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# RADIOLARIAN MICROFAUNA FROM RADIOLARITES OF THE VARÍN PART OF THE WEST CARPATHIAN KLIPPEN BELT

*(4 Figs., V Pls.)*

Abstract: Microfaunistic analysis of samples from radiolarites and radiolarian limestones of the Kysuca succession in the western part of the Varín stretch of the Klippen Belt at localities Brodno, Snežnica and Lopušné Pažite has proved the presence of radiolarian microfauna which can be correlated, according to biostratigraphic zoning of Baumgartner (1984), with U.A.7 and U.A.8 stratigraphically corresponding (Baumgartner, 1987) to the upper part of the Lower to Upper Oxfordian. A new species? *Angulabrocchia cava* n. sp. has been described in the assemblage of the sample S-4 (Snežnica).

Резюме: Анализ микрофауны в образцах из радиоларитов и радиоляриевых известняков кисуцкой сукцесии в западной части варийской части клиппен-пояса на местонахождениях Бродно, Снежница и Лопушне Пажите показал присутствие радиоляриевой микрофауны которую можно коррелировать по биостратиграфической зональности Баумгартнера (Baumgartner, 1984) с A.7 и A.8, что стратиграфически соответствует (Baumgartner, 1987) верхней части нижнего до высшего оксфордского яруса. В ассоциации из образца С-4 (Снежница) был описан новый вид *?Angulobracchia cava* n. sp.

## *Introduction*

Samples have been collected in a profile of red and green radiolarian limestones and radiolarites of the Kysuca succession in the western part of the Varín stretch of the Klippen Belt at localities Brodno, Snežnica and Lopušné Pažite (Fig. 1). The most abundant microfauna occurred in red-brown radiolarites which form intercalations in green-gray radiolarian limestones (samples B-1 Brodno, S-4 Snežnica, LP-4 Lopušné Pažite).

Results of the geological research obtained so far suggest that the radiolarites and radiolarian limestones overlie the Supra *Posidonia* beds of Bajocian, Bathonian and possibly also Callovian age and underlie Kimmeridgian nodular limestones. On the basis of this superposition they are assigned into the Upper Callovian to Oxfordian (Andrusov, 1945; Scheibner, 1961; Haško, 1974).

The principal constituent of the radiolarian limestones are calcified *Radiolaria*. Siliceous layers in the limestones are of various, predominantly lenticular shapes, in numerous cases, however, they are represented by typical bedded radiolarites. The radiolarian limestones and radiolarites are intercalated with siliceous shales (Haško, 1974).

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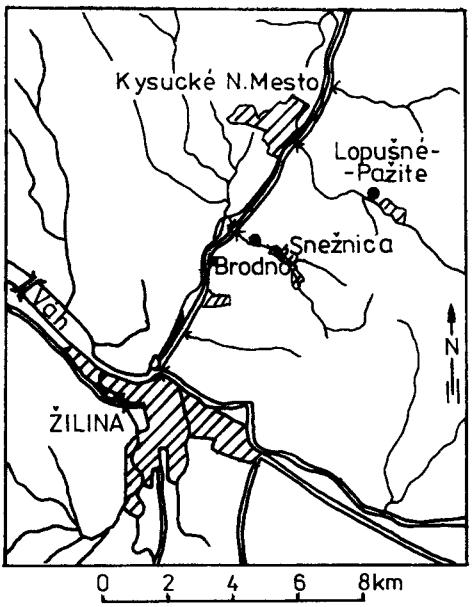



Fig. 1. Map of the area with sample location.

*Evaluation of radiolarian assemblages*

The assemblages were of the following composition:

B-1: *Acanthocircus amissus* (SQUINABOL), *Acanthocircus suboblongus* (YAO), *Archaeodictyomitra apiaria* (RÜST), *Archaeodictyomitra* sp., *Archaeospongoprunum imlayi* PESSAGNO, *Cinguloturris carpatica* DUMITRICA, *Emiluvia pessagnoi* FOREMAN s l., *Homoeoparonaella argolidensis* BAUMGARTNER, *Hsuum brevicostatum* (OŽVOLDOVÁ), *Mirifusus mediodilatatus mediodilatatus* (RÜST), *Paronaella* sp., *Podobursa triacantha* (FISCHLI), *Praeconocaryomma hexagona* (RÜS), *Ristola procera* (PESSAGNO), *Staurosphaera antiqua* RÜST, *Tetraditryma pseudoplena* BAUMGARTNER, *Tetratrabs zealis* (OŽVOLDOVÁ), *Triactoma blakei* (PESSAGNO), *Triactoma cornuta* BAUMGARTNER, *Triactoma jonesi* (PESSAGNO), *Triactoma tithonianum* RÜST, *Triactoma* cf. *tithonianum* RÜST, *Tritrabs worzeli* (PESSAGNO), *Williriedellum carpathicum* DUMITRICA;

S-4: *Acanthocircus amissus* (SQUINABOL), *Acaeniotyle diaphorogona* FOREMAN s. l., *Angulobracchia biordinale* OŽVOLDOVÁ, *Archaeodictyomitra apiaria* (RÜST), *Archaeospongoprunum imlayi* PESSAGNO, *Emiluvia chica* FOREMAN, *Emiluvia ordinaria* OŽVOLDOVÁ, *Emiluvia orea* BAUMGARTNER, *Emiluvia premyogii* BAUMGARTNER, *Emiluvia sedecimporata elegans* (WIŚNIOWSKI), *Foremanella hipposidericus* (FOREMAN), *Homoeoparonaella* sp. A, *Mirifusus mediodilatatus* (RÜST) s. l., *Obesacapsula* aff. *rotunda* (HINDE), *Orbiculiforma* sp., *Paronaella denudata* (RÜST), *Paronaella kotura* BAUMGARTNER, *Perispyridium ordinarium* (PESSAGNO), *Podobursa spinosa* (OŽVOLDOVÁ), *Podobursa triacantha* (FISCHLI), *Spongocapsula perampla* (RÜST), *Staurosphaera antiqua* RÜST, *Tetratrabs bulbosa* BAUMGARTNER, *Tetratrabs zealis* (OŽVOL-

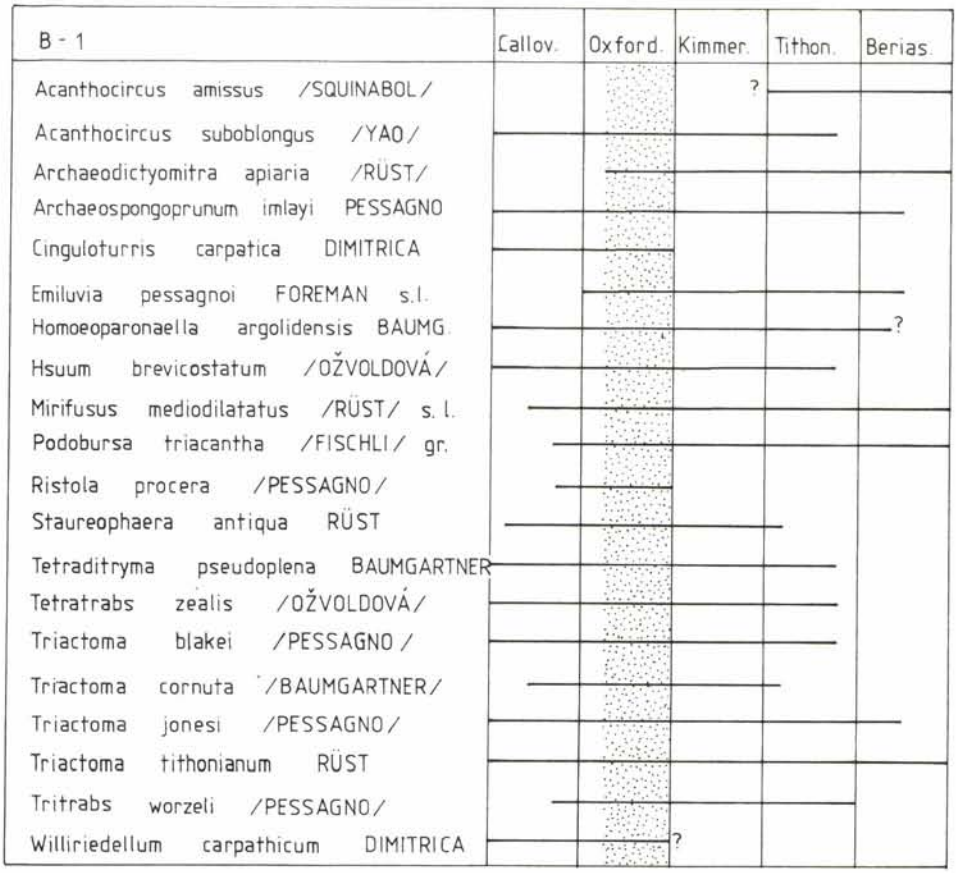



Fig. 2. Stratigraphic range of evaluated taxons in the sample B-1.
Dotted area represents age of the assemblage.

DOVÁ), *Triactoma blakei* (PESSAGNO), *Tricolocapsa* sp. B, *Tritrabs casmaliaensis* (PESSAGNO), *Tritrabs ewingi* (PESSAGNO), *Tritrabs exotica* (PESSAGNO). The sample contains a new species? *Angulobracchia cava* n. sp.

LP-4: *Angulobracchia digitata* BAUMGARTNER, *Emiluvia orea* BAUMGARTNER, *Emiluvia sedecimporata salensis* PESSAGNO, *Homoeoparonaella argolidensis* BAUMGARTNER, *Hsuum brevicostatum* (OŽVOLDOVÁ), *Paronaella pygmaea* BAUMGARTNER, *Podobursa spinosa* (OŽVOLDOVÁ), *Podobursa triacantha* (FISCHLI), *Staurosphaera antiqua* RÜST, *Tetraditryma pseudoplena* BAUMGARTNER, *Tetratrabs zealis* (OŽVOLDOVÁ), *Triactoma jonesi* (PESSAGNO), *Tritrabs ewingi* (PESSAGNO), *Tritrabs exotica* (PESSAGNO).

The presence of the species *Emiluvia orea* BAUMGARTNER, *Archaeodictyomitra apiaria* (RÜST) or *Foremanella hipposidericus* (FOREMAN) in the above assemblages suggests that they are not older than U.A.7 – lower part of zone B (Baumgartner, 1984)

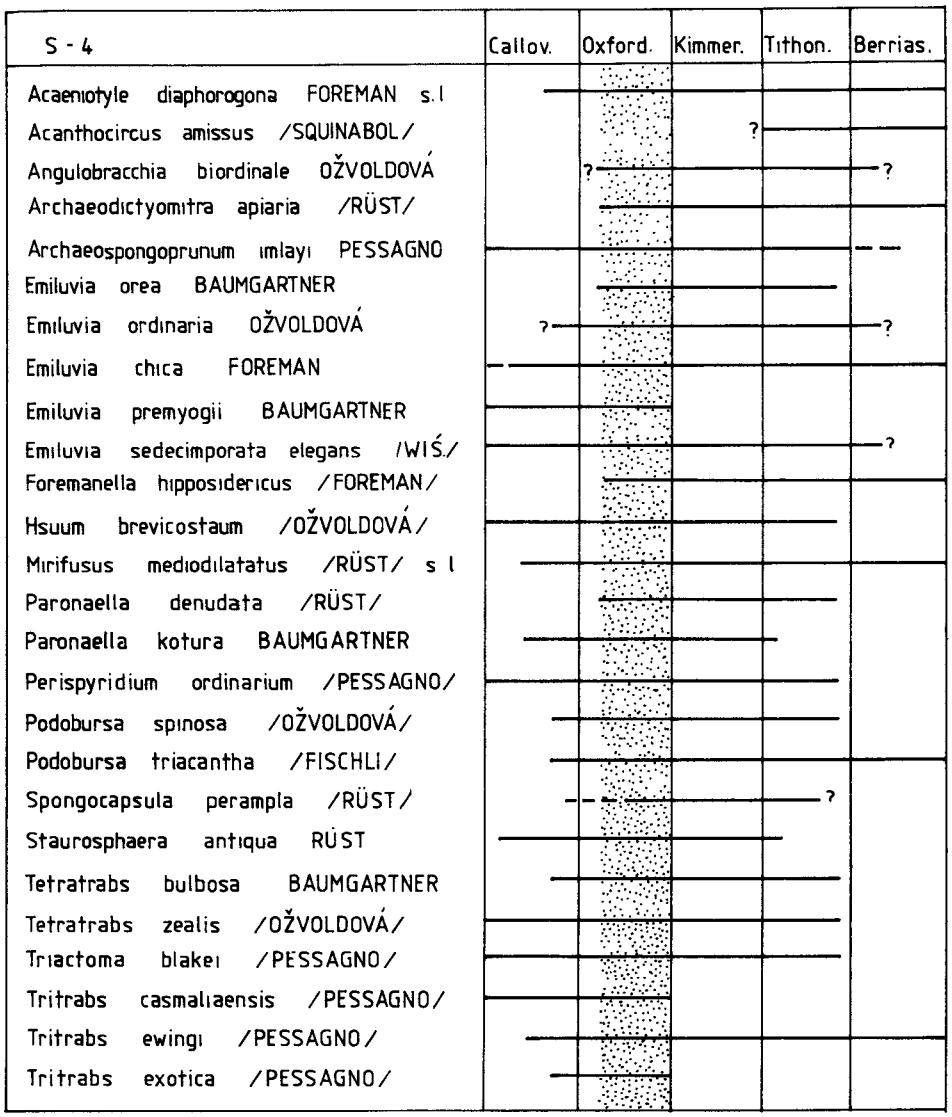



Fig. 3. Stratigraphic range of evaluated taxons in the sample S-4.
Dotted area represents age of the assemblage.

– upper part of the Lower Oxfordian (Baumgartner, 1987). On the other hand, the presence of the species *Emiluvia premyogii* BAUMGARTNER, *Tritrabs casmaliaensis* (PESSAGNO), *Tritrabs exotica* (PESSAGNO) or *Ristola procera* (PESSAGNO), whose occurrence ends in U.A.8 (upper part of zone B), indicate the upper age boundary of the assemblages – end of the Upper Oxfordian.

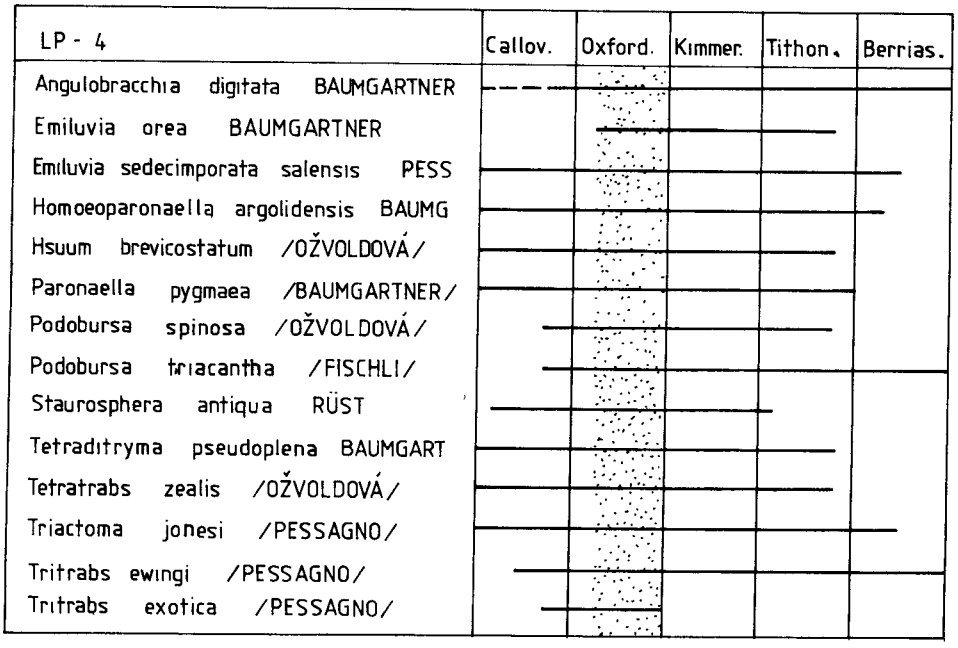



Fig. 4. Stratigraphic range of evaluated taxons in the sample LP-4.
Dotted area represents age of the assemblage.

From the above facts it results that the assemblages represent the stratigraphic range from the upper part of the Lower Oxfordian to the end of the Upper Oxfordian. The assemblages, however, did not contain species whose occurrence begins, according to Baumgartner (1984), in U.A.8 (*Podacapsa amphitreptera* FOREMAN, *Foremanella diamphidia* (FOREMAN), and therefore they are likely to represent only U.A.7, with their stratigraphic range lasting only until the lower part of the Upper Oxfordian.

However, the first occurrence of the species *Podocapsa amphitreptera* FOREMAN is problematic. In the samples from the western part of the West Carpathians studied so far, this species has never been found in assemblages older than the Kimmeridgian and was almost always accompanied by the species *Sethocapsa cetia* FOREMAN. This fact was also confirmed by its occurrences in the eastern part of the Klippen Belt (Ondrejičková, personal communication).

Stratigraphic range of taxons evaluated in individual samples and age of the assemblages are given in Figs. 2, 3, 4.

## *Conclusion*

Radiolarian assemblages from the red-brown radiolarites forming intercalations in the green-gray radiolarian limestones of the Kysuca succession at localities Brodno, Snežnica and Lopušné Pažite in the western part of the Varín stretch of the Klippen Belt can be correlated, according to Baumgartner's (1984) biostratigraphic zoning, with U.A.7 und U.A.8

which stratigraphically correspond to the upper part of the Lower Oxfordian to Upper Oxfordian (Baumgartner, 1987). Microscopic identification of the lower part of this radiolarian horizon has not been successful.

*Systematic part*

Apart from the new species, the chapter deals only with those specimens whose specific assignation was problematic or which did not quite well correspond to the diagnosis of the species.

Genus *Angulobracchia* BAUMGARTNER, 1980
Typical species: *Paronaella* (?) *purisimaensis* PESSAGNO, 1977
? *Angulobracchia cava* n. sp.
Pl. II, Figs. 1, 2, 3, 5

Holotype: Nos. 1871, 4279, Pl. II, Figs. 1, 3.

Type locality: Snežnica, Kysucká vrchovina upland (S-4).

Stratotype: radiolarites – upper part of the Lower Oxfordian to Upper Oxfordian.

Denomination: cavus – hollow, dug, according to a cavity in the middle of the central area.

Description: Three-ray test with axially highly elevated central area. The rays are broad from vertical view, widening into a cudgel shape in distal direction. Tubular extensions at the end of the rays, typical of the genus *Angulobracchia* were preserved only as relics (Pl. II. Fig. 5). From the lateral view the rays abruptly thin towards their termination. Lateral sides are concave. Central area is large, with a circular cavity in the middle. Ray meshwork consists of tetragonal to polygonal sublinearly to linearly arranged pore frames. Lateral sides with horizontal rows of circular pores. Pore frames on the central area meshwork are concentrically distributed.

Remark: Assignation to the genus *Angulobracchia* is controversial, because the specimens have no distinct lateral beams on the rays, and tubular extensions at the end of the rays are indistinct.

| Dimensions | Holotype | Max. | Min. |
|---|---|---|---|
| Length of rays | AX-0.222 | 0.250 | 0.175 |
| | BX-0.200 | | |
| | CX-0.195 | | |
| Width of narrow part of rays | 0.072 | 0.074 | 0.055 |
| Width of wide part of rays | 0.094 | 0.094 | 0.075 |
| Diameter of central cavity | 0.038 | 0.039 | 0.035 |
| Diameter of central area | 0.111 | 0.115 | 0.100 |

Genus *Archaeodictyomitra* PESSAGNO, 1976; sensu PESSAGNO, 1977
Typical species: *Archaeodictyomitra squinaboli* PESSAGNO, 1976
*Archaeodictyomitra* sp.
Pl. IV, Fig. 9, Pl. V, Fig. 6

Description: Narrow-conical test, from a half of its height slightly narrowing towards the termination. 24 to 28 longitudinal ridges are separated from one another by a row of pores. The pores also have a horizontal linear pattern.

Remark: These specimens differ from the species *A. apiaria* (RÜST) in the absence of a domed shape of the proximal part of the test as well as in their distal part narrowing towards its termination. On the other hand the specimens do not quite correspond to the species A. *directiporata* (RÜST) because the test of the former is not egg-shaped. They resemble the specimen *Archaeodictyomitra* sp. *A.* described by Mizutani (1981) from Tithonian radiolarian assemblage.

Occurrence: B-1. In addition to this occurrence the specimens have also been found at locality Lednica (radiolarites of the Kysuca succession of the Klippen Belt) in an assemblage representing a transitional interval between U.A.8 und U.A.9 (Baumgartner, 1984) – between the Upper Oxfordian and Lower Kimmeridgian (Baumgartner, 1987).

Genus *Homoeoparonaella* BAUMGARTNER, 1980
Typical species: *Paronaella elegans* PESSAGNO, 1977
*Homoeoparonaella* sp. A
Pl. I, Figs. 6, 9

Description: Test with three short thick rays with onion-like termination. The ray meshwork is linear, composed of five longitudinal beams which are transversally linked together by bars thus forming four longitudinal rows of quadrangular pore frames. Bulbous terminations of the rays have an irregular, fine-pore meshwork. At the end of each ray is a long thick central spine and several smaller lateral ones. Small central area has a concentric pattern of pore frames.

Occurrence: S-4. In addition to this occurrence the specimens have also been found at locality Keblie near Púchov (radiolarites of the Kysuca succession of the Klippen Belt) in an assemblage corresponding to U.A.5 und U.A.6 (Baumgartner, 1984) which, in terms of stratigraphy, means the Upper Callovian to lower part of the Lower Oxfordian (Baumgartner, 1987).

Genus *Obesacapsula* PESSAGNO, 1977
Typical species: *Obesacapsula morroensis* PESSAGNO, 1977
*Obesacapsula* aff. *rotunda* (HINDE, 1900)
Pl. III, Fig. 3

1900 *Stichocapsa rotunda* – G. J. Hinde, p. 41, Pl. 3, Fig. 24 (non vidi).
1977 *Obesacapsula rotunda* (HINDE) – E. A. Pessagno, p. 53, Pl. 9, Figs. 12, 18.
1978 *Syringocapsa rotunda* (HINDE) – H. P. Foreman, p. 749, Pl. 2, Fig. 2.
1984 *Obesacapsula* sp. aff. *O. rotunda* (HINDE) – E. A. Pessagno et al., p. 30, Pl. 4, Fig. 9.

Remark: This specimen differs from the species *O. rotunda* (HINDE) mainly in a longer apical part of the test, less inflated post-abdominal segments and less distinct strictures

between them. As a probable ancestor of the species *O. rotunda,* the form was established by Pessagno et al. (1984) for Upper Jurassic specimens differing from the Lower Cretaceous species O. rotunda in the above-described signs.

Occurrence: S-4. In addition to this occurrence the specimens have also been found at locality Myjava–Turá Lúka (TL-3) in an assemblage representing a transitional interval between U.A.8 and U.A.9 (Baumgartner, 1984) – between the Upper Oxfordian and Lower Kimmeridgian (Baumgartner, 1987).

Genus *Orbiculiforma* PESSAGNO, 1973
Typical species: *Orbiculiforma quadrata* PESSAGNO, 1973
*Orbiculiforma* sp.
Pl. III, Fig. 1

Description: Disc-shaped oval test with a central cavity making up about one fourth of the test's diametre. The meshwork of the test consists of polygonal pore frames which are much larger in the vicinity of the central cavity and with distinctly inflated nodes. Central cavity is constituted by a meshwork of small densely distributed circular pores.

Occurrence: S-4. Apart from this occurrence the specimens have also been found at other localities in the West Carpathians (Keblie near Púchov, Myjava–Turá Lúka, Vršatec – radiolarites of the Kysuca succession of the Klippen Belt) in assemblages ranging from U.A.5 to U.A.9 (Baumgartner, 1984) – Upper Callovian to Lower Kimmeridgian (Baumgartner, 1987)

Genus *Paronaella* PESSAGNO, 1971; sensu BAUMGARTNER, 1980
Typical species: *Paronaella solanoensis* PESSAGNO, 1971
*Paronaella* sp.
Pl. IV, Fig. 8

Description: The test consists of three ray whose longitudinal cross-section is oblong, whereas transversal one is ellipsoidal. Each ray is terminated by a short central spine and several lateral ones which are preserved on our specimens only in the form of relics. The ray meshwork is regular, consisting of five longitudinal beams which are transversally linked together by bars giving rise to four longitudinal rows of predominantly tetragonal pore frames. The central area is constituted by large quadrangular or polygonal irregularly distributed pore frames.

Occurrence: B-1. In addition to this occurrence the specimens have been found at locality Myjava–Turá Lúka (TL-2, radiolarites of the Kysuca succession of the Klippen Belt) in an assemblage representing a transitional interval between U.A.8 and U.A.9 (Baumgartner, 1984) – between the Upper Oxfordian and Lower Kimmeridgian (Baumgartner, 1987).

Genus *Triactoma* RÜST, 1885
Typical species: *Triactoma tithonianum* RÜST, 1885
*Triactoma* cf. *tithonianum* RÜST, 1885
Pl. IV, Fig. 7

1885 *Triactoma tithonianum* m.–D. Rüst, p. 289, Pl. 28, Fig. 5.
1888 *Triactis tithoniana* RÜST – D. Rüst, p. 197.

1898 *Triactiscus tithonianus*, RÜST – D. Rüst, p. 20.
1984 *Triactoma* sp. cf. T. *echiodes* FOREMAN – L. Ožvoldová – M. Sýkora, p. 272, Pl. 13, Fig. 3.

Remark: In addition to this occurrence the specimens have been found at locality Šípovský Háj in the Čachtické Karpaty Mts. (limestones) where they have been identified (Ožvoldová – Sýkora, 1984) as *Triactoma* cf. *echiodes* FOREMAN. From the species *T. echiodes*, however, they differ in almost equal angles between individual spines and in thinner spines. Our specimens most resemble the species *T. tithonianum* from which they differ in thicker spines and more abundant pores of cortical shell.

Occurrence: B-1. Also in Lower Berriasian assemblage in limestones at locality Šípkovský Háj in the Čachtické Karpaty Mts. (Ožvoldová – Sýkora, 1984).

Genus *Tricolocapsa* HAECKEL, 1881
Typical species: *Tricolocapsa theophrasti* HAECKEL, 1887
*Tricolocapsa* sp. B
Pl. II, Fig. 4

Description: The test is made up of three segments. Cephalis is circular, poreless, without an apical horn. Thorax is low, its height equals one fifth of abdomen height. Walls of the thorax are slightly inflated, stricture between the cephalis and thorax is distinct. Limbar stricture between the thorax and abdomen is very conspicuous. Abdomen is large, circular, slightly compressed along the main axis. Aperture is small with an elevated margin. Pore frames of the thorax and abdomen are hexagonal. On the thorax they are smaller by about two thirds. Abdomen pores are large, circular.

Remark: Our specimens differ from the species *T. yaoi* MATSUOKA in inflated thorax, distinct limbar stricture as well as larger pore frames and pores.

Occurrence: S-4. In addition to this occurrence the specimens have been found at other localities of the West Carpathians (Keblie near Púchov, Myjava–Turá Lúka) in assemblages ranging from U.A.5 to transitional interval between U.A.8 and U.A.9 i.e. Upper Callovian to Lower Kimmeridgian (Baumgartner, 1987). Sample with the youngest occurrence of these specimens collected at locality Myjava–Turá Lúka represented transitional interval between U.A.8 and U.A.9, i.e. Upper Oxfordian Lower–Kimmeridgian (Baumgartner, 1987).

Translated by Ľ. Böhmer

Plate I

Sample S-4 (Snežnica):

Fig. 1 – *Triactoma blakei* (PESSAGNO) – 1631, 115× magn.; Fig. 2 – *Emiluvia chica* FOREMAN – 1865, 120× magn.; Fig. 3 – *Emiluvia premyogii* BAUMGARTNER – 4294, 185× magn.; Fig. 4 – *Tritrabs exotica* (PESSAGNO) – 1862, 140× magn.; Fig. 5 – *Foremanella hipposidericus* (FOREMAN) – 1870, 105× magn.; Fig. 6 – *Homoeoparonaella* sp. A – 4293, 170× magn.; Fig. 7 – *Paronaella denudata* (RÜST) – 1624, 125× magn. – Fig. 8 – *Tritrabs casmaliaensis* (PESSAGNO) – 4281, 135× magn.; Fig. 9 – *Homoeoparonaella* sp. A – 4280, 180× magn.; Fig. 10 – *Mirifusus mediodilatatus* (RÜST) s. 1. – 1627, 110× magn.

Plate I

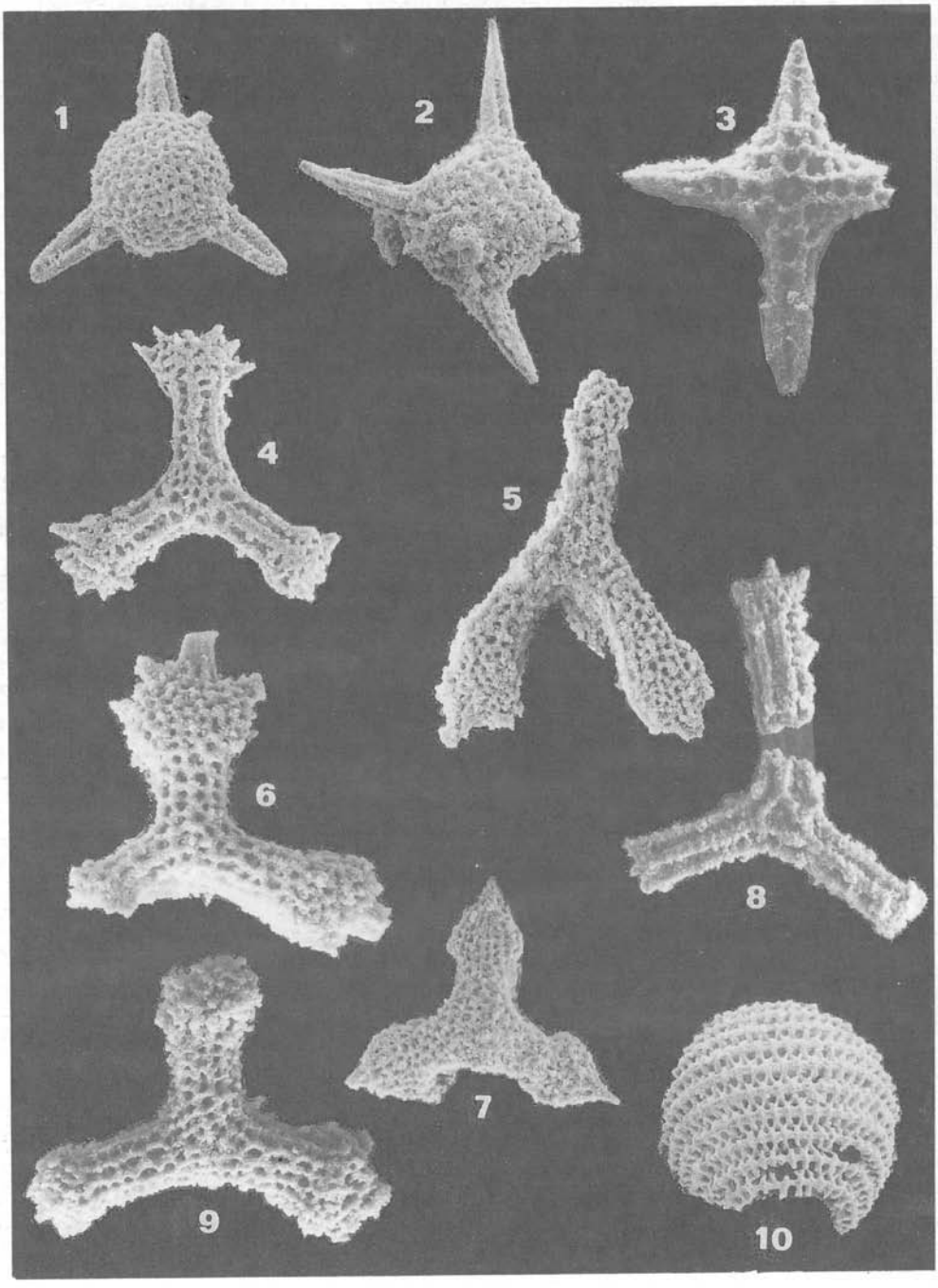


Plate II

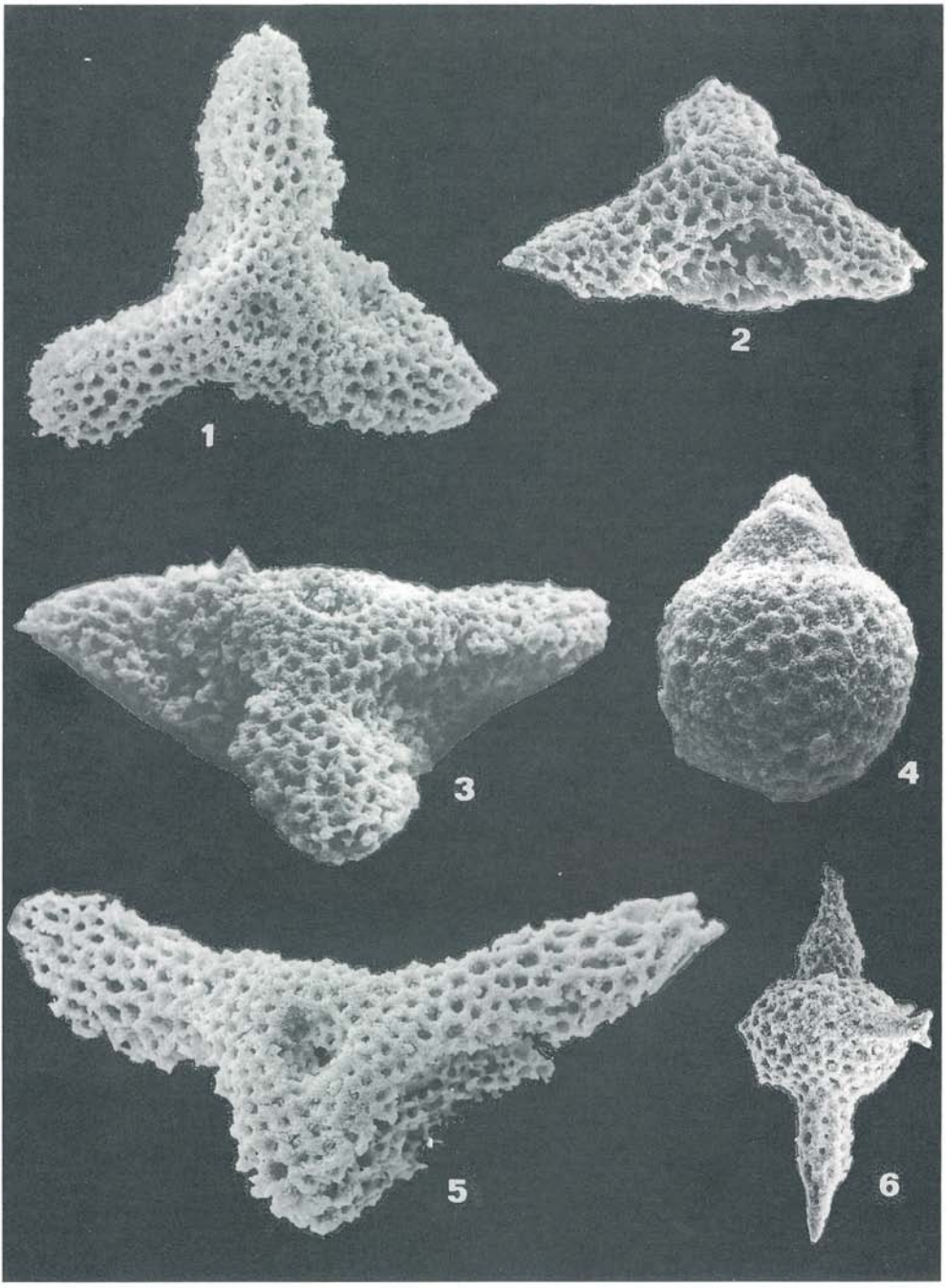


Plate III

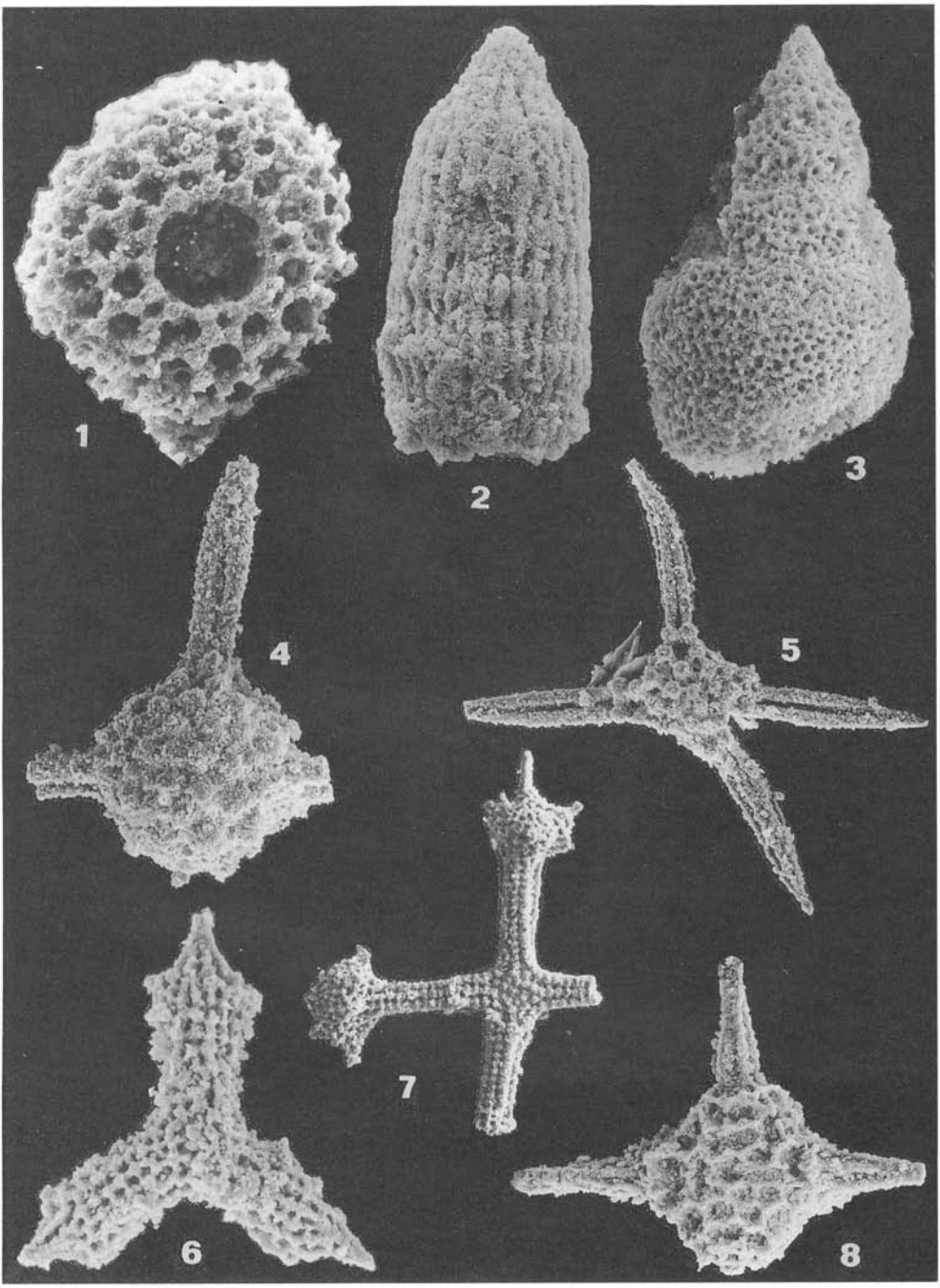


Plate IV

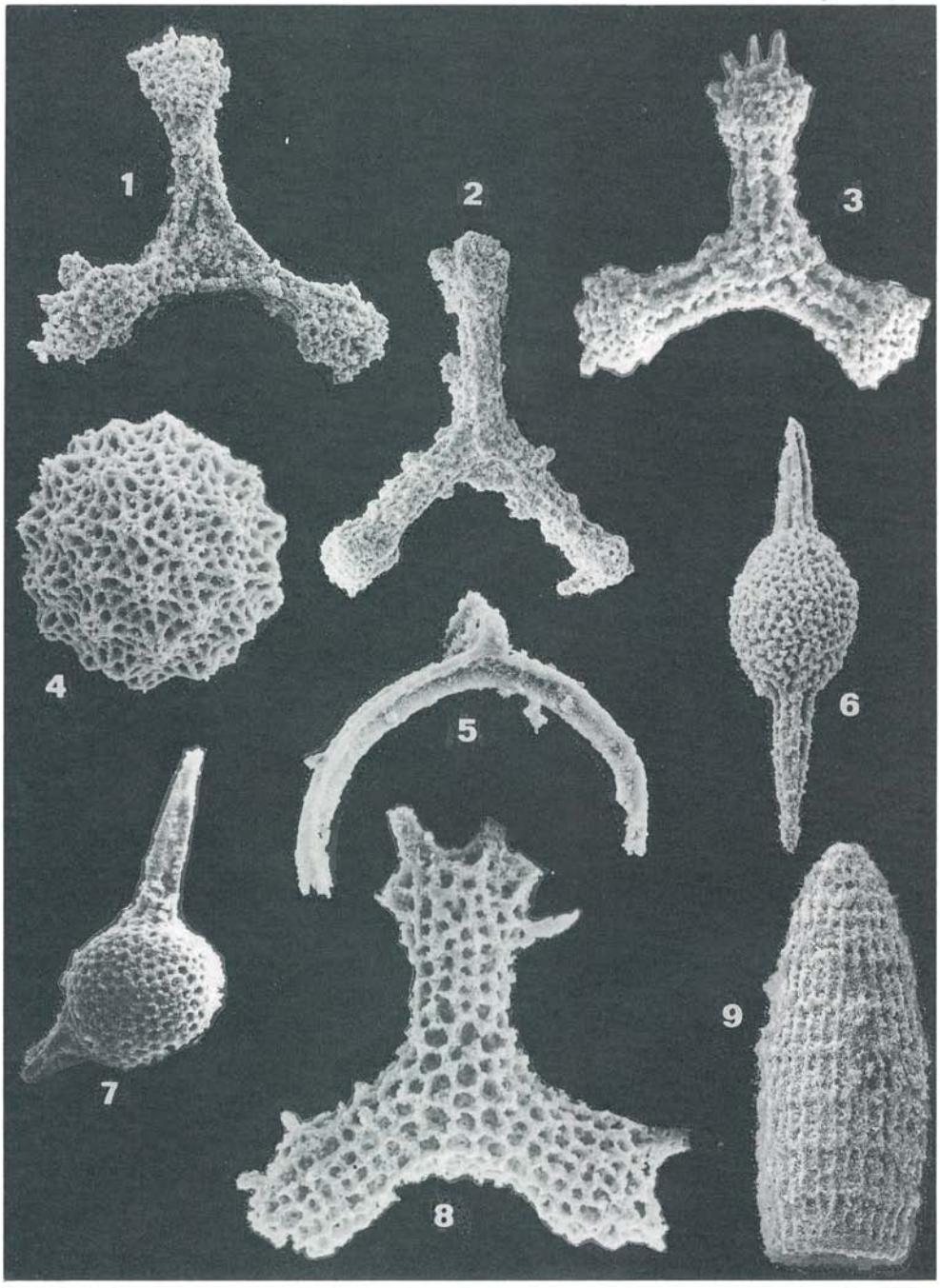
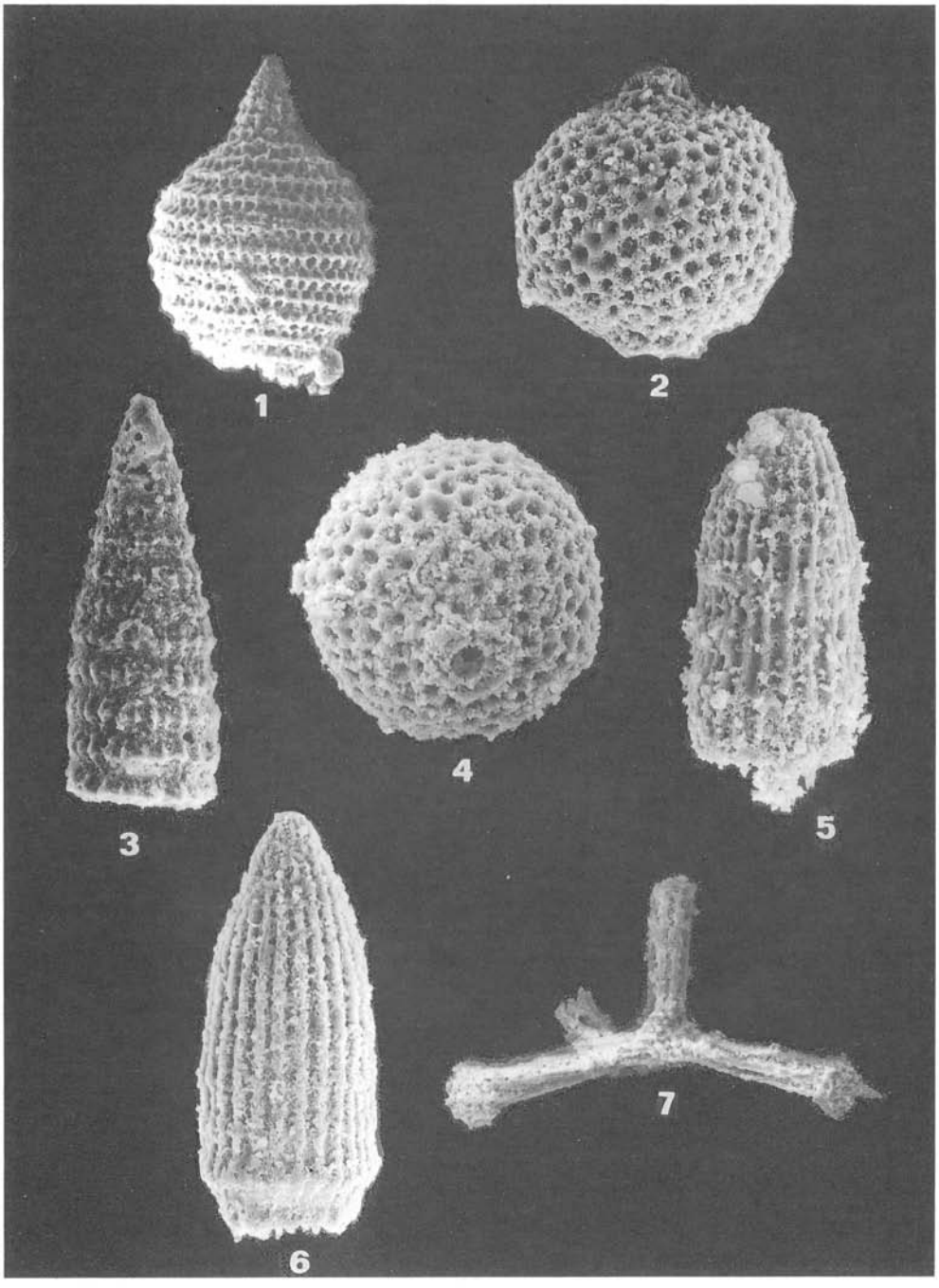


Plate V



## Plate II

Sample S-4 (Snežnica):

Fig. 1. – ? *Angulobracchia cava* n. sp. – holotype, 1871, 180× magn.; Fig. 2 – ? *Angulobracchia cava* n. sp. – paratype, 4290, 200× magn.; Fig. 3 – ? *Angulobracchia cava* n. sp. – holotype, side view, 4279, 210× magn.; Fig. 4 – *Tricolocapsa* sp. B – 4274, 300× magn.; Fig. 5 – ? *Angulobracchia cava* n. sp. – paratype, 1873, 240× magn.; Fig. 6 – *Podobursa spinosa* (OŽVOLDOVÁ) – 1630, 130× magn.

## Plate III

Sample S-4 (Snežnica):

Fig. 1 – *Orbiculiforma* sp. – 4292, 195× magn.; Fig. 2 – *Archaeodictyomitra apiaria* (RÜST) – 1864, 350× mang.; Fig. 3 – *Obesacapsula* aff. *rotunda* (HINDE) – 1868, 145× magn.

Sample LP-4 (Lopušné Pažite):

Fig. 4 – *Emiluvia orea* BAUMGARTNER – 0887, 115× magn.; Fig. 5 – *Emiluvia sedecimporata salensis* PESSAGNO – 0881, 125× magn.; Fig. 6 – *Paronaella pygmaea* BAUMGARTNER – 1632, 230× magn.; Fig. 7 – *Tetraditryma pseudoplena* BAUMGARTNER – 4256, 100× magn.; Fig. 8 – *Staurosphaera antiqua* RÜST – 0880, 125× magn.

## Plate IV

Sample LP-4 (Lopušné Pažite):

Fig. 1 – *Angulobracchia digitata* BAUMGARTNER – 0886, 125× magn.; Fig. 2 – *Homoeoparonaella argolidensis* BAUMGARTNER – 0879, 85× magn.; Fig. 3 – *Tritrabs exotica* (PESSAGNO) – 4252; 145× magn.;

Sample B-1 (Brodno):

Fig. 4 – *Praeconocaryomma hexagona* (RÜST) – 0915, 175× magn.; Fig. 5 – *Acanthocircus amissus* (SQUINABOL) – 0892; 170× magn.; Fig. 6 – *Archaeospongoprunum imlayi* PESSAGNO – 0916; 140× magn.; Fig. 7 – *Triactoma* cf. *tithonianum* RÜST – 4272; 140× magn.; Fig. 8 – *Paronaella* sp. – 0920, 280× magn.; Fig. 9 – *Archaeodictyomitra* sp. – 4630; 250× magn.

## Plate V

Sample B-1 (Brodno):

Fig. 1 – *Mirifusus mediodilatatus mediodilatatus* (RÜST) – 4273, 95× magn.; Fig. 2 – *Williriedellum carpathicum* DUMITRICA – 0911, 300× magn.; Fig. 3 – *Hsuum brevicostatum* (OŽVOLDOVÁ) – 0903, 190× magn.; Fig. 4 – *Williriedellum carpathicum* DUMITRICA – view of the oral part of the test, 0910, 315× magn.; Fig. 5 – *Archaeodictyomitra apiaria* (RÜST) – 0912, 350× magn.; Fig. 6 – *Archaeodictyomitra sp.* – 0919, 255× magn.; Fig. 7 – *Tritrabs worzeli* (PESSAGNO) – 0890, 95× magn.

Photographed by SEM, Geological Inst. of D. Štúr, Bratislava.

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