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A Problematic Microfossil from the Oligocene of Rott (Siebengebirge, Germany), with Affinities to Freshwater Bryozoan Statoblasts (Phylactolaemata)

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Abstract:
From the Upper Oligocene of Rott (Germany) a problematic microfossil is described and interpreted as a statoblast of freshwater bryozoans. Differences to Recent statoblasts are discussed briefly.

Zusammenfassung:
Aus dem Oberoligozän von Rott (Siebengebirge / Deutschland) wird ein Fossil beschrieben, das nach seiner Struktur und Dimension als ein Statoblast von Süsswasserbryozoen interpretiert wird. Unterschiede zu rezenten Statoblasten werden kurz diskutiert.

Key words: Rott - Oligocene - Freshwater Bryozoans - Statoblasts.

INTRODUCTION

In contrast to their marine relatives, the taxa of freshwater bryozoans develop non-calcified skeletal hard parts. Hence, phylactolaemate bryozoans cannot be expected to have any fossil remains and are, therefore, generally unknown in the fossil record. However, freshwater bryozoans sometimes form asexually small encapsulated buds, linking one generation of colonies with the next (WOOD 1979). Those sclerotized buds have been called statoblasts in the literature. They represent a certain survival strategy, due to seasonal changings, like alteration of hydrochemical composition. Statoblasts can be divided into two different types: floatable statoblasts (= floatoblasts) and sessile statoblasts (= sessoblasts). A statoblast, enclosing yolky germinal mass, consists of a dorsal and a ventral valve, which are separated when the statoblast germinates (ODA & MUKAI 1989). In general, the dorsal valve has a bigger float area than the ventral one (BUSHNELL & RAO 1979). Some statoblasts have been used for species identification, while others have no taxonomic value (WOOD 1979). Other metazoan taxa in freshwater environments with similar strategies are sponges, forming gemmulae (WEISSENFELS 1989), and cladoceres (WESENBERG-LUND 1939).

Although WESENBERG-LUND (1897, 1907, 1939) and KUC (1973) described well preserved subfossil statoblasts from inter-

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and postglacial deposits of Danmark and northern Canada, confident evidence of fossil material of prequaternary age is unknown up to now. Recently, KINZELBACH & FRANZ (in prep.) have found a single statoblast of a freshwater bryozoan in the Middle Eocene maar-sediments of Eckfeld (Eifel, Germany) (pers. comm. of Prof. E. VOIGT, Hamburg). The microfossils from Upper Cretaceous cherts described as statoblasts by TURPIN (1837) and other workers (cf. SARJEANT 1961) are dinoflagellate cysts (MANTELL 1845).

This rare representation of statoblasts in the fossil record may be a result of a late phylogentic development of phylactolaematan bryozoa even in the Late Tertiary, a preservational problem, or a neglection of these tiny fossils by former workers. BASSLER (1953) in his first edition of "Treatise of Invertebrate Paleontology" mentioned doubtful freshwater bryozoans from the Cretaceous of Bohemia, but in the second edition this information was rejected. E.VOIGT (1990, pers. comm.) described these fossils as "dubious matter".

Purpose of this study is the documentation and description of a single problematic microfossil (which was covered by an old label) from the Upper Oligocene of Rott (Germany) with remarkable affinities to statoblasts of freshwater bryozoans. The fossil has been compared with various Recent statoblasts of Japan (*Asajirella gelatinosa, Cristatella mucedo, Plumatella emarginata, Stephanella hina*), and Germany (*Plumatella* cf. *repens*).

LOCALITY

The deposits of Rott near Bonn (Germany) consist of an alternation of clayey and fine laminated coaly sediments. In the 19th century, during mining, they have yielded many vertebrate and invertebrate fossils, especially insects and other arthropodes. Due to the abundance of aquatic organisms, like larvae of dragonflies, frogs and several species of fishes, the paleoenvironment has been interpreted as lacustrine with partial anoxic conditions on the bottom of the former lake. The coaly sediments have been dated as Upper Oligocene on the basis of the mammal *Microbunodon*. Further information on the geological setting and the faunal inventar of this locality is given by KOENIGSWALD (1989). One of the authors (J. R.) had acquired a small collection of material from Rott with dominantly insect and fish remains (KOHRING & REITNER 1991).

DESCRIPTION AND INTERPRETATION

The problematic fossil (Pl.1, fig.1) is more or less circularshaped with a diameter of about 0.59 mm. It is one (ventral ?) disk and resembles a floatoblast more than a sessoblast. The small dark brown shelf displays no clearly developed spines, which are common in many Recent statoblasts (Pl.1, fig.3). The inner reticular network is regulary and somewhat spiralic, but all single polygonal cells have nearly the same dimensions. This network is quite similar to that of the Recent *Plumatella emarginata* (compare Pl.1, figs. 1 and 4). Relics are also visible in the periphery zone (= float ring ?). The network disappears in the center of the specimen. This central part exhibits a strange pattern of concentric circles, which is unknown in Recent statoblasts (pers. comm. by R. CUFFEY, Pennsylvania, and H. MUKAI, Gunma).

Due to UV fluorescence-analysis this disk-shape fossil is definetly not a part of a plant, because the characteristic yellow fluorescence of diagenetic altered animal remains is visible.

The problem in analyzing this fossil object depends on the differences in preservation between Recent and fossil statoblasts. It is unclear whether the absence of marginal organic spines is a diagenetic feature or a taxonomic character. These spines are developed in several species of *Cristatella*, and also preserved in subfossil statoblasts of this genus from various

postglacial deposits (WESENBERG-LUND 1939, KUC 1973).

Additionally, the concentric pattern in the center of the specimen may be caused by compaction.

DISCUSSION

Obviously, statoblasts of phylactolaematan bryozoans are normally not fossilized. The described microfossil from the Upper Oligocene of Rott is also questionable. H. MUKAI (Gunma) stated, "from the size and pattern of its meshes, the object in question seems not to be a statoblast" (pers.comm). However, he concluded, that he is only familiar with Recent species. R. CUFFEY (Pennsylvania) also discussed the here presented object and infers from an assignment to the Phylactolaemata "it is possible, but not certain" (pers. comm.). A. TRAVERSE (Pennsylvania) supposed an assignement to acritarchian algae (family Prasinophyceae). However, this is impossible due to the size of the object, absence of fluorescence reaction (see above), the age of this locality and the suggested lacustrine paleoenvironment.

The here described microfossil displays some affinities to Recent phylactolaematan bryozoans (Pl. 1, figs. 2 - 8), probably to the genus *Cristatella*. However, it seems important to point out, that there are differences (e. g. lack of spines) to Recent floatoblasts of this genus. Because of the rareness of fossil statoblasts of freshwater bryozoans each new discovery of these particular taxa is important for phylogenetic and paleoenvironmental reconstructions.

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Plate 1

Fig.1 - Fossil object from the Upper Oligocene of Rott with some affinities to phylactolaematan statoblasts. Bar = 0.5 mm.

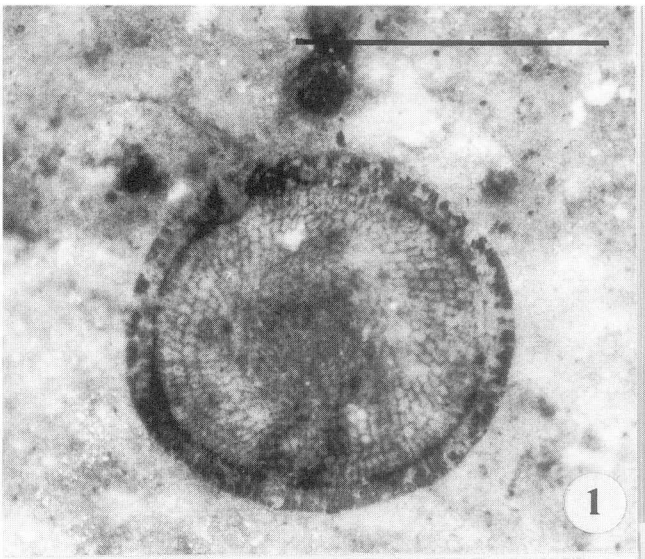
Figs.2 and 3 - Recent statoblasts of *Cristatella mucedo*.
Fig.2 - Dorsal valve. Bar = 0.5 mm.
Fig.3 - Ventral valve. Bar = 0.5 mm.

Fig.4 - Recent statoblast of *Plumatella emarginata*. Floatoblast, dorsal valve. Bar = 0.3 mm.

Fig.5 - Recent statoblast of *Asajirella gelatinosa*. Ventral valve. Bar= 1 mm.

Fig.6 - Recent statoblast of *Stephanella hina*. Sessoblast. Bar = 0.4 mm.

Figs.7 and 8 - Recent statoblast of *Plumatella* cf. *repens*.
Fig.7 - Float ring with cell structure. Bar = 0.1 mm.
Fig.8 - Statoblast. Bar = 0.3 mm.



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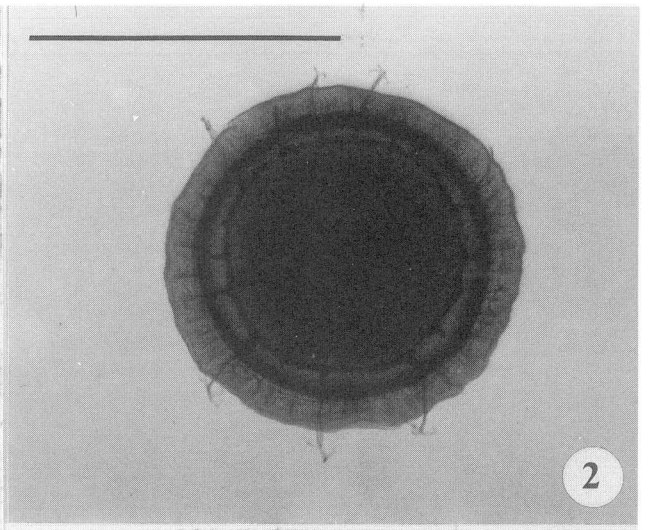

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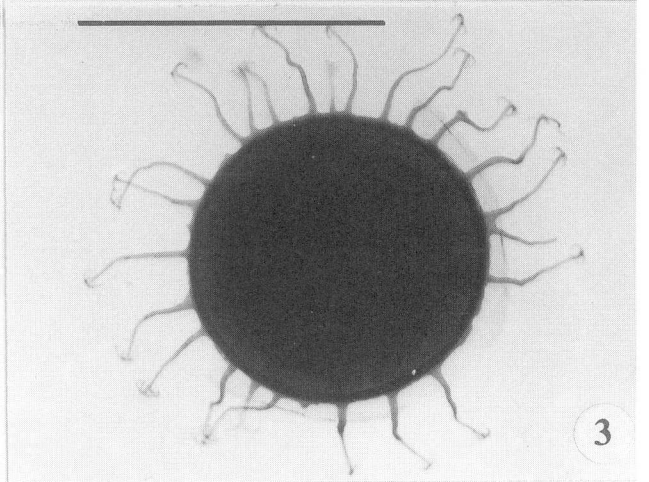

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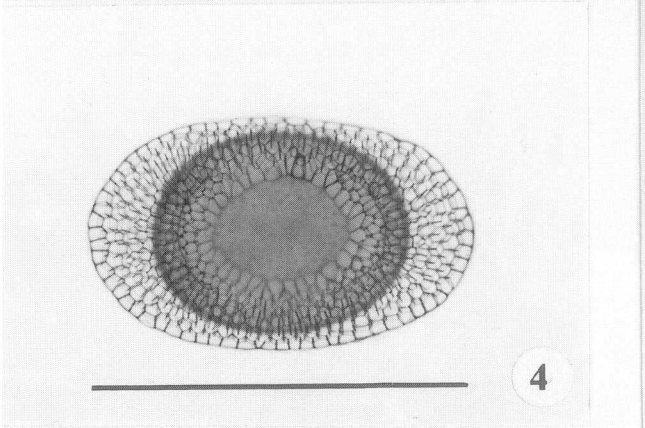

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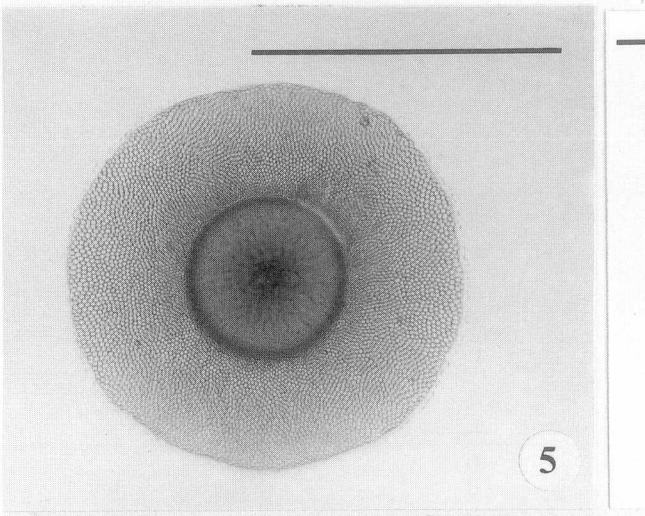

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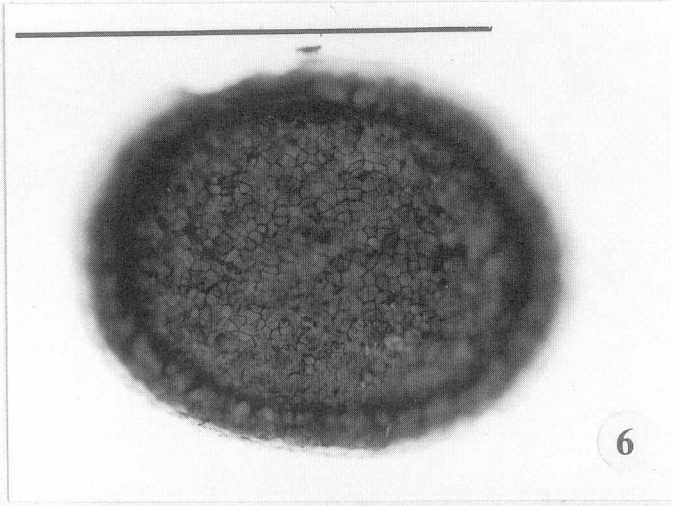

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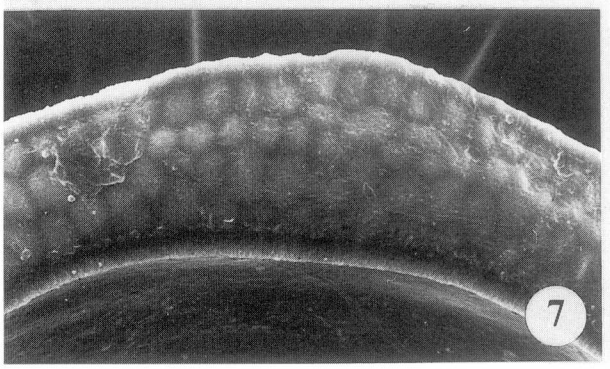

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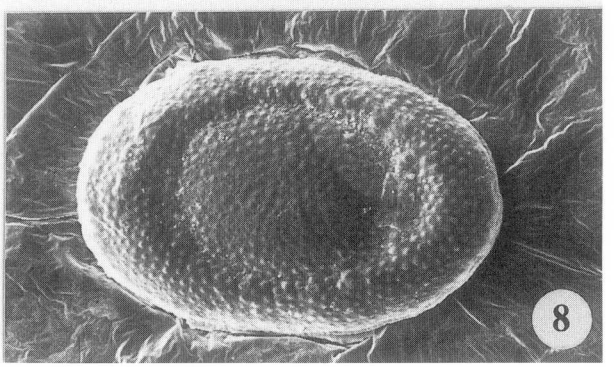

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