



Late Telychian Graptolites of the Rauchkofel Bodentörl Section (Central Carnic Alps, Austria)

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3 Text-Figures

Österreichische Karte 1 : 50.000
Blatt 197

Kärnten
Karnische Alpen
Silur
Graptolithen
Biostratigraphie

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Obertelychische Graptolithen aus dem Rauchkofel-Bodentörl-Profil (Zentrale Karnische Alpen, Österreich)

Zusammenfassung

Die Graptolithenfauna des Rauchkofel-Bodentörl-Profiles (zentrale Karnische Alpen) wird beschrieben. Sie umfasst 15 Arten, die eine Einstufung in den unteren Teil der *Oktavites-spiralis*-Biozone des oberen Telychium nahe legen. Eine neue Art, *Oktavites bodentoerlensis*, wird beschrieben. Die Ablagerung der Graptolithen führenden Schichten erfolgte während einer Periode hohen eustatischen Meeresspiegels. Die Basis des Wenlock im Rauchkofel-Bodentörl-Profil liegt wahrscheinlich etwas höher als bisher angenommen.

Abstract

The graptolite fauna of the Rauchkofel Bodentörl section, central Carnic Alps is described. It comprises 15 species, indicative of the lower part of the *Oktavites spiralis* Biozone of the upper Telychian. One new species, *Oktavites bodentoerlensis*, is described. Deposition of the graptolitic strata took place during a period of high eustatic sea-level. The base of the Wenlock in the Rauchkofel Bodentörl section is probably somewhat higher than previously thought.

1. Introduction

The graptolite assemblage from 1.3 m above the base of the Rauchkofel Bodentörl section, central Carnic Alps, Austria, is of considerable significance for integrating the Silurian graptolite and conodont biozonal schemes (JAEGER & SCHÖNLAUB, 1970; SCHÖNLAUB, 1994) and for the construction of sea-level curves (LOYDELL, 1998, 1999).

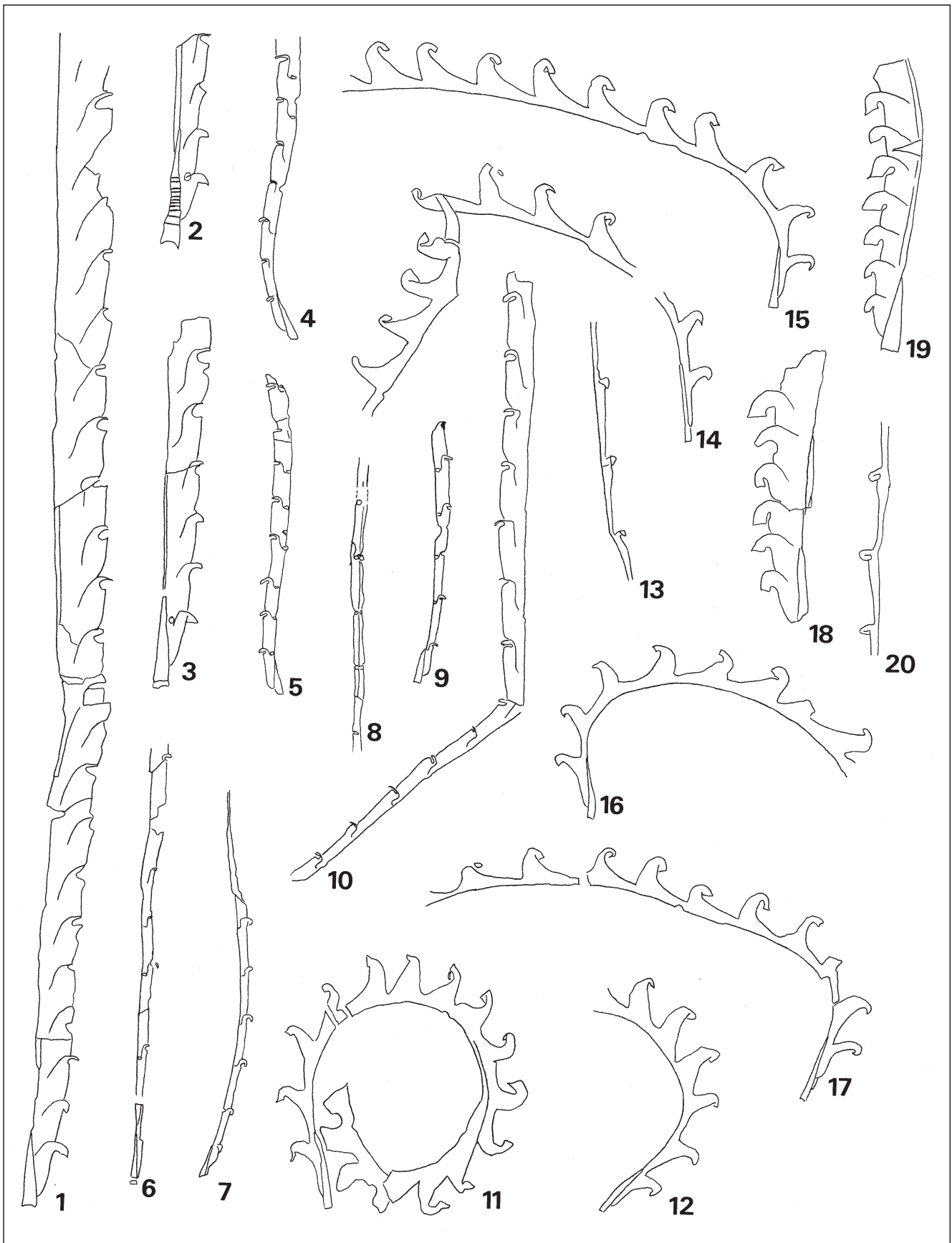
JAEGER (in JAEGER & SCHÖNLAUB, 1970) listed, but did not describe or illustrate, the graptolites from the section and assigned the material to the *curvus* Subzone of the upper part of the *crenulata* Biozone (Telychian, Llandoverly).

The graptolites from the section are described herein and their significance is discussed.

2. The Graptolite Assemblage

The graptolites from the section are housed in the Geologische Bundesanstalt, Vienna, with the registration numbers 1998/1.1–1998/1.101. Preservation varies from flattened and poor with few details visible to medium relief pyrite internal moulds. Diversity is quite high, with 15 species present in the collection of several hundred graptolites.

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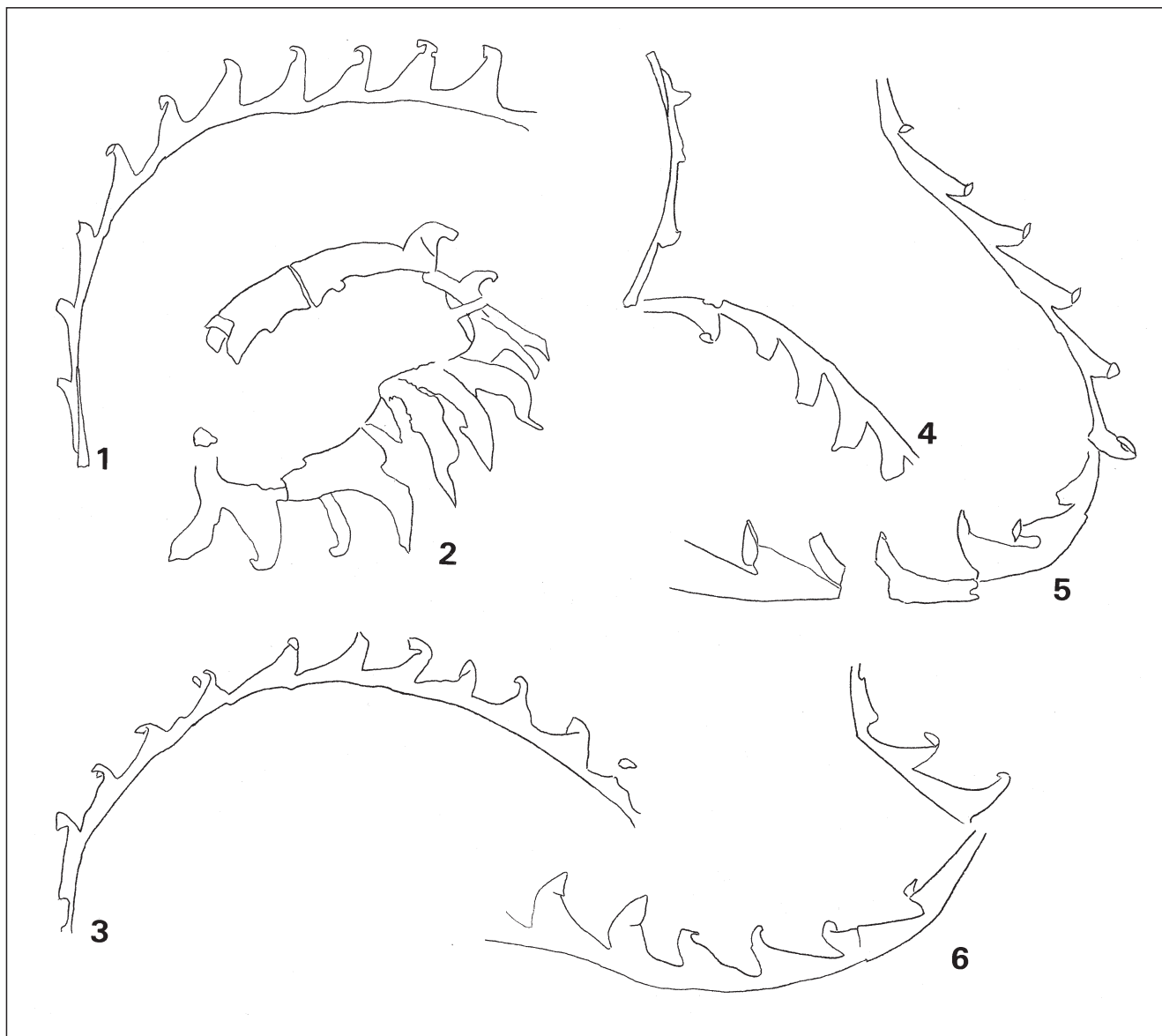


Text-Fig. 1.

Graptolites from the lower *spiralis* Biozone, Rauchkofel Bodentörl section.

1–3 = *Monoclimacis crenulata* (ELLES & WOOD): 1, 1998/1.75; 2, 1998/1.3; 3, 1998/1.57a; 4–5 = *Monoclimacis* sp.: 4, 1998/1.10b; 5, 1998/1.68; 6–10 = *Monoclimacis woodae* ZALASIEWICZ, LOYDELL & ŠTORCH: 6, 1998/1.37; 7, 1998/1.7b; 8, oblique/dorsal view, 1998/1.7a; 9, 1998/1.56; 10, 1998/1.74; 11–12 = *Oktavites falx* (Suess): 11, 1998/1.61; 12, 1998/1.81; 13 = *Torquigraptus pergracilis* BOUČEK, 1998/1.49; 14–17 = *Oktavites bodentoerlensis* sp. nov.: 14, 1998/1.6b; 15, holotype, 1998/1.12; 16, 1998/1.79; 17, 1998/1.15; 18–19 = *Monograptus priodon* (BRONN): 18, 1998/1.10a; 19, 1998/1.91; 20 = *Lapworthograptus?* sp., 1998/1.51.

All × 10.



Text-Fig. 2.
Graptolites from the lower *spiralis* Biozone, Rauchkofel Bodentörl section.
1 = *Torquigraptus spiralooides* (PŘIBYL), 1998/1.78; 2 = *Oktavites spiralis* (GEINITZ), 1998/1.6a; 3 = *Torquigraptus tullbergi* (BOUČEK), 1998/1.57b; 4–6 = *Torquigraptus flagellaris* (TÖRNQUIST): 4, 1998/1.5; 5, 1998/1.59; 6, 1998/1.16.
All $\times 10$.

The two very abundant species present are *Monograptus priodon* (BRONN) and *Monoclimacis woodae* ZALASIEWICZ, LOYDELL & ŠTORCH. The collection also includes the following: *Retiolites angustidens* ELLES & WOOD, *Streptograptus* sp. indet., *Cochlograptus veles* (RICHTER), *Oktavites spiralis* (GEINITZ), *O. falx* (Suess), *O. bodentoerlensis* sp. nov., *Monoclimacis crenulata* (ELLES & WOOD), *Mcl.* sp., *Lapworthograptus* ? sp., *Torquigraptus pergracilis* (BOUČEK), *T. tullbergi* (BOUČEK), *T. spiralooides* (PŘIBYL) and *T. flagellaris* (TÖRNQUIST). Most of these taxa are illustrated in Text-Figures 1–2.

This assemblage is indicative of a level low in the *spiralis* Biozone.

3. Palaeontological Notes

Most of the taxa are well known and therefore detailed descriptions of each species are not provided. Of interest, however are the following. Sicular annuli are present on one specimen (Text-Fig. 1:2) of *Monoclimacis crenulata* (ELLES & WOOD) (see LENZ & KOZŁOWSKA [1998] for review), the first time that they have been recorded in this taxon.

Prothecal folds are present in two of the *Monoclimacis* species, *Mcl. woodae* (Text-Fig. 1:6, 8–9) and *Mcl.* sp. (Text-Fig. 1:4–5). They were previously recognised by BJERRESKOV (1975) in material assigned by her to *Monoclimacis griestoniensis* and suggest either that prothecal folds developed independently in *Streptograptus* and *Monoclimacis* or that at least some species currently placed in *Monoclimacis* are closely phylogenetically related to *Streptograptus*. In some specimens of *Mcl. woodae* (e.g. Text-Fig. 1:7) the dorsal wall extends over the aperture forming a hood (as illustrated by BJERRESKOV 1975, Fig. 18B in material assigned by her to *Mcl. griestoniensis*; the specimens from Bornholm may be *Mcl. woodae*). This feature was not observed in the type material from Bohemia (ZALASIEWICZ, LOYDELL & ŠTORCH, 1995). The Austrian records of *Mcl. woodae* herein extend the stratigraphical range of the species; it is now known from the upper *griestoniensis* through to lower *spiralis* biozones.

The material assigned to *Oktavites falx* herein (Text-Fig. 1: 11–12) has a more strongly curved rhabdosome than specimens from younger stratigraphical horizons (see ŠTORCH,

1998), but is identical to that described from the *crenulata* or lower *spiralis* Biozone of Buttington Brick Pit, Wales (LOYDELL & CAVE, 1993).

4. Systematic Palaeontology

Oktavites bodentoerlensis sp. nov.

(Text-Fig. 1: 14–17; Text-Fig. 3)

Derivation of name: After the locality, Bodentörl, along the path from Lake Wolayer to Mount Rauchkofel.

Holotype: Figure 1:15, 1998/1.12, a proximal end bearing thecae 1–10, preserved in low relief, from the lower *spiralis* Biozone of the Rauchkofel Bodentörl section.

Other material: Six specimens, preserved in low to medium relief: 1998/1.6, 1998/1.12 (on other side of slab from holotype), 1998/1.14–15 (counterparts), 1998/1.60, 1998/1.79 and 1998/1.80.

Diagnosis: Dorsally curved rhabdosome, most strongly curved between th2 and th4. Thecae non-overlapping, apparently non-spinose, with small hooks aperturally, so that the apertures appear to face the ventral prothecal walls. Dorso-ventral width increases from 0.65–0.7 mm at th1 to 0.75–0.95 mm at th5, with a maximum distally of 1.0 mm. Thecae quite widely spaced, with 2TRD values of 1.95–2.05 mm at th5, distal maximum 2.4 mm. Sicula narrow, with an apertural width of 0.15 mm and a length of 1.25–1.35 mm, the apex reaching the top of th1 or up to nearly one-half of the distance up th2.

Description: The four proximal ends each show similar dorsal curvature, most strongly between th2 and th4. Distally the rhabdosome is gently dorsally curved. The thecae appear to be of uniform morphology throughout the rhabdosome, with concave ventral prothecal walls and hooked metathecae. The thecal apertures appear to face the ventral prothecal wall and to be non-spinose. Measurements made on the proximal ends are as tabulated (DVW = dorso-ventral width, 2TRD = two thecae repeat distance, ap. = apertural):

Discussion: The new species differs from other mid–late Telychian *Oktavites* species in its rhabdosome morphology, dorso-ventral width and thecal spacing. *O. falx* (Suess) has more closely spaced thecae (2TRD is 1.4–1.5 mm in the material from the Rauchkofel Bodentörl section) and shows more continuous dorsal curvature. Both *O. excentricus* (BJERRESKOV) and *O. spiralis* (GEINITZ) attain a greater dorso-ventral width (2–3 mm) and *O. spiralis* has more complex thecal apertures (LENZ & MELCHIN, 1989). *O. ? grobsdorfiensis* (HEMMANN) has widely spaced thecae (8 in 10 mm [= 2TRD of 2.5 mm], according to PŘIBYL [1945]), but is strongly dorsally curved throughout (almost planispirally) and has less prominent metathecae than *O. bodentoerlensis* sp. nov.

Specimen								sicula
1998/1.6	th	1	2	3	5	9	10	apex above top th1
	DVW	0.7	0.65	—	0.85	0.95		length 1.35 mm
	2TRD	—	2.2	2.05	—	1.95		ap. width 0.15 mm
1998/1.12	th	1	2	3	5	9	10	apex nearly 1/2 up th2
	DVW	0.7	0.75	0.75	0.75	—	0.95	length 1.25 mm
	2TRD	—	1.95	2.0	2.05	1.95		ap. width 0.15 mm
1998/1.14/15	th	1	2	3	5	7	8	apex more than 1/4 up th2
	DVW	0.65	0.7	0.7	0.75	0.8	0.75	length 1.3 mm
	2TRD	—	1.6	1.65	2.0	1.9		ap. width 0.15 mm
1998/1.79	th	1	2	3	5			apex above top th1
	DVW	0.6	0.65	0.7	0.75			
	2TRD	—	1.65	1.9	1.95			

Distal maxima are 1.0 mm (DVW) and 2.4 mm (2TRD)

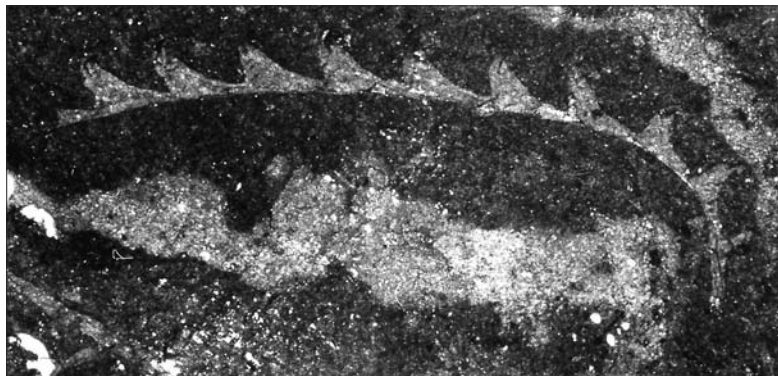
5. Significance of the Graptolite Assemblage

The age of the graptolite assemblage is slightly different from that indicated by JAEGER & SCHÖNLAUB (1970): early *spiralis* Zone rather than late *crenulata* Zone. The high diversity of the graptolite assemblage indicates a considerable water depth (LOYDELL, 2001). Deposition of the graptolite-bearing strata took place during a period of high eustatic sea-level (see LOYDELL, 1998, Fig. 3), one of the highest during the Silurian.

JAEGER & SCHÖNLAUB (1970) placed the boundary between the celloni and *amorphognathoides* conodont biozones at 2.5–3 m above the base of the Rauchkofel Bodentörl section. This is consistent with the approximately base *lapworthi* Biozone level for this boundary recognised in the Ohesaare core, Estonia (LOYDELL, KALJO & MÄNNIK, 1998). It is likely that the base of the Wenlock in the Rauchkofel Bodentörl section is somewhat higher than indicated by JAEGER & SCHÖNLAUB (1970) and SCHÖNLAUB (1994, Fig. 16), i.e. within rather than at the base of the *amorphognathoides* conodont Biozone.

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Text-Fig. 3.

Holotype of *Oktavites bodentoerlensis* sp. nov. 1998/1.12; × 10.

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Manuskript bei der Schriftleitung eingelangt am 25.Mai 2001