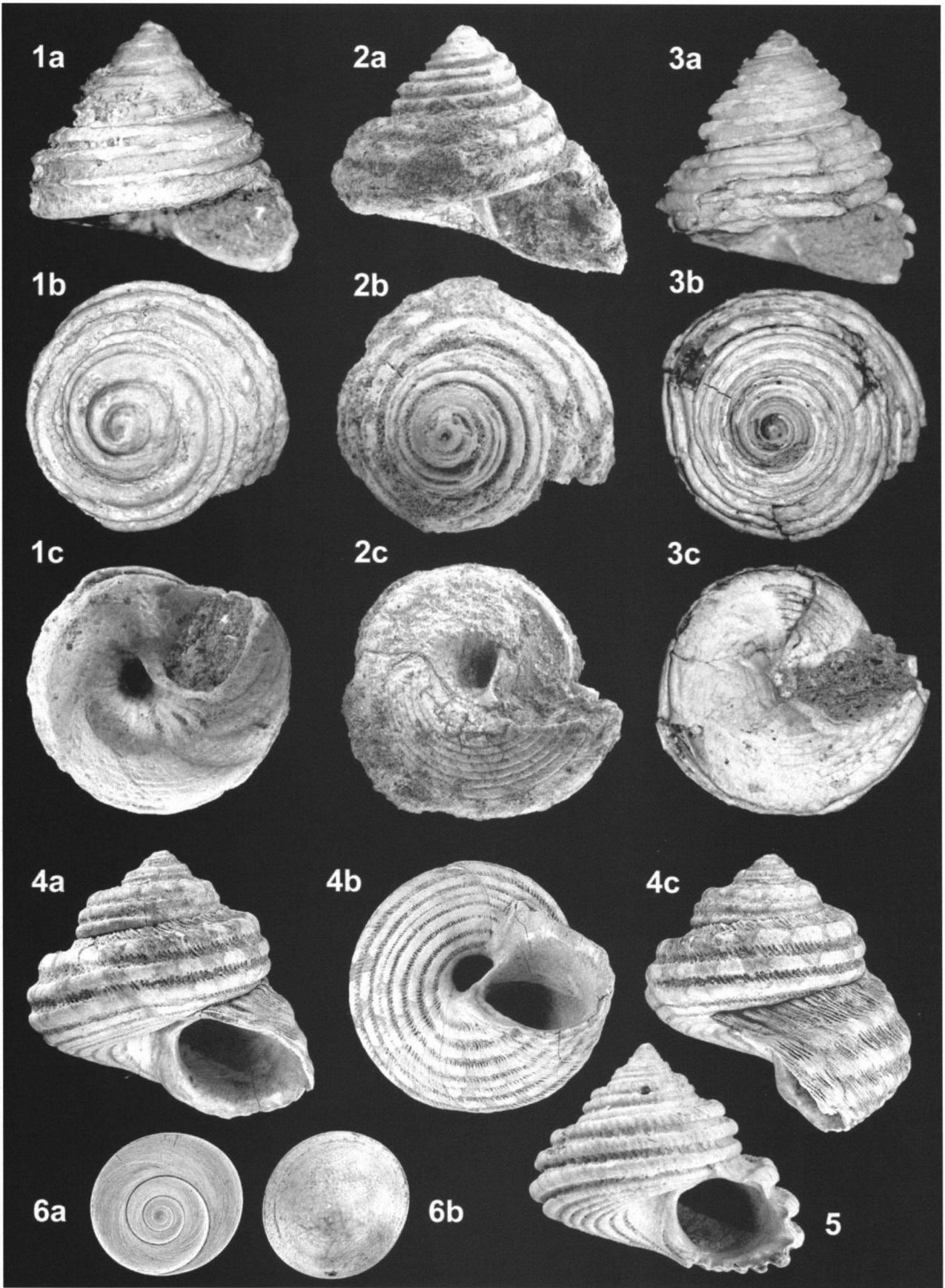


Figure 2. *Heteroninella bertarellii* (1-3) and *H. parkinsoni* (de Basterot, 1825) (4-6) compared:

- 1 - MNHN PL 15297B; original height = 56.2 mm; Velerín Conglomerates (Lower Pliocene, Zanclean), Velerín (Estepona, Spain);
- 2 - MNHN PL 15297C; original height = 41.2 mm; same stratigraphic level and locality;
- 3 - Landau Colln, specimen 1; original height = 59.1 mm; same stratigraphic level and locality;
- 4 - MNHN PL 5932A; original height = 34 mm; Lower Oligocene ('Stampian'), Gaas (Landes, France);
- 5 - MNHN PL 6020A; original height = 32 mm; Lower Oligocene ('Stampian'), Bordeaux (Gironde).
- 6 - MNHN PL 5932B; operculum; original width = 10 mm; Lower Oligocene ('Stampian'); Gaas (Landes, France).

The cords are convex but flattened, separated by deeply excavated interspaces, approximately half the width of the cords on early teleoconch whorls. In some specimens the cords remain broader throughout, while in others the interspaces increase in width abaxially to be equal to or wider than the cords on the body whorl. There is a tendency for the cord placed at the periphery to be slightly stronger. Axial ornament absent, except for weak, close-set prosocline growth lines, which cover the whole surface. Base flattened to slightly convex, bearing eight flattened, close-set spiral cords, the peripheral cord being broadest, the remaining cords subequal in strength and width. Strong axial folds are visible on the last half whorl, corresponding to the position of earlier apertures. The umbilicus is wide, about half the diameter of the base and very deep, almost extending to the apex. The slope of the umbilicus is shallow up to a broad, indistinct cord arising from the mid-columellar margin, beyond which the umbilicus dips steeply. The spiral ornament does not extend into the umbilicus. The aperture is tangential, large and subquadrate. The outer lip is regularly arched, with a shallow notch at the junction with the columella, coinciding with the outer border of the umbilicus. Columella somewhat thickened, especially at the mid-portion, erect and slightly reflected over the umbilicus. Basal callus thin and restricted.

Measurements (in mm) —

Specimen	H	W	AA	remarks
MNHN PL 15297A	56.3	58.2	70°	adult
MNHN PL 15297B	56.2	61.5	90°	adult
MNHN PL 15297C	41.2	48.5	90°	subadult
Landau Colln, no. 1	59.1	58.6	70°	adult
Landau Colln, no. 2	49.5	56.8	88°	adult
Landau Colln, no. 3	53.4	56	66°	adult
Landau Colln, no. 4	c. 58	56.3	65°	incomplete adult
Landau Colln, no. 5	47.5	49.8	80°	subadult

Discussion — *Heteroninella bertarellii* is somewhat variable in height; although usually taller than broad, some specimens are more depressed. The height measurements given above are an underestimate, as the apical whorls are eroded in all the specimens available; nevertheless, the apical angle varies between 65E and 88E. The ornament is relatively constant in number of ribs and character, varying only in the width of the ribs.

The shell is not well preserved and chalky, with the

apical whorls eroded, even in juvenile specimens. Despite this, one of the specimens (MNHN PL 15297A) shows some trace of original colour pattern on the spiral cords, consisting of orange-brown, vertical flammules. As Andreoli & Marsigli (1997) correctly noted, there is no species in the European Miocene to Recent with which *H. bertarellii* is likely to be confused. Those authors discussed its superficial similarity to *Gibbula ardens* (von Salis Marschlins, 1793), but this is much smaller and does not have the very deep umbilicus characteristic of the present taxon. In our opinion, *H. bertarellii* does not belong to the family Trochidae, but rather to the Turbinidae. Indeed, the closest relative seems to be *H. parkinsoni* (de Basterot, 1825) (Figure 2/4-6), a species characteristic of the French Atlantic Lower Oligocene ('Stampian'). This species shows the same sculptural characteristics of strong spiral cords and a deep umbilicus, but the cords in the latter are not as strong or elevated, the interspaces shallower and although the umbilicus is equally deep, it is much narrower. The body whorl is more evenly rounded in *H. parkinsoni*, whereas the base of *H. bertarellii* is flattened, giving the body whorl a subtrigonal outline.

Faunal elements co-occurring with *H. bertarellii* in Málaga are similar to those described by Andreoli & Marsigli (1997, p. 20), with the same species they listed found in association. The Italian beds consist of gravels and sands, also representing a sandy environment, similar to that of the Velerín Conglomerates. Andreoli & Marsigli (1997) dated the Italian beds as late Early to Middle Pliocene, now generally assigned to the Zanclean Stage, which would be similar in age to the deposits in Estepona.

Remarks — From an ecological point of view, the larger turbinine gastropods may be separated into two groups (Beesley *et al.*, 1998), namely:

1. the genus *Bolma* Risso, 1826 and its allies, which are predominantly offshore;
2. the group of *Turbo* Linné, 1758 and *Astralium* Link, 1807, which are predominantly intertidal to shallow tidal.

The earliest European species of *Bolma* are from the Upper Oligocene (North Sea and Aquitaine basins). Outside Europe, *Bolma* has been recorded from the Upper Eocene of Australia (Beu & Ponder, 1979; Darragh & Kendrick, 2000). At present, the genus is represented in the Mediterranean Sea by *Bolma rugosa* (Linné, 1767).

Vera-Peláez *et al.* (1996) listed four species of *Bolma*

occurring in the Estepona outcrops, *Bolma fimbriata* (Borson, 1825), *B. granosa* (Borson, 1825), *B. rugosa*, and *B. muricata* (Dujardin, 1837).

Although the oldest undoubted species of *Turbo* in Europe is *T. munieri* Vasseur, 1882 (Middle Eocene, France), the major turbinid radiation occurred during the Early Oligocene. For instance, six species of *Turbo*, inclusive of *Heteroninella parkinsoni*, are on record from the Lower Oligocene of the Aquitaine Basin (Magne & Vergneau-Saubade, 1971) and three from the Upper Oligocene. Only one species has been described from the Lower Miocene of Europe, *Turbo neuvillei* Cossmann & Peyrot, 1917 (Aquitaine Basin, France). The genus *Astralium* comprises only *A. aquitanicum* Benoist, 1874, which ranges from the Upper Oligocene to the Lower Miocene (Lozouet *et al.*, 2001).

Subsequent to the Early Miocene, the *Turbo/Astralium* group appeared to be no longer represented in the European fossil record. It is clear that this group must have suffered species extinctions at the Oligocene/Miocene boundary. In this respect, the occurrence of a species of *Heteroninella* in the Lower Pliocene of the Mediterranean area is particularly astonishing. As indicated by Lozouet (1992), the newly collected material from Málaga is both complementing our views of the Mediterranean Pliocene fauna and aptly demonstrating the necessity for detailed studies of strata occurring beyond the classic Italian deposits.

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