

Cephalopoden des frühen und mittleren Santoniums der Gosau-Gruppe (Oberkreide, Österreich)

1. Nautiloidea und nicht-heteromorphe Ammonoidea

Zusammenfassung

Es werden fünf taxa Nautiloidea und 37 taxa nicht-heteromorphe Ammonoidea aus dem unteren und mittleren Santonium der österreichischen Vorkommen der Gosau-Gruppe beschrieben. Neu für die Gosau-Gruppe sind: *Angulithes westphalicus* (SCHLÜTER, 1876), *Cymatoceras* cf. *huxleyanum* (BLANFORD, 1861), *Hyporbulites woodsi* (VAN HOEPEN, 1921), *Saghalinites nuperus* (VAN HOEPEN, 1921), *Anagaudryceras* sp., *Jimboiceras* cf. *reyi* COLLIGNON, 1983, *Hauericeras* (*Gardeniceras*) aff. *gardeni* (BAILY, 1855), *Damesites sugata* (FORBES, 1846), *Nowakites carezi* (DE GROSSOUVRE, 1894), *Nowakites savini* (DE GROSSOUVRE, 1894), *Patagiosites stobaei* (NILSSON, 1827), *Tragodesmoceras* aff. *clypeale* (SCHLÜTER, 1872), *Pseudoschloenbachia* (*Pseudoschloenbachia*) sp. und *Texasia cricki* (SPATH, 1921). *Muniericeras gosauicum* (HAUER, 1858) und *Hemitissotia randoi* GERTH, 1961, die unter die Synonymie von *Eulophoceras natalense* HYATT, 1903 fallen, werden revidiert.

Introduction

Following the description of the late Santonian cephalopods of the Gosau Group from the Schattaugraben outcrops of the Gosau Basin of Salzburg (SUMMESBERGER et al., 2017a; this volume) and Finstergrabenwandl, Upper Austria (WIEDMANN, 1978; SUMMESBERGER, 1979, 1980, 1992), we describe below the early and middle Santonian nautiloids and non-heteromorph ammonites of the Austrian Gosau Group. With the description of the lower and middle Santonian heteromorphs (SUMMESBERGER et al., 2017b; this volume) the revision of the Austrian Gosau cephalopods will be continued.

The first ammonites described from the lower Santonian of the Gosau Group were *Ammonites gosauicus* HAUER (1858: 13, Pl. 2, Figs. 7–9) and *Ammonites texanus* ROEMER, 1849 (HAUER, 1858: 10, Pl. 2, Figs. 4–6). REDTENBACHER (1873: 9–140, Pls. 22–30) provided comprehensive descriptions of the cephalopods of the Gosau Group, although dealing with only a few early to middle Santonian localities:

“Gosau” (possibly the Neffgraben and Randograb en sections: see below);

“Stöcklwald” (possibly the Randograb en);

“Tiefengrab en” (possibly Grab enbach);

“St. Wolfgang” (possibly Schneiderwirtsbrücke);

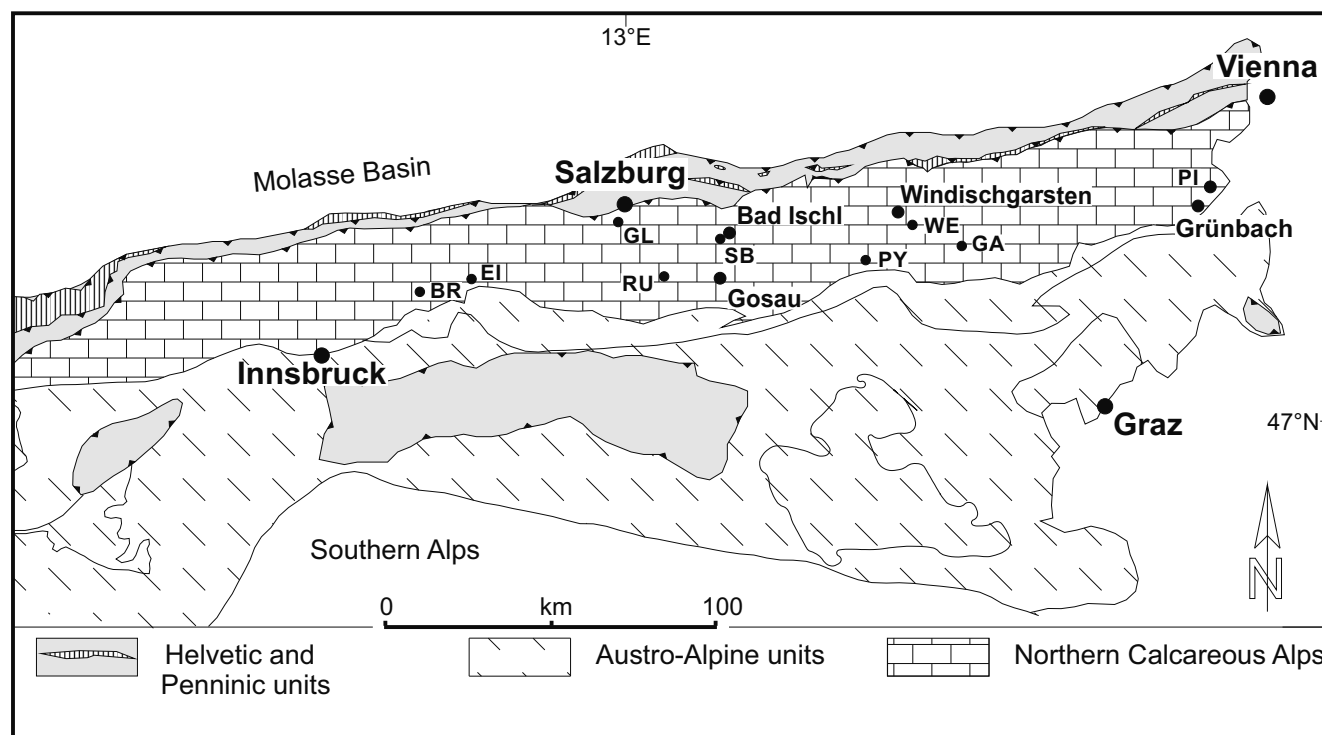
“Strobl-Weißenbach” (possibly also Schneiderwirtsbrücke, as Strobl-Weißenbach is a late Turonian locality: fide SUMMESBERGER & KENNEDY, 1996);

“Weißenbach next Bad Aussee” (Styria) is a Coniacian locality;

“Wolfsbachau next Reifling” (Styria) is possibly Campanian.

KATSCHTHALER (1935) and BRINKMANN (1935) provided the first list of early Santonian cephalopods from Brandenburg (Tirol). GERTH (1956, 1961) was the first to describe early Santonian ammonites from the Gosau Basin and successfully logged and interpreted the extensive Neffgraben section (Rußbach, Salzburg). A revision of the Austrian Texaninitinae was provided by KENNEDY et al. (1981). IMMEL et al. (1982) and IMMEL (1987) gave detailed descriptions of the early Santonian Brandenburg cephalopods.

From 1971 onwards H.A. Kollmann (NHMW) and H. Summesberger (NHMW) ran a stratigraphic program, collected numerous early Santonian fossils and acquired detailed knowledge of the fossil bearing sites of the Gosau Basin itself and the Gosau Group occurrences in the Northern Calcareous Alps (Text-Fig. 1).



Text-Fig. 1.

Distribution of Gosau Group localities mentioned in the text. BR – Brandenburg, EI – Eiberg, GA – Gams, GL – Glanegg, PI – Markt Piesting, PY – Pyhrnpass, RU – Rußbach, SB – Schneiderwirtsbrücke, WE – Weißwasser.

CAMPANIAN	EARLY	Ressen Fm.	Conglomerates Sandstones Shales (Turbidites) 300m		Section of the Santonian part of the Gosau Basin.			
		Bibereck Fm.	Shales Sandstones 100-200 m					
SANTONIAN	LATE	Sandkalkbank Mb.	20 m		Finstergrabenwandl <i>Placentoceras paraplanum</i> <i>Texanites quinquenodosus</i> <i>Munierceras gosauicum</i> Paraplanum Subzone Gosauicum Subzone Polyopsis Zone			
	MIDDLE	Hochmoos Fm.	Hofergraben Mb. Fossiliferous soft shales 50-200 m					
		Hochmoos Mb.	Fossiliferous mudstones and sandstones 250 m					
	EARLY	Grabenbach Fm.	Shales with stormlayers 300-500 m	• Rando 1 • Rando 2 • Rando 3				
CONIACIAN		Streiteck Fm.	Conglomerates 0-50 m		<i>Munierceras gosauicum</i> <i>Texanites quinquenodosus</i> <i>Eulophoceras natalense</i> <i>Cl. undulaticus</i> Natalense Subzone Serratmarginatus Zone			

Text-Fig. 3.

Composite stratigraphic section of the Santonian parts of the Gosau Group with main focus on the cephalopods described in the text. With alterations after WAGREICH et al. (2010). CI = *Cladoceras*.

GPII	Geologisch-Paläontologisches Institut der Universität Innsbruck, Austria.	CG	Collection Gustav Gapp, Gosau, Austria.
TUW	Collection of the Technical University (formerly Technische Hochschule), Vienna, now partly in the collection of PIUW, Vienna.	M	Collection Odo Mader, Rattenberg, Tyrol, Austria.
HNS	Haus der Natur, Salzburg, Austria.	MA	Collection Wolf-Peter Maherndl, Bad Ischl, Austria.
GPIB	Geologisch-Paläontologisches Institut der Universität Bonn, Germany.	SCH	Collection Schwaighofer, Rußbach, Salzburg, Austria.
BSP	Bayerische Staatssammlung für Paläontologie und historische Geologie, Munich, Germany.	SIM	Collection Simonsky, Vienna, Austria.
MAD	Collection Odo Mader, Bayerische Staatssammlung für Paläontologie und historische Geologie, Munich, Germany.	SK	Collection Dr. Peter Skoumal, Vienna, Austria.
BMNH	British Museum of Natural History, London, UK.	TLMF/SM	Tiroler Landesmuseum Ferdinandeum, Innsbruck, Tyrol, Austria (formerly the Mader Collection).
		SEIDL/CE	Collection Heinz Seidl, Salzburg, Austria.

Early and middle Santonian nautiloid and ammonite faunas of the Gosau Group (excluding heteromorphs) and key inoceramid bivalve occurrences

Brandenberg (Tyrol), Mühlbach

? *Cimomia* cf. *gosavica* (REDTENBACHER, 1873)

Cymatoceras sp.

Hyporbulites woodsi (VAN HOEPEN, 1921)

Anagaudryceras redtenbacheri (IMMEL et al., 1982), juv.

? *Anagaudryceras* cf. *subtililineatum* (KOSSMAT, 1895)

Gaudryceras mite (REDTENBACHER, 1873)

Gaudryceras ex gr. *denseplicatum* JIMBO, 1894

Gaudryceras sp. indet.

Saghalinites nuperus (VAN HOEPEN, 1921)

Nowakites carezi (DE GROSSOUVRE, 1894)

Nowakites carezi (DE GROSSOUVRE, 1894), juv.

Damesites sugata (FORBES, 1846)

Parapuzosia daubreei (DE GROSSOUVRE, 1894)

Parapuzosia corbarica (DE GROSSOUVRE, 1894)

Parapuzosia sp. indet.

Hauericeras (*Hauericeras*) *pseudogardeni* (SCHLÜTER, 1872)

Hauericeras (*Gardeniceras*) aff. *gardeni* BAILY, 1855

Kossmaticeras (*Kossmaticeras*) cf. *sparsicostatum* (KOSSMAT, 1897)

Patagiosites? sp.

Eupachydiscus isculensis (REDTENBACHER, 1873), microconch

Paratexanites serratomarginatus (REDTENBACHER, 1873)

Texanites quinquenodosus (REDTENBACHER, 1873)

Eulophoceras natalense HYATT, 1903

Cladoceras undulatoplicatus (ROEMER, 1852)

Eiberg (Kufstein, Tyrol), early to middle Santonian

Ammonite fauna after IMMEL, 1987:

Parapuzosia daubreei (DE GROSSOUVRE, 1894)

Hauericeras sp.

Eupachydiscus isculensis (REDTENBACHER, 1873)

Texanites quinquenodosus (REDTENBACHER, 1873)

Basin of Gosau (Rußbach, Salzburg), early Santonian

Randobach 3

Angulithes westphalicus (SCHLÜTER, 1872)

Hyporbulites woodsi (VAN HOEPEN, 1921)

Nowakites carezi (DE GROSSOUVRE, 1894)

Nowakites savini (DE GROSSOUVRE, 1894)

Parapuzosia daubreei (DE GROSSOUVRE, 1894)

Texasia cricki (SPATH, 1921)

Eulophoceras natalense HYATT, 1903

Cladoceras undulatoplicatus (F. ROEMER, 1852)

Stöcklwaldgraben

Texanites quinquenodosus (REDTENBACHER, 1873)

Eulophoceras natalense HYATT, 1903

Basin of Gosau (Rußbach, Salzburg), middle Santonian

Randobach 1

Angulithes westphalicus (SCHLÜTER, 1872)

Muniericeras gosauicum (HAUER, 1858)

Texanites quinquenodosus (REDTENBACHER, 1873)

Randobach 2

Angulithes westphalicus (SCHLÜTER, 1872)

Gaudryceras mite (HAUER, 1866)

Parapuzosia corbarica (DE GROSSOUVRE, 1894)

Tragodesmoceras aff. *clypeale* (SCHLÜTER, 1872)

Muniericeras gosauicum (HAUER, 1852)

Pseudoschloenbachia (*Pseudoschloenbachia*) sp.

Texanites quinquenodosus (REDTENBACHER, 1873)

Zimmergraben

Texanites quinquenodosus (REDTENBACHER, 1873)

Neffgraben

Damesites sugata (FORBES, 1846)

Nowakites draschei (REDTENBACHER, 1873)

Muniericeras gosauicum (HAUER, 1852)

Texanites quinquenodosus (REDTENBACHER, 1873)

Parking area Hornspitz – cable car, early Santonian

Hauericeras cf. *gardeni* (BAILY, 1855)

Nowakites sp.

Texanites quinquenodosus (REDTENBACHER, 1873)

Eulophoceras sp. indet.

Gosau (Upper Austria), early Santonian

Edlbachgraben

Angulithes westphalicus (SCHLÜTER, 1872)

Hyporbulites woodsi VAN HOEPEN, 1921

Saghalinites nuperus (VAN HOEPEN, 1921)

Nowakites savini (DE GROSSOUVRE, 1894)

Parapuzosia daubreei (DE GROSSOUVRE, 1894)

Hauericeras cf. *gardeni* (BAILY, 1855)

Texanites quinquenodosus (REDTENBACHER, 1873)

Eulophoceras natalense (HYATT, 1903)

Cladoceras undulatoplicatus (ROEMER, 1852)

**Pass Gschütt (forest road Wegscheidgraben;
middle Santonian)**

(Collection Leibfinger-Prömer)

Muniericeras gosauicum (HAUER, 1852)

Texanites quinquenodosus (REDTENBACHER, 1873)

**Grabenbach (p.p. Tiefengraben), early and middle
Santonian**

Cymatoceras cf. *huxleyanum* (BLANFORD, 1861)

Muniericeras gosauicum (HAUER, 1852)

Pachydiscidae indet.

Eulophoceras natalense HYATT, 1903 (lowest part of Grabenbach)

Platyceramus cycloides ahsenensis (SEITZ, 1961)

Tauerngraben (middle Santonian)

Muniericeras gosauicum (HAUER, 1852)

Bad Ischl N (Upper Austria)

**Schneiderwirtsbrücke, road bridge over the Ischl river
near the confluence with the Nussenseebach (middle
Santonian)**

Saghalinites nuperus (VAN HOEPEN, 1921)

Eupachydiscus isculensis (REDTENBACHER, 1873)

Tragodesmoceras cf. *clypeale* (SCHLÜTER, 1872)

Muniericeras gosauicum (HAUER, 1852)

Texanites quinquenodosus (REDTENBACHER, 1873), holotype

Kohlbüchl (Upper Austria, Santonian)

Eupachydiscus isculensis (REDTENBACHER, 1873, holotype); Santonian

**Weißwasser (Upper Austria), early and middle
Santonian**

Bergeralm, Breitenberg, Blahberg

Saghalinites nuperus (VAN HOEPEN, 1921)

Muniericeras gosauicum (HAUER, 1858)

Texanites quinquenodosus (REDTENBACHER, 1873)

Eulophoceras natalense HYATT, 1903

**Windischgarsten (Upper Austria, Pyhrnpass),
early Santonian**

Eulophoceras natalense HYATT, 1903

Markt Piesting (Lower Austria), early Santonian

Eulophoceras natalense HYATT, 1903

Conventions

Dimensions are given in millimeters: D = diameter, Wb = whorl breadth, Wh = whorl height, U = umbilicus, c = costal dimension, ic = intercostal dimension. Figures in parentheses are dimensions as a percentage of the diameter. The suture terminology is that of KORN et al. (2003): E = external lobe, A = adventive lobe (= lateral lobe, L, of KULLMANN & WIEDMANN, 1970), U = umbilical lobe, I = internal lobe.

Systematic Palaeontology

Class Cephalopoda CUVIER, 1797

Subclass Nautiloidea AGASSIZ, 1847

Order Nautilida AGASSIZ, 1847

Superfamily Nautilaceae DE BLAINVILLE, 1825

Family Nautilidae DE BLAINVILLE, 1825

Genus *Angulithes* MONTFORT, 1808

Type species: '*Nautilites* *triangularis* MONTFORT, 1808 by subsequent designation of SPATH (1927: 21).

***Angulithes westphalicus* (SCHLÜTER, 1876)**

(Pl. 1, Figs. 1–3, Pl. 2, Figs. 1–3, Pl. 3, Figs. 4–5, Pl. 4, Figs. 1–3, Tab. 1)

1872 *Nautilus westphalicus* SCHLÜTER: 13.

1876 *Nautilus westphalicus* SCHLÜTER: 175, Pl. 47, Figs. 1, 2.

1906 *Nautilus westphalicus* SCHLÜTER; MÜLLER & WOLLMANN: 1, Pl. 1, Figs. 1, 2.

1991 *Deltoidonautilus westphalicus* (SCHLÜTER, 1876); RIEGRAF & SCHEER: 426.

1999 *Deltoidonautilus* (sic!) *westphalicus* (SCHLÜTER, 1872c); WITTLER et al.: 37, Figs. 51a, b, 52a, b.

2001 *Angulithes* cf. *westphalicus* (SCHLÜTER, 1872); FÖZY: 34, Pl. 5.

2010 *Angulithes westphalicus* (SCHLÜTER, 1872); FRANK: 490, Figs. 3A–N (with additional synonymy).

Type: The lectotype by the subsequent designation of FRANK (2010: 490) is GMB 97, the original of SCHLÜTER, 1872 (Pl. 47, Figs. 1, 2) from the lower Campanian *Scaphites binodosus* Zone of Dülmen, Westphalia, Germany, housed in the Goldfuss Museum, Bonn.

Material: Eight specimens: two large individuals (SIM 1996/1, SCH 2012/1) from the early Santonian of the Randobach (Rußbach, Salzburg), three specimens from the early Santonian of the Edlbachgraben (Gosau, Upper Austria): NHMW 2012/1082/0001, SK/EB/1985/10, 11, and two further unregistered specimens in the the Skoumal collection, NHMW 2012/1086/0001.

Description: SIM 1996/1 (Pl. 1, Figs. 1–3) is a large internal mould, with a maximum preserved diameter of 185 mm, with remnants of thick shell adhering. The general shape

Plate 6

Figs. 1a–c: *Cimomia gosavica* (REDTENBACHER, 1873); NHMW 2009z0045/0002; from the Schattaugraben section.

Figs. 2a–d: *Cimomia gosavica* (REDTENBACHER, 1873); GBA 1873/0001/0003; the holotype of *Nautilus gosavicus* (REDTENBACHER, 1873: 96, Pl. 22, Fig. 2); from the Santonian Gosau Group of Neffgraben, Rußbach, Salzburg.

Fig. 3: *Cimomia gosavica* (REDTENBACHER, 1873); NHMW 1990/0029/0520; from the late Santonian Sandkalkbank Member of the Hochmoos Formation (Finstergrabenwandl, Gosau, Upper Austria).

All figures are 85 % of natural size. Figs. 2a–d and 3 are coated with ammonium chloride.

