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MIDDLE JURASSIC RADIOLARIAN ASSEMBLAGES FROM RADIOLARITES OF THE SILICA NAPPE (SLOVAK KARST, WESTERN CARPATHIANS)

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Abstract: Up to now the data about the age of radiolarites of the Silica Nappe in the Slovak Karst has been established by Dumitrică (in Dumitrică & Mello 1982) as Callovian-Oxfordian in the locality Bohúňovo. In the Drieňovec Mt., at the locality of Bleskový prameň near the village of Drnava, radiolarites with Upper Bathonian-Lower Callovian radiolarian microfauna also occur as lithoclasts in carbonate breccia of debris flow deposit origin (Sýkora & Ožvoldová 1996). Apart from this finding the presented paper brings the further information about the age of the radiolarite in this locality, based on radiolarian research. The radiolarian assemblages represent the stratigraphical range — latest Bajocian-early Bathonian to upper Bathonian-early Callovian (Unitary Association Zones: U.A.Z. 5 – U.A.Z. 7 according to the biozonation of Baumgartner et al. 1995).

Key words: Western Carpathians, Silica Nappe, Middle Jurassic, radiolarites, radiolarians.

Introduction

The discovery that the Austroalpine Triassic of the Slovak Karst does not form one tectonic unit with the underlying Paleozoic of the Gemeric Superunit led up to the identification of the Silica Nappe (Kozur & Mock 1973). Information about the geological structure of the Slovak Karst is given by Bystrický (1964, 1973), Mello (1979), Gaál & Mello (1983), as well as Maheľ (1986).

The Silica Nappe in the Slovak Karst (Fig. 1b) is formed mainly by Triassic rocks. Jurassic rocks are known only from several localities of lesser extent. The lithological and stratigraphical description of Jurassic sequences in this area except for the above mentioned authors is given by Sýkora & Ožvoldová (1996) and Rakús & Sýkora (in press). Information on the Jurassic limestones of the Silica Nappe was also derived from the analysis of limestone pebbles in Cretaceous and Tertiary conglomerates in the territory of Slovakia and Northern Hungary (Mišík & Sýkora 1980).

Geological setting

The radiolarites of the Silica Nappe in the Slovak Karst represent the youngest preserved member of Jurassic sequences. In the past the determination of their Doggerian age was based on the superposition of the strata.

Up to now the data about the age of the radiolarites has been only established by Dumitrică (in Dumitrică & Mello 1982) in the locality Bohúňovo. The radiolarian assemblages showed Callovian-Oxfordian age.

In the area of the Drieňovec Mt., in the locality Bleskový prameň near the village Drnava (Fig. 1a,c) radiolarite lithoclast with Upper Bathonian-Lower Callovian radiolarian fauna was also found in debris flow sediment (Sýkora & Ožvoldová 1996). Apart for this finding the presented paper brings further information about the age of the radiolarite in this area.

The lithological and stratigraphical characteristic of the Jurassic sequences in this locality are given by Rakús & Sýkora (in press). The outcrops of radiolarites except for one small outcrop, partly covered by debris (samp. BP in Fig. 1c) are absent. Therefore other radiolarite samples were taken from scree material.

Results of radiolarian research in the studied locality

For the evaluation of radiolarian assemblages the latest biozonation of Baumgartner et al. (1995) was used.

The oldest known part of this radiolarite horizon is represented by the red radiolarites, which have been found in the scree (material of M. Mišík). The radiolarian assemblage in the sample BP-8 (Fig. 1c; Fig. 2; Pls. I, II) corresponds to U.A.Z. 5 (latest Bajocian-early Bathonian), based mainly on the presence of the species *Tricolocapsa tetragona* Matsuoka (Pl. I: Fig. 1). The species *Eucyrtidiellum semifactum* Nagai & Mizutani (Pl. I: Fig. 3) which appears in this zone is also observed, as well as numerous specimens of *Parvicingula dhimenaensis* Baumgartner (Pl. I: Fig. 4), which are typical of this association. Up to now it is the oldest Jurassic radiolarian association, found in the Slovak Western Carpathians.

The radiolarites in this locality were also found as lithoclasts in carbonate breccia of debris flow deposit origin (Sýkora & Ožvoldová 1996). This breccia, taken from the scree contains mostly limestone lithoclasts, more rarely grey

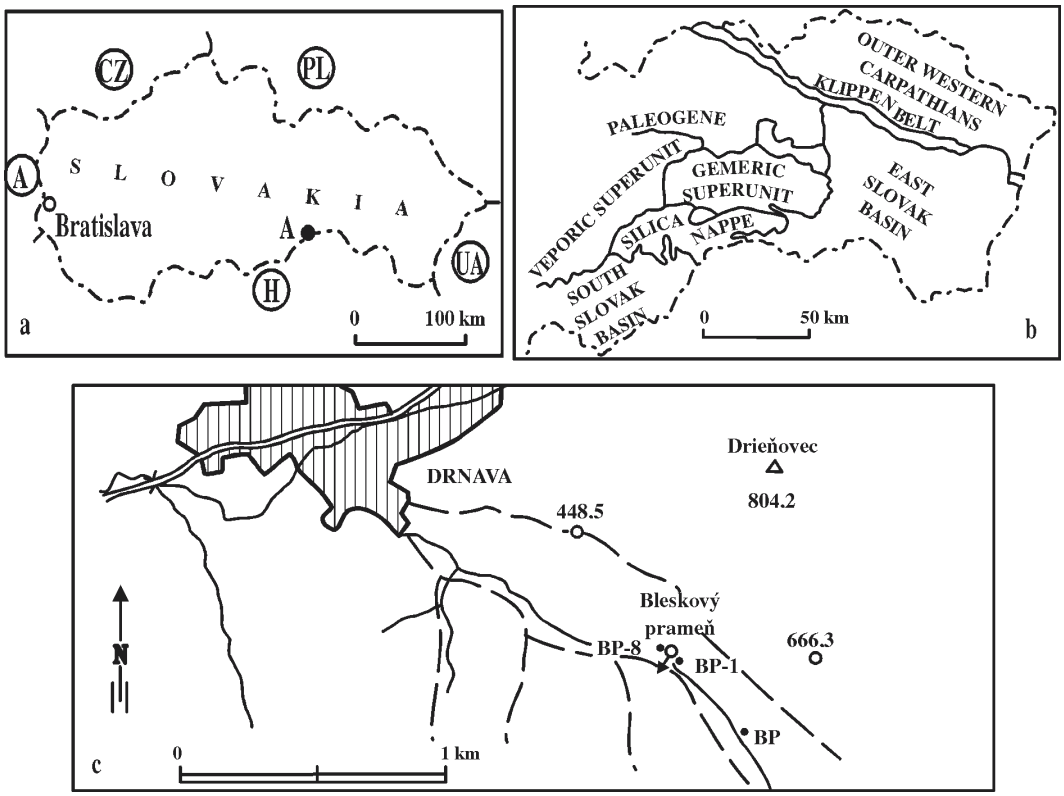

Fig. 1. Location of **a/** the locality investigated (A), **b/** the Silica Nappe in the Slovak Karst, **c/** the samples studied.

Samples / Radiolarian fauna	BP-8	BP-1	BP
Archaeodictyomitra (?) amabilis Aita	*		
Archaeodictyomitra exigua Blome	*	*	
Archaeodictyomitra cf. exigua Blome			*
Archaeodictyomitra primigena Pessagno & Whalen	*	*	
Archaeodictyomitra prisca Kozur & Mostler			*
Archaeodictyomitra rigida Pessagno		*	
Archaeodictyomitra whalenae Kozur & Mostler			*
Cinguloturris (?) cf. venusta Chiari, Cortese and Marcucci	*		
Cinguloturris carpatica Dumitrica			*
Dictyomitrella (?) kamoensis Mizutani & Kido			*
Eucyrtidiellum ptyctum Riedel & Sanfilippo			*
Eucyrtidiellum nodosum Wakita			*
Eucyrtidiellum semifactum Nagai & Mizutani	*	*	
Eucyrtidiellum unumaense pustulatum Baumgartner		*	*
Eucyrtidiellum unumaense unumaense (Yao)	*		
Hsuum mirabundum Pessagno		*	
Pantanellium sp.	*		
Parvicingula dhimenaensis Baumgartner	*	*	
Protunuma (?) lanosus Ožvoldová	*	*	
Protunuma (?) ochiensis Matsuoka		*	
Protunuma turbo Matsuoka	*	*	
Pseudodictyomitrella hexagonata (Heitzer)			*
Spongocapsula palmerae Pessagno		*	
Stichocapsa convexa Yao	*	*	
Stichocapsa himedaruma Aita	*		
Stichocapsa japonica Yao			*
Stichocapsa cf. japonica Yao	*		
Stichocapsa sp. E sensu Baumgartner et al. 1995		*	*
Transhsuum maxwelli (Pessagno)	*		*
Tricolocapsa buekkensis (Kozur)			*
Tricolocapsa conexa Matsuoka	*		*
Tricolocapsa plicarum Yao		*	
Tricolocapsa sp. A sensu Goričan 1994			*
Tricolocapsa sp. S sensu Baumgartner et al. 1995	*		
Tricolocapsa tetragona Matsuoka	*		
Tricolocapsa yaoi (Kozur)	*		*
Unuma latusicostatus Aita	*		
Unuma sp. A sensu Baumgartner et al. 1995	*		
Williriedellum carpathicum Dumitrica			*
Williriedellum sp. A sensu Matsuoka 1983	*		
Zhamoidellum sp.			*

radiolarite lithoclasts (samp. BP-1 in Fig. 1c) with radiolarian microfauna (Fig. 2; Pl. III) of Middle Bathonian-early Callovian age (U.A.Z. 6 – U.A.Z. 7), based on co-occurrence of the species *Spongocapsula palmerae* Pessagno (Pl. III: Fig. 2) with the species *Protunuma turbo* Matsuoka (Pl. III: Fig. 11) and *Eucyrtidiellum semifactum* Nagai & Mizutani (Pl. III: Fig. 1). In the comparison with the association from the grey radiolarites taken from the outcrop (samp. BP in Fig. 1c) the absence of the species *Cinguloturris carpatica* Dumitrică and *Williriedellum carpathicum* Dumitrică shows, that this association represents the lower part of the above mentioned stratigraphical range.

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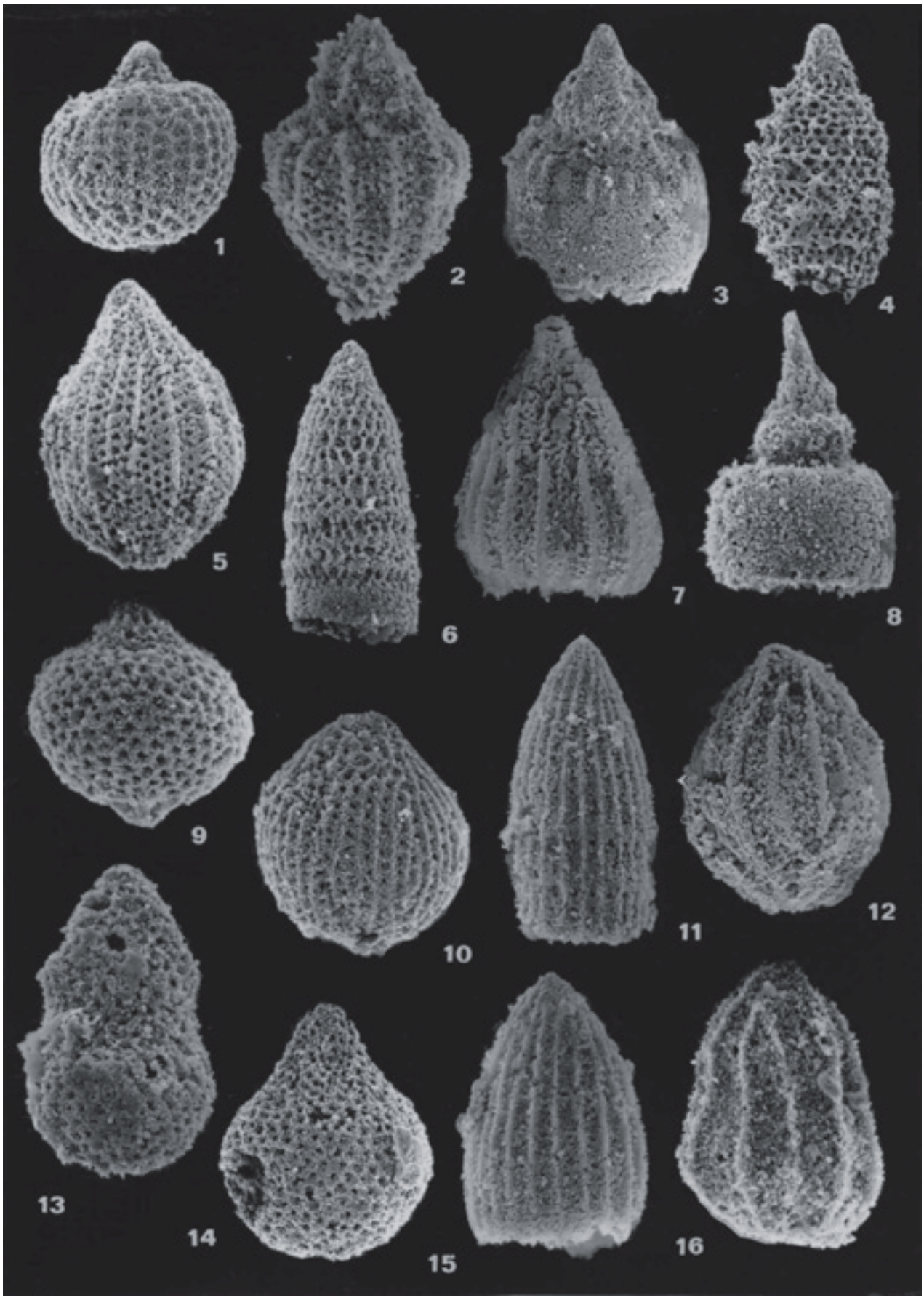
Fig. 2. Distribution of radiolarians in the samples studied.

Plate I: Sample BP-8. **Fig. 1.** *Tricolocapsa tetragona* Matsuoka — 3948, 350×. **Fig. 2.** *Unuma latusicostatus* Aita — 3862, 400×. **Fig. 3.** *Eucyrtidiellum semifactum* Nagai & Mizutani — 3966, 450×. **Fig. 4.** *Parvicingula dhimenaensis* Baumgartner — 3953, 280×. **Fig. 5.** *Protunuma turbo* Matsuoka — 3954, 400×. **Fig. 6.** *Cinguloturris* (?) cf. *venusta* Chiari, Cortese and Marcucci — 3963, 380×. **Fig. 7.** *Archaeodictyomitra* (?) *amabilis* Aita — 3865, 400×. **Fig. 8.** *Eucyrtidiellum unumaense unumaense* (Yao) — 3957, 450×. **Fig. 9.** *Williriedellum* sp. A sensu Matsuoka 1983 — 3876, 400×. **Fig. 10.** *Tricolocapsa conexa* Matsuoka — 3962, 350×. **Fig. 11.** *Archaeodictyomitra exigua* Blome — 3874, 440×. **Fig. 12.** *Unuma* sp. A sensu Baumgartner et al. 1995 — 3945, 400×. **Fig. 13.** *Stichocapsa himedaruma* Aita — 3853, 400×. **Fig. 14.** *Stichocapsa convexa* Yao — 3950, 250×. **Fig. 15.** *Archaeodictyomitra primigena* Pessagno & Whalen — 3866, 450×. **Fig. 16.** *Protunuma* (?) *lanosus* Ožvoldová — 3868, 490×.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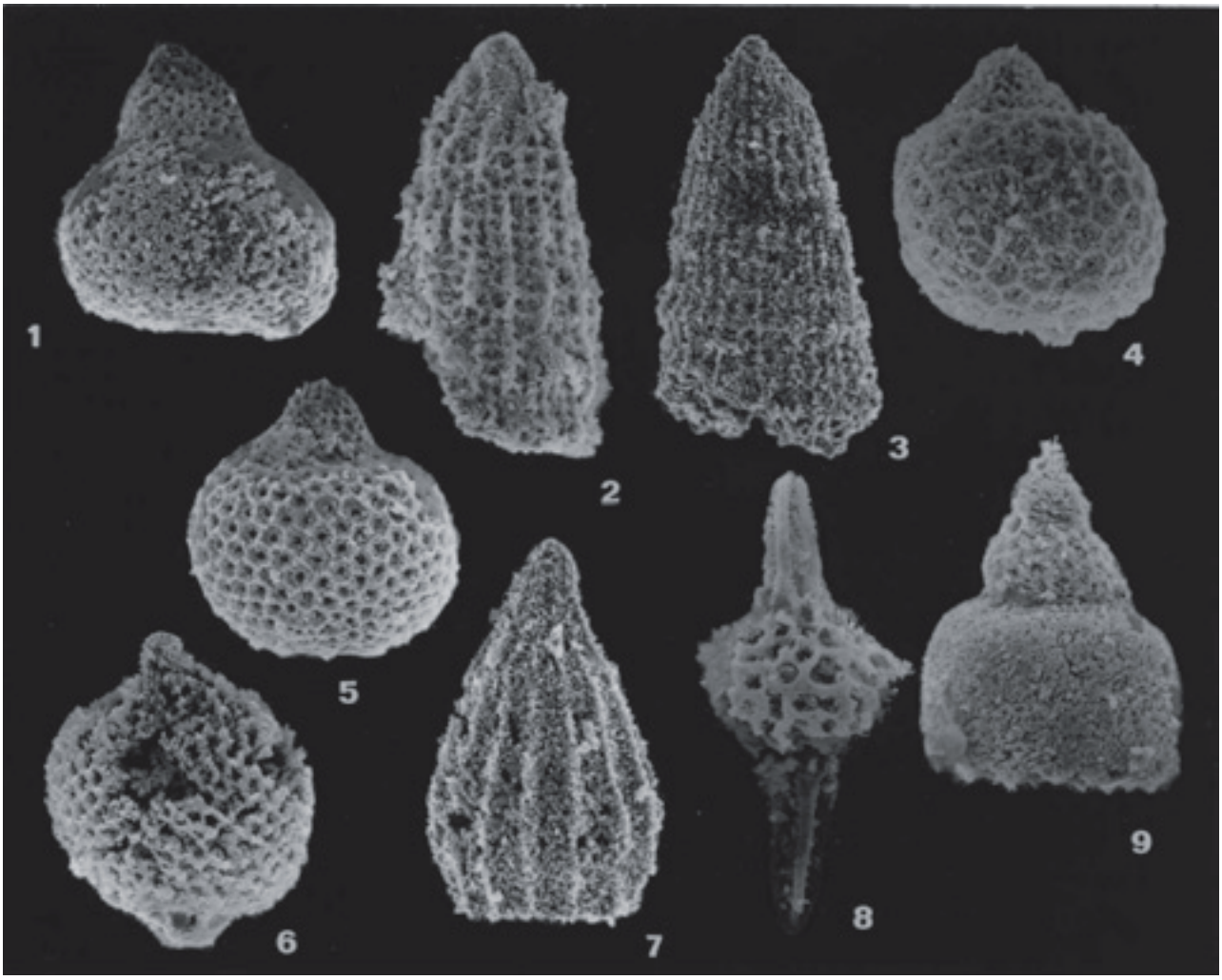


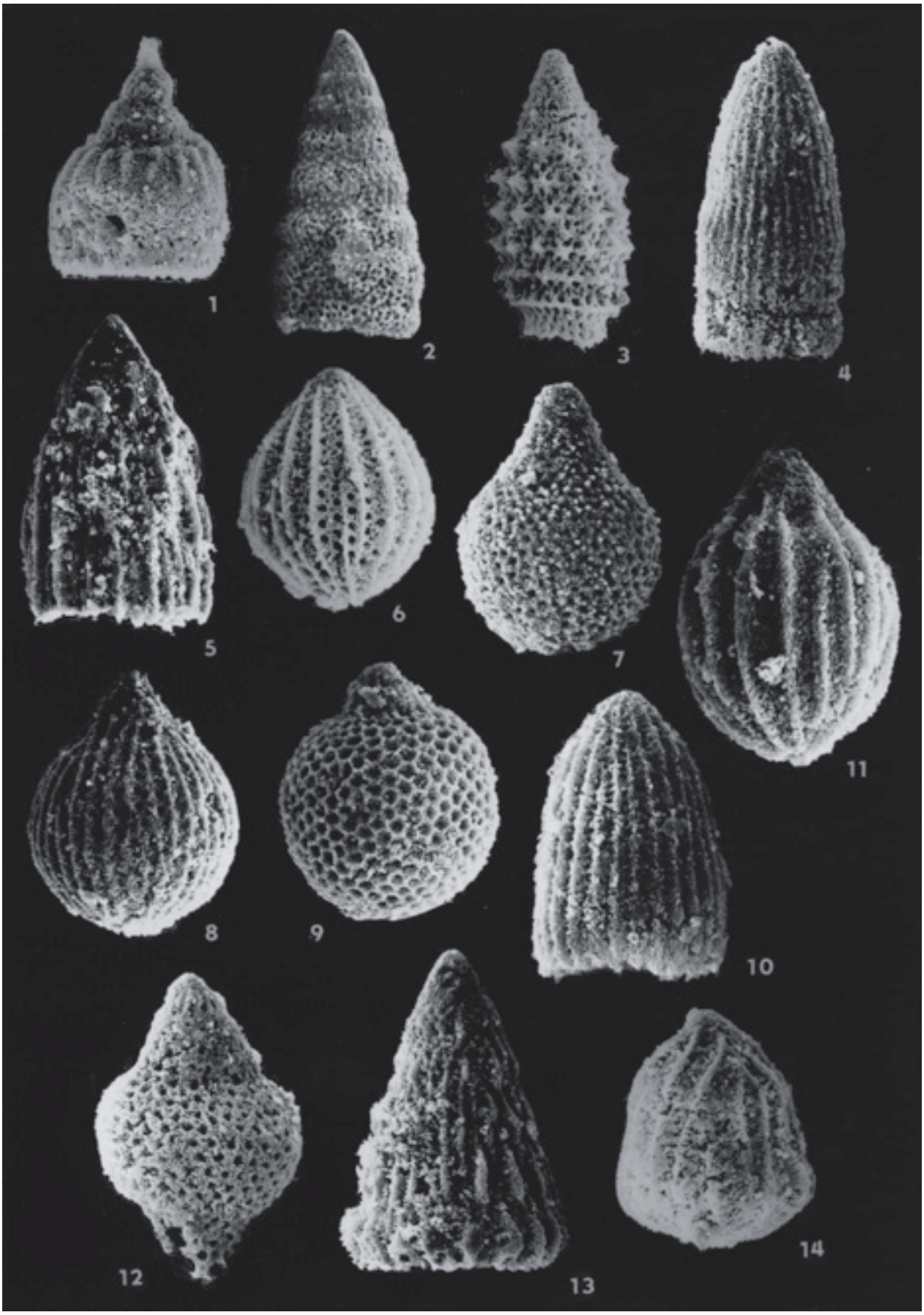
Plate II: Sample BP-8. **Fig. 1.** *Stichocapsa* cf. *japonica* Yao — 3960, 380×. **Fig. 2.** *Transhsuum maxwelli* (Pessagno) — 3849, 350×. **Fig. 3.** *Archaeodictyomitra* sp. — 3961, 450×. **Fig. 4.** *Tricolocapsa yaoi* (Kozur) — 3859, 400×. **Fig. 5.** *Tricolocapsa* sp. S sensu Baumgartner et al. 1995 — 3944, 350×. **Fig. 6.** *Williriedellum* sp. A sensu Matsuoka 1983 — 3952, 330×. **Fig. 7.** *Archaeodictyomitra* (?) *amabilis* Aita — 3957, 450×. **Fig. 8.** *Pantanellium* sp. — 3877, 400×. **Fig. 9.** *Eucyrtidiellum unumaense unumaense* (Yao) — 3866, 450×.

The species *Protunuma (?) lanosus* Ožvoldová (Pl. III: Fig. 14) was described in this association (l.c.). Its known occurrence is U.A.Z. 5 (latest Bajocian-early Bathonian) (in the above mentioned red radiolarites in the studied locality, samp. BP-8) to the first half of Callovian (the locality of Guba in the Meliata Unit) (Kozur et al. 1996; Mock et al. in press).

From the small outcrop of dark-grey thin layered radiolarites, partly covered by debris (Rakús & Sýkora in press) a rich assemblage has been obtained from the sample BP (Fig. 1c; Fig. 2; Pls. IV, V). The age corresponds to late Bathonian-early Callovian (U.A.Z. 7), based on co-occurence of the species *Cinguloturris carpatica* Dumitrică (Pl. IV: Fig. 16) and *Williriedellum carpathicum* Dumitrică (Pl. IV: Fig. 5) with the species *Dictyomitrella(?) kamoensis* Mizutani & Kido (Pl. IV: Fig. 2). The species *Eucyrtidiellum ptyctum* Riedel & Sanfilippo (Pl. IV: Fig. 1) also occurs in the association. The first occurrence of this species is established by Baumgartner et al. (1995) in U.A.Z. 5 (the latest Bajocian-early Bathonian). But according to our data as well as that of other authors (e.g. Goričan 1994; Kozur et al. 1996) this species appears in the Callovian. Therefore, this association most probably represents the uppermost part of the above mentioned stratigraphical range.

In the assemblage the specimen *Stichocapsa* sp. E sensu Baumgartner et al. 1995 (Pl. IV: Fig. 15) with the previously assumed last occurrence in U.A.Z. 5 (the latest Bajocian-ear-

Plate III: Sample BP-1. **Fig. 1.** *Eucyrtidiellum semifactum* Nagai & Mizutani — 0118, 500×. **Fig. 2.** *Spongocapsula palmerae* Pessagno — 0115, 300×. **Fig. 3.** *Parvicingula dhimenaensis* Baumgartner — 0085, 250×. **Fig. 4.** *Archaeodictyomitra rigida* Pessagno — 0101, 400×. **Fig. 5.** *Hsuum mirabundum* Pessagno — 0092, 400×. **Fig. 6.** *Protunuma* (?) *ochiensis* Matsuoka — 0080, 300×. **Fig. 7.** *Stichocapsa convexa* Yao — 0084, 300×. **Fig. 8.** *Tricolocapsa plicarum* Yao — 0117, 350×. **Fig. 9.** *Zhamoidellum* sp. — 0081, 320×. **Fig. 10.** *Archaeodictyomitra primigena* Pessagno & Whalen — 0093, 600×. **Fig. 11.** *Protunuma turbo* Matsuoka — 0111, 500×. **Fig. 12.** *Stichocapsa* sp. E sensu Baumgartner et al. 1995 — 0090, 380×. **Fig. 13.** *Transhsuum* sp. — 0116, 400×. **Fig. 14.** *Protunuma* (?) *lanosus* Ožvoldová — 0094, 400×.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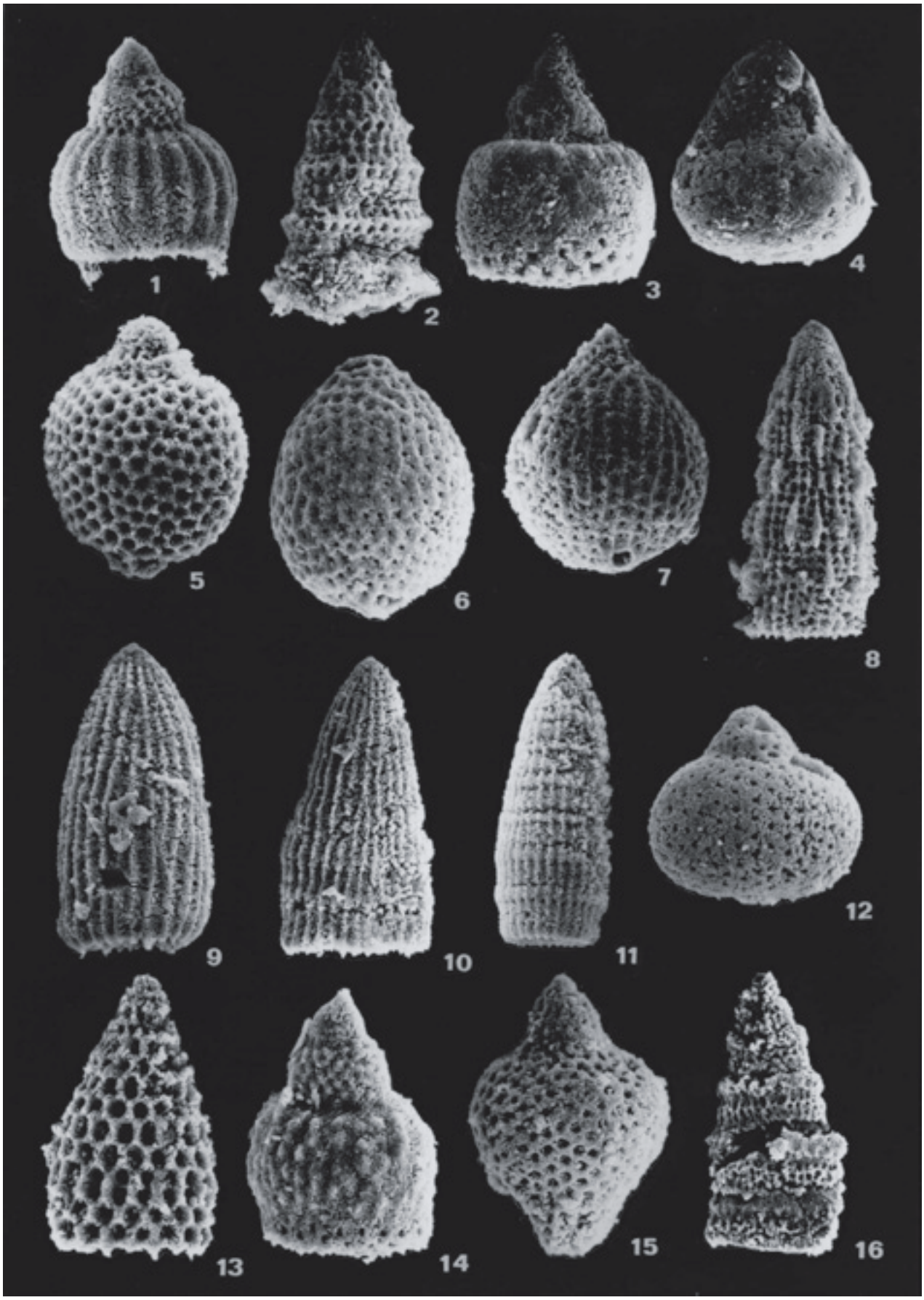
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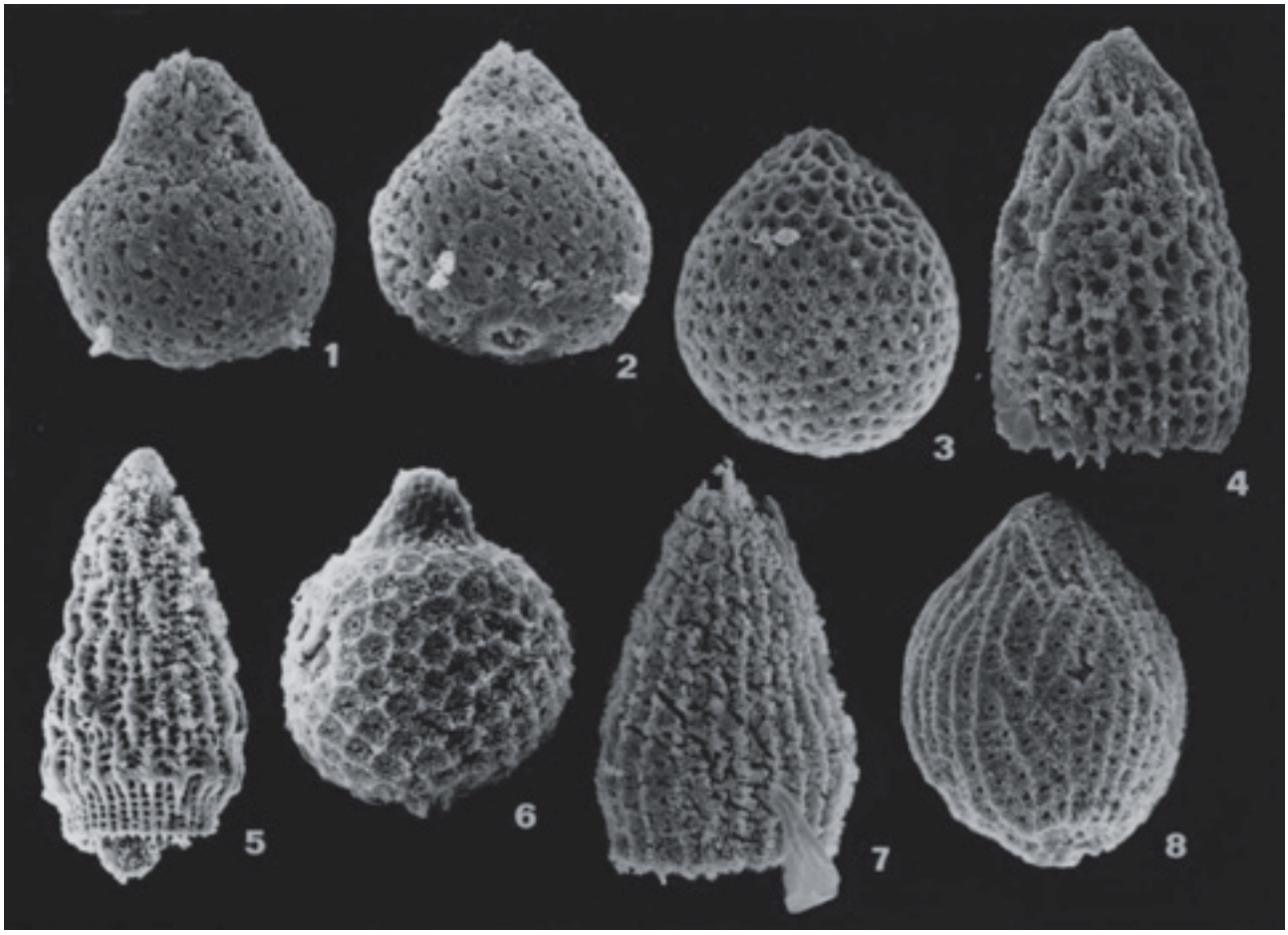

Plate V: Sample BP. **Fig. 1.** *Tricolocapsa buekkensis* (Kozur) — 3543, 580×. **Fig. 2.** *Tricolocapsa buekkensis* (Kozur) — antapical view of Fig. 1, 3544, 580×. **Fig. 3.** *Zhamoidellum* sp. — 3534, 300×. **Fig. 4.** ?*Hsuum* sp. — 3545, 380×. **Fig. 5.** *Transhsuum maxwelli* (Pessagno) — 4495, 210×. **Fig. 6.** *Tricolocapsa yaoi* (Kozur) — 4508, 400×. **Fig. 7.** *Archaeodictyomitra* sp. — 3536, 490×. **Fig. 8.** *Tricolocapsa conexa* Matsuoka — 3539, 400×.

Plate IV: Sample BP. **Fig. 1.** *Eucyrtidiellum ptyctum* Riedel & Sanfilippo — 4490, 400×. **Fig. 2.** *Dictyomitrella* (?) *kamoensis* Mizutani & Kido — 4511, 400×. **Fig. 3.** *Eucyrtidiellum unumaense pustulatum* Baumgartner — 4491, 540×. **Fig. 4.** *Stichocapsa japonica* Yao — 4506, 650×. **Fig. 5.** *Williriedellum carpathicum* Dumitrică — 4484, 370×. **Fig. 6.** *Tricolocapsa* sp. A sensu Goričan 1994 — 4504, 400×. **Fig. 7.** *Tricolocapsa conexa* Matsuoka — 4493, 360×. **Fig. 8.** *Transhsuum maxwelli* (Pessagno) — 4489, 300×. **Fig. 9.** *Archaeodictyomitra* cf. *exigua* Blome — 4482, 400×. **Fig. 10.** *Archaeodictyomitra whalenae* Kozur & Mostler — 4507, 300×. **Fig. 11.** *Archaeodictyomitra prisca* Kozur & Mostler — 4487, 300×. **Fig. l2.** *Tricolocapsa buekkensis* (Kozur) — 4494, 450×. **Fig. 13.** *Pseudodictyomitrella hexagonata* (Heitzer) — 4492, 400×. **Fig. 14.** *Eucyrtidiellum nodosum* Wakita — 4498, 420×. **Fig. 15.** *Stichocapsa* sp. E sensu Baumgartner et al. l995 — 0090, 330×. **Fig. 16.** *Cinguloturris carpatica* Dumitrică — 4509, 300×.

ly Bathonian) also occurs. On the basis of the material investigated here its stratigraphical range should be, therefore, extended into the early Callovian.

The presence of the species *Tricolocapsa buekkensis* (Kozur) in this association (Pl. IV: Fig. 12) shows, that its occurrence continues from middle Bajocian-early Bathonian (Kozur et al. 1996) to the early Callovian.

Conclusions

Rare radiolarite findings in the Silica Nappe of the Slovak Karst, in the area of Drienkova Mt., near the village of Drnava, in the locality of Bleskový prameň contain radiolarian assemblages, which represent (according to the biozonation of Baumgartner et al. 1995) the stratigraphical range — latest Bajocian-early Bathonian (U.A.Z. 5) to late Bathonian-early Callovian (U.A.Z. 7).

In comparison with the assemblages of the Middle Bathonian-early Callovian age (U.A.Z. 6 – U.A.Z. 7) (l.c.) from the Meliata Unit in the type locality of Meliata in the Slovak Karst (Kozur et al. 1996; Mock et al. in press), which forms a tectonic window in this area, the species *Tricolocapsa conexa* Matsuoka highly prevails in the assemblages of this unit.

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