Abh. Geol. B.-A.	ISSN 0378-0864 ISBN 3-900312-54-0	Band **39**	S. 231–237	Wien, März 1987

Report on Triassic Nannoliths from Austria

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With 6 Figures and 2 Plates

Austria
Nannofossils
Triassic

Contents

Zusammenfassung

Drei bereits bekannte und eine neue, noch unbenannte Art von Nannolithen werden aus der österreichischen Trias beschrieben und mittels REM Aufnahmen dargestellt.

Abstract

Three species of triassic nannoliths already known to science and one still unnamed new nannolith species are described from Austrian sites and illustrated by means of SEM micrographs.

1. Introduction

Triassic nannoliths have been described in important papers by FISCHER, HONJO & GARRISON (1967), MOSHKOVITZ (1982), JAFAR (1983) and BOWN (1985), who all have examined samples from sites in Austria. In the past years we have tried to collect more data from Austrian Triassic samples and to give more evidence on the species so far described.

Among more than sixty samples only six are fairly well suited for electron microscopy. In the others the state of preservation and the frequency of nannoliths were not found rewarding.

2. Sampling sites

a) Fischerwiese in the N of Ober Luppitsch, Styria. Rhaetian, *Choristoceras marshi* ammonite zone; 2 samples.
b) Poetschenpass, Upper Austria. Intercalated marls of the Poetschen-limestone. Norian; 1 sample.
c) Hohe Wand, Plackles, Lower Austria. Zlambach marls, Lower Rhaetian; 1 sample.
d) Vorderer Ampelsbach in the northern part of the Rofan Mountains near Achenkirch, Tyrol. Rhaetian; *Choristoceras marshi* ammonite zone; 1 sample.
e) Geissau, Salzburg. Bituminous shales of the Kössener Schichten. Rhaetian. *Choristoceras marshi* ammonite zone; 1 sample.

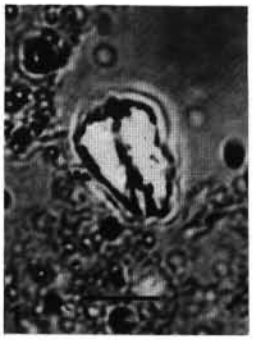

Fig. 1: *Conusphaera zlambachensis* MOSHKOVITZ 1982.
Fischerwiese, Styria (Rhaetian). Lateral view, transmitted light.
Scale bar = 5 µm.

Fig. 2: *Conusphaera zlambachensis* MOSHKOVITZ 1982.
Ampelsbach, Tyrol (Rhaetian). Lateral view, transmitted light.
Scale bar = 5 µm.

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Fig. 3: *Prinsiosphaera triassica* JAFAR 1983.
Fischerwiese, Styria (Rhaetian). Transmitted light.
Scale bar = 5 µm.

Fig. 4: *Prinsiosphaera triassica* JAFAR 1983.
Fischerwiese, Styria (Rhaetian). Polarized light, ×-nicols.
Scale bar = 5 µm.

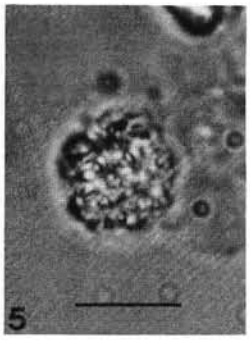

Fig. 5: *Prinsiosphaera triassica* JAFAR 1983.
Pötschenpaß, Upper Austria (Norian). Transmitted light.
Scale bar = 5 µm.

3. Systematics

The following species were encountered:

Conusphaera zlambachensis MOSHKOVITZ 1982

(Plate 1, figs. 1–9; text-figs. 1,2,6)

1982 *Conusphaera zlambachensis* nov. spec. MOSHKOVITZ, p. 612, pl. 1, fig. 1–10
1983 *Eoconusphaera tollmanniae* nov. spec. JAFAR, p. 228, figs. 6/1a–1c, 6/2.

These Triassic cone-shaped nannofossils have an interior crystal arrangement slightly different from that of the Lower Cretaceous *Conusphaera mexicana* TREJO 1969. While *Conusphaera mexicana* is composed of three conical layers of elongate crystal lamellae with the two inner ones in more or less radial arrangement and the outer one in peripheral orientation to form the mantle of the cone-shaped body, *Conusphaera zlambachensis* shows only two different groups of elements, namely the core and the mantle. The core of the conical body consists of 7 or 8 piles of tabular rhombohedric calcite plates, which are obliquely stacked and are aligned in such a way, that the longer edges of the crystal plates of one pile are bordering the serrate edges of the neighbouring pile. The cross-section of a conical body shows a distinct twist of the radially arranged piles. The mantle surface consists of elongated, smooth plates each separated from each other by an interval or a deep suture (compare MOSHKOVITZ, pl. 1, fig. 3), while in *Conusphaera mexicana* the mantle appears to be tightly fitting and entirely closed (compare THIERSTEIN, pl. 3, fig. 1 and GRÜN & ALLEMANN, pl. 8, fig. 10 and text-fig. 30).

The mantle of *Conusphaera zlambachensis* seems to be analogous to the middle layer in *Conusphaera mexicana*. The outer mantle of *C. mexicana* seems to be a later evolution during the time from Upper Triassic to Lower Cretaceous, or it has not been preserved and thus never been observed in *Conusphaera zlambachensis*.

In analogy to *Conusphaera mexicana* (compare original description by TREJO 1969, figs. 7 and 8) also the conical nannoliths of *Conusphaera zlambachensis* are considered to represent the "building stones" of hollow spherical shells with an overall diameter four times that of the width of the wall.

Since the wall in *Conusphaera*-spheres in most cases is disintegrated, the length of a conical body would correspond to the thickness of the wall of the sphere. By measuring the angle of the cone, one can calculate the diameter of the entire "nannolithosphere", which in the case of *Conusphaera zlambachensis* has varied from 25 to 40 microns.

Occurrences: Fischerwiese, Styria; Rhaetian. Not common.
Ampelsbach, Tyrol; Rhaetian. Rare.

Fig. 6: Cross-section of a conical body of *Conusphaera zlambachensis* MOSHKOVITZ 1982.
Schematic drawing, view from distal (peripheral) side.

Prinsiosphaera triassica JAFAR 1983

(Pl. 2, figs. 1–7, text-figs. 3–5)

1967 "ultramicroscopic bodies composed of batteries of small plates". FISCHER, HONJO & GARRISON, p. 36, Figs. 79–81.
1979 *Thoracosphaera* ssp. 6 & 7. JAFAR; Pl. 3, Figs. 7a–b, 8a–b.
1982 Undetermined globular calcitic body – MOSHKOVITZ, p. 614, pl. 2, Figs. 3 and 4.
1983 *Prinsiosphaera triassica* JAFAR, p. 232, Fig. 8/1a–1c.

The calcareous bodies are usually spherical with a depression at one end. They have a compact core,

which is covered by a separate shell, both core and shell being composed of parallely stacked groups of calcite plates. Speaking generally these crystal stacks lie in random distribution, however towards the depressed end or the crater they in some specimen show an orientation along the meridians of the globular body (compare also MOSHKOVITZ, pl. 2, Fig. 3). There is only one crater per specimen, and it appears to be spared out by the crystal stacks.

Occurrences: In all our samples; rare to common. Norian – Rhaetian.

Prinsiosphaera geometrica JAFAR 1983

(Pl. 2, figs. 8–11)

1983 *Prinsiosphaera geometrica* JAFAR; p. 233, Figs. 10/5, and 10/6.

Spherical or hemispherical calcareous bodies which on one side, the domal part, show a more delicate ultrastructure consisting of minute equidimensional interpenetrant calcite rhombohedra. The rest of the surface shows similar features as in *Prinsiosphaera triassica* JAFAR.

Ocurrence: Fischerwiese, Styria; Rhaetian. Very rare.

Unnamed New Species

Reserved holotype: Specimen of Plate 1, figs. 10 and 11.

Reserved paratype: Specimen of Plate 1, fig. 12.

Globular nannoliths with flattened base, their surface consisting of an irregular pseudo "honeycomb" pattern. The irregular cells of this pattern are polygonal and are formed of elongate crystal plates arranged in diametrical direction. Pending further microchemical analyses using energy dispersive x-ray data of this new species the assignment to a new genus is postponed.

In the opinion of our palynologist it certainly does not resemble to spores or pollen of any kind. Very rare.

Dimensions: Diameter 5 to 7 microns

Locus typicus: Fischerwiese, Styria;

Stratum typicum: Upper Triassic, Rhaetian.

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Plate 1

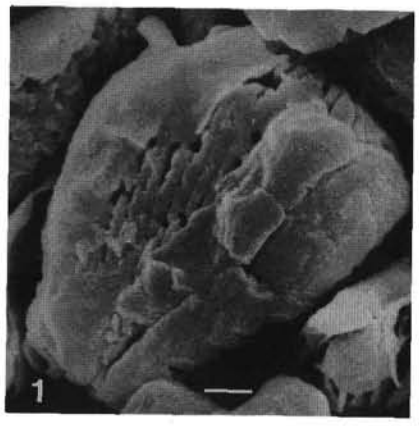
Conusphaera zlambachensis MOSHKOVITZ 1982

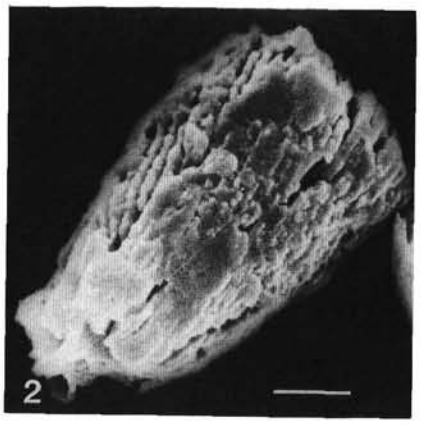
Fig. 1: Largest specimen, with overcalcified mantle.
Fig. 2: Middle-sized specimen.
Fig. 3: Specimen with best-preserved outline and partly preserved mantle plates.
Fig. 4: Etched specimen showing remnant of mantle plate.
Fig. 5: Etched specimen.
Fig. 6: Badly corroded specimen.
Fig. 7: Specimen with patchy mantle covering (artefacts?).
Fig. 8: Smallest specimen showing ultrastructure of obliquely stacked lamellae.
Fig. 9: Middle-sized specimen showing ultrastructure of distal end and well preserved mantle plates.

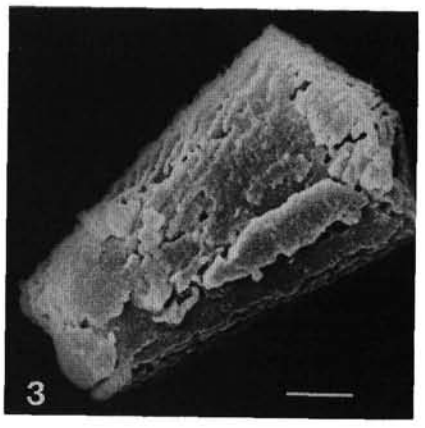
Unnamed species

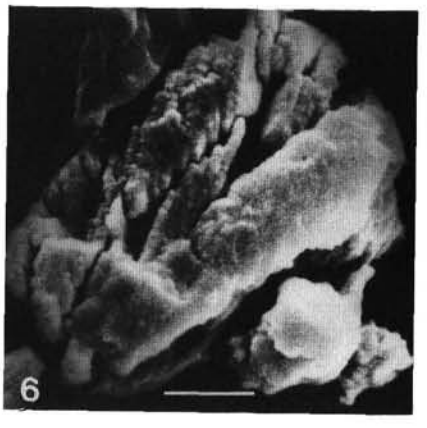
Fig. 10: Lateral view of ovular nannolith showing irregular pseudo-honeycomb pattern on its surface.
Fig. 11: Close-up of surface (same specimen).
Fig. 12: Another specimen in lateral view.

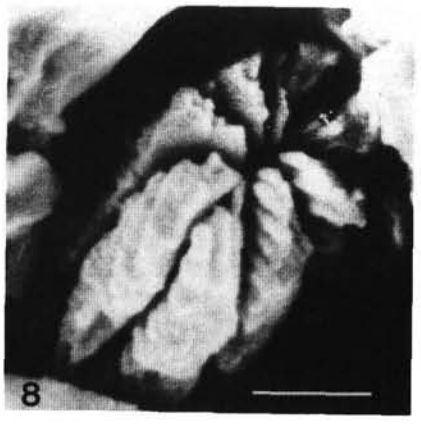
Locations: Fischerwiese, Styria, Rhaetian (Figs. 1–6,8–12); Ampelsbach, Tyrol, Rhaetian (Fig. 7).
Scale bars = 1 μm.

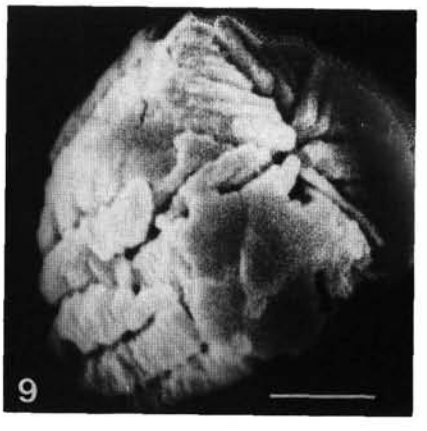


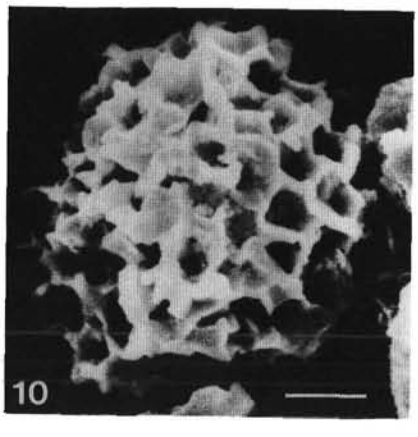


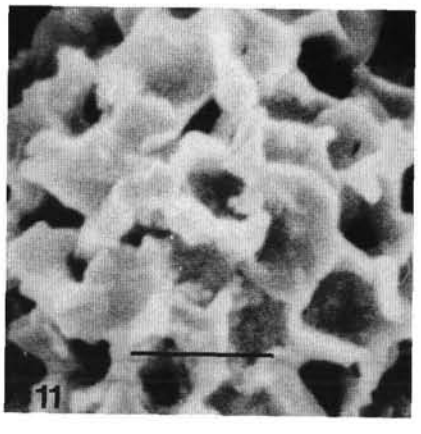












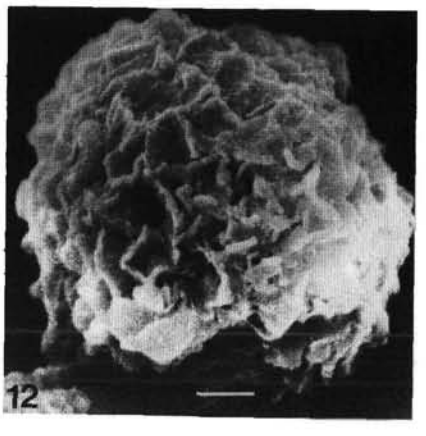


Plate 2

Prinsiosphaera triassica JAFAR 1983

Fig. 1: Best preserved specimen with slightly etched shell surface and rhombical crater lining.
Fig. 2: Same specimen, close-up of the crater.
Fig. 3: Specimen with parallel crystal stacks.
Fig. 4: Specimen with partly covered crystal stacks (effect of overcalcification?).
Fig. 5: Specimen in lateral view, crater above.
Fig. 6: Specimen with shell-layer partly destroyed.
Fig. 7: Same specimen; close-up of shell layer with crystal stacks in random distribution.

Prinsiosphaera geometrica JAFAR 1983

Fig. 8: Ovular specimen showing typical finely granulated shell surface.
Fig. 9: Specimen with overcalcified surface.
Fig. 10: Twin-arrangement of two nannoliths, both with *P. geometrica* surface pattern.
Fig. 11: *Prinsiosphaera* sp.
Nannolith showing crater; no distinct surface pattern recognizable.

Locations: Fischerwiese, Styria, Rhaetian (Figs. 1–10); Geissau, Salzburg, Rhaetian (Fig. 11).
Scale bars = 1 μm.