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The Brachiopoda of the Langhian (Lower Badenian) of the Molasse Zone and the northern Vienna Basin (Austria)

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(With 2 textfigures and 1 plate)

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Zusammenfassung

In dieser Arbeit werden erstmals Brachiopoden aus dem Unteren Badenium von Niederleis beschrieben. Das Vorkommen von *Argyrotheca cuneata* (RISSO, 1826) ist neu für das Miozän Österreichs.

Schlüsselwörter: Brachiopoda, Unteres Badenium, Mittelmiozän, Österreich, Zentrale Paratethys

Abstract

The brachiopod fauna from the Lower Badenian (Langhian) of Niederleis and Immendorf, Lower Austria is described and illustrated. *Argyrotheca cuneata* (RISSO, 1826) is reported for the first time from the Miocene of Austria.

Keywords: Brachiopoda, Lower Badenian, Middle Miocene, Austria, Central Paratethys

Introduction

Although brachiopods are commonly found in many Miocene sediments from Austria (DREGER 1889), they are particularly rare in the Badenian of Niederleis. Only two specimens were found in the collection of the Natural History Museum Vienna and no additional material could be obtained from additional bulk samples kept at the Museum. Bulk samples from the "Grund Beds" (Grunder Schichten) yielded no brachiopods, despite the large number of samples processed. Thus the only species and specimen documented from the "Grund Beds" is *Discinisca scutellum* (DREGER, 1889), already reported by DREGER (1889).

Study Area

The studied brachiopods derive from the Lower Badenian (Langhian) time slice of the Molasse zone and the northern Vienna basin. Two outcrops preserving marine sediments of this time slice were studied: Niederleis and Grund, both in Lower Austria. For a short summary on the geographic position, biostratigraphy and sedimentology see KROH (this volume).

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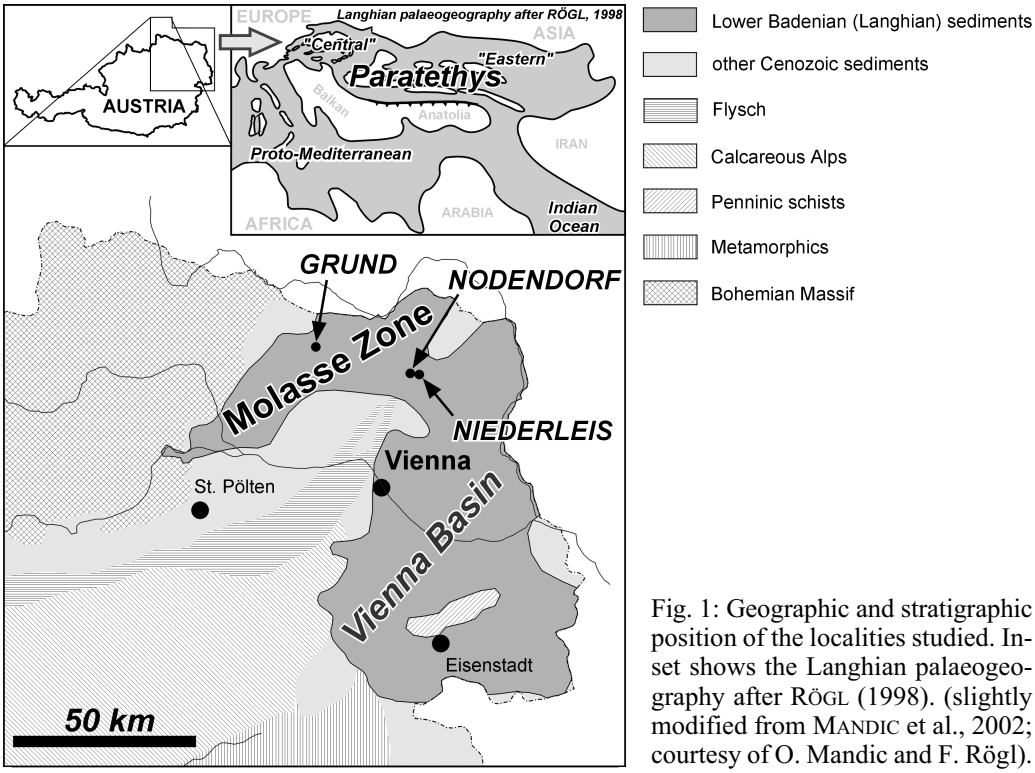

Fig. 1: Geographic and stratigraphic position of the localities studied. Inset shows the Langhian palaeogeography after RÖGL (1998). (slightly modified from MANDIC et al., 2002; courtesy of O. Mandic and F. Rögl).

Additionally, a specimen from the sandpit of Immendorf, Lower Austria, a historical locality, no longer outcropping was investigated. Immendorf is in the immediate vicinity of Grund and the sediments exposed there belong also to the Grund Formation.

Material and Methods

The material of Niederleis comes from an old bulk sample (taken 15.08.1865) housed at the Natural History Museum Vienna. All material used for this study is deposited at the Natural History Museum Vienna (NHMW). The abbreviation NÖ used in this study stands for Niederösterreich (Lower Austria).

Systematics

Phylum Brachiopoda DUMÉRIL, 1806

Class Lingulata GORJANSKY & POPOV, 1985

Order Lingulida WAAGEN, 1885

Family Discinidae GRAY, 1840

Genus *Discinisca* DALL, 1871

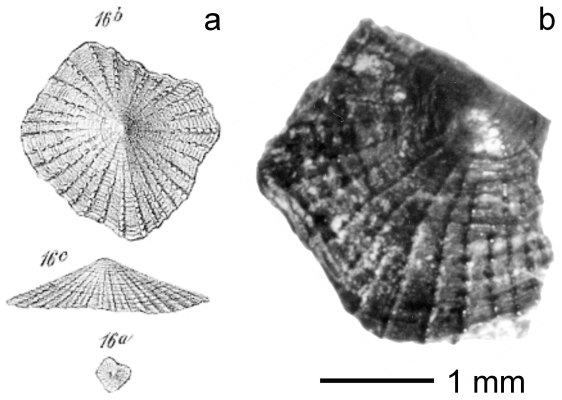

Fig. 2: *Discinisca scutellum* (DREGER, 1889); Immendorf, NÖ; NHMW 1861.XXXV.102. a: reproduced original illustration from DREGER (1889); b: photograph of the dorsal side.

***Discinisca scutellum* (DREGER, 1889)** (figs. 2a-b)

1889 *Discina scutellum* n. sp. – DREGER: 182-183; pl. 1, figs. 16a-c.

M a t e r i a l : Immendorf, Lower Austria: 1 dorsal valve (holotype; NHMW 1861.XXXV.102).

D e s c r i p t i o n : The inside of the holotype is worn and no muscle scars are visible. The outer surface is quite well preserved and ornamented with radially arranged thin ribs with a distinctly beaded appearance. The apex of the shell is tilted slightly posteriorly and has a smooth surface.

R e m a r k s : Since the description of the species, no additional material has been found. THOMSON (1927) placed this species into the genus *Discinisca*. This *Discinisca*-species belongs to the third group of species (group C) defined by DALL (1921), characterised by their small size, regular radiating sculpture and solid shell. A review on fossil and extant species of this group can be found in RADWAŃSKA & RADWAŃSKI (1989), who discuss also the differences between this species and the contemporaneous *D. polonica* RADWAŃSKA & RADWAŃSKI (1984), a species from the Korytnica Basin.

D i s t r i b u t i o n : Lower Badenian (Langhian) of Immendorf, Lower Austria (DREGER 1889).

Class Rhynchonellata WILLIAMS & al., 1996

Order Terebratulida WAAGEN, 1883

Family Megathyrididae DALL, 1870

Genus *Megathiris* D'ORBIGNY, 1847

***Megathiris detruncata* (GMELIN, 1790)** (pl. 1, figs. 4-6)

1889 *Argiope decollata* Chemnitz. – DREGER: 183-185; pl. 1, figs. 1-5.
1990 *Megathiris detruncata* (GMELIN, 1790) – BITNER: 135-138; pl. 3, figs. 1-8; pl. 6, figs. 1-7; text-figs. 3-4 [*cum syn.*].
1990 *Megathiris detruncata* (GMELIN, 1790) – POPIEL-BARCZYK & BARCZYK: 175-178; pl. 6, figs. 6-11; pl. 7, figs. 1-13; text-figs. 10-11.

M a t e r i a l : Niederleis: 1 complete specimen (NHMW 2002z0087/0056)

R e m a r k s : The species *Megathiris detruncata* (GMELIN) is well known and one of the most common brachiopods in the Neogene of the Central Paratethys. It is characterised by the internal features of the brachial valve (i.e. the presence of lateral septa) and its ornamentation. Its morphology show a great variability, especially in shape and ornamentation (DAVIDSON 1870, SACCO 1902, THOMSON 1927, BITNER 1990). BITNER (1990) suggested that the differences in shape result from different growth rates as described by THAYER (1977) for the extant *Terebratalia transversa* (SOWERBY).

D i s t r i b u t i o n : This species occurs first in the Eocene of Italy (DAVIDSON 1870). In the Miocene it is common throughout the Central Paratethys and the Mediterranean, occurring in Austria (DREGER 1889), France (JULIEN 1940, PAJAUD 1984), Hungary (MEZNERICS 1944), Italy (SEGUENZA 1865, 1866; DAVIDSON 1870, SACCO 1902), Poland (KRACH 1950, RADWAŃSKI 1969, BARCZYK & POPIEL-BARCZYK 1977, STUDENCKI 1988, BITNER 1990, POPIEL-BARCZYK & BARCZYK 1990), Spain (CALZADA 1978; LLOMPART & CALZADA 1982), and the Ukraine (FRIEDBERG 1921). In the Pliocene this species is known from Spain (PAJAUD 1977) and Italy (SEGUENZA 1865, DAVIDSON 1870), where it occurs also in the Pleistocene (GAETANI & SACCA 1983). Today *M. detruncata* is found throughout the Mediterranean Sea (LOGAN 1979), in the Lusitanian and Mauritanian regions of the Atlantic Ocean (DAVIDSON 1887, BRUNTON & CURRY 1979) and the Caribbean Sea (COOPER 1977).

Genus *Argyrotheca* DALL, 1900

Argyrotheca cuneata (RISSO, 1826) (pl. 1, figs. 1-3)

1990	*Argyrotheca cuneata* (RISSO, 1826) – BITNER: 138-140; pl. 4, figs. 1-9; text-figs. 5-6 [*cum syn.*].
1993	*Argyrotheca cuneata* (RISSO, 1826) – BITNER: 149-150; pl. 2, figs. 1-6; pl. 3, figs. 1-6.
2000	*Argyrotheca cuneata* (RISSO, 1826) – BITNER & PISERA: 9; pl. 1, figs. 1-7.

M a t e r i a l : Niederleis: 1 pedicle valve (NHMW 2002z0087/0002).

R e m a r k s : This small species is characterised by 2-7 rounded ribs, a median groove, sometimes with a short intercalated rib, a large, triangular area with a hypothyridid foramen restricted by two narrow, disjunct deltidial plates. The outline of this species is rather variable (see BITNER 1990 and 1993) and shows some similarities to *Megathiris detruncata* (GMELIN) in general outline and ornamentation, however, these two species can be readily told apart by the punctate shell of *Argyrotheca cuneata* and the numbers of septa on the brachial valve. *A. cuneata* differs from the closely related *Argyrotheca cordata* (RISSO, 1826) by its shell outline, ornamentation and the presence of tubercles along the anterior margin on the inside of both pedicle and brachial valve in *A. cordata*. This species is hereby reported for the first time from the Neogene of Austria.

D i s t r i b u t i o n : This species is known from the Miocene of Bulgaria (BITNER 1993), Italy (SEGUENZA 1866, DAVIDSON 1870) and Poland (BITNER 1990, BITNER & PISERA 2000). Today *A. cuneata* is found in the Mediterranean Sea (LOGAN 1979, LOGAN & NOBLE 1983) and in the Lusitanian and Mauritanian regions of the Atlantic Ocean (BRUNTON & CURRY 1979, LOGAN 1983 1988, 1999).

Biostratigraphy and Palaeoecology

Due to the stratigraphic ranges of *M. detruncata* and *A. cuneata* from Eocene to Recent respectively Miocene to Recent for the latter, the species considered here have no or very limited biostratigraphical value.

Extant representatives of *M. detruncata* and *A. cuneata* exhibit a cryptic mode of life in shallow depth (ASGAARD & BROMLEY 1991) and inhabit light-poor environments, e.g. caves, crevices or the undersides of boulders, where they are associated with other sessile benthos, such as bryozoans, sponges, encrusting foraminifera, colonial ascidians and ahermatypic corals (LOGAN & NOBLE 1983). In deeper water they occur also on coralline algae bottoms and gravel. The Megathyrididae have a short massive pedicle, with which they are firmly attached to the substrate (LOGAN 1993). Although both species show a wide depth range (e.g. from a few metres to 600 metres in the case of *A. cuneata* [LOGAN 1979, 1983, 1988]), they are most abundant between 20 to 60 metres water depth and belong to the "shallow-water" group of brachiopods in the Mediterranean Sea, which includes also *Argyrotheca cordata* (RISSO), *A. cistellula* (SEARLES-WOOD) and *Lacazella mediterranea* (RISSO) (LOGAN 1979, LOGAN & NOBLE 1983). The distribution of brachiopods, however, depends on many factors including the substrate type, hydrodynamics, temperature, and salinity and should thus be used with caution as palaeobathymetric indicators (EMIG 1988).

Like most other Middle Miocene brachiopod assemblages in the Paratethys (e.g. BARCZYK & POPIEL-BARCZYK 1977, PAJAUD 1984, POPIEL-BARCZYK & BARCZYK 1990, BITNER 1990, 1993; BITNER & PISERA 2000), this assemblage is also dominated by micromorphic brachiopods. BITNER (1990, 1993) showed that the taxonomic composition of the individual faunas can be correlated to some extent with depth and sedimentary environment. Unfortunately the low number of specimens available for this study precludes a direct comparison with the data of BITNER (1990). The assemblage of sample W-1 from Węglin consists also mainly of *M. detruncata* and *A. cuneata* (accounting for up more than 90% of the brachiopods from the sample together) comes from marls and was interpreted as the deepest environment present in the study, with a depositional depth of "several dozen metres" (BITNER 1990).

Extant species of *Discinisca* favour intertidal to shallow sublittoral habitats, down to 45 metres water depth. The animals live attached to primary or secondary hardgrounds, are often found in cryptic habitats and are known to form clusters (RADWAŃSKA & RADWAŃSKI 1984, 1989).

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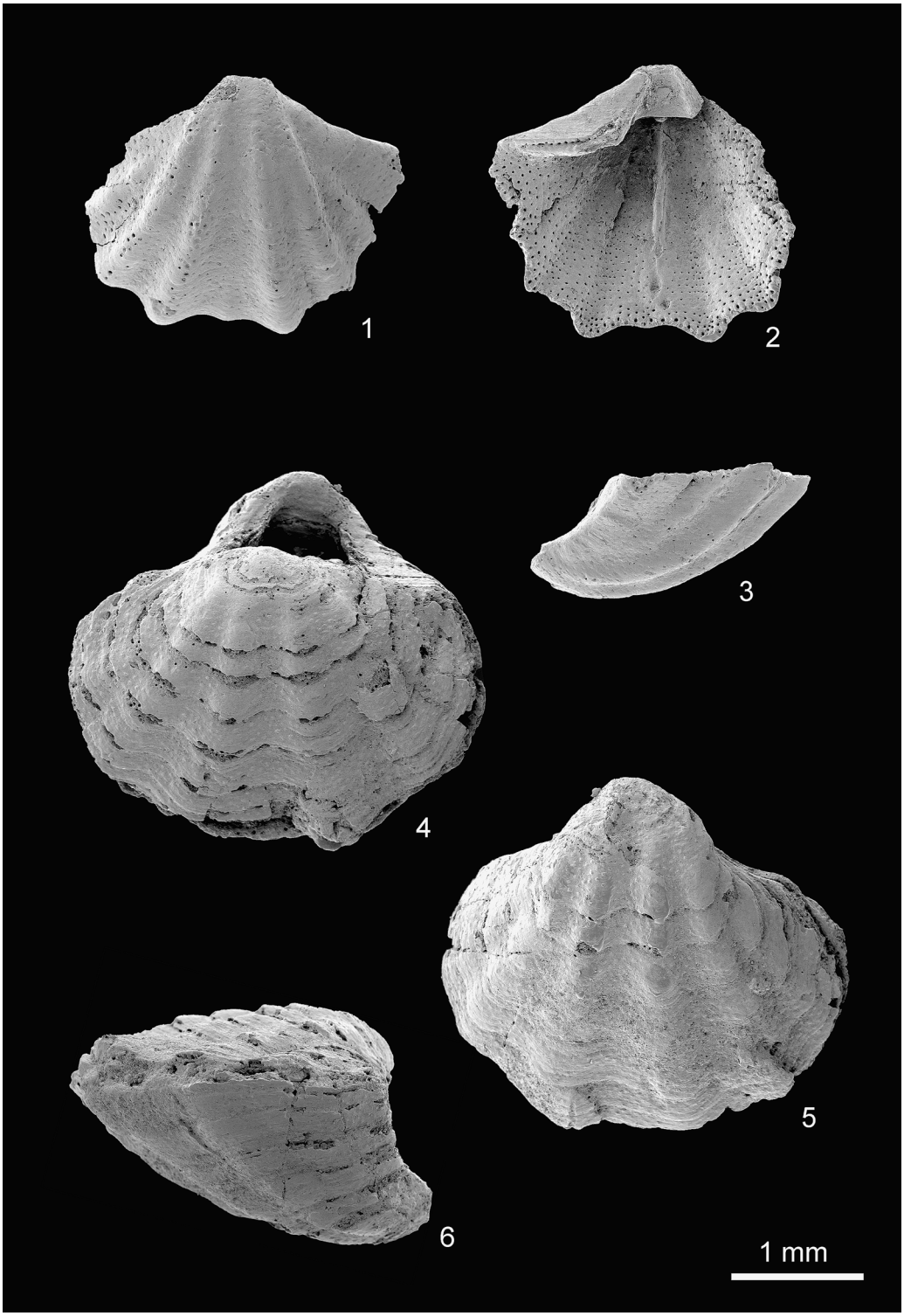
Plate 1

Fig. 1-3: ***Argyrotheca cuneata* (RISSO, 1826)**; Niederleis, NÖ (NHMW 2002z0087/0002)

4-6 ***Megathiris detruncata* (GMELIN, 1790)**; Niederleis, NÖ (NHMW 2002z0087/0056)

all figures are SEM photographs and are given in the same magnification, scale bar equals 1 mm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