

The First Nautiloid from the Upper Ordovician of the Carnic Alps (Austria)

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3 Text-Figures

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*Karnische Alpen
Ordovizium
Cephalopoden
Paläontologie
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Der erste Nautiloidee aus dem Ober-Ordovizium der Karnischen Alpen (Österreich)

Zusammenfassung

Orthoceras sp. cf. *O. regulare* (SCHLOTHEIM, 1820) aus dem Uggwa-Kalk (Ashgillian) der Karnischen Alpen (Österreich) wird beschrieben. Die Form ist aus Estland, Deutschland und Polen wohl bekannt. Aus dem Ordovizium von Österreich ist es der erste Nachweis eines Cephalopoden.

Abstract

Orthoceras sp. cf. *O. regulare* (SCHLOTHEIM, 1820) from the Uggwa Limestone (Ashgillian) of the Carnic Alps is described. This species was previously known from Estonia, Germany and Poland. This is the first record of cephalopods in the Ordovician of Austria.

1. Introduction

The Ordovician marks the great expansion of the Nautiloidea. Here are developed ten of the twelve recognised orders, and more than 170 genera are known (CRICK, 1990). The distribution of the Ordovician cephalopods is well documented in deposits of Baltica, Siberia, Kazakhstan, Australia, China and North America. These, mainly systematic investigations have been successful in opening the way for palaeobiogeographic and palaeoclimatologic reconstructions. The most comprehensive studies on the global distribution of cephalopod faunas have been carried out on North American material. FOERSTE (1924) was the first who noticed the geographic zonation

in the Ordovician cephalopod distribution. The tropical cephalopod fauna dominated mainly by the Actinoceratida, Discosorida, Ascoceratida and Barrandeoceratida, with minor number of genera in the Michelinoceratida, Oncoceratida and Endocerida and, in contrast, the temperate fauna dominated by orthocones, were later recognised by FLOWER (1946, 1976). CRICK (1980) recognised four realms in Arenigian cephalopod provincialism, indicating that

“... nautiloids were not truly part of the nekton capable of oceanic dispersal, but were members of the shallow-shelf vagrant benthos ...” (CRICK, 1990).

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The distribution pattern of the cephalopods appears to be controlled by different palaeoenvironmental factors, such as water depth, temperature, salinity, water currents, etc. The importance of each of these factors is almost unknown. Palaeoenvironmental and palaeoecological studies on Lower Palaeozoic nautiloids are very rare. Recent studies in the Ordovician (FREY, 1989; EVANS, 1993) and Silurian (HEWITT & WATKINS, 1980; BOGOLEPOVA, 1989; 1996) showed some trends in inshore-offshore distribution within the different cephalopod morphotypes, however, at the moment, these problems are beyond the scope of the paper.

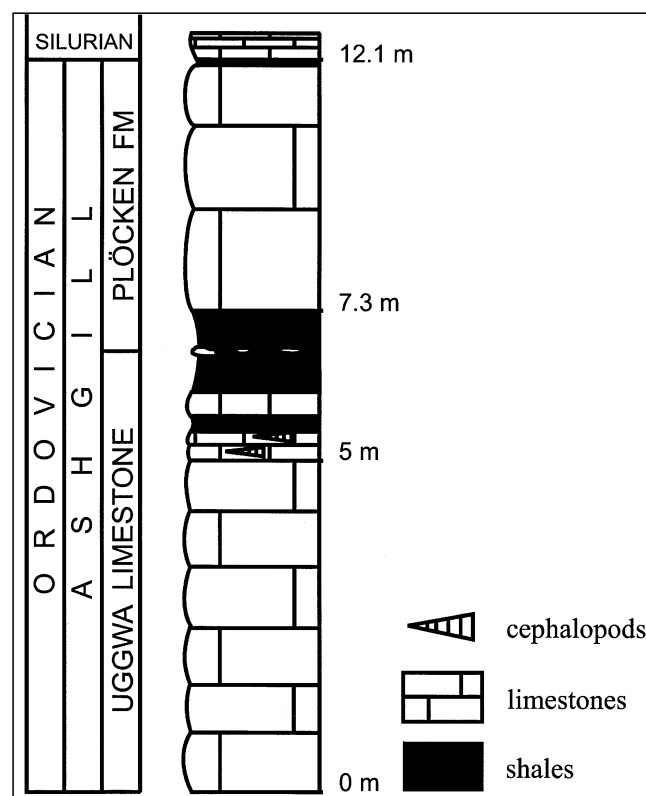
Ordovician cephalopods have been reported from many localities of the northern margin of Gondwana. But in fact, only one cephalopod assemblage has recently been studied from Spain and Portugal (BABIN & GUTIERREZ-MARCO, 1992; BABIN et al., 1996) providing additional evidence on faunal exchange between Iberia and Baltica as well as further constrains on the plate tectonic affinities within the Gondwana-derived terranes.

Ordovician cephalopods from the territory of Austria have never been studied systematically although their remains have been known for many years in the Ashgillian Uggwa Limestone of the Carnic and Karawanken Alps of Austria. The aim of the present paper is to show the first result on cephalopod study carried out in this region during the year 1996.

2. Regional Geology and Stratigraphy

The Carnic Alps of Southern Austria and northeastern Italy belong to the Southern Alps due to their position south of the Periadriatic Line, and extend above 150 km in an east-western direction from Arnoldstein (Carinthia) to Sillian (Tyrol) in Austria (Text-Fig. 1).

The Ordovician of the Carnic Alps is represented by more than 600 m of marine clastic rocks with minor carbonates, and volcanics: greywackes, lydites and shales of the Val Visdende Group (about 500 m), thick acid volcanics of Comelico Porphyroid (300 m) and volcanoclastics of the Fleons Formation (up to 100 m) with their lateral and vertical transition into the Uggwa Shale (about 100 m) and the Himmelberg Sandstone (60 m) which are Caradocian in age. They are succeeded by bioclastic limestones: the massive Wolayer Limestone (about 20 m) and the corresponding Uggwa Limestone (6 m) of Ashgillian age. At the



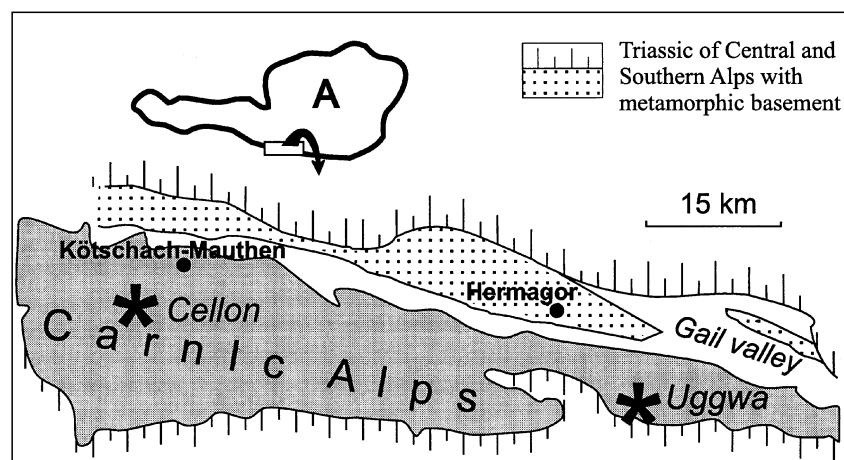
Text-Fig. 2.

The Cellon section (the Ordovician part) showing sample location.

end of the Ordovician a global regression occurred that is documented in the Carnic Alps by calcareous sandstones of the Plöcken Formation. They are disconformably overlain by Silurian black shales and carbonates. Fossil groups include bryozoans, brachiopods, trilobites, cystoids and hyolithes occurring in the shales, and abundant conodonts, cystoids, bryozoans, and less often trilobites, gastropods, ostracodes and cephalopods in the limestones (VINASSA DE REGNY, 1913/1914, 1925; GAERTNER VON, 1931; NEKHOROSHEV, 1936; MANARA & VAI, 1970; SCHÖNLAUB, 1979; SCHALLREUTER, 1990). The Upper Ordovician of the Carnic Alps corresponds with the British Caradocian and Ashgillian Series. By comparison with the Barrandian, it is equivalent with the Berounian, the Kraluv Dvurian and the Kosovian (SCHÖNLAUB, 1971; JAEGER et al., 1975).

This paper is concerned with cephalopods from the Ordovician part of the Cellon section, which is exposed in the Central Carnic Alps, on the eastern slope of Mount Cellon, SSW of Kötschach-Mauthen, close to the Austrian-Italian border (Text-Fig. 1).

The cephalopod specimens described here were collected from the nodular Uggwa Limestone (Text-Fig. 2). Although the age assignment within the Ashgill is not precisely known except for its upper part, in which the Hirnantia fauna is found (SCHÖNLAUB, 1980; 1988), if this part of the section correlates with the stratotype in the Uggwa Valley of the Italian part of the Carnic Alps (VAI, 1971) the age of the beds, according to SERPAGLI (1967) can be recognised as lower Ashgillian. Among the conodonts deter-



Text-Fig. 1.

Sketch map of Austria with position of the Carnic Alps and location of the Cellon section. After SCHÖNLAUB (1979).

mined from the same level are: *Scabardella altipes*, *Dapsilodus mutatus*, *Hamarodus europaeus*, *Drepanoistodus* sp. that confirms the assignment of these fossil bearing beds to the *Amorphognathus ordovicicus* Biozone.

3. Systematic Palaeontology

Family: Orthoceratidae Mc COY, 1844

Genus: *Orthoceras* BRUGIERE, 1789

Type species: *Orthoceratites regularis* SCHLOTHEIM 1820, by decision of the Commission of Zoological Nomenclature.

Diagnosis: Shell orthoceraconic, very slightly increasing, rounded in cross section, with fine reticulate sculpture. Sutures are straight and transverse; the septa are deep, camerae are long. Siphuncle subcentral. Septal necks short and orthochoanitic, connecting rings cylindrical. Body chamber comparatively long and transversely constricted at about mid-length, with short, dorsal longitudinal and 2 short ventral, longitudinal narrow depressions. Embryonic conch unknown.

Composition: *Orthoceras bifoveatum* NOETLING, 1884; *Orthoceras gaspense* FOERSTE, 1936; *Orthoceras kindlei* FOERSTE, 1936; *Orthoceras percense* FOERSTE, 1936; *Orthoceras regularis* (SCHLOTHEIM, 1820); *Orthoceras quinquefoveatum* NOETLING, 1884; *Orthoceras scabridum* ANGELIN, 1890.

Stratigraphic range: Lower to Upper Ordovician.

Geographic distribution: Estonia, Russia, Sweden, Germany, Poland, Spain, Portugal, Carnic Alps of Austria, and Canada.

Orthoceras sp. cf. *O. regularis* (SCHLOTHEIM, 1820)

(Text-Fig. 3)

Material: five fragments.

Description: The specimen examined consists of a portion of an orthocone 48 mm long, with a diameter about 15 mm. Camerae long, half the diameter. Septa are deep and concave to the depth of a camera (half the shell diameter). The siphuncle is central. It is 3 mm in diameter. Septal necks short, orthochoanitic. Connecting rings almost cylindrical. Cameral deposits developed. Siphonal deposits not seen. Living chamber is not preserved.

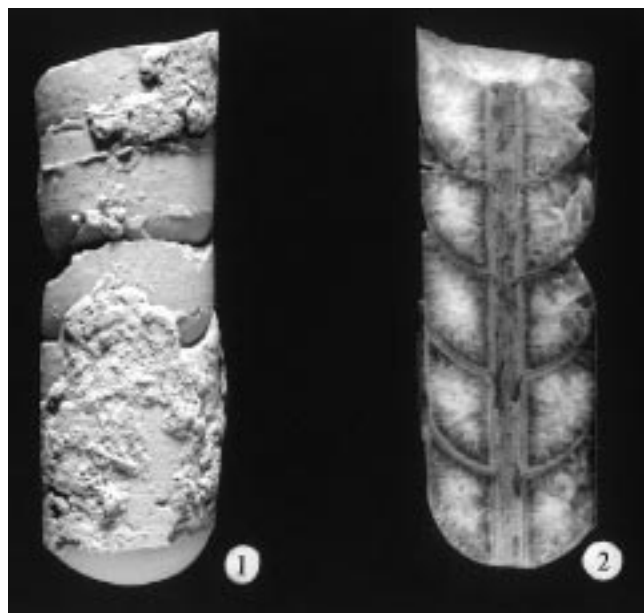
Remarks: The reason for using the term "cf." is the absence of specimens with the living chamber.

Occurrence: upper part of the Uggwa Limestones (samples no. OCO 96/4-1-5), lower Ashgill, Cellon section, Carnic Alps of Austria.

Geographic and stratigraphic distribution: Estonia, Llanvirn–Caradoc; Germany, Llanvirn–Caradoc; Poland, Llanvirn–Llandeilo; Austria, lower Ashgill.

4. Conclusions

The nautiloid described here is of interest particularly because of its palaeogeographic distribution. This first record of the "Baltic" cephalopods in the Alps is in accordance with other data: trilobites, brachiopods, conodonts, ostracods, and echinoids (JAEGER et. al., 1975; SCHÖNLAUB, 1980, 1992, 1994; SCHALLREUTER, 1990), suggesting the Baltic affinities to be predominant in the late Ordovician of this region.



Text-Fig. 3.

Orthoceras sp. cf. *O. regularis* (SCHLOTHEIM, 1820).

Uggwa Limestone, lower Ashgill, Upper Ordovician, Cellon section, Carnic Alps, Austria.

1) Lateral view, $\times 1.5$ (n. OCO 96/4-5).

2) Dorsoventral section, $\times 1.5$ (n. OCO 96/4-5).

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