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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;

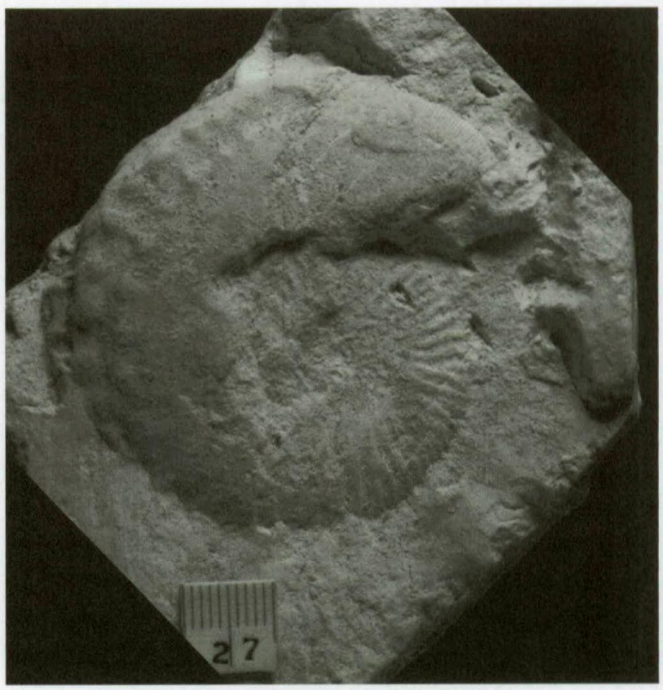

Fig. 1 — Pathological macroconch, in composite mould preservation, of *Hoploscaphites constrictus lvivensis* MACHALSKI, 2005b (MWGUW 009666), from level V at Chełm quarry, lower upper Maastrichtian. Scale bar in millimetres.

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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References

ABDEL-GAWAD, G.I., 1986. Maastrichtian non-cephalopod mollusks (Scaphopoda, Gastropoda and Bivalvia) of the Middle Vistula Valley, Central Poland. *Acta Geologica Polonica*, **36**: 69-224.

ALEXANDROWICZ, S.W., 1977. Sclerites of octocorals from the Upper Cretaceous of eastern Poland. *Journal of Paleontology*, **51**: 687-692.

BINKHORST VAN DEN BINKHORST, J.-T., 1861. Monographie des Gastéropodes et des Céphalopodes de la Craie supérieure du Limbourg, suivie d'une description de quelques espèces de Crustacés du même dépôt crétacé, avec dix-huit planches dessinées et lithographiées par C. Hohe, de Bonn. A. Muquardt, Brussels/ Muller Frères, Maastricht: vi + 83 + 44 pp.

BIRKELUND, T., 1982. Maastrichtian ammonites from Hemmoor, Niederelbe (NW-Germany). *Geologisches Jahrbuch*, **A61**: 13-33.

BIRKELUND, T., 1993. Ammonites from the Maastrichtian White Chalk of Denmark. *Bulletin of the Geological Society of Denmark*, **40**: 33-81.

CHRISTENSEN, W.K., SCHMID, F. & SCHULZ, M.-G., 2004. *Belemnitella* from the Upper Maastrichtian of Hemmoor, Northwest Germany. *Geologisches Jahrbuch*, **A157**: 23-67.

DIENER, C., 1925. Ammonoidea neocretacea. Fossilium Catalogus, 1. Animalia, **29**. W. Junk, Berlin, 244 pp.

GILL, T., 1871. Arrangement of the families of mollusks. *Smithsonian Miscellaneous Collections*, **227**: 1-49.

GROSSOUVRE, A. DE, 1908. Description des Ammonitidés du Crétacé supérieur du Limbourg belge et hollandais et du Hainaut. *Mémoires du Musée royal d'Histoire naturelle de Belgique*, **4**: 1-39.

HAGENOW, F. VON, 1842. Monographie der Rügen'schen Kreideversteinerungen. III. Abtheilung: Mollusken. *Neues Jahrbuch für Mineralogie, Geognosie, Geologie und Petrefaktenkunde*, **1842**: 528-575.

JAGT, J.W.M., 1995. A late Maastrichtian ammonite faunule in flint preservation from northeastern Belgium. *Mededelingen van de Rijks Geologische Dienst*, **53**: 21-47.

JAGT, J.W.M., 2002. Late Cretaceous ammonite faunas of the Maastrichtian type area. *In*: SUMMESBERGER, H., HISTON, K. & DAURER, A. (Editors), Cephalopods – present and past. *Abhandlungen der Geologischen Bundesanstalt Wien*, **57**: 509-522.

JAGT, J.W.M. & KENNEDY, W.J., 1989. *Acanthoscaphites varians* (Lopuski, 1911) (Ammonoidea) from the Upper Maastrichtian of Haccourt, NE Belgium. *Geologie en Mijnbouw*, **68**: 237-240.

JAGT, J.W.M., KENNEDY, W.J. & MACHALSKI, M., 1999. Giant scaphitid ammonites from the Maastrichtian of Europe. *Bulletin de l'Institut royal des Sciences naturelles de Belgique, Sciences de la Terre*, **69**: 133-154.

JAGT-YAZYKOVA, E.A. & JAGT, J.W.M., 2006. Maastrichtian (Late Cretaceous) ammonite distribution in Europe: a summary of recent progress. *In*: NOWAK, A. & HEBDA, G. (Editors), Biodiversity of quarries and pits. Opole Scientific Society, 3rd Department of Natural Sciences, Opole/ Górażdże, pp. 95-115.

JAGT-YAZYKOVA, E.A. & JAGT, J.W.M., 2007. Analiz rasprostraneniia Maastrikhtskikh ammonitov v zapadnoj Evrope: novye dannye i predvaritel'noe sopostavlenie s kompleksami Vostochno-Evropejskoj Platformy i Kryma. *Byulleten' Moskovskogo Obchestva Ispytatelej Prirody, Otdel Geologii*, **82**: 32-39.

KENNEDY, W.J., 1986. The ammonite fauna of the Calcaire à *Baculites* (Upper Maastrichtian) of the Cotentin Peninsula (Manche, France). *Palaeontology*, **29**: 25-83.

KENNEDY, W.J., 1987. The ammonite fauna of the type Maastrichtian with a revision of *Ammonites colligatus* Binkhorst, 1861. *Bulletin de l'Institut royal des Sciences naturelles de Belgique, Sciences de la Terre*, **56**(1986): 151-267.

KENNEDY, W.J. & SUMMESBERGER, H., 1987. Lower Maastrichtian ammonites from Nagoryany (Ukrainian SSR). *Beiträge zur Paläontologie von Österreich*, **13**: 25-78.

KNER, R., 1848. Versteinerungen des Kreidemergels von Lemberg und seiner Umgebung. *W. Haidinger's naturwissenschaftliche Abhandlungen*, **(3)2**: 1-42.

LANDMAN, N.H. & WAAGE, K.M., 1986. Shell abnormalities in scaphitid ammonites. *Lethaia*, **19**: 211-224.

LANDMAN, N.H. & WAAGE, K.M., 1993. Scaphitid ammonites of the Upper Cretaceous (Maastrichtian) Fox Hills Formation in South Dakota and Wyoming. *Bulletin of the American Museum of Natural History*, **215**: 1-257.

ŁOPUSKI, C., 1911. Przyczynki do znajomości fauny kredowej guberni Lubelskiej. *Sprawozdania Towarzystwa Naukowego*

Warszawskiego, **4**: 104-140.

MACHALSKI, M., 2005a. The youngest Maastrichtian ammonite faunas from Poland and their dating by scaphitids. *Cretaceous Research*, **26**: 813-836.

MACHALSKI, M., 2005b. Late Maastrichtian and earliest Danian scaphitid ammonites from central Europe: Taxonomy, evolution, and extinction. *Acta Palaeontologica Polonica*, **50**: 653-696.

MACHALSKI, M., JAGT, J.W.M., LANDMAN, N.H. & MOTCHUROVA-DEKOVA, N., 2007. The highest records of North American scaphitid ammonites in the European Maastrichtian (Upper Cretaceous) and their stratigraphic implications. *Acta Geologica Polonica*, **57**: 169-185.

MAKOWSKI, H., 1962. Problem of sexual dimorphism in ammonites. *Palaeontologia Polonica*, **12**: 1-92.

NIEBUHR, B., 2003. Late Campanian and Early Maastrichtian ammonites from the white chalk of Kronsmoor (northern Germany) – taxonomy and stratigraphy. *Acta Geologica Polonica*, **53**: 257-281.

NOWAK, J., 1911. Untersuchungen über die Cephalopoden der oberen Kreide in Polen. II. Teil. Die Skaphiten. *Bulletin international de l'Académie des Sciences de Cracovie, Classe des Sciences mathématiques et naturelles*, **B 1911**: 547-589.

NOWAK, J., 1913. Untersuchungen über die Cephalopoden der oberen Kreide in Polen. III. Teil. *Bulletin international de l'Académie des Sciences de Cracovie, Classe des Sciences mathématiques et naturelles*, **B1913**: 335-415.

ORBIGNY, A. D', 1840-1842. Paléontologie française; Terrains crétacés, 1. Céphalopodes. Masson, Paris, pp. 1-120 (1840); 121-430 (1841); 431-662 (1842).

REICH, M. & FRENZEL, P., 2002. Die Fauna und Flora der Rügener Schreibkreide (Maastrichtium, Ostsee). *Archiv für Geschiebekunde*, **3**: 74-284.

SCHMID, F., 1965. *Acanthoscaphites tridens varians* (Lopuski 1911) aus dem Maastricht von Hemmoor (Niederelbe) in Nordwest-Deutschland. *Geologisches Jahrbuch*, **83**: 681-692.

SCHMID, F., SCHULZ, M.-G. & WOOD, C., 2004. The Maastrichtian sections of Hemmoor and Kronsmoor – retrospect, stocktaking and bibliography. *Geologisches Jahrbuch*, **A157**: 11-22.

SCHULZ, M.-G. & SCHMID, F., 1983. Das Ober-Maastricht von Hemmoor (N-Deutschland): Faunenzonen-Gliederung und Korrelation mit dem Ober-Maastricht von Dänemark und Limburg. *Newsletters of Stratigraphy*, **13**: 21-39.

SOWERBY, J., 1817. The Mineral Conchology of Great Britain; or coloured figures and descriptions of those remains of testaceous animals or shells, which have been preserved at various times and depths in the earth, **2**. The author, London, pls 151-184, A, 185, 186.

TUUK, L.A. VAN DER, 1987. Scaphitidae (Ammonoidea) from the Upper Cretaceous of Limburg, the Netherlands. *Paläontologische Zeitschrift*, **61**: 57-79.

WOLANSKY, D., 1932. Die Cephalopoden und Lamellibranchiaten der Ober-Kreide Pommerns (mit einem Abriß der Stratigraphie und Palaeogeographie des Südbaltikums vom Wealden bis zum Senon). *Abhandlungen aus dem geologisch-palaeontologischen Institut der Universität Greifswald*, **9**: 1-72.

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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).

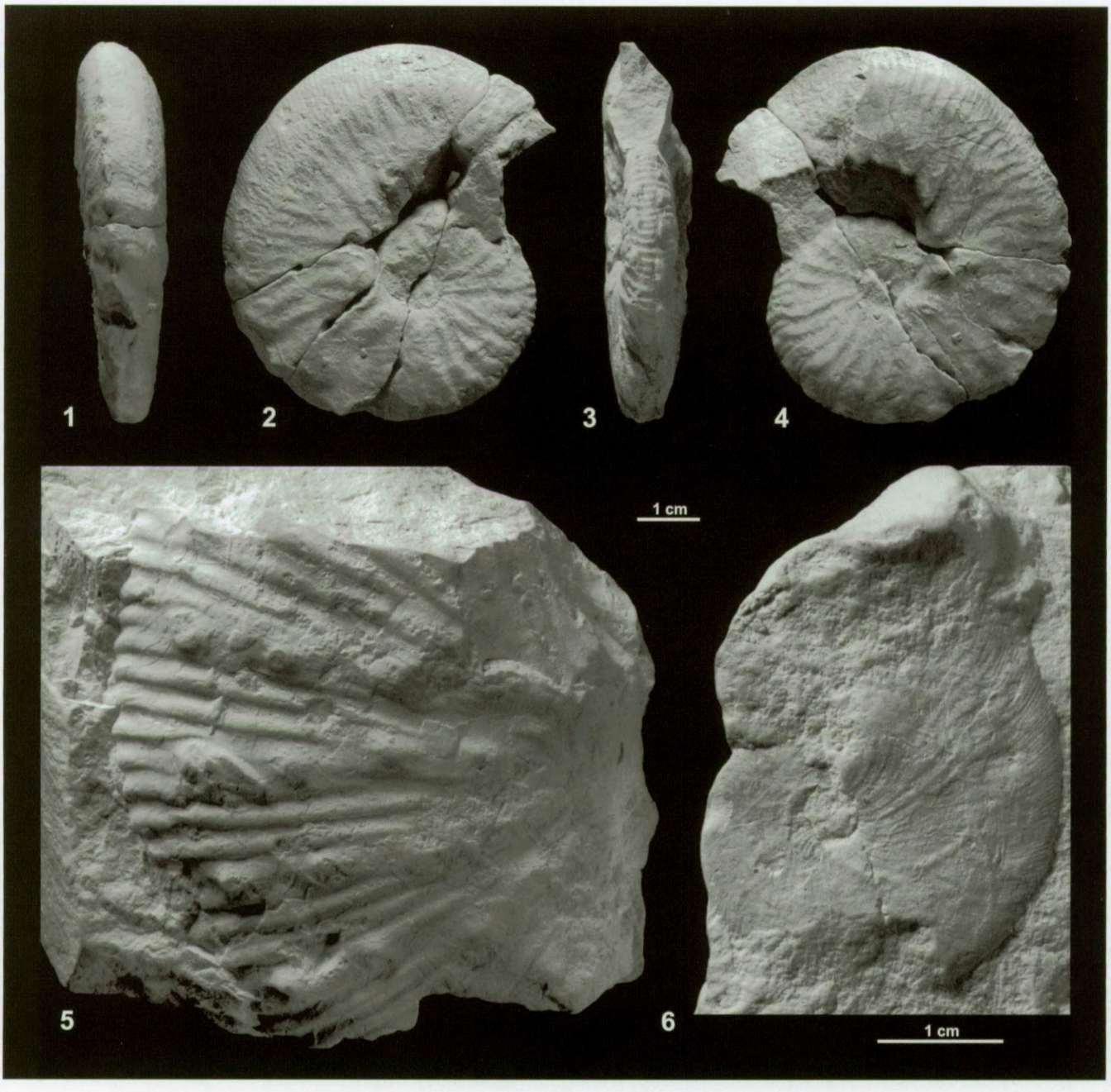

PLATE 1