

# THE GENUS *CYMBIUM* (GASTROPODA, VOLUTIDAE) IN THE IBERIAN NEOGENE

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A new species of the volutid genus *Cymbium* Röding, 1798 is recorded from the Arenas de Huelva Formation (Zanclean, Early Pliocene), as exposed near the village of Lucena del Puerto (province of Huelva), and from the Velerin Conglomerates near Estepona (province of Málaga), both in southern Spain. It is the first record of the genus from the European Neogene.

Key words — Zanclean, Pliocene, Spain, Mollusca, Volutidae, new species.

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## INTRODUCTION

The present paper continues the series describing new and endemic molluscan species which have recently come to light in outcrops of Early Pliocene (Zanclean) strata in southern Spain (Landau, 1984; Landau & Marquet, 1999; Lozano Francisco & Landau, 1999).

Outcrops around Lucena del Puerto (province of Huelva) comprise fine- to relatively coarse-grained sands deposited nearshore. The new species described herein, however, is restricted to the 'grey sands' at localities 4 and 5 of Landau (1984), as exposed near the hamlet of Santa Catalina. Previous authors have commented on the distinction between these fine grey sands, which are known only from boreholes around Santa Catalina (Landau, 1984; Landau & Marquet, 1999), and the coarser 'yellow sands' described by Civis *et al.*

(1987) as the Arenas de Huelva Formation.

Deposits around Velerin, Estepona (province of Málaga) are more varied, consisting of nearshore or beach deposits (coarse conglomerates and coarse sands) and fine clayey sands laid down at relatively greater depths. The conglomerates contain the richest fauna, comprising a curious admixture of large and small water-worn and perfectly preserved shells between rocks and lumps of mudstone of varying sizes. Deposition must have been relatively rapid, possibly under storm conditions. These deposits are considered contemporaneous with those at Huelva (Vera-Peláez *et al.*, 1995). This correlation is further confirmed by the occurrence at Velerin of the new species of *Cymbium* described herein, and of two additional species originally thought to be endemic to the Arenas de Huelva Formation, namely *Crepidula lucenica* Landau, 1984 and *Cyllene (Cyllenina) lucenensis* Landau & Marquet, 1999.

## SYSTEMATIC PALAEONTOLOGY

*Abbreviations* — To denote the repositories of specimens referred to in the text, the following abbreviations are used:

IRScNB Rmol DC  
Institut royal des Sciences naturelles de Belgique  
(Brussels), Recent Mollusca, Dautzenberg Colln;  
IRScNB Rmol GC  
ditto, Recent Mollusca, General Colln;  
IRScNB IST  
ditto, Invertebrates of Secondary and Tertiary  
Colln;  
KF K. Fraussen Colln, Aarschot (Belgium);  
MG M. Grigis Colln, Ninove (Belgium);  
BML B.M. Landau Colln, Albufeira (Portugal);  
RM R. Marquet Colln, Antwerp (Belgium);  
JLVP J.L. Vera-Peláez Colln, Málaga (Spain).

Superfamily Volutacea Rafinesque, 1815  
Family Volutidae Rafinesque, 1815  
Subfamily Zidoninae H. & A. Adams, 1853  
Genus *Cymbium* Röding, 1798

*Type species* — *Voluta cymbium* Linné, 1758, by original designation.

***Cymbium ibericum* sp. nov.**

Pl. 1, Figs 1, 2; Pl. 3, Fig. 5; Pl. 4, Fig. 1

?1952b *Yetus gracilis* (Broderip, 1830) — Lecointre, p. 133, pl. 25, fig. 8a, b.  
1984 *Cymbium olla* (Linné, 1758) — Landau, p. 140.

*Types* — Holotype is IRScNB IST 6399; paratype is IRScNB IST 6400.

*Derivatio nominis* — Named after the Iberian Peninsula.

*Locus typicus* — Locality 4 (Landau, 1984), Santa Catalina, near Lucena del Puerto (Huelva, Spain).

*Stratum typicum* — Arenas de Huelva Formation (Zanclan, Early Pliocene).

*Material studied* — Of *C. ibericum*, material contained in the following collections was studied: BML Colln (4 specimens), RM Colln (3 specimens), MG Colln (3 specimens), all from the type locality and level. Material from the Velerin Conglomerates is contained in the following collections: JLVP Colln (1 specimen), RM Colln (1 juvenile, 1 fragment), and BML Colln (4 fragments).

Extant species of *Cymbium*, contained in the collections of the Institut royal des Sciences naturelles de Belgique (Brussels), and identified by T. Backeljau, I. Marche-Marchad and J. Van Goethem, were also studied. These include the following, illustrated here (Pls 1-4):

- *Cymbium olla* (Linné, 1758): IRScNB Rmol GC 192, from Lagos (Algarve, Portugal) (Pl. 1, Fig. 3);
- *C. gracilis* (Broderip, 1830) (= *C. marmoratus* Link, 1807): IRScNB Rmol GC 359, from Avepozo (15

- km west of Lomé, Togo), from 8 m depth, December 1979 (Pl. 2, Fig. 2);
- *C. souliei* Marche-Marchad, 1974 (= *C. cymbium* (Linné, 1758)): IRScNB Rmol DC, without locality data (identified by Marche-Marchad) (Pl. 3, Fig. 1);
- *C. marmoratus*: IRScNB Rmol 24, from Dakar (Senegal) (Pl. 2, Fig. 1);
- *C. patulum* (Broderip, 1830): IRScNB Rmol DC, from Embouchure du Catumbella, 17 June 1910 (Mission Gruvel) (Pl. 3, Fig. 4);
- *C. pepo* (Lightfoot, 1786) (= *C. senegalensis* Marche-Marchad, 1978): IRScNB Rmol GC 302, from West Africa (Pl. 2, Fig. 5);
- *C. glans* (Gmelin, 1791): IRScNB Rmol DC, from the estuary of Gabon River, 1892 (Pl. 3, Fig. 3);
- *C. cucumis* Röding, 1798: IRScNB Rmol GC 399, from Gibraltar, at about 45 m depth, 1964 (Pl. 2, Fig. 4);
- *C. cymbium*: IRScNB Rmol GC 306, from Mbour (Senegal), 5 January 1989 (Pl. 3, Fig. 2);
- *C. maroccanum* (Pallary, 1930): IRScNB Rmol DC, from Mogador (Morocco) (Pl. 2, Fig. 3).

Also examined, but not illustrated here, were:

- *C. pachyus* (Pallary, 1930): IRScNB Rmol DC [holotype, repository is Brussels IRScNB, not Paris, as mentioned by Weaver & DuPont, 1970, p. 68].

Lastly, the KF Collection contains *C. fragile* Fittkau & Stuermer, 1985, from Grand Lahou (Ivory Coast), dredged at 30 m depth, which is illustrated here in Pl. 4, Fig. 2.

*Diagnosis of C. ibericum* — A small to medium-sized species characterised by short, broad body whorl and a U-shaped subsutural canal with a sharp edge reflected inwards over the canal, forming a ledge and partially covering it.

*Dimensions* — see Tables 1 and 2.

*Description* — Shell small to medium for genus, ovate and broadly inflated, thin, maximum height 83.8 mm, maximum width 49.0 mm. Protoconch relatively broad and completely covered by thick callus. Deep U-shaped subsutural canal around the protoconch, partially covered by the edge of the body whorl which is sharp and reflected inwards over the canal. Teleoconch of about 1.25 to 1.5 whorls. Body whorl short and inflated, shoulder curving smoothly towards the canal. Aperture wide and semioval. Outer lip thin, bevelled, forming a shallow arch where the outer lip joins the parietal wall, slightly flared below, smooth within. Siphonal notch shallow and wide. Fasciole well defined by a ridge. Columella concave with three strong columellar plaits. Parietal callus thin, in some specimens containing excrescences, extending onto the apertural side of the body whorl, progressively covering more of the body whorl

inferiorly. Shell smooth, growth lines forming the only ornament.

*Remarks* — *Cymbium ibericum* is not common in the 'grey sands' at Santa Catalina. The twelve adult shells available are all remarkably similar not only in size, ranging from 91.0 to 99.2 mm in length, but also in other shell characteristics. The protoconch is more worn in some specimens, giving it a flatter appearance, but it is otherwise fairly constant in width.

In the Velerin Conglomerates near Estepona, this species is very rare, and is known only from one complete, repaired specimen (Pl. 3, Fig. 5; Pl. 4, Fig. 1) which is larger than the Huelva shells, as well as a single juvenile (RM Colln) and four fragments (BML and RM collns). The characteristics of the teleoconch are identical to those of the Huelva specimens, but the protoconch is markedly larger, varying in size from 16.3 to 21.7 mm, more heavily callused and more dome-shaped. It is this form which has the closest resemblance to a specimen identified as '*Yetus gracilis*' (= *Cymbium marmoratus*) and illustrated by Lecointre (1952b, pl. 25, fig. 8a, b). In contrast to the situation in most gastropods, the protoconch seems to have little importance in defining species of the genus *Cymbium*. Also in the Recent specimens studied, the size of the protoconch varies considerably, which is in first instance caused by the degree in which the callus covers the protoconch in adult and subadult specimens.

*Comparisons* — The only extant member of *Cymbium* which inhabits the southern Atlantic coast of Iberia, *C. olla*, is distinguished immediately from the Pliocene congener by its smaller subconical protoconch, raised on a low spire and by the teleoconch, which has only two columellar plaits. Although Poppe & Goto (1992, p. 180) described this species as having two to three columellar plaits, all the specimens examined by us have only two. Furthermore, *Cymbium olla* has a less inflated body whorl, a more deeply concave columella, a more extensive callus over the body whorl and a narrower subsutural canal than the new species, with the canal edge folded inwards rather than sharp. Although *C. olla* is described as uncommon by Weaver & DuPont (1970, p. 68), specimens are brought up by the hundreds in fishing nets off the Algarve coast (Portugal).

The genus *Cymbium* is well represented off the West African coast. The range of *C. olla* extends to Morocco, while *C. cucumis*, which is rarely brought ashore also in the Iberian Peninsula, has a much larger, heavier, more elongated shell than *C. ibericum* sp. nov. *Cymbium cymbium* (= *C. souliei*) has a larger, more elongated shell with a wider subsutural canal and an elongated, narrower aperture. *Cymbium fragile* is quite similar in shape to the Pliocene species, but more elongated and the protoconch is not covered by callus. *Cymbium marmoratus* (= *C. gracilis*) is more elongated with a V-shaped subsutural canal, while *C. pachyus* has a wide, flat subsutural platform. *Cymbium glans*, *C. patulum*

(Broderip, 1830), *C. tritonis* (Broderip, 1830) (see Poppe & Goto, 1992, p. 186, pl. 81, figs 3, 4), *C. pepo* (= *C. senegalensis*) all have inflated shells with the maximum width mid-shell and narrower at both ends, quite unlike *C. ibericum*. *Cymbium maroccanum* has an apex which very slightly protrudes above the suture, as well as a much narrower shell with less globular adapical part than the new species.

Lecointre (1952b, p. 133, pl. 25, fig. 8a, b) described *C. marmoratus* from the Neogene of Morocco, albeit under the name *Yetus gracilis*, which is a junior synonym. His illustration of a specimen from Dar-bel Hamri, also of Early Pliocene age, is very similar to *C. ibericum* from Velerin, in showing a short, broad shell with the characteristic sharply edged subsutural canal and large protoconch. Link's species is more slender with an elongated narrower aperture. The canal is also sharply edged but not reflected inwards. The columellar ridges are more oblique in the Recent shell. The specimen from Agadir (Morocco), of Tyrrhenian (Ouljien, Pleistocene) age, illustrated by Lecointre (1952a, pl. 25, fig. 9), is more elongated than the one illustrated in fig. 8 and may well represent *C. cucumis*, rather than *C. marmoratus*, as noted earlier by Brébion (1979, p. 139, pl. 4, fig. 5).

*Palaeoecological considerations* — This is the first record of the genus *Cymbium* from the European Neogene and firmly establishes its presence in the southern Iberian seas by the Early Pliocene and possibly slightly earlier on the Atlantic coast of Morocco. Bondarev (1997, pp. 35, 36), in his work on the systematics of the Volutidae, considered *Cymbium* to be a very young genus with the first fossil specimens occurring in the Early Quaternary; on p. 40 of the same work, however, he contradicts himself by noting that the oldest fossil *Cymbium* appeared during the Pliocene. He may have overlooked Lecointre's 1952b monograph; that author reported the genus from Dar-bel Hamri (Morocco). Rocks exposed there were considered to be of Late Miocene (Tortonian) age by Chavan (1940, p. 97), *i.e.* slightly older than the Spanish deposits, but of Early Pliocene date by Lecointre (1952a, p. 22). This age assignment agrees better with the benthic molluscan fauna described in Lecointre's work, which is not unlike that of the Velerin Conglomerates. This minor confusion does not detract from the essence of Bondarev's theory on the migration of the genus. Indeed, *C. ibericum* sp. nov. may represent the ancestral stock which migrated from South America to Africa across underwater 'bridges', predating their erosion during the Pliocene (Bondarev, 1997, p. 40). The southerly migration route, indicated by Bondarev (1997, fig. 2), leading to South Africa and Namibia, is not a likely possibility for the migration of *Cymbium*, the oldest species of which are found at the northern, not the southern, margin of their distribution, while their highest Recent species diversity is also reached in West Africa, rather than in southern Africa.

The northern 'bridge', as indicated by Bondarev (1997, fig. 2), however, offers better possibilities.

All extant members of the genus live on sandy or sandy/muddy bottoms, intertidally or in shallow water ranging to a depth of 90 m. The 'grey sands' represent shallow, offshore deposition on a fine sandy bottoms.

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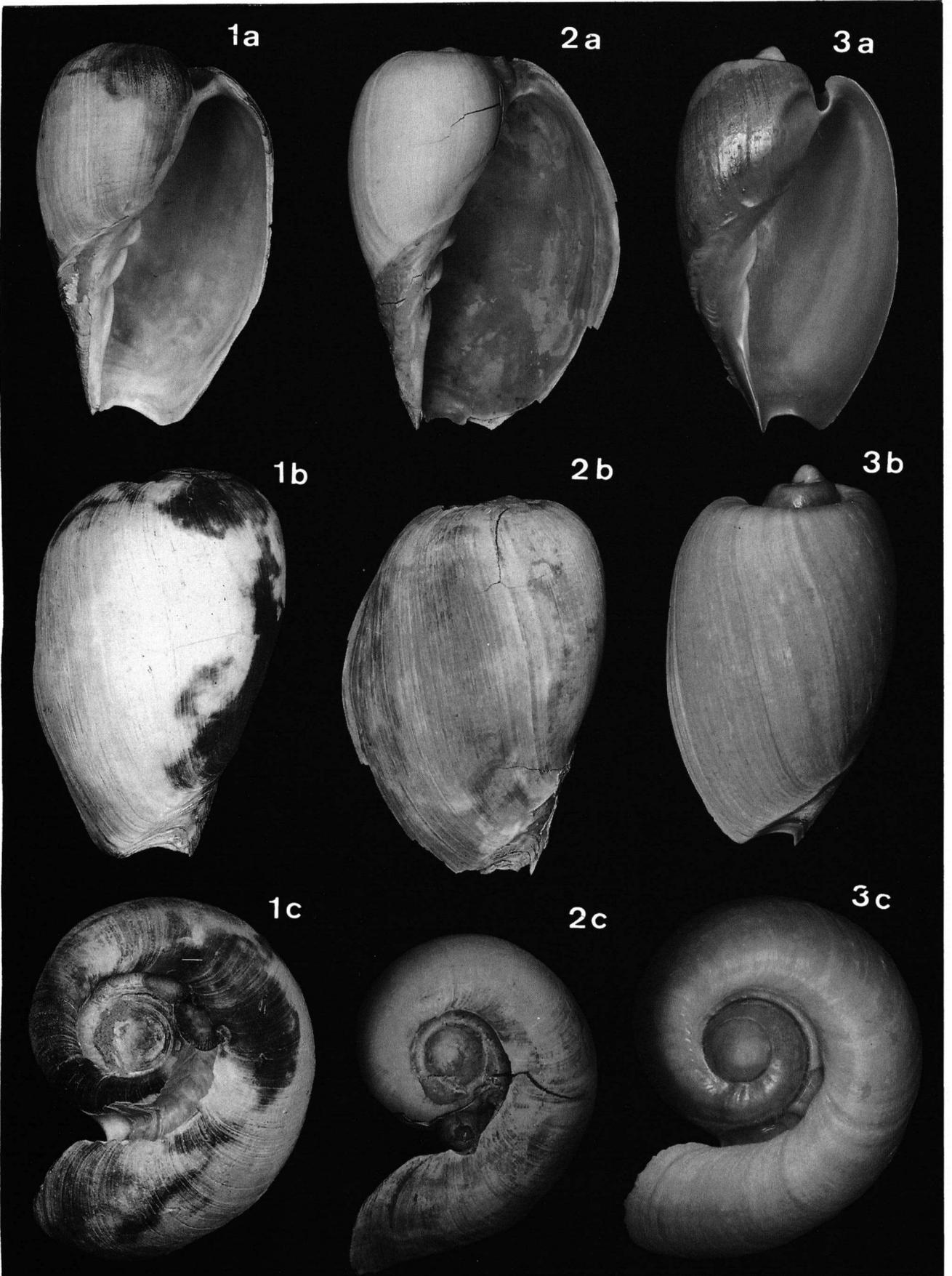
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#### PLATE 1

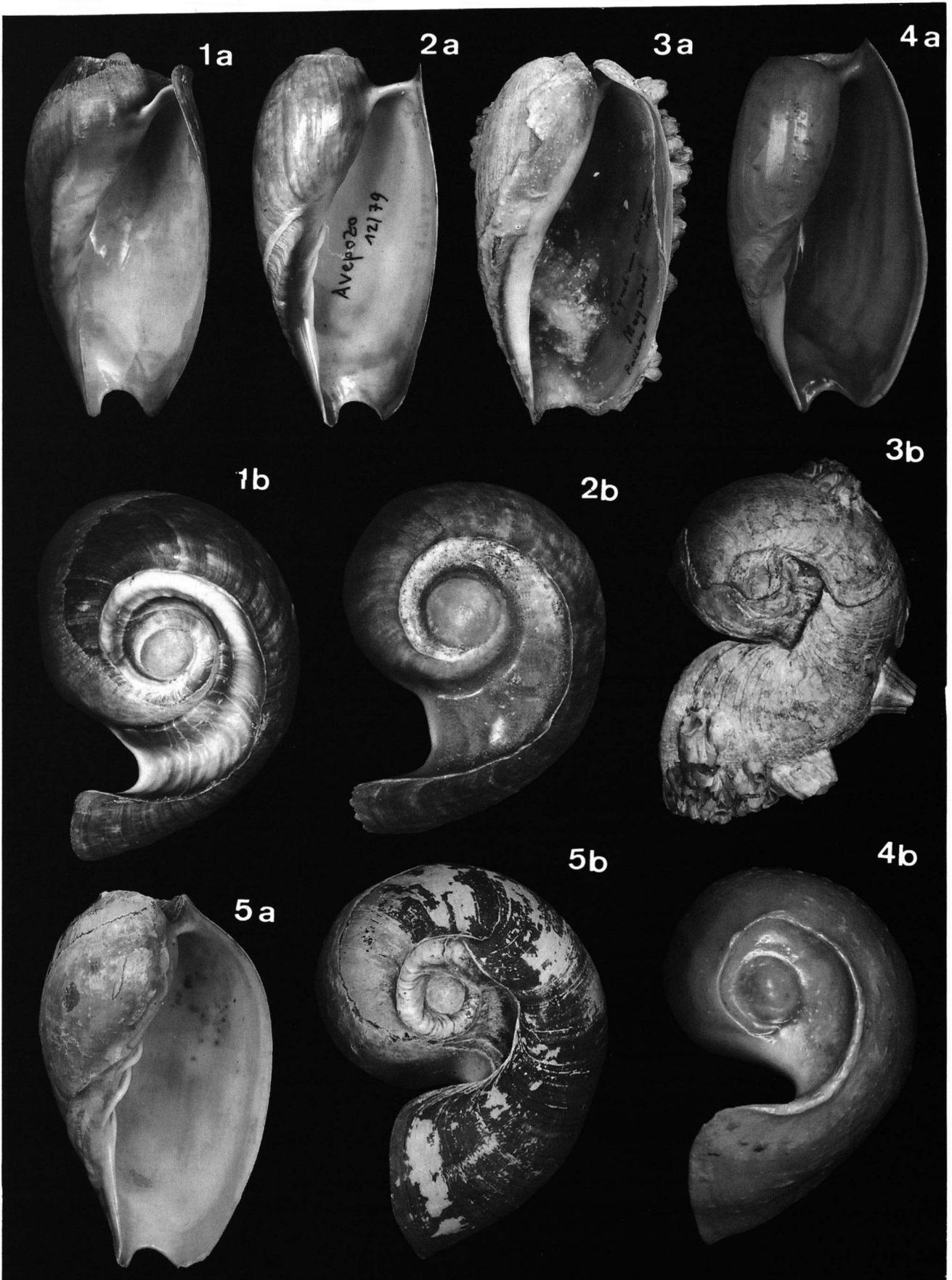
- Figs 1, 2. *Cymbium ibericum* sp. nov., Santa Catalina, locality 4 of Landau (1984), near Lucena del Puerto (Huelva, Spain), Arenas de Huelva Formation (Zanclean, Early Pliocene), IRScNB IST 6399 (holotype) and IST 6400 (paratype), respectively; 1a - apertural view (x 0.74), 1b - dorsal view (x 0.8), 1c - apical view (x 1); 2a - apertural view (x 0.78), 2b - dorsal view (x 0.78), 2c - apical view (x 0.86).
- Fig. 3. *Cymbium olla* (Linné, 1758), IRScNB Rmol GC 192, coast off Lagos (Algarve, Portugal), Recent; apertural (a, x 0.77), dorsal (b, x 0.8) and apical views (c, x 1.2).



## PLATE 2

- Fig. 1. *Cymbium marmoratus* Link, 1807, IRScNB Rmol 24, Dakar (Senegal), Recent; apertural (a, x 0.55) and apical views (b, x 1).
- Fig. 2. *Cymbium gracilis* (Broderip, 1830) (= *C. marmoratus*), IRScNB Rmol GC 359, Avepozo (15 km west of Lomé, Togo, 8 m depth, December 1979); apertural (a, x 0.60) and apical views (b, x 0.79).
- Fig. 3. *Cymbium maroccanum* (Pallary, 1930), IRScNB Rmol DC, Mogador (Morocco); apertural (a, x 0.48) and apical views (b, x 1.2).
- Fig. 4. *Cymbium cucumis* Röding, 1798, IRScNB Rmol GC 399, Gibraltar, c. 45 m depth, 1964; apertural (a, x 0.43) and apical views (b, x 0.70).
- Fig. 5. *Cymbium pepo* (Lightfoot, 1786) (= *C. senegalensis* Marche-Marchad, 1978), IRScNB Rmol GC 302, West Africa; apertural (a, x 0.46) and apical views (b, x 0.86).

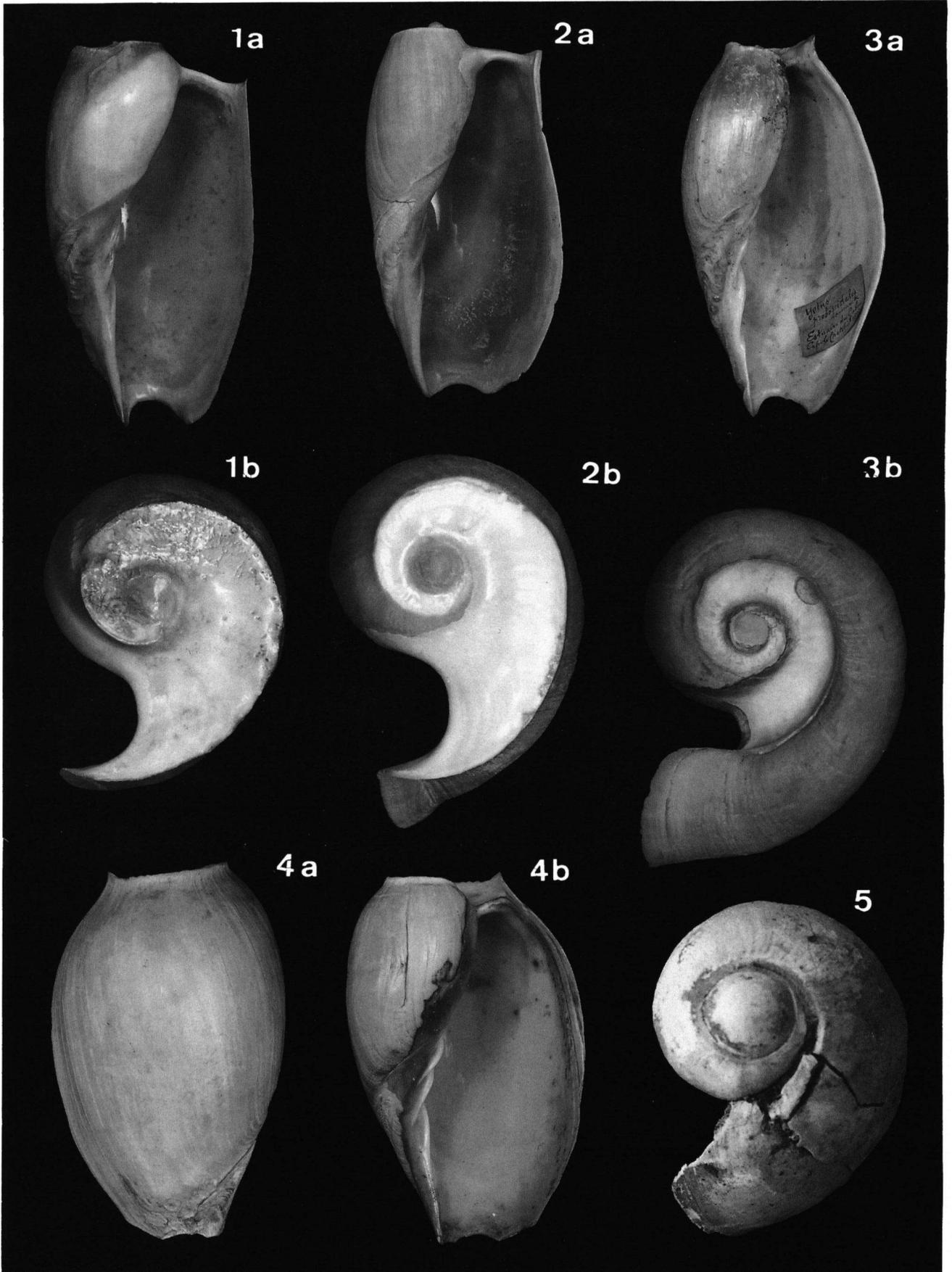
PLATE 2



### PLATE 3

- Fig. 1. *Cymbium souliei* Marche-Marchad, 1974 (= *C. cymbium*), IRScNB Rmol DC (identified by Marche-Marchad), without locality data; apertural (a, x 0.80) and apical views (b, x 1.14).
- Fig. 2. *Cymbium cymbium* (Linné, 1758), IRScNB Rmol GC 306, Mbour (Senegal), 5 January 1989; apertural (a, x 0.56) and apical views (b, x 1.1).
- Fig. 3. *Cymbium glans* (Gmelin, 1791), IRScNB Rmol DC, Gabon River estuary, 1892; apertural (a, x 0.47) and apical views (b, x 0.80).
- Fig. 4. *Cymbium patulum* (Broderip, 1830), IRScNB Rmol DC, Embouchure du Catumbella, 17 June 1910 (Mission Gruvel); apertural (a, x 0.54) and dorsal views (b, x 0.54).
- Fig. 5. *Cymbium ibericum* sp. nov., JLVP Colln, Estepona (Málaga, Spain), Zanclean; apical view (x 0.88) (see also Pl. 4, Fig. 1).

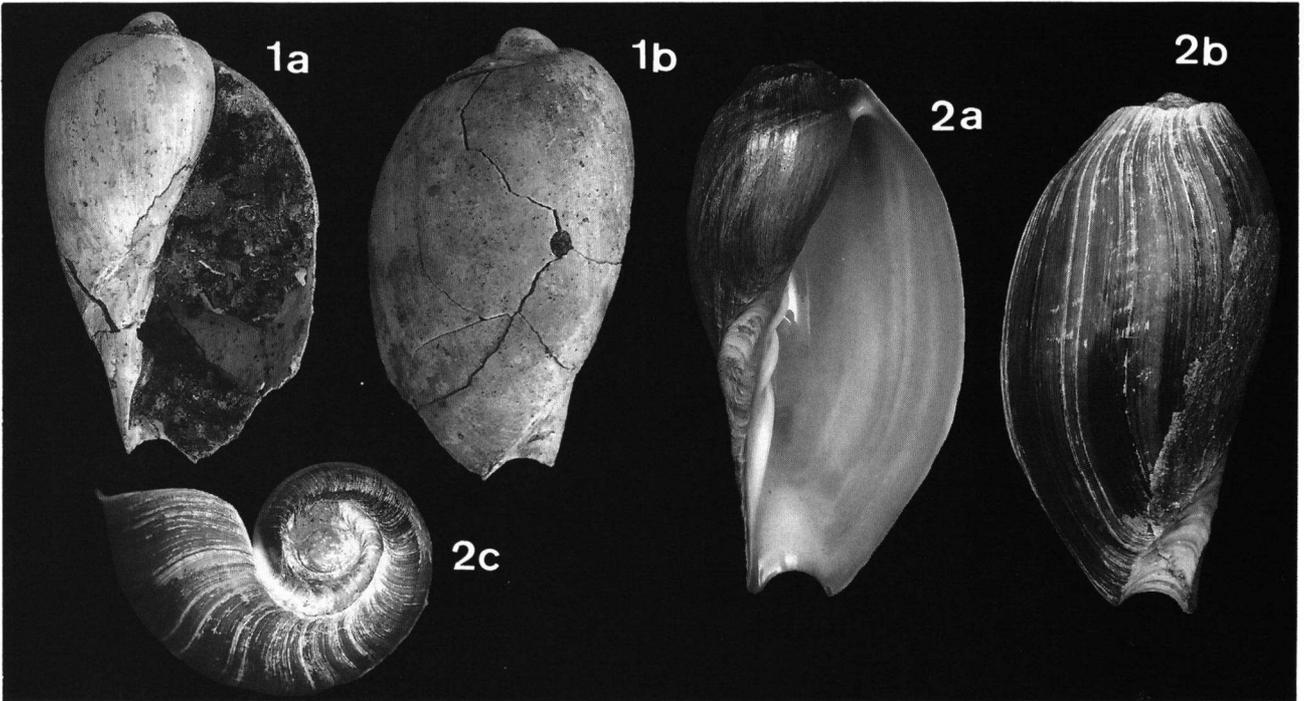
PLATE 3



#### PLATE 4

- Fig. 1. *Cymbium ibericum* sp. nov., JLVP Colln, Estepona (Málaga, Spain), Zanclean; apertural and dorsal views (both x 0.5), respectively (see also Pl. 3, Fig. 5).
- Fig. 2. *Cymbium fragile* Fittkau & Stuermer, 1985, KF Colln, Grand Lahou (Ivory Coast), at 30 m; apertural and dorsal (a, b: both x 0.5) and apical views (c, x 0.8).

PLATE 4



Specimen	Length (mm)	Width (mm)	Protoconch width (mm)	Remarks
<b>Holotype</b>	<b>92.8</b>	<b>57.3</b>	<b>11.7</b>	<b>Adult specimen</b>
<b>Paratype</b>	<b>92.1</b>	<b>65.9</b>	<b>11.2</b>	<b>Incomplete adult</b>
<b>Coll. BML sp. 1</b>	<b>91.0</b>	<b>55.7</b>	<b>10.5</b>	<b>Adult</b>
<b>Coll. BML sp. 2</b>	<b>99.2</b>	<b>64.8</b>	<b>10.4</b>	<b>Adult</b>
<b>Coll. BML sp. 3</b>	<b>65.3</b>	<b>49.7</b>	<b>10.1</b>	<b>Incompl. subadult</b>
<b>Coll. BML sp. 4</b>	<b>69.8</b>	<b>45.5</b>	<b>12.0</b>	<b>Incompl. subadult</b>
<b>Coll. MG sp. 1</b>	<b>93.3</b>	<b>64.1</b>	<b>10.5</b>	<b>Incompl. adult</b>
<b>Coll. MG sp. 2</b>	<b>71.2</b>	<b>41.7</b>	<b>10.6</b>	<b>Incompl. subadult</b>
<b>Coll. MG sp. 3</b>	<b>77.4</b>	<b>39.8</b>	<b>10.7</b>	<b>Incompl. subadult</b>
<b>Coll. JLVP</b>	<b>117.7</b>	<b>68.3</b>	<b>21.7</b>	<b>Adult</b>

Table 1. Dimensions of type and other material of *Cymbium ibericum* sp. nov. The types and specimens in the BML and MG collections are from Santa Catalina, locality 4 of Landau (1984), near Lucena del Puerto (Huelva, Spain), Arenas de Huelva Formation (Zanclean, Early Pliocene); the specimen in the JLVP Colln is from Estepona (Málaga, Spain), from the Zanclean conglomerate.

Specimen	Length (mm)	Width (mm)	Remarks
<i>Cymbium olla</i>	192	56	
<i>Cymbium gracilis</i>	109	87	= <i>C. marmoratus</i> ?
<i>Cymbium souliei</i>	92	50	= <i>C. cymbium</i> ?
<i>Cymbium marmoratus</i>	122	65	
<i>Cymbium patulum</i>	130	79	
<i>Cymbium pepo</i>	159	98	
<i>Cymbium glans</i>	149	78	
<i>Cymbium cucumis</i>	150	79	
<i>Cymbium cymbium</i>	125	64	
<i>Cymbium maroccanum</i>	144	57	
<i>Cymbium fragile</i>	104	54	

Table 2. Dimensions of extant species of the genus *Cymbium* illustrated herein (Pls 1-4).