

## Uppermost Maastrichtian radiolaria and foraminifera assemblages from the Polish part of the Magura Unit (Rača sub-unit)

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**Abstract.** Abundant radiolarian fauna and foraminifers have been found within uppermost Maastrichtian deposits of the Inoceranian beds in the Magura Unit. The nassellarians dominate in numbers of specimens and taxa. The most characteristic genera among the radiolarians are *Amphipyndax*, *Dictyomitra* and *Theocapsomma*, *Pseudoaulophacus* and *Patellula*. Foraminiferal assemblage is represented mostly by deep-water agglutinated forms. The most frequent are tubular-shaped forms of genera *Rhabdammina*, *Bathysiphon* and *Nothia*.

**Key words.** Radiolaria, foraminifera, uppermost Maastrichtian, Magura Unit, Outer Carpathians.

### Introduction

Radiolarian and foraminiferal faunas around Cretaceous-Tertiary boundary have been a subject of systematic descriptions and stratigraphic studies from different regions of the world.

In the Carpathians, the investigations of radiolarian, foraminiferal and nannofloras assemblages from the K/T boundary interval were started by Bubik et al. (1997, 1999), in the Czech part of the Magura Nappe (Rača subunit)

Our investigations concern uppermost Cretaceous microfossils, which have been found in the Polish part of the Rača sub-unit, within the Beskid Niski Mts.

### Geological setting

The microfauna investigated have been found within the Inoceranian beds located at Szymbark village, in the stream-bed of the Ropa river, near the mouth of the Bielanka creek. The Inoceranian beds at the Szymbark locality consist of dark-grey and greenish shaly silts and argillaceous shales, alternated with thin- and medium-bedded, calcareous, laminated, micaceous sandstones, with some thick-bedded sandstone intercalations.

Twenty samples for micropalaeontological purposes were collected during our field studies

### Radiolarian assemblage

The radiolarian assemblage consists of well preserved, pyritized specimens, which have been found in the dark-grey silty claystones. The nassellarians dominate in numbers of specimens and taxa. They consist of 90 percent of all specimens found. The most characteristic genera are *Amphipyndax*, *Dictyomitra* and *Theocapsomma*. The spumellarians are represented predominantly by species belong-

ing to the family Pseudoaulophacidae (genera: *Pseudoaulophacus* and *Patellula*). The fauna described has a character of low latitude radiolarian association (Pl. 1).

### Foraminiferal assemblage

Deep-water agglutinated foraminifera represent nearly 100% of foraminiferal assemblage, which number and diversity varies of lithology. The most frequent are tubular-shaped forms of genera *Rhabdammina*, *Bathysiphon* and *Nothia*. They are accompanied by siliceous-walled *Hormosina excelsa*, *Rzehakina epigona*, *R. inclusa*, *R. minima*, *Ammodiscus cretaceus* and *Glomospira diffundens*. Less frequent are *Pseudoreophax splendidus*, *Pseudonodosinella parvula*, *Reophax* spp., *Recurvoides* spp., *Saccamina placenta*. Moreover, there have been found *Paratrochamminoides heteromorphus*, *Trochamminoides* spp., *Spiroplectammina* cf. *spectabilis* and *Remesella varians*. Planktic foraminifera occur only as single specimens in five samples.

### Age assignment

**Radiolarian fauna.** The age of the radiolarian assemblage has been assigned based on correlation with the radiolarian zonal schemes of previous authors (Foreman, 1975, 1977; Riedel & Sanfilippo, 1974; Pessagno, 1976; Hollis, 1997). The assemblage investigated can be correlated with the upper Campanian to Maastrichtian *Amphipyndax tylotus* radiolarian Zone of Foreman (1977), based on the presence of the index species and *Afenslirioides* which co-occur with *Siphocampe bassilis*, *Siphocampe daseia*, *Stichomitra grandis*, *Theocapsomma teren* and *Theocapsomma comys*, described also by Foreman (1968) from the upper Maastrichtian deposits in California.

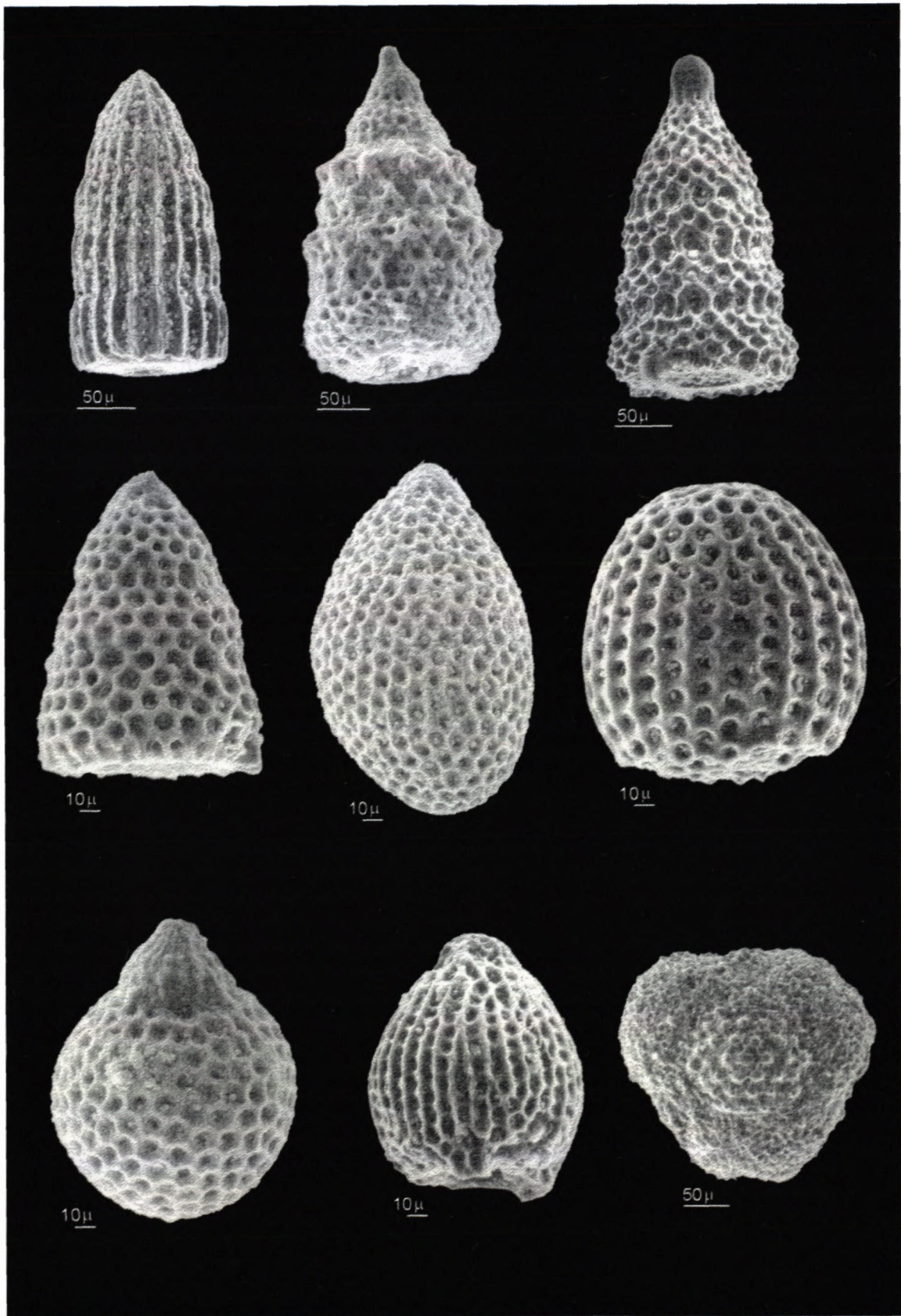


Plate 1. Uppermost Maastrichtian Radiolaria from Magura Unit (Rača sub-unit).

1 - *Dictyomitra multicostata* ZITTEL - Sz19, 2 - *Stichomitra grandis* (CAMPBELL & CLARK) - Sz18, 3 - *Amphipyndax tylotus* FOREMAN - Sz0, 4 - *Amphipyndax stocki* (CAMPBELL & CLARK) - Sz18, 5 - *Theocapsomma teren* FOREMAN - Sz19, 6 - *Theocapsomma* sp. - Sz18, 7 - *Cryptamphorella conara* (FOREMAN) - Sz18, 8 - *Myllocercion acineton* FOREMAN - Sz0, 9 - *Pseudoaulophacus floresensis* PESSAGNO - Sz0

The assemblage studied is also similar to those of Riedel and Sanfilippo (1974), and can be correlated with the *Theocapsomma comys* Zone of Riedel and Sanfilippo (1974) of approximately Maastrichtian age, based on the co-occurrence of the index species with *Stichomitra grandis*, *Amphipyndax stocki*, *Afens liriodes* and *Amphipyndax pseudoconulus*.

The presence of *Orbiculiforma renillaeformis* together with the above mentioned radiolarian species allows correlation with the Maastrichtian *Orbiculiforma renillaeformis* interval Zone proposed by Pessagno (1976) for the California Coastal Ranges.

The assemblage investigated corresponds also to the *Lithomelissa ?hoplites* radiolarian Interval Zone (RK9) of Hollis (1997) for the upper Campanian to uppermost Maastrichtian interval. The radiolarian species that occur within this zone (Hollis, 1993, 1997) are similar to the radiolarian association from the Magura Nappe deposits. Both associations contain *S. carnegiense*, *S. grandis*, *S. bertrandi*, *Amphipyndax stocki*, *Mylocercion acineton*, *Dictyomitra lamellicostata* and *D. multicostata*. The species *Amphisphaera aotea* (first species providing evidence of earliest Paleocene) is not present in the assemblage investigated. Moreover the nassellarians dominate within the association in number of specimens as well as in number of taxa. The characteristic change of faunal character from nassellarians to spumellarians dominance which also coincides with the top of the *Lithomelissa ?hoplites* Zone of Hollis (1997) does not occur in the association investigated. Based on these facts the age of the radiolarian assemblage from the Magura Nappe is assigned to the latest Maastrichtian.

**Foraminifers.** The planktic foraminifera include single specimens of *Pseudotextularia elegans*, *Heterohelix striata*, *Racemiguembelina fructifera*, *Pseudoguembelina palpebra*, *Globotruncanita stuartiformis*, *Globotruncana arca* and *Gansserina gansseri*. Taking into account the stratigraphic ranges of these taxa (e.g., Caron, 1985), it could be speculated the age of the deposits, as not older than the *Gansserina gansseri* Zone (middle Maastrichtian). The late Maastrichtian *Abathomphalus mayaroensis* has not been found.

Some agglutinated foraminifera, occurring in the section, such as *Remesella varians*, rzehakinids and *Spiroplectammina spectabilis* could confirm this suggestion. The FAD of *Remesella varians* is known from the middle-upper Maastrichtian (e.g., Kuhnt & Moullade, 1991; Kuhnt & Kaminski, 1997). Numerous small rzehakinids are also described from the Maastrichtian flysch deposits (e.g., Malata et al., 1996). First appearance of *Spiroplectammina spectabilis* was documented from the latest Maastrichtian, near the Cretaceous-Tertiary boundary (Kaminski et al., 1988; Peryt et al., 1997).

From other hand, lack of small Early Paleocene globigerinids and truly Paleocene deep-water agglutinated foraminifer, *Rzehakina fissistomata* (Geroch & Nowak, 1984), have excluded the Paleocene age of the studied deposits.

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