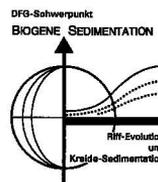


MARKUS WILMSEN & FRANK WIESE



The species *Scaphites bituberculatus*
SANTAMARIA-ZABALA, 1992 (Cretaceous
Ammonoidea) from the Upper Cenomanian
of Tagle (Cantabria, northern Spain):
geologic setting, paleontology,
and stratigraphic position

ABSTRACT: The heteromorphic ammonite *Scaphites bituberculatus* SANTAMARIA-ZABALA, 1992, is described from an Upper Cenomanian (*geslinianum* Zone) succession near the village of Tagle (Cantabria, northern Spain). Its second proof in Spain seems to confirm the validity of this possibly endemic species. Additionally, the lithology and microfacies as well as the bio- and sequence stratigraphy of the find interval are described.

INTRODUCTION

Though scaphitid ammonites are known to occur commonly in Upper Cretaceous strata in Spain, especially in the Campanian (WIEDMANN 1962, 1978; MARTINEZ 1982; KÜCHLER & KUTZ 1989; WIESE & *al.*, *this volume*), the record of mid-Cretaceous scaphitids in literature is poor. Compared with the vast amounts of ammonites collected the last decades by workers such as the late Jost WIEDMANN, even the number of documented *Scaphites* species is low and it appears that the genus was in fact extremely rare in Spain. Only one fragment of *Scaphites* cf. *obliquus* (SOWERBY) was figured by SANTAMARIA-ZABALA (1992, p. 233, Pl. 2, Fig. 11) from the Upper Cenomanian of Ganuza, Navarra. From the Santander area (Liencre, *comp.* Text-fig. 1), *Worthoceras vermiculus* (SHUMARD) and *Scaphites peroni* (PERVINQUIÈRE) were figured by WIESE & WILMSEN (1995, Pl. 1, Figs 5 and 8) from a mid-Cenomanian hardground. In the

Turonian, where heteromorphic ammonites showed peak endemism (WIEDMANN 1979, KLINGER & WIEDMANN 1983), only *Scaphites geinitzi* (D'ORBIGNY) (see SANTAMARIA-ZABALA 1992, p. 233, Fig. 10) and *Scaphites kieslingwaldensis* (LANGENHAN & GRUNDEY) (see KÜCHLER & ERNST 1989, p. 188, Pl. 2, Fig. 7) were reported from Navarra. In addition to these species that are to a different degree common in European areas north of Spain (France, Great Britain, Germany, Poland, Bohemia), SANTAMARIA-ZABALA (1992) erected the possibly endemic species *Scaphites bituberculatus* SANTAMARIA-ZABALA, 1992, for a bituberculate scaphitid, the holotype of which is an isolated body chamber from Upper Cenomanian strata of Ganuza, Navarra.

During summer fieldwork of 1995, another specimen of this rare species was collected from an Upper Cenomanian (*geslinianum* Zone) basinal marl/limestone succession near the small village of Tagle, northern Cantabria. Since it is an almost completely preserved specimen and only the second proof of this species in Spain, it is to be described in order to verify the species. Additionally, the lithofacies of the find interval with the associated ammonite fauna and its stratigraphic position are discussed.

GEOLOGIC SETTING

The study area is situated at the southern coast of the Bay of Biscay near the small villages of Suances and Tagle, approximately 20 km west of the Cantabrian capital Santander (Text-figs 1-2). It is part of the stable "Santander Block" (ENGESER & *al.* 1984), which is separated from the strongly subsiding Basco-Cantabrian Basin (BCB) in the east by the north/south trending "Rio Miera Flexure" (FEUILLÉE & RAT 1971). The Mesozoic and Cenozoic sedimentary cover of the Santander Block is comparably thin (2-3 km), whereas in some parts of the BCB more than 10 km

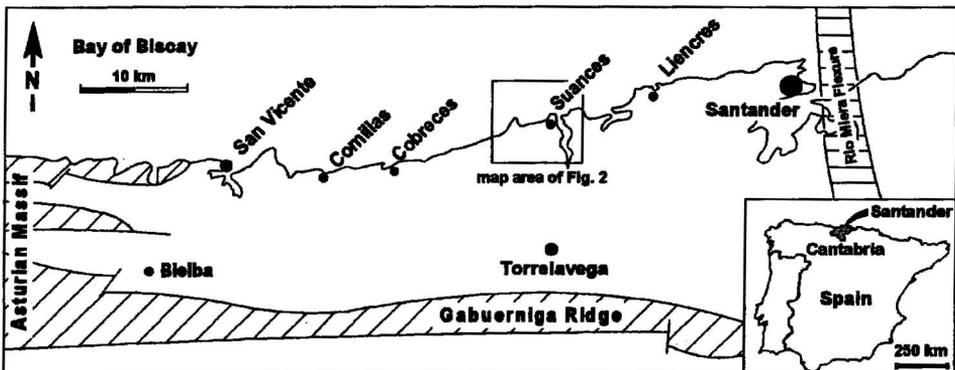


Fig. 1. Location of the study area in northern Spain

of sediment were accumulated (ENGESER & *al.* 1984). To the south, the study area is bordered by the east-west trending "Cabuerniga Ridge" (PUJALTE 1981), in the west it is confined to the Paleozoic Asturian Massif (*see* Text-fig. 1).

In the past, the structural and sedimentological history of the BCB was treated in great detail by numerous workers (*e.g.* WIEDMANN & *al.* 1983, ENGESER & *al.* 1984, FLOQUET 1991, GRÄFE 1994). Despite of the excellent coastal exposures, there are only limited publications on the sedimentary succession west of Santander. Apart from some papers on fossil occurrences (*e.g.* JIMENÉZ DE CISNEROS 1912; LAMBERT 1919, 1922), the first papers on the complete succession were published by MENGAUD (1920) and KARREBERG (1934). The Upper Cretaceous succession was the scope of the investigations of CARRERAS & RAMIREZ DEL POZO (1971) and GARCIA-MONDEJAR & PUJALTE (1982). However, the first detailed study of the Upper Cretaceous was given by WILMSEN & *al.* (1996).

THE SECTIONS OF THE TAGLE AREA

Four sections have been studied. They are located around the villages of Tagle and Suances (Text-fig. 2):

- 1 — Tagle West section,
- 2 — Tagle North section,
- 3 — "Pas du Chat" section (MENGAUD 1920),
- 4 — Cortiguera section.

These sections expose an approximately 15 m thick succession of gray marls, marly limestones and hard, brownish limestones (Text-fig. 3) that yielded abundant ammonites. Section 3 ("Pas du Chat") was mentioned by MENGAUD (1920) and FEUILLÉE (1967, 1971), whereas KARREBERG (1934, 1935) described some ammonites from the nearby section 1. The investigated strata overlie an approximately 100 m thick unit of yellow to brownish calcarenites. These limestones are known as the "Altamira-Formation" ("Calcaires roux d'Altamira", FEUILLÉE 1967; "Formación de Altamira", GARCIA-MONDEJAR & PUJALTE 1982) and are mapped with the signature C23/21 in the geologic maps of Cantabria (IGME 1976).

The lithofacies development in any of the four sections is very similar with a small increase in thickness from north to south. The succession starts with marls and thin limestone beds, which are overlain by two to three metres of hard, brownish limestone beds. These well-bedded limestones bear abundant limonitized intra- and bioclasts; they become more nodular upsection. The next eight meters are composed of gray marls, marly limestones and thin beds of the *Thalassinoides*-generated limestone

nodules. The succession is terminated by a distinct level of bioclastic limestones, containing up to 50% glauconite and glauconitic lithoclasts. Upsection, the glauconite content decreases rapidly and an alternation of marls and marly limestones is developed. According to lithology, microfacies, faunal content and paleogeographic reconstructions, the depositional environment of the sediments was a basinal setting.

Two distinct erosion surfaces are developed, which are interpreted as sequence boundaries (WILMSEN 1996, and *in prep.*). A sequence stratigraphic interpretation is given in Text-fig. 3.

BIOSTRATIGRAPHY

The early studies (MENGAUD 1920; KARREBERG 1934, 1935; FEUILLÉE 1967, 1971) record abundant Middle to Late Cenomanian ammonites from the working area. These records were unfortunately not referred to any section or distinct level. However, detailed measuring of the four investigated sections and careful collecting bed by bed enabled us to erect a precise biostratigraphic subdivision by means of ammonites and inoceramids.

Few meters below the first erosion surface *Calycocheras* (*Newboldiceras*) *asiaticum asiaticum* (JIMBO) was found (Text-fig. 3). In parallel sections (WILMSEN, *in prep.*), *Acanthoceras jukesbrownei* (SPATH) occurs in this interval, suggesting a late Middle Cenomanian age (the *jukesbrownei* Zone). About 50 cm below the first erosion surface,

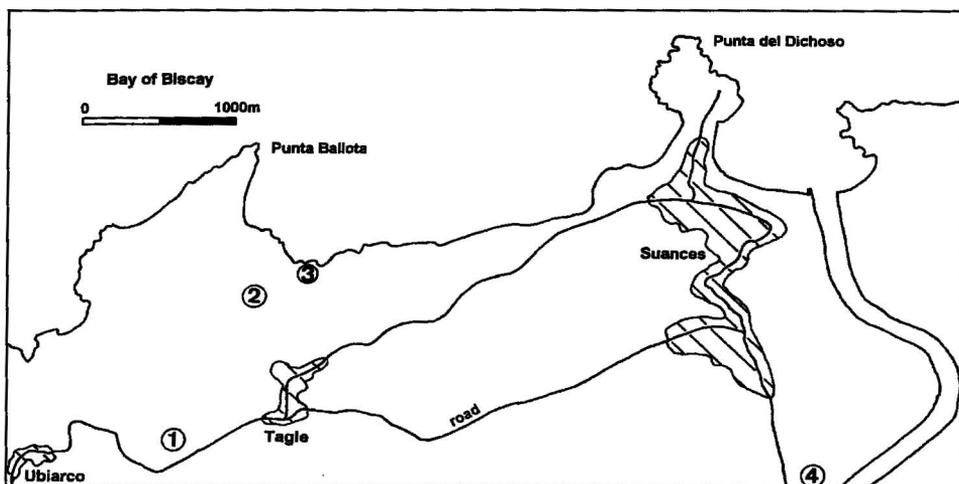


Fig. 2. Location of the four studied sections in the Tagle/Suances area, west of Santander

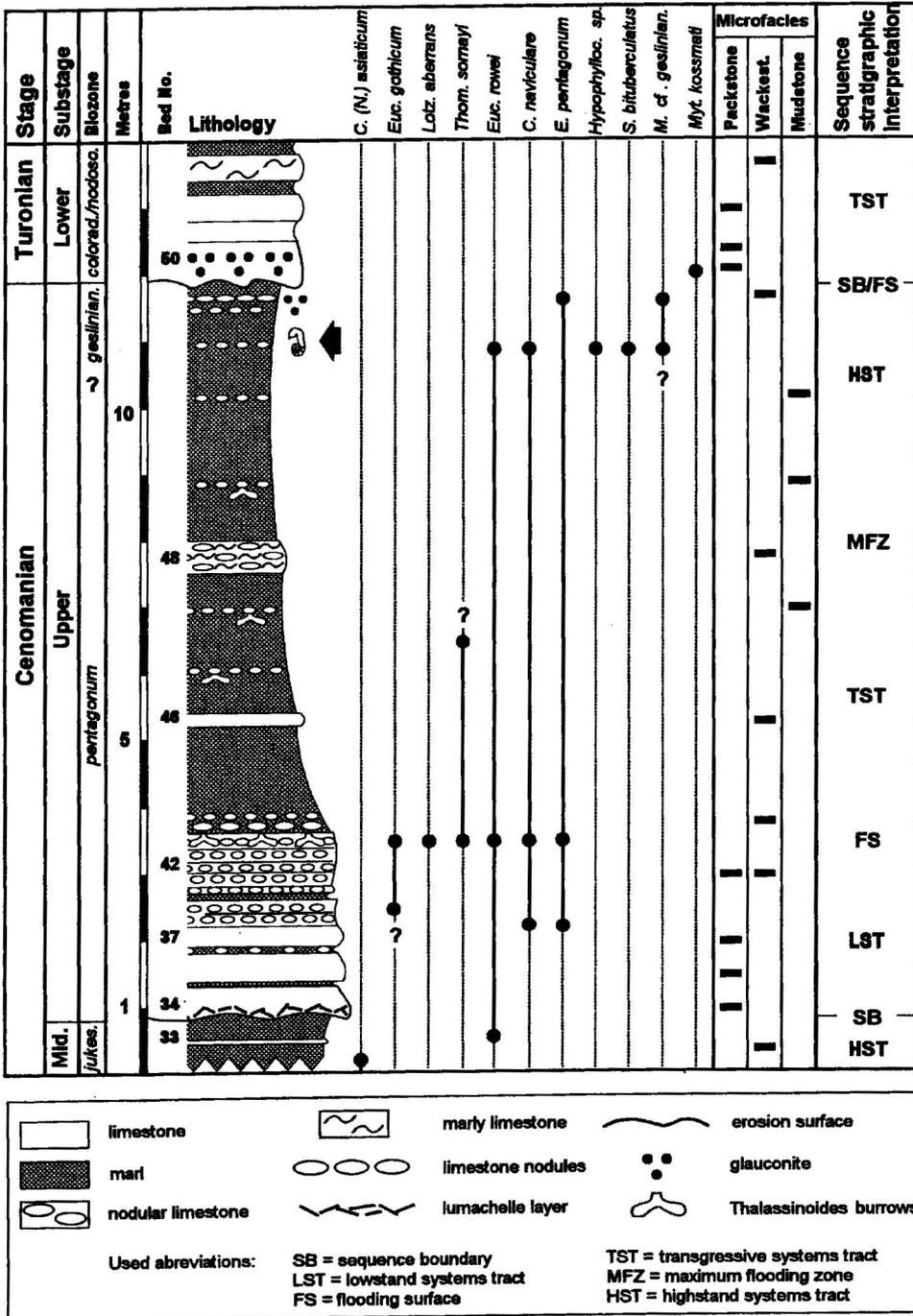


Fig. 3. The Tagle West section (no. 1 in Text-fig. 2) with stratigraphic ranges of ammonites, microfacies analysis, and sequence stratigraphic interpretation; arrowed is the find-layer of *Scaphites bituberculatus* SANTAMARIA-ZABALA, 1992

some specimens of *Eucalycoceras rowei* (SPATH) were found. According to WRIGHT & KENNEDY (1990), KENNEDY & JUIGNET (1994), and SANTAMARIA-ZABALA (1992), this would indicate a Late Cenomanian age at this level. WIEDMANN (1979) and WIEDMANN & *al.* (1989) recorded *E. rowei* already in the higher part of the *jukesbrownei* Zone in northern Spain and northwestern Germany. Since unequivocal Late Cenomanian ammonites occur in great abundance immediately above the erosion surface (Text-fig. 3), the Middle/Late Cenomanian boundary is placed at the level of the erosion surface. This is also suggested by correlation with other sections (WILMSEN, *in prep.*). The list of the ammonites include *Eucalycoceras rowei* (SPATH) (Pl. 1, Fig. 3), *Eucalycoceras gothicum* (KOSSMAT) (Pl. 2, Fig. 1), *Lotzeites aberrans* (KOSSMAT) (Pl. 2, Fig. 2), *Thomelites sornayi* (THOMEL), *Calycoceras naviculare* (MANTELL), and *Eucalycoceras pentagonum* (JUKES-BROWNE) (Pl. 1, Fig. 2). This assemblage indicates the lower part of the early Late Cenomanian *pentagonum* Zone (= *guerangeri* Zone). The ammonites are especially abundant at a level at the top of the brownish limestone interval, which is interpreted as a flooding surface. In the succeeding marls and nodular limestones, ammonites are rare. At the top of the succession, just below the second erosion surface, the number of ammonites increases again and *Metoicoceras cf. geslinianum* (D'ORBIGNY) (Pl. 2, Fig. 3) enters, showing an overlap with *C. naviculare*, *E. rowei*, and *E. pentagonum* at that level. This places the topmost part of the succession in the *geslinianum* Zone of the higher Late Cenomanian. KARRENBERG (1934, 1935) recorded *Metoicoceras swallovi* (SHUMARD) from this interval. This species falls into the synonymy of *M. geslinianum* (WRIGHT & KENNEDY 1981). In this level *Scaphites bituberculatus* SANTAMARIA-ZABALA has been found (*see* Text-fig. 3).

The glauconitic limestones above the erosion surface yielded *Mytiloides kossmati* (HEINZ), a species that has its first occurrence in the middle part of the Early Turonian *coloradoense* Zone (WALASZCZYK 1992). This suggests that the *juddii* Zone of the latest Cenomanian and at least the lower part of the Early Turonian *coloradoense* Zone are missing (WILMSEN 1996; WIESE, *in prep.*).

In the Cenomanian part of the section, the European standard ammonite zones can be recognized (*see* KENNEDY 1984, 1985; HANCOCK 1991).

LOCATION OF SPECIMENS

All figured specimens are deposited at the *Naturkunde Museum* in Berlin.

SYSTEMATIC ACCOUNT

Order **Ammonoidea** ZITTEL, 1884
Suborder **Ancyloceratina** WIEDMANN, 1960
Superfamily **Scaphitaceae** GILL, 1871
Family **Scaphitidae** GILL, 1871
Genus *Scaphites* PARKINSON, 1911

TYPE SPECIES: *Scaphites equalis* SOWERBY (1818; p. 53, Pl. 18, Figs 1-3)

Subgenus *Scaphites* PARKINSON, 1911

Scaphites (Scaphites) bituberculatus SANTAMARIA-ZABALA, 1992
(Pl. 1, Figs 1a-1c)

1992. *Scaphites (Scaphites) bituberculatus*; R. SANTAMARIA-ZABALA, p. 233, Pl. 2, Fig. 9.

HOLOTYPE: The holotype of this species is specimen No. 47.881 from Ganuza (Navarra, northern Spain), section GANUZA-GO, nivel 6 *sensu* SANTAMARIA-ZABALA 1992 (Upper Cenomanian).

MATERIAL: One specimen from Tagle, uppermost part of Unit 49 (Text-fig. 3); Upper Cenomanian, *geslinianum* Zone, Cantabria, northern Spain. It is deposited at the *Naturkunde Museum* in Berlin under the registration number MB. C. 1885.

DESCRIPTION: The find is a complete specimen (size of the adult shell 30 mm). One side is almost completely preserved, the other side shows strong corrosion. There is almost no evidence for compaction. Relicts of the suture are visible but the poor preservation does not permit any analysis. The spire shows moderate involution and is more compressed than depressed. The whorl section in the intercostal space is oval with maximum breadth in the upper third, the costal section is almost subrectangular with maximum breadth at the ventrolateral shoulders. The venter is flat to broadly rounded.

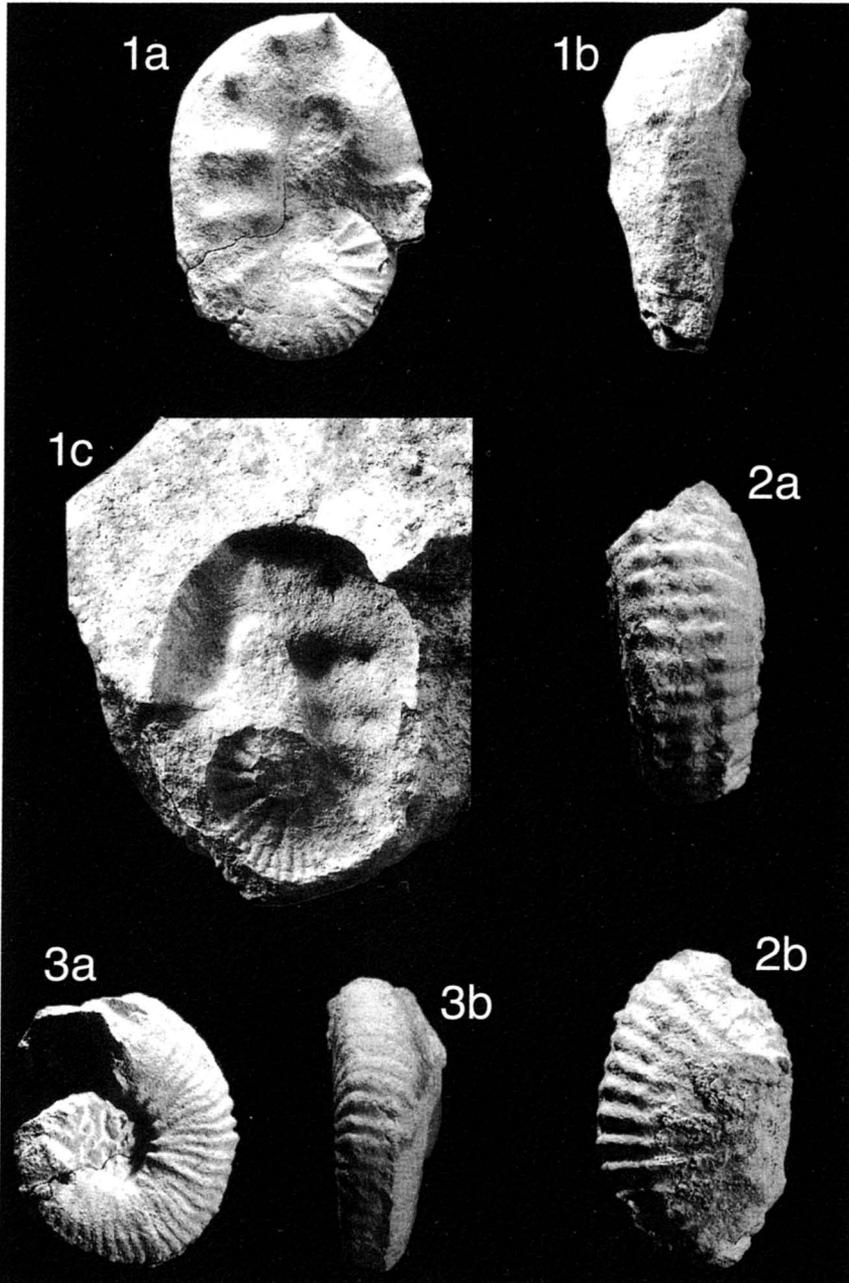
From the umbilicus, strong rectiradiate to slightly rursiradiate primary ribs arise (7 per half whorl) which are transverse or slightly bent backwards on the venter. Bifurcation of the primaries starts between mid-flank and ventrolateral shoulders (Pl. 1, Figs 1 and 3), where first two, towards the end of the phragmocone three secondaries intercalate. With the beginning of the body chamber, ventrolateral and umbilical rows of tubercle develop. The latter has strong, bullate tubercles that give rise to one straight, simple rib. They terminate in the ventrolateral tubercles which become increasingly spinose. In that state, there are three primary ribs on the shaft, the strength of which decrease markedly when crossing the venter and no differences to the secondaries can be seen, which now only arise at the umbilical shoulder. On the hook, the umbilical tubercles disappear and are substituted by one broad bulge from which single, weak ribs arise. Whether or not ventrolateral tubercles are still present cannot be said since the venter of the terminal body chamber is not preserved. It appears that the body chamber is terminated by a marked constriction. Lappets are not preserved.

DISCUSSION: The specimen from Tagle is very distinct from all other Cenomanian scaphitids by the presence of the very prominent umbilical and ventrolateral tubercles. The only similar species is *S. bituberculatus* from Ganuza, Navarra (Spain). SANTAMARIA-ZABALA (1992) erected this species on one isolated body chamber. However, he was not entirely

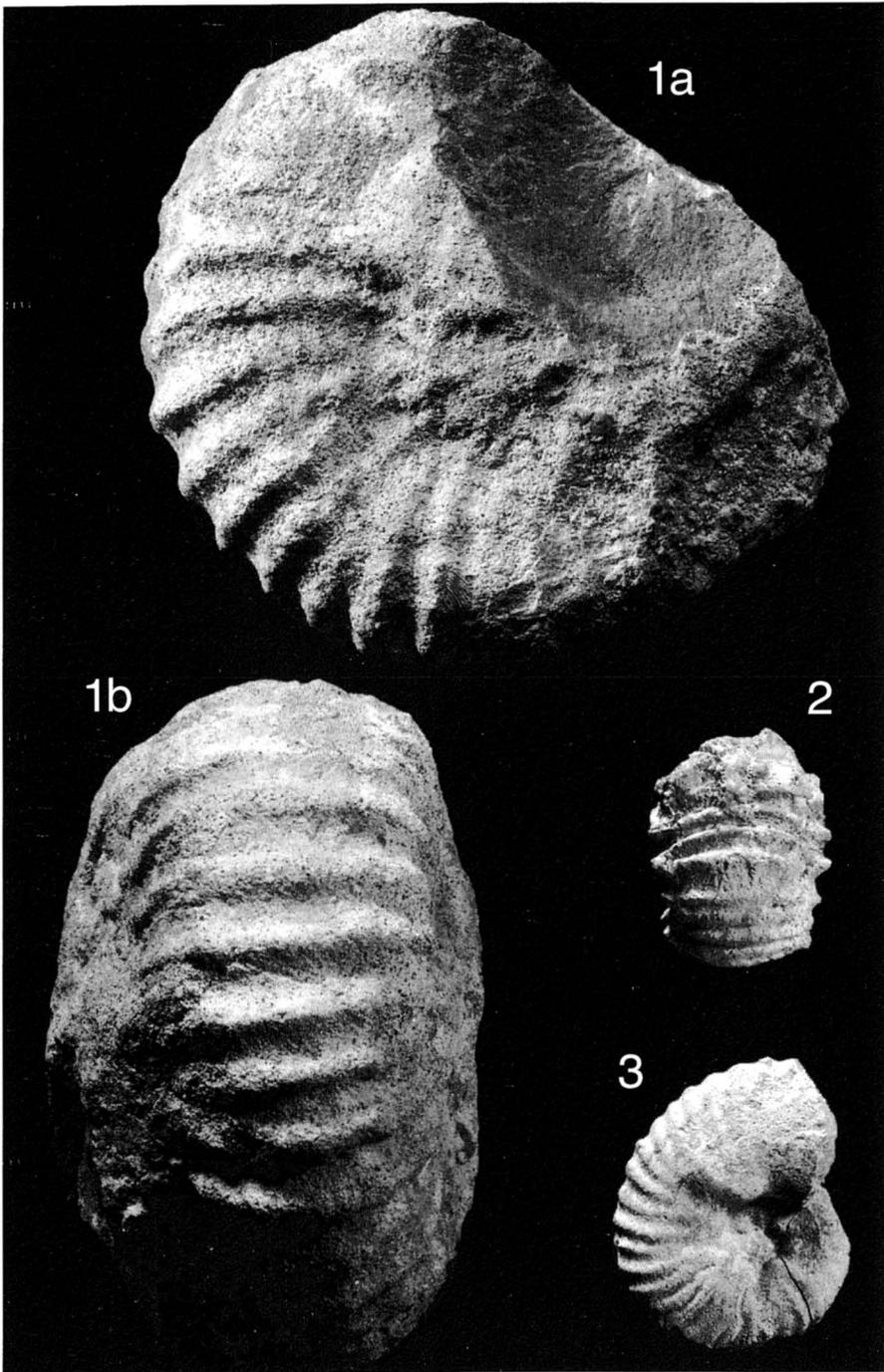
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- 1 — *Scaphites bituberculatus* SANTAMARIA-ZABALA, 1992; Specimen No. MB. C. 1885;
1a — side view, **1b** — ventral view, **1c** — external mold; $\times 1.5$
- 2 — *Eucalycoceras pentagonum* (JUKES-BROWNE, 1896); Specimen No. MB. C. 1887;
2a — ventral view, **2b** — side view; nat. size
- 3 — *Eucalycoceras rowei* (SPATH, 1926); Specimen No. MB. C. 1886; **3a** — side view,
3b — ventral view; nat. size



1 — *Eucalycoceras gothicum* (KOSSMAT, 1895); 1a — side view, 1b — venter view of the specimen MB. C. 1888

2 — *Lotzeitites aberrans* (KOSSMAT, 1895); venter of the specimen MB. C. 1889

3 — *Metoicoceras* cf. *geslinianum* (D'ORBIGNY, 1850); side view of the specimen MB. C. 1890

All figures in natural size