Additional records of scaphitid ammonites from the basal upper Maastrichtian (Upper Cretaceous) of eastern Poland

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Abstract

New records of rare and/or poorly known scaphitid ammonites are presented from the basal upper Maastrichtian (Upper Cretaceous) white chalk exposed at Chełm quarry, Lublin Upland (eastern Poland). The described and illustrated material comprises four specimens, all preserved as composite moulds, and includes a well-preserved microconch of *Hoploscaphites schmidi* (BIRKELUND, 1982), fragmentary specimens of *H. felderi* KENNEDY, 1987 and *Acanthoscaphites* (*Euroscaphites*) *varians blaszkiewiczi* JAGT, KENNEDY & MACHALSKI, 1999, as well as a pathological macroconch of *Hoploscaphites constrictus lvivensis* MACHALSKI, 2005b.

Keywords: Ammonoidea, Scaphitidae, taxonomy, white chalk, Maastrichtian, Poland.

Résumé

Les auteurs présentent de nouvelles observations d'ammonites Scaphitidae provenant de la craie blanche du Maastrichtien supérieur basal exposée dans la carrière de Chełm, Lublin Upland (Pologne orientale). Le matériel décrit et illustré se compose de quatre spécimens, tous préservés à l'état de moules composites, et comprend une microconch bien conservée de *Hoploscaphites schmidi* (BIRKELUND, 1982), des spécimens fragmentaires de *H. felderi* KENNEDY, 1987 et de *Acanthoscaphites* (*Euroscaphites*) *varians blaszkiewiczi* JAGT, KENNEDY & MACHALSKI, 1999, ainsi qu'une macroconche pathologique de *Hoploscaphites constrictus lvivensis* MACHALSKI, 2005b.

Mots-clefs: Ammonoidea, Scaphitidae, taxinomie, craie blanche, Maastrichtien, Pologne.

Introduction

Scaphitids are an important component of Maastrichtian ammonite faunas in central Europe. However, despite recent progress in their study (*e.g.*, JAGT, 2002; NIEBUHR, 2003; MACHALSKI, 2005a, b; JAGT-YAZYKOVA & JAGT, 2006, 2007; MACHALSKI *et al.*, 2007), some taxa remain poorly known. This is due mainly to the limited number of specimens available and/or their poor state of preservation.

The aim of the present note is to record new finds of hitherto poorly-known scaphitids from the basal upper Maastrichtian white chalk succession exposed at Chełm quarry in the Lublin Upland (eastern Poland). All material was collected by one of us (ZD) during fieldwork in 2007 and is now housed in the collections of the Museum of the Department of Geology of Warsaw University (MWGUW).

Other abbreviations used in the text to denote repositories of material referred to include: IRScNB – Institut royal des Sciences naturelles de Belgique, Brussels; MGUH – Geological Museum, Copenhagen University, Copenhagen; NHMM – Natuurhistorisch Museum Maastricht, Maastricht; NLfB – Niedersächsisches Landesamt für Bodenforschung, Hannover; ZPAL – Polska Akademia Nauk, Instytut Paleobiologii, Warszawa.

Provenance of material

The scaphitid material described below was collected at a large quarry situated near the town of Chełm, Lublin Upland, eastern Poland (locality 6 of MACHALSKI, 2005b, fig. 1B); all specimens are preserved as composite moulds. The white chalk succession at Chełm, *c.* 40 metres in overall thickness, is well exposed along four exploitation levels, each comprising *c.* 10 metres of chalk and labelled levels V to II, in ascending order. Level I has since been entirely excavated.

All scaphitids described below were collected from level V.

In addition to scaphitid ammonites, as described by MACHALSKI (2005b) and in the present note, the Chełm chalk succession has yielded irregular and regular echinoids, brachiopods, cirripedes and rare belemnite guards, the latter including *Belemnitella junior* NOWAK, 1913 from levels III and V (part of the material identified by the late W.K. Christensen, and part by one of us, ZD). Bivalves are not uncommon, *Spyridoceramus tegulatus* (VON HAGENOW, 1842) being the single species of inoceramid to have been documented from levels III, IV and V (ABDEL-GAWAD, 1986; I. WALASZCZYK, pers. comm., 2007).

On the basis of foraminifera, a 'mid-late Maastrichtian age' was suggested for the Chełm succession (ALEXANDROWICZ, 1977). The co-occurrence of *Spyridoceramus tegulatus* and *Belemnitella junior* suggests correlation of levels V to III at Chełm with the basal upper Maastrichtian *tegulatus/junior* Zone of the Hemmoor subdivision as presented by SCHULZ & SCHMID (1983), CHRISTENSEN *et al.* (2004) and SCHMID *et al.* (2004).

Systematic palaeontology

Family Scaphitidae GILL, 1871
Genus *Hoploscaphites* NOWAK, 1911

Type species: *Ammonites constrictus* J. SOWERBY, 1817, by original designation.

Hoploscaphites schmidi (BIRKELUND, 1982)
Pl. 1, Figs 1-4

1932 — cf. *Acanthoscaphites tridens* KNER var. *trinodosus* NOWAK – WOLANSKY, p. 10 (*partim*), pl. 1, fig. 11; *non* pl. 2, fig. 4 (= *Acanthoscaphites* ex gr. *tridens*).
1982 — *Acanthoscaphites schmidi* BIRKELUND, p. 17, pl. 1, figs 7-9.
1982 — ?*Acanthoscaphites schmidi* BIRKELUND, p. 18, pl. 1, fig. 10; pl. 2, figs 1-4.
1982 — *Hoploscaphites constrictus* (SOWERBY, 1818) [*sic*] – BIRKELUND, p. 19 (*partim*), pl. 3, fig. 12 (*non* pl. 3, figs 1-11, 13, 14 = *Hoploscaphites constrictus*).
1982 — *Acanthoscaphites varians* (ŁOPUSKI, 1911) – BIRKELUND, p. 16 (*partim*), pl. 1, fig. 6 (non pl. 1, fig. 4 = *Hoploscaphites* ex gr. *pungens-schmidi*; *non* pl. 1, fig. 5 = *Acanthoscaphites* (*Euroscaphites*) *varians blaszkiewiczi*).
2005b — *Hoploscaphites schmidi* (BIRKELUND, 1982) – MACHALSKI, p. 676, figs 14A, C, E-H, 15, 16A, 17C, D.

Type

Holotype is NLfB kma 181 from the lower upper Maastrichtian at Hemmoor, northern Germany (BIRKELUND, 1982, p. 17, pl. 1, figs 7-9; reillustrated by MACHALSKI, 2005b, fig. 16A$_1$, A$_2$).

Material

A single specimen (MWGUW 009663) from level V at Chełm quarry, plus a cast of the holotype for comparison.

Description and discussion

The holotype is an adult microconch 46 mm in length, described in detail by BIRKELUND (1982). MWGUW 009663 is a microconch as well, which is indicated by the concave umbilical wall and the low whorl of the shaft, these being typical features of scaphitid microconchs (see *e.g.*, MAKOWSKI, 1962; LANDMAN & WAAGE, 1993; MACHALSKI, 2005b). It measures 58 mm in length, and is thus considerably larger than the holotype. In fact, MWGUW 009663 constitutes the largest known microconch of this species and the third one on record to date. Other microconch records are those from Hemmoor, and a problematic individual (ZPAL Am. 12/97) from Albrychtówka, close to Kazimierz Dolny (Middle Vistula River section, central Poland; see MACHALSKI, 2005b, p. 677, fig. 16B). All other material currently referred to *H. schmidi* comprises macroconchs, from northern Germany, Denmark and Poland (MACHALSKI, 2005b). As far as overall shape and ornament are concerned, MWGUW 009663 is essentially a larger copy of the holotype. It should be stressed, however, that the distance between the dorsal wall of the hook and the venter of the spire is relatively greater than that in the holotype (see Pl. 1, Fig. 4).

Hoploscaphites schmidi is a close ally of *H. pungens* (BINKHORST VAN DEN BINKHORST, 1861), originally recorded from the Kunrade limestone facies (Maastricht Formation) in southern Limburg, The Netherlands (BIRKELUND, 1982; KENNEDY, 1987; JAGT, 1995). The latter species is known almost exclusively from microconchs, which usually are larger than, but similar in overall proportions and style of ornament, to those of *H. schmidi* (see KENNEDY, 1987). However, the outer lateral tubercles (*sensu* MACHALSKI, 2005b, fig. 4A; inner ventrolaterals *sensu* KENNEDY, 1987) on the spire of *H. schmidi* are weak and bullate rather than strong and tuberculate as in *H. pungens*. Moreover, ventrolateral tubercles on the body chamber efface some distance away from the aperture in all available microconchs of *H. schmidi,* whereas they seem to continue right up to the aperture in all microconchs of *H. pungens* known to date which are complete and/or preserved well enough for this character to be evaluated.

Stratigraphic and geographic range
Upper lower and/or lower upper Maastrichtian of northern Germany (*tegulatus/junior* and *argentea/junior* zones), Denmark (*tenuicostata-semiglobularis* Zone or *semiglobularis-humboldtii* Zone) and eastern and ?central Poland (*tegulatus/junior* Zone). Reference is made to MACHALSKI *et al.* (2007, fig. 2) for the most recent compilation of the various biostratigraphic schemes for the European Maastrichtian.

Hoploscaphites felderi KENNEDY, 1987
Pl. 1, Fig. 6

1861 — *Ammonites Decheni* BINKHORST VAN DEN BINKHORST, p. 30, pl. 5a, fig. 15a-e.
1908 — *Scaphites* cf. *roemeri* D'ORBIGNY – DE GROSSOUVRE, p. 35, pl. 10, figs 1-3.
1987 — *Hoploscaphites felderi* KENNEDY, p. 203, text-fig. 13c; pl. 27, fig. 1; pl. 33, figs 1-15; pl. 34, figs 7-11, 13-17.
1993 — *Hoploscaphites tenuistriatus* (KNER, 1848) – BIRKELUND, p. 59 (*partim*), pl. 14, fig. 14 (*non* pl. 14, figs 8-11, 15, 16 = *Hoploscaphites tenuistriatus*; *non* pl. 14, fig. 13 = *Hoploscaphites* sp.).
1995 — *Hoploscaphites felderi* KENNEDY, 1987 – JAGT, p. 30, pl. 6, figs 3-6; pl. 7, figs 3, 4, 10-12.
2005b — *Hoploscaphites felderi* KENNEDY, 1987 – MACHALSKI, p. 679, fig. 19.

Type
Holotype is IRScNB 9483, the original of DE GROSSOUVRE (1908, pl. 10, fig. 1a-c) from the upper Maastrichtian Kunrade limestone facies (Maastricht Formation), southern Limburg, the Netherlands, and reillustrated by KENNEDY (1987, pl. 27, fig. 1).

Material

A single individual (MWGUW 009665a, b), preserved in two parts, from level V at Chełm quarry, plus a second specimen from Chełm (ZPAL Am. 12/710) for comparison.

Description and discussion
As yet, no body chambers are known of this species, which is characterised by a compressed whorl section, flattened flanks, distinctive ornament and intricately subdivided suture (KENNEDY, 1987; JAGT, 1995; MACHALSKI, 2005b).

MWGUW 009665a, b also is an incomplete phragmocone, 31 mm in maximum preserved diameter. It shows the same ornament as other specimens of the species (see MACHALSKI, 2005b for an overview). The diffuse character of the adapertural part of this individual (Pl. 1, Fig. 6) lends some support to speculations that the body chamber of *H. felderi* was either very thin or weakly calcified and thus prone to *post mortem* destruction (MACHALSKI, 2005b, p. 680).

The only other specimen of *H. felderi* recorded so far from Chełm is ZPAL Am. 12/710 (see MACHALSKI, 2005b, fig. 19D), from level III. This also is an incomplete spire, 25 mm in maximum preserved diameter, and it reveals a more distinct ornament than MWGUW 009665a, b.

Stratigraphic and geographic range
Upper lower and/or lower upper Maastrichtian of northeast Belgium (province of Liège) and southern Limburg, The Netherlands (*Belemnitella junior* Zone of authors), Denmark (*semiglobularis-humboldtii* Zone and possibly *tenuicostata-semiglobularis* Zone), and Poland (*tegulatus/junior* and *Belemnella kazimiroviensis* zones).

Genus *Acanthoscaphites* NOWAK, 1911

Type species: *Scaphites tridens* KNER, 1848, by subsequent designation of DIENER (1925).

Discussion
Following KENNEDY & SUMMESBERGER (1987) and JAGT *et al.* (1999), the presence of distinct ventral (siphonal) tubercles is accepted here as a diagnostic feature of the genus (compare MACHALSKI, 2005b).

Subgenus *Acanthoscaphites* (*Euroscaphites*) JAGT, KENNEDY & MACHALSKI, 1999

Type species: *Scaphites varians* ŁOPUSKI, 1911, p. 120, pl. 4, figs 1-3, by original designation.

Acanthoscaphites* (*Euroscaphites*) *varians blaszkiewiczi JAGT, KENNEDY & MACHALSKI, 1999
Pl. 1, Fig. 5

1965 — *Acanthoscaphites tridens varians* (ŁOPUSKI) – SCHMID, p. 684, pl. 62, fig. 1; pl. 63, figs 1-3.
1982 — *Acanthoscaphites varians* (ŁOPUSKI) – BIRKELUND, p. 16 (*partim*), pl. 1, fig. 5 (*non* pl. 1, fig. 4 = *Hoploscaphites* ex gr. *pungens-schmidi*; *non* pl. 1, fig. 6 = *Hoploscaphites schmidi*).
?1986 — *Acanthoscaphites* cf. *verneuilianus* (D'ORBIGNY, 1841) – KENNEDY, p. 74, pl. 16, figs 20, 21.
1989 — *Acanthoscaphites varians* (ŁOPUSKI, 1911) – JAGT & KENNEDY, p. 238, figs 1-3.

1993 — *Acanthoscaphites varians* (ŁOPUSKI, 1911) – BIRKELUND, p. 56 (*partim*), pl. 9, figs 3, 4, 6, 7; pl. 10, fig. 3 (*non* pl. 9, fig. 5; pl. 10, fig. 2 = *Acanthoscaphites verneuilianus*).

1999 — *Acanthoscaphites* (*Euroscaphites*) *varians blaszkiewiczi* JAGT *et al.*, p. 139 (*partim*), text-figs 5, 6; pl. 8, figs 2-4, 6 (*non* pl. 8, figs 1, 5 = *Acanthoscaphites verneuilianus*).

non 2002 — *Acanthoscaphites varians* (ŁOPUSKI, 1911) – REICH & FRENZEL, p. 146, pl. 23, fig. 1a, b (= *Acanthoscaphites* sp. aff. *verneuilianus*).

2005 — *Acanthoscaphites* (*Euroscaphites*) *varians blaszkiewiczi* JAGT, KENNEDY, and MACHALSKI, 1999 – MACHALSKI, p. 684, figs 22A, 23, 24, 25C, E.

Type

The specimen illustrated by BIRKELUND (1993, pl. 10, fig. 3) from the upper lower or lower upper Maastrichtian of Rørdal, Jylland (northern Denmark), is the holotype (see also MACHALSKI, 2005b, fig. 22A). It was numbered MGUH 20129A by MACHALSKI (2005b) to avoid confusion, as two specimens referred to *Acanthoscaphites varians* by BIRKELUND (1993) bore the same registration number, MGUH 20129 (BIRKELUND, 1993, pl. 9, fig. 7; pl. 10, fig. 3).

Material

A single specimen (MWGUW 009664) from level V at Chełm quarry, plus a comparative specimen (ZPAL Am. 12/372) from the same locality.

Description and discussion

According to JAGT *et al.* (1999), the present subspecies differs from the chronologically later subspecies, *A.* (*E.*) *v. varians*, in retaining multiple tuberculation on macroconch body chambers, especially the ventral row and two rows of outer flank tubercles (see MACHALSKI, 2005b, fig. 22A, B). Only on the youngest parts of the body chamber in specimens from Denmark has the loss of some rows of tubercles been observed (BIRKELUND, 1993; JAGT *et al.*, 1999; MACHALSKI, 2005b, fig. 22A). MWGUW 009664 represents a flank sector of the body chamber, presumably of a macroconch, with nearly straight, rather coarse primary and secondary ribs and up to four longitudinal rows of tubercles. In this respect it is very close to the relevant portion of the specimen figured in pl. 9, fig. 7 by BIRKELUND (1993), which is from the upper lower or lower upper Maastrichtian of Rørdal, Jylland (northern Denmark).

The only specimen from Poland previously assigned to *A.* (*E.*) *v. blaszkiewiczi* is a fragment of a body chamber (ZPA. Am. 12/372) from level III at Chełm quarry. It belonged to a large specimen, also thought to be a macroconch, and shows four distinct tubercles arranged in two rows (MACHALSKI, 2005b, p. 685).

Stratigraphic and geographic range

Upper lower and/or lower upper Maastrichtian of northern Germany (*Belemnella cimbrica* to *argentea/junior* zones), northeast Belgium, province of Liège (‘*Inoceramus*’ *morgani* Zone), Denmark (*tenuicostata-semiglobularis* and *semiglobularis-humboldtii* zones) and Poland (*tegulatus/junior* Zone).

Pathological scaphitid from Chełm

In view of the fact that records of pathological scaphitids from Europe are scant in comparison to North America (LANDMAN & WAAGE, 1986, 1993), we here also illustrate a macroconch of *Hoploscaphites constrictus lvivensis* MACHALSKI, 2005b (Fig. 1) from level V at Chełm quarry (MWGUW 009666). It measures 53 mm in length, and does not differ from normal specimens of this (temporal) subspecies, except for the presence of a double row of ventrolateral tubercles. A closely similar macroconch, referable to *H. constrictus johnjagti* MACHALSKI, 2005b, is known from the upper Meerssen Member, Maastricht Formation (upper Maastrichtian;

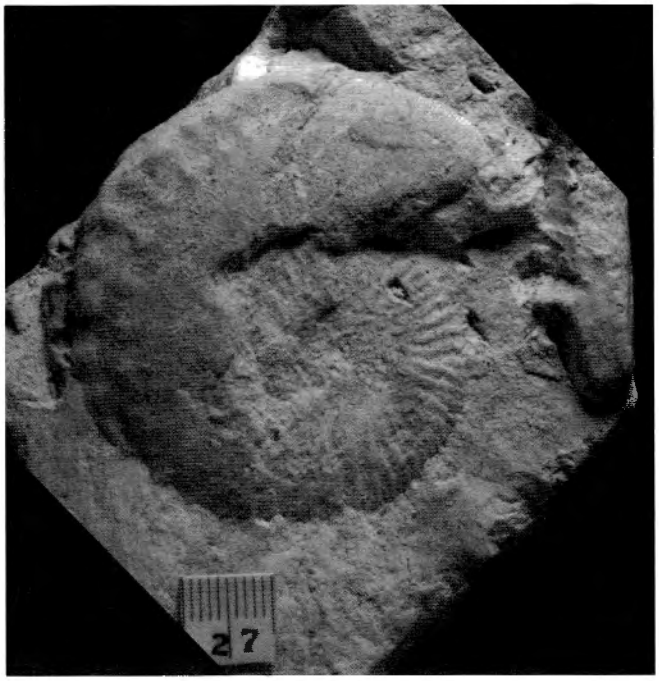

Fig. 1 — Pathological macroconch, in composite mould preservation, of *Hoploscaphites constrictus lvivensis* MACHALSKI, 2005b (MWGUW 009666), from level V at Chełm quarry, lower upper Maastrichtian. Scale bar in millimetres.

see JAGT, 1995, pl. 7, figs 13, 14); additional pathological scaphitids from the Maastrichtian type area were illustrated by VAN DER TUUK (1987).

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Explanation of the plate

PLATE 1

Rare and/or poorly known scaphitid ammonites, all in composite mould preservation, from level V (basal upper Maastrichtian) at Chełm quarry, Lublin Upland (eastern Poland). Scale bars equals 10 mm.

Figs 1-4 — *Hoploscaphites schmidi* (BIRKELUND, 1982), microconch (MWGUW 009663).
Fig. 5 — *Acanthoscaphites* (*Euroscaphites*) *varians blaszkiewiczi* JAGT, KENNEDY & MACHALSKI, 1999, fragmentary ?macroconch (MWGUW 009664).
Fig. 6 — *Hoploscaphites felderi* KENNEDY, 1987, incomplete spire (MWGUW 009665a, b).

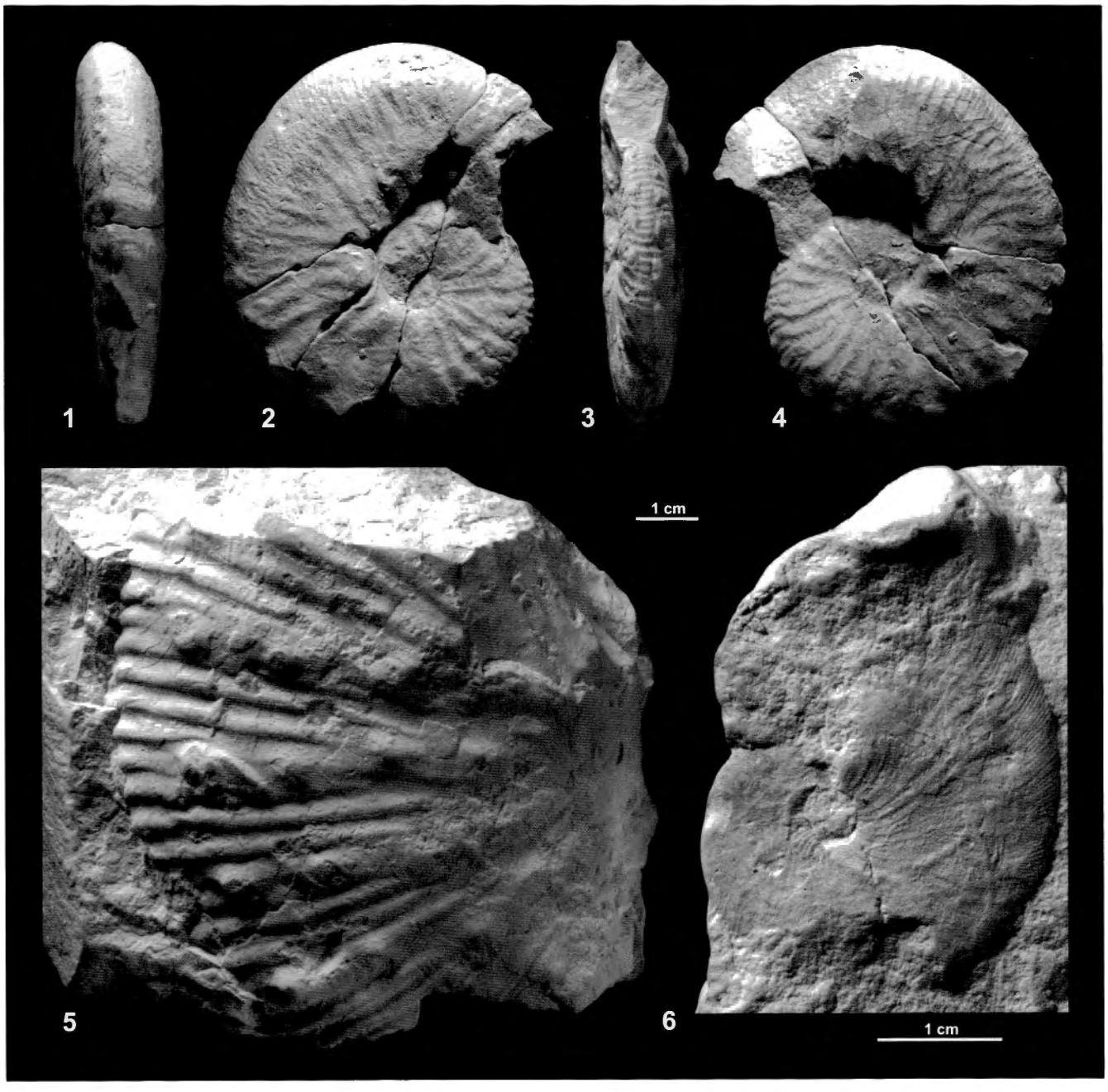

PLATE 1