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## TREPOSTOME AND CRYPTOSTOME BRYOZOANS FROM THE KONĚPRUSY LIMESTONE (LOWER DEVONIAN, PRAGIAN) OF ZLATÝ KŮŇ (CZECH REPUBLIC)

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**Key words:** Bryozoa, Taxonomy, Early Devonian, Bohemia, Palaeozoogeography.

**Abstract.** The present paper presents descriptions of 10 bryozoan species from material deposited at the Geological Centrum Göttingen, Germany. The studied material comes from the Lower Devonian rocks (Koněprusy Limestone, Pragian), exposed in a quarry near Zlatý Kůň in Central Bohemia. Described bryozoans comprise 8 trepostome and 2 cryptostome (rhabdomesine) species. One genus and species is new: the cryptostome (rhabdomesine) *Paracuneatopora striata* gen. n., n. sp., and 7 species are new: trepostomes *Leioclema elegans* n. sp., *Atactotoechus divulgatus* n. sp., *Loxophragma fistulosum* n. sp., *Leptotrypella punctata* n. sp., *Microcampylus obscurus* n. sp., *Dyscritella bohémica* n. sp., and the rhabdomesine *Orthopora tenuis* n. sp. Furthermore, two trepostomes, *Monotrypa bohémica* Prantl, 1933 and *Anomalotoechus* cf. *typicus* Duncan, 1939 were identified in this material. The described fauna displays palaeozoogeographic relations to the Lower Devonian (Pragian) of Morocco and the Middle Devonian of Michigan (USA).

**Riassunto.** Vengono descritte 10 specie di briozoi nel materiale depositato presso il Geologische Zentrum di Göttingen, Germania. Il materiale studiato proviene da rocce del Devoniano Inferiore (Calcere di Koněprusy, Pragian), affiorante in una cava presso Zlatý Kůň in Boemia Centrale. I briozoi descritti comprendono 8 specie di trepostoma e 2 specie di cryptostoma (rhabdomesina). Un genere ed una specie di cryptostoma (rhabdomesina) sono nuovi: *Paracuneatopora striata* gen. n., n. sp., così come 7 specie di trepostoma: *Leioclema elegans* n. sp., *Atactotoechus divulgatus* n. sp., *Loxophragma fistulosum* n. sp., *Leptotrypella punctata* n. sp., *Microcampylus obscurus* n. sp., *Dyscritella bohémica* n. sp., ed il rhabdomesina *Orthopora tenuis* n. sp. Inoltre, in questo materiale sono stati identificati due trepostoma: *Monotrypa bohémica* Prantl, 1933 e *Anomalotoechus* cf. *typicus* Duncan, 1939. La fauna descritta mostra relazioni paleozoobiografiche con il Devoniano Inferiore (Pragian) del Marocco ed il Devoniano Medio del Michigan (USA).

### Aims of study

Bryozoa are abundant and diverse in the Devonian worldwide. This period was a time of important changes in the structure and composition of bryozoan faunas (Cuffey & McKinney 1979). Silurian faunas were dominated mainly by trepostomes and cystoporates. During the Early Devonian, the taxonomic composition of bryozoans shifted towards a dominance of fenestrate and cryptostome (rhabdomesine) taxa. This change influenced significantly the composition of the Carboniferous and Permian bryozoan faunas. The bryozoan faunas in some parts of Europe, especially Germany, Spain and some other areas, are scarcely investigated. Fenestrate bryozoans of the Barrandian area are relatively well studied (see below). However, other bryozoan groups have been often neglected. The purpose of the present study is to provide a description of 8 trepostome and 2 cryptostome (rhabdomesine) species from the Koněprusy Limestone (Pragian) of the locality Zlatý Kůň Hill, Czech Republic, and discuss their palaeozoogeographic relations.

### Overview of previous studies of bryozoans in the Devonian of Prague Basin

Fenestrate bryozoans from the Lower Devonian of the Czech Republic were first described in the paper of Počta (1894), with a supplement by Barrande. Prantl (1928) established the fenestrate bryozoan *Ptilopora bohémica* Prantl, 1928 from the Koněprusy Limestone

(Pragian) of Koněprusy. Later, he published a major work on fenestrate bryozoans of the Lower Devonian of the Barrandian (Prantl 1932). Recently, McKinney & Kříž (1986) revised fenestrate bryozoans from the Lower Devonian of the Prague Basin. They reassigned most of species described by Počta (1894), Barrande in Počta (1894) and Prantl (1932), and additionally described 9 new species. Kettner (1919) described 4 species of *Polypora*. In all, fenestrate bryozoans from the Lower Devonian of the Prague Syncline include 43 species: *Alternifenestella estrellita* McKinney & Kříž, 1986, *A. strigilla* McKinney & Kříž, 1986, *Cyclopelta sacculus* (Barrande in Počta, 1894), *C. bohémica* Prantl, 1932, *C. victrola* McKinney & Kříž, 1986, *Fabifenestella joachimi* McKinney & Kříž, 1986, *Fenestella conopeum* McKinney & Kříž, 1986, *F. gracilis* (Barrande in Počta, 1894), *F. minuscula* (Počta, 1894), *Filites bohemicus* (Barrande in Počta, 1894), *Flexifenestella bellaforma* McKinney & Kříž, 1986, *Hemitrypa bohémica* Barrande in Počta, 1894, *H. linotheras* McKinney & Kříž, 1986, *H. mimicra* McKinney & Kříž, 1986, *H. tenella* Barrande in Počta, 1894, *Isotrypa acris* (Počta, 1894) (= *Isotrypa pannosa* (Počta, 1894)), *I. bifrons* (Barrande in Počta, 1894), *I. gracilis* (Barrande in Počta, 1894), *I. lineolata* (Počta, 1894), *I. sportula* (Počta, 1894), *Laxifenestella capillosa* (Počta, 1894), *L. digitata* (Prantl, 1932), *Penniretepora bohémica* (Prantl, 1932), *P. spinosa* (Počta, 1894), *Polypora hanusi* Prantl, 1932, *P. inusitata* McKinney & Kříž, 1986, *P. moravica* Kettner, 1919, *P. ovalipora* Kettner, 1919, *P. quenstedti* Kettner, 1919, *P. ? delicata* Kettner, 1919, *Polyporella inserta* (Prantl, 1932), *P. cancellata* (Počta, 1894), *Ptilopora bohémica* Prantl, 1928, *Rectifenestella exilis* (Počta, 1894), *Reteporina formosa* Prantl, 1932, *R. petala* (Počta, 1894), *Reteporina tranisens* (Počta, 1894), *Semicoscinium discreta* (Prantl, 1932), *S. subacta* (Počta, 1894), *Spinofenestella inclara* (Počta, 1894), *Utropora nobilis* Prantl, 1932, *U. parallela* Barrande in Počta, 1894.

Non-fenestrate bryozoans were described in a few papers. Kettner (1919) established 4 cystoporate species: *Ceramopora? tenuis* Kettner, 1919, *Fistulipora celechovicensis* Kettner, 1919, *Fistulipora corticosa* Kettner, 1919, and *Fistulipora smyckai* Kettner, 1919. Prantl (1933, 1935) established the following bryozoan species from the Lower Devonian of Prague Basin: trepostomes *Monotrypa bohémica* Prantl, 1933 from Koněprusy Limestone (Pragian), *Leptotrypella circumtexta* Prantl, 1933 from the Chapel Coral Horizon (Zlíchovian), cyclostomes *Corynotrypa formosa* Prantl, 1935 and *Clonopora* sp., cystoporates *Fistulipora astreoides* Prantl, 1935, *Fistulipora gibbosa* Prantl, 1935, *Fistulipora* sp., and rhabdomesine cryptostome genus *Petaloporella* Prantl, 1935 with the type species *P. bo-*

*hemica* Prantl, 1935 from the Branik-Limestone (Zlíchovian).

Astrova (1970) described three trepostome species from the Upper Koněprusy bioherm Limestone (Pragian) of Zlatý Kůň: *Leptotrypella multifora* Astrova, 1970, *Paralioclema barrandei* Astrova, 1970, and *Chondraulus bohemicus* Astrova, 1970.

Kulich (1984) established two trepostome species from the Chapel Coral Horizon (Zlíchovian) of Zlíchov: *Monotrypa vltavensis* Kulich, 1984 and *Cyphotrypa zlichovensis* Kulich, 1984. Furthermore, he described an unnamed bryozoan Trepostomata gen. indet. from the same horizon.

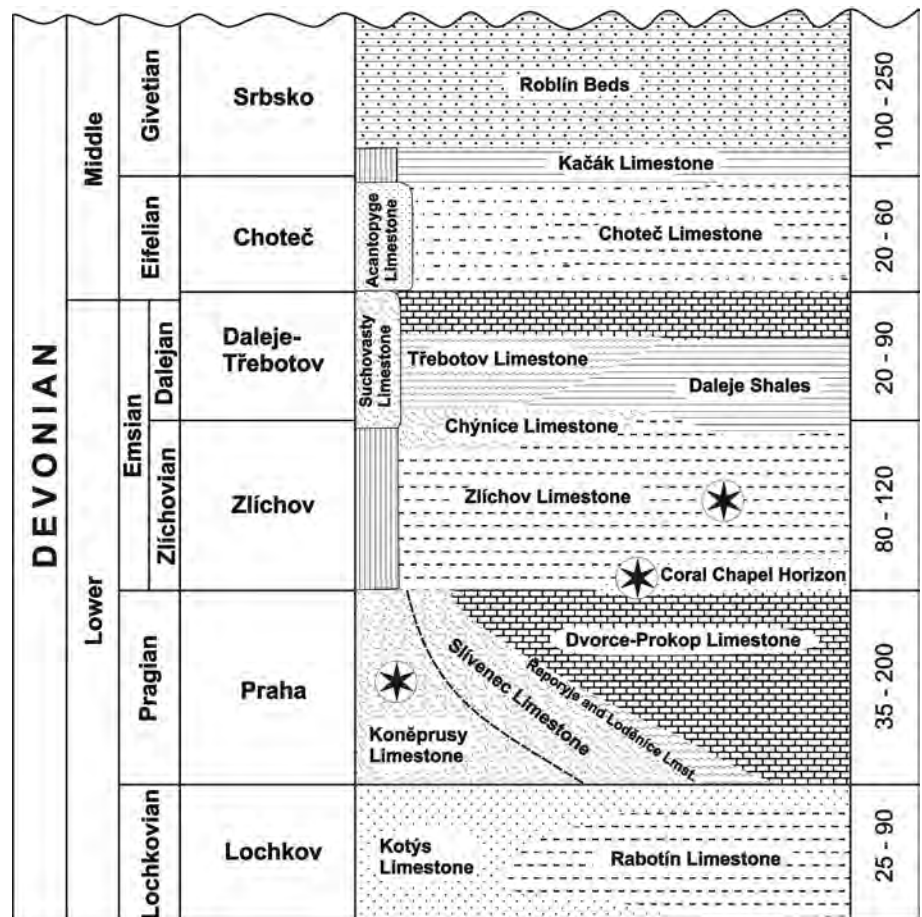
### Lithology and accompanying fauna

Lower Devonian limestones rich in fossils (Fig. 1) are a part of the Ordovician to Devonian sequence developed in the linear sedimentary basin known as the Barrandian (Prague Syncline). Their chronostratigraphy is based on Bohemian stages as defined by Chlupáč (1976, 1982) and partly accepted as the standard Lower Devonian stages (Lochkovian, Pragian). The Lower Devonian rocks in the Prague Basin vary from white, well-washed boundstones and grainstones to black micritic limestones and calcareous shales. The Lower and Middle Devonian sequences in the Prague Basin were deposited under normal marine conditions in a tropical position (Chlupáč 1993). Reefs were developed on some highs along the margin of the basin. The best-known reef is the Koněprusy reef in Czech Republic, which represents a rare example of Lower Devonian reefs worldwide (Flajs & Hüssner 1996a, b). The fauna of the reef is dominated by crinoids and bryozoans, followed by algae, brachiopods and corals (Flajs & Hüssner 1996b). The reef is composed mainly of white, well-washed boundstones, and grainstones, which contain whole-bodied fossils. The locality Koněprusy is situated on the slopes of the Zlatý Kůň Hill near the village Koněprusy.

### Material and methods

The material for the present study comes from the vicinity of Zlatý Kůň (Czech Republic). It was collected during a geological excursion in 1964 and is now deposited at the Geological Centrum Göttingen. For the study, 64 oriented thin sections were made from eight hand samples. Bryozoans were investigated in thin sections using binocular microscope in transmitted light. Statistics were summarized with arithmetic mean, sample standard deviation, coefficient of variation, minimum and maximum value. Thin sections and offcuts are housed at the Geological Centrum Göttingen, Germany, under collection numbers GZG.IN.0.010.553-560. Separate thin sections of the same sample are numbered by adding a small letter suffix.

Fig. 1 - Stratigraphic chart of the Lower Devonian sequence in the Barrandian area (modified after Chlupáč et al. 1992). Asterisks show occurrences of known bryozoan faunas.



### Systematic palaeontology

Phylum **Bryozoa** Ehrenberg, 1831

Class **Stenolaemata** Borg, 1926

Order **Trepostomata** Ulrich, 1882

Suborder **Halloporina** Astrova, 1965

Family **Heterotrypidae** Ulrich, 1890

Genus **Leioclema** Ulrich, 1882 [= *Lioclema* Ulrich, 1882]

Type species: *Callopora punctata* Hall, 1858. Lower Carboniferous; Iowa (USA).

**Diagnosis.** Incrusting, branched, less commonly massive colonies. Autozoecia with polygonal to rounded-polygonal, sometimes petaloid apertures. Autozoecial diaphragms rare. Mesozoecia abundant, with abundant diaphragms, often beaded. Acanthostyles abundant, commonly large. Autozoecial walls thin in endozones; laminated, regularly thickened in exozones (modified after Astrova 1978).

**Comparison.** *Leioclema* Ulrich, 1882 differs from *Heterotrypa* Nicholson, 1879 in having rare autozoecial diaphragms and abundant acanthostyles and mesozoecia, from *Stigmatella* Ulrich & Bassler, 1904 in having abundant mesozoecia.

**Occurrence.** Lower Silurian to Upper Carboniferous; worldwide.

### *Leioclema elegans* n. sp.

Pl. 1, figs 1-7; Appendix

? 1981 *Eridotrypa* cf. *eximia* Yaroshinskaja, 1970 - Bigey, p. 114-116, pl. 11, figs 5-10.

**Etymology.** The specific name '*elegans*' refers to the small sizes and general delicate appearance of the new species (derived from Latin '*elegantis*' = elegant).

**Holotype.** GZG.IN.0.010.559m.

**Paratypes.** GZG.IN.0.010.558g, GZG.IN.0.010.559b, d-k, n (five colonies).

**Type locality.** Zlatý Kůň, Czech Republic.

**Type stratum.** Koněprusy Limestone, Pragian (Lower Devonian).

**Occurrence.** Zlatý Kůň, Czech Republic; Koněprusy Limestone, Pragian (Lower Devonian). Ménez-Bélaire Syncline, Armorican Massif, France; upper Emsian (Lower Devonian).

**Diagnosis.** Branched and incrusting colonies; exozones distinctly separated from endozones; diaphragms rare to common; mesozoecia abundant; acanthostyles abundant, moderately large.

**Description.** Ramose branching and incrusting colonies. Branched colonies 1.64-3.20 mm in diameter, with distinctly separated endozones and exozones. Endozones 1.00-1.04 mm wide, exozones 0.30-1.08 mm wide, incrusting sheets 0.54-1.11 mm in thickness. Secondary overgrowths occurring. In incrusting colonies, autozoecia budding from a thin epitheca, on short

distances parallel to the substrate, then bending sharply and intersecting the colony surface at right angle. In branched colonies, autozoecia growing parallel to branch axis for short distance in endozones, bending in exozone and intersecting the colony surface at angles of 90°. Autozoecial apertures rounded-polygonal to petaloid due to indenting acanthostyles. Autozoecial basal diaphragms thin, straight or slightly deflected proximally, rare to common, more abundant in transition zone between endo- and exozones. Mesozoecia abundant, 5-9 surrounding each aperture, polygonal in cross section, often beaded, containing abundant and thick diaphragms, sometimes as large as autozoecia, usually sealed by skeleton at the colony surface. Acanthostyles moderately large, abundant, 3-6 surrounding each aperture, originating in the distal part of exozone, often indenting autozoecia, having distinct calcite cores and dark laminated sheaths. Walls granular, 0.010-0.015 mm thick in endozones; distinctly laminated, 0.030-0.035 mm thick in the exozone.

**Comparison.** The present material is similar to *Eridotrypa* (= *Leioclema*) cf. *eximia* Yaroshinskaja, 1970, described by Bigey (1981) from the upper Emsian of the Armorican Massif, differing only in having smaller apertures (0.11-0.18 mm vs. 0.16-0.22 mm). *Leioclema elegans* n. sp. differs from the similar species *Leioclema multiacanthoporum* Astrova, 1968 (in Astrova & Jaroshinskaya, 1968) in having smaller colonies (1.64-3.20 mm vs. 5.00-10.00 mm in *L. multiacanthoporum*). *Leioclema minor* Yang, 1956 from the Middle Devonian of China, is similar to *Leioclema elegans* n. sp., differing in larger colonies (3.00-5.00 mm vs. 1.64-3.20 mm in *Leioclema elegans*). Furthermore, *L. minor* Yang, 1956 has large openings (0.28 mm), which are distributed in a regular pattern on the colony surface. Yang (1956) regarded them as large autozoecia. However, a more plausible explanation would be borings of a parasitic or symbiotic organism. Such borings are common in Palaeozoic trepostome bryozoans.

#### Suborder **Amplexoporina** Astrova, 1965

##### Family Amplexoporidae Miller, 1889

##### Genus *Monotrypa* Nicholson, 1879

Type species: *Chaetetes undulatus* Nicholson, 1879. Canada; Trentonian (Middle Ordovician).

**Diagnosis.** Massive irregular, discoidal or hemispherical colonies; exozone and endozone not clearly distinct. Autozoecia with polygonal apertures, thin undulating walls without thickenings. Diaphragms complete, thin, rare, sometimes absent. Exilazoecia rare or absent. Acanthostyles absent (modified after Astrova 1978).

**Comparison.** *Monotrypa* Nicholson, 1879 differs from other genera of the family Amplexoporidae by having thinner walls, fewer exilazoecia and no acanthostyles.

**Occurrence.** Middle Ordovician to Upper Devonian; worldwide.

#### **Monotrypa bohémica** Prantl, 1933

Pl. 2, figs 1-2; Appendix

1933 *Monotrypa bohémica* Prantl, p. 2-4, figs 1-2.

1984 *Monotrypa bohémica* Prantl, 1933 - Kulich, p. 228-229, pl. 6, figs 2-3.

**Material.** GZG.IN.0.010.559d, k, r (single colony).

**Occurrence.** Zlatý Kůň, Czech Republic; Koněprusy Limestone, Pragian (Lower Devonian).

**Description.** Massive and incrusting colony; exozone and endozone not distinct. Autozoecia straight, large, budding slightly inclined from thin basal epitheca. Autozoecial apertures polygonal. Autozoecial diaphragms common, thin, and planar. Exilazoecia rare, beaded in longitudinal view, originating both in endo- and exozones, polygonal in cross section. Autozoecial walls straight, granular, 0.005-0.015 mm thick in endozones; varying in thickness from 0.025 mm to 0.050 mm, finely laminated in exozones. Maculae distinct, consisting of larger autozoecia. Acanthostyles absent.

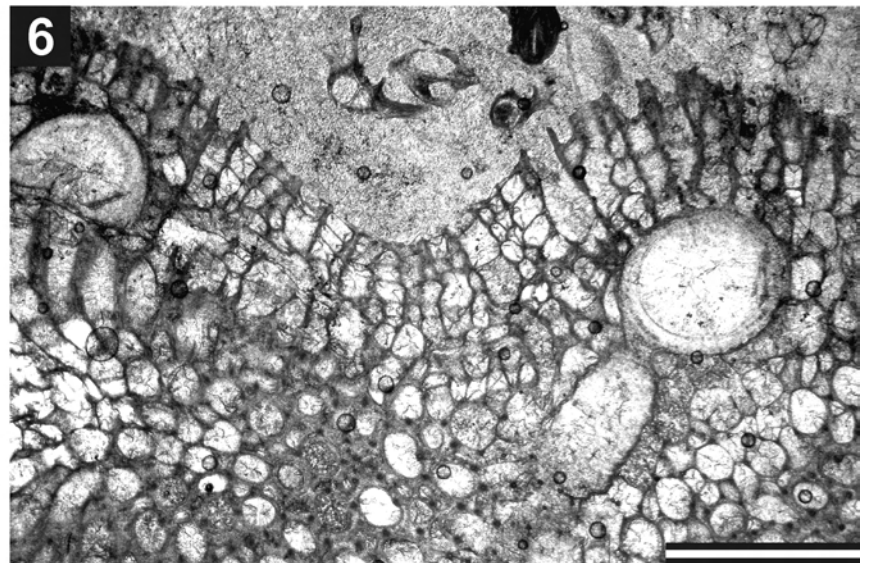
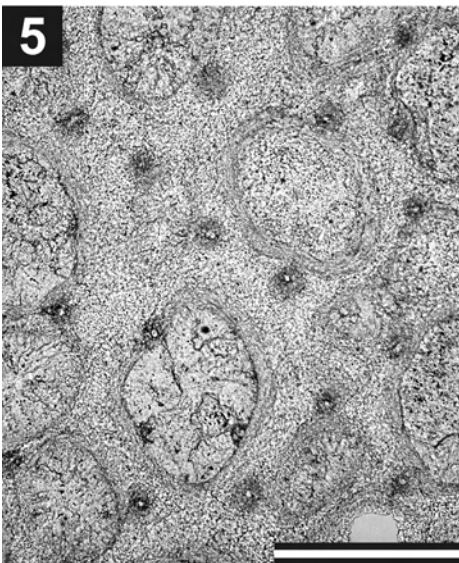
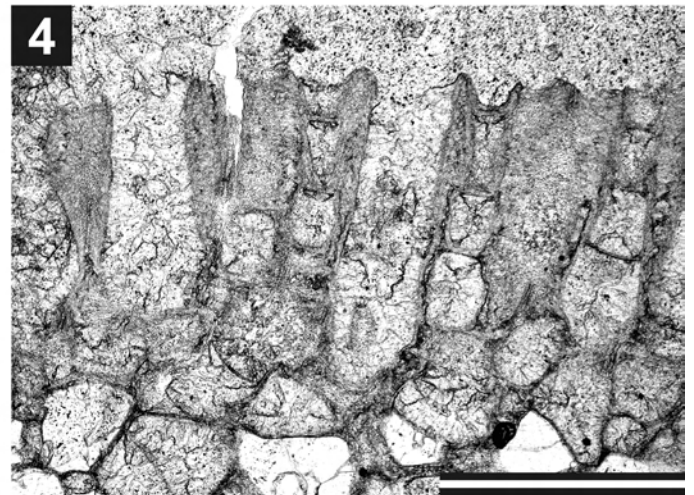
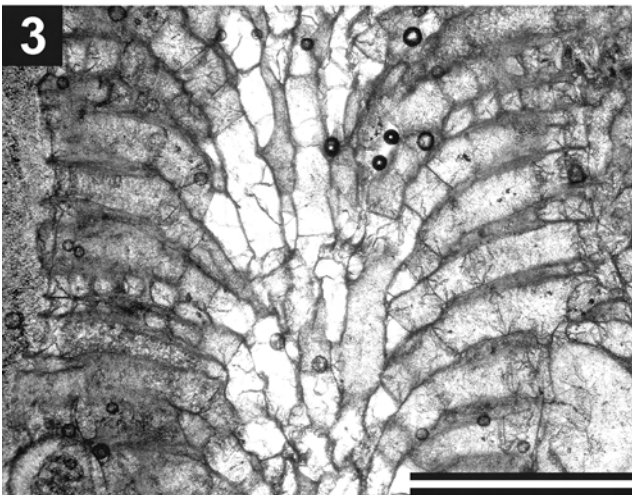
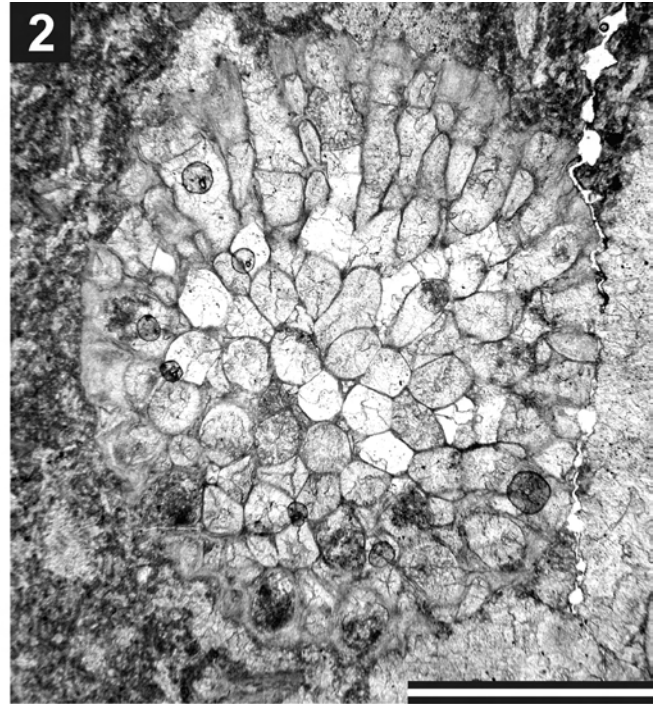
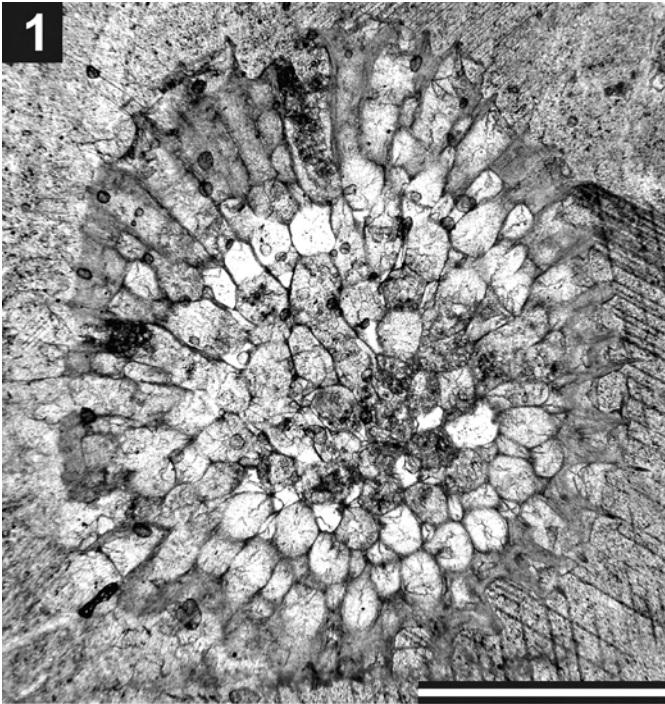
**Comparison.** *Monotrypa bohémica* Prantl, 1933 is similar to *M. vltavensis* Kulich, 1984 from the Chapel Horizon (Zlíchovian), but differs from it by presence of diaphragms and in greater variation of autozoecial sizes (0.28-0.60 mm vs. 0.40-0.50 mm in *M. vltavensis*).

#### PLATE 1

All thin sections are from Koněprusy Limestone, Pragian (Lower Devonian) of Zlatý Kůň, Czech Republic.

*Leioclema elegans* n. sp.

- Fig. 1 - Paratype GZG.IN.0.010.559f, cross section, scale bar = 1 mm;  
 Fig. 2 - Paratype GZG.IN.0.010.559h, cross section, scale bar = 1 mm;  
 Fig. 3 - Paratype GZG.IN.0.010.559b, longitudinal section;  
 Fig. 4 - Holotype GZG.IN.0.010.559m, longitudinal section, scale bar = 0.5 mm;  
 Fig. 5 - Holotype GZG.IN.0.010.559m, tangential section, scale bar = 0.2 mm;  
 Fig. 6 - Paratype GZG.IN.0.010.559b, longitudinal section of an incrusting colony, scale bar = 1 mm.



## Family Atactotoechidae Duncan, 1939

Genus *Atactotoechus* Duncan, 1939

Type species: *Atactotoechus typicus* Duncan, 1939. Traverse Group (Middle Devonian); Michigan (USA).

**Diagnosis.** Incrusting, massive and branched colonies. Autozoecia with polygonal to rounded-polygonal apertures. Diaphragms abundant, straight or inclined. Cystiphragms singly or several in cluster. Exilazoecia rare. Acanthostyles absent or present in small numbers in maculae. Autozoecial walls thin in endozone; irregularly thickened, finely laminated in exozone (modified after Astrova 1978).

**Comparison.** *Atactotoechus* Duncan, 1939 differs from *Orbignyella* Ulrich & Bassler, 1904 in having thickened autozoecial walls and absence of acanthostyles.

**Occurrence.** Lower Silurian to Upper Devonian; worldwide.

***Atactotoechus divulgatus* n. sp.**

Pl. 2, figs 3-7; Appendix

**Etymology.** The specific name '*divulgatus*' refers to the characteristic morphology and moderate dimensions of the new species (derived from Latin '*divulgatus*' = ordinary).

**Holotype.** GZG.IN.0.010.554d.

**Paratypes.** GZG.IN.0.010.554a-c (eight colonies).

**Type locality.** Zlatý Kůň, Czech Republic.

**Type stratum.** Koněprusy Limestone, Pragian (Lower Devonian).

**Diagnosis.** Branched colonies; bifurcation common; exozones distinctly separated from endozones; diaphragms abundant in exozones; cystiphragms few; exilazoecia rare; acanthostyles rare to abundant, small.

**Description.** Ramose branched colonies. Branches 3.20-6.40 mm in diameter. Exozones 0.44-0.70 mm wide, endozones 2.76-5.70 mm wide. Exozones distinctly separated from endozones. Autozoecia long in endozones, bending sharply in exozones. Autozoecial apertures polygonal with rounded corners. Autozoecial diaphragms abundant in exozones, straight or inclined; absent to rare in endozones. Cystiphragms few. Exilazoecia rare, short, polygonal in cross section. Acanthostyles small, locally abundant, 2-4 surrounding each autozoecial aperture, locally absent, having distinct narrow cores and laminated sheaths. Autozoecial walls granular, 0.005-0.010 mm thick in endozones, thick, showing reversal V-shaped lamination without distinct zoecial boundaries, 0.06-0.13 mm thick in exozones. Maculae consisting of larger autozoecia, 2.4-2.6 mm in diameter.

**Comparison.** *Atactotoechus divulgatus* n. sp. is similar to *A. cartus* Boardman, 1960 from the Hamilton Group (Middle Devonian) of the New York State (USA). The new species differs in having smaller apertures (aperture diameters in non-macular area 0.11-0.19 mm vs. 0.17-0.26 mm in *A. cartus*; aperture diameters in macular area 0.20-0.32 mm vs. = 0.50 mm in *A. cartus*).

Genus *Anomalotoechus* Duncan, 1939 [= *Stereotoechus* Duncan, 1939]

Type species: *Anomalotoechus typicus* Duncan, 1939. Traverse Group (Middle Devonian); Michigan (USA).

**Diagnosis.** Incrusting, massive, less commonly branched colonies. Autozoecia with polygonal to rounded-polygonal apertures. Diaphragms abundant in exozones, straight or inclined. Exilazoecia rare, short. Acanthostyles abundant. Autozoecial walls thin in endozone; finely laminated, strongly and irregularly thickened in exozone (modified after Astrova 1978).

**Comparison.** *Anomalotoechus* Duncan, 1939 differs from *Leptotrypa* Ulrich, 1883 in having massive and branched colonies, thickened walls and abundant diaphragms, from *Atactotoechus* Duncan, 1939 in having abundant acanthostyles.

Boardman (1960: 40) suggested that the type species of the genus *Anomalotoechus*, *A. typicus* Duncan, 1939 and *Leptotrypa? spinifera* Duncan, 1939 are the same species. He placed *Leptotrypa? spinifera* in the genus *Stereotoechus* Duncan, 1939, and synonymised *A. typicus* with *Stereotoechus spiniferus*. The species *Anomalotoechus tuberatus* Duncan, 1939 was placed by Boardman (1960: 40, 70) in the genus *Atactotoechus* Duncan, 1939. Therefore, the genus *Anomalotoechus* became invalid. However, Astrova (1978: 120) argued that *Anomalotoechus* was described earlier in the publication of Duncan (1939: 187) than *Stereotoechus* (p. 260) and suggested *Stereotoechus* to be a junior synonym of *Anomalotoechus*. The species *Leptotrypa? spinifera* Duncan, 1939 and *Stereotoechus typicus* Duncan, 1939 were synonymised with the type species *Anomalotoechus typicus* Duncan, 1939. This suggestion is followed in the present publication.

## PLATE 2

All thin sections are from Koněprusy Limestone, Pragian (Lower Devonian) of Zlatý Kůň, Czech Republic.

*Monotrypa bohémica* Prantl, 1933

Fig. 1 - GZG.IN.0.010.559k, longitudinal section, scale bar = 1 mm;

Fig. 2 - GZG.IN.0.010.559d, tangential section, scale bar = 0.5 mm;

*Atactotoechus divulgatus* n. sp.

Fig. 3 - Paratype GZG.IN.0.010.554b, cross section, scale bar = 1 mm;

Fig. 4 - Paratype GZG.IN.0.010.554a, longitudinal section, scale bar = 2 mm;

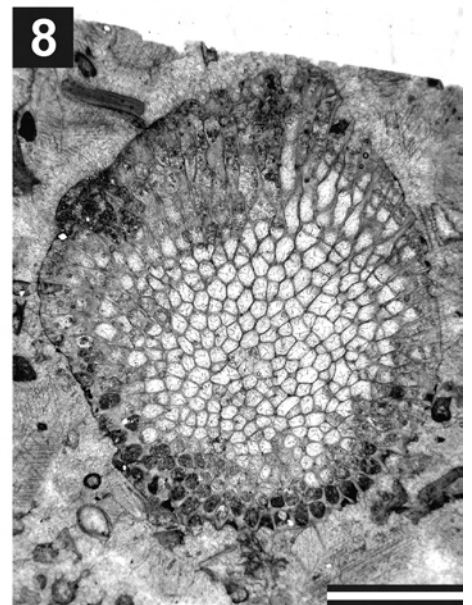
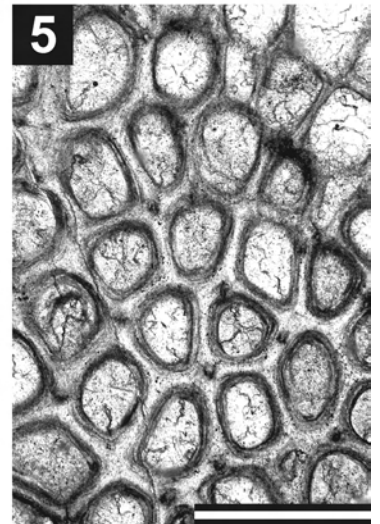
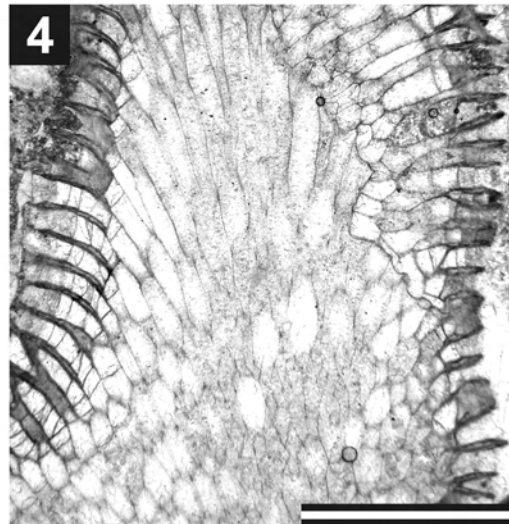
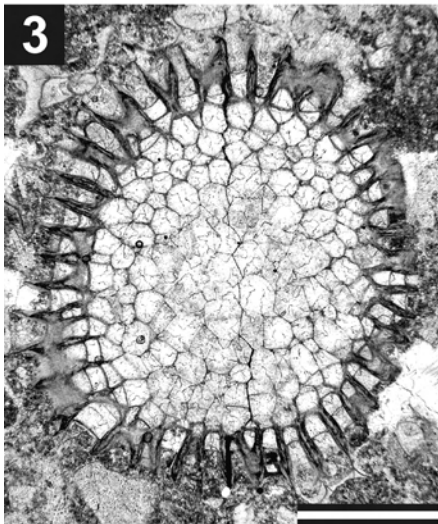
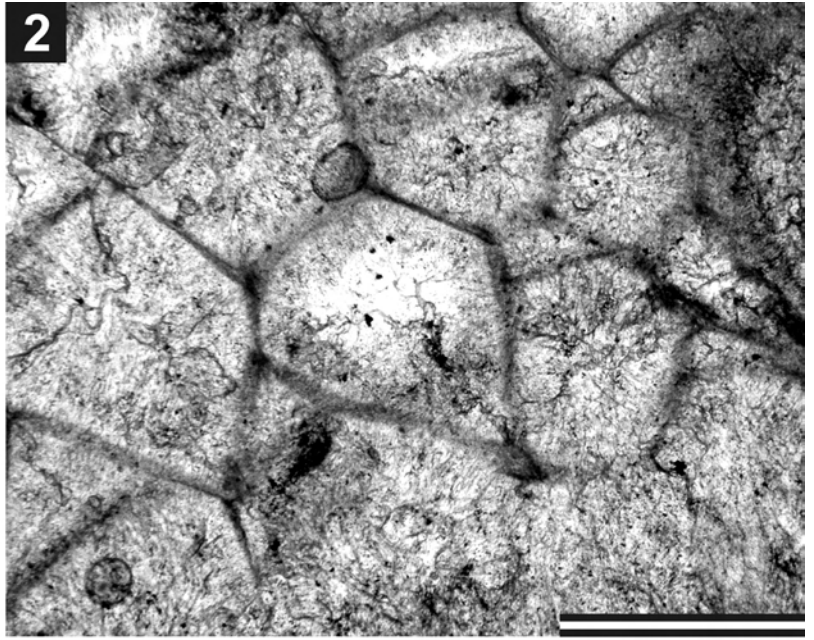
Fig. 5 - Holotype GZG.IN.0.010.554d, tangential section, scale bar = 0.5 mm;

Fig. 6 - Paratype GZG.IN.0.010.554a, longitudinal section, scale bar = 0.5 mm;

Fig. 7 - Paratype GZG.IN.0.010.554b, longitudinal section, scale bar = 0.2 mm.

*Anomalotoechus* cf. *typicus* Duncan, 1939

Fig. 8 - GZG.IN.0.010.558c, cross section, scale bar = 2 mm.



**Occurrence.** Middle Silurian to Upper Devonian; worldwide.

**Anomalotoechus cf. typicus** Duncan, 1939

Pl. 2, fig. 1, Pl. 3, figs 1-3; Appendix

cf. 1939 *Anomalotoechus typicus* Duncan, p. 189, pl. 1, figs 4-7.  
cf. 1939 *Leptotrypa? spinifera* Duncan, p. 222, pl. 5, figs 3-5.  
cf. 1939 *Stereotoechus typicus* Duncan, p. 261, pl. 13, figs 10-13.  
cf. 1960 *Stereotoechus* cf. *S. typicus* Duncan, 1939 - Boardman, p. 41, pl. 1, fig. 1.

**Material.** GZG.IN.0.010.558c, o, q, u, w (two colonies).

**Occurrence.** Zlatý Kůň, Czech Republic; Koněprusy Limestone, Pragian (Lower Devonian).? Michigan, USA; Traverse Group (Middle Devonian).? Hamilton Group (Middle Devonian); USA (New York).

**Description.** Massive (? subramose) colonies, up to 5.5 mm in diameter. Exozones indistinctly separated from endozones. Autozoecia long, bending gently in endozones, having polygonal cross sections. Autozoecial apertures rounded-polygonal to circular and oval. Autozoecial diaphragms restricted to exozones, locally common, 2-5 occurring in each autozoecium; locally absent. Exilazoecia rare, short, with rounded apertures. Acanthostyles large, 2-5 surrounding each autozoecial aperture, having distinct cores and laminated sheaths. Autozoecial walls granular, 0.005-0.010 mm thick in endozones; irregularly thickened, showing reversal U-shaped lamination without distinct zoecial boundaries, 0.020-0.050 mm thick in exozones. Maculae not observed.

**Comparison.** The present material is similar to *Anomalotoechus typicus* Duncan, 1939. All the species synonymised with *A. typicus*, have incrusting or subramose colonies. The following measurements for autozoecial aperture width are given by Duncan (1939) (in brackets measurements for megazoecia):

<i>Anomalotoechus typicus</i>	0.15-0.20 mm (up to 0.30 mm)
<i>Leptotrypa? spinifera</i>	0.20-0.28 mm (0.28-0.30)
<i>Stereotoechus typicus</i>	0.14-0.17 mm (0.21-0.30)
present material	0.14-0.23 mm (not observed)

The present material differs from species *Anomalotoechus bublitschenkoi* (Nekhoroshev, 1948) from the Middle Devonian of Altai in having smaller autozoecial apertures (0.14-0.23 mm vs. 0.30-0.50 mm in *A. bublitschenkoi*). *Anomalotoechus firmus* Kopajevich, 1984 from the Middle Devonian of Mongolia has large massive colonies and larger autozoecial apertures (0.18-0.32 mm vs. 0.14-0.23 mm in present material).

Genus *Loxophragma* Boardman, 1960 [= *Multiphragma* Yang & Hu, 1981]

Type species: *Loxophragma lechrium* Boardman, 1960. Hamilton Group (Middle Devonian); New York (USA).

**Diagnosis.** Branched and incrusting colonies. Autozoecia with polygonal apertures. Autozoecial diaphragms abundant in exozones, often inclined, non-parallel, thickened. Exilazoecia rare to common. Acanthostyles small, variable in number. Autozoecial walls thin in endozones, irregularly thickened in exozones (modified after Astrova 1978).

**Comparison.** *Loxophragma* Boardman, 1960 differs from *Atactotoechus* Duncan, 1939 in having irregularly thickened walls and abundant and complicated diaphragms.

Genus *Multiphragma* Yang & Hu, 1981 is a junior synonym of *Loxophragma* Boardman, 1960 (Boardman, pers. comm., 2008).

**Occurrence.** Lower Devonian of Europe (France and Czech Republic), Middle Devonian of Northern America and Upper Devonian of China and Canada.

**Loxophragma fistulosum** n. sp.

Pl. 3, figs 4-7; Appendix

**Etymology.** The specific name '*fistulosum*' refers to the relatively abundant exilazoecia of the new species (derived from Latin '*fistulosus*' = porous).

**Holotype.** GZG.IN.0.010.558p.

**Paratypes.** GZG.IN.0.010.558 b, j, l, n, r (two colonies).

**Type locality.** Zlatý Kůň, Czech Republic.

**Type stratum.** Koněprusy Limestone, Pragian (Lower Devonian).

**Diagnosis.** Branched colonies with distinctly separated endozones and exozones; autozoecial diaphragms abundant in exozones; acanthostyles small, exilazoecia common.

**Description.** Branched colonies. Branches 2.80-4.30 mm in diameter. Exozones 1.05-2.20 mm wide,

PLATE 3

All thin sections are from Koněprusy Limestone, Pragian (Lower Devonian) of Zlatý Kůň, Czech Republic.

*Anomalotoechus* cf. *typicus* Duncan, 1939

Fig. 1 - GZG.IN.0.010.558c, longitudinal section, scale bar = 0.5 mm;

Fig. 2 - GZG.IN.0.010.558w, tangential section, scale bar = 0.5 mm;

Fig. 3 - GZG.IN.0.010.558o, tangential section, scale bar = 0.2 mm.

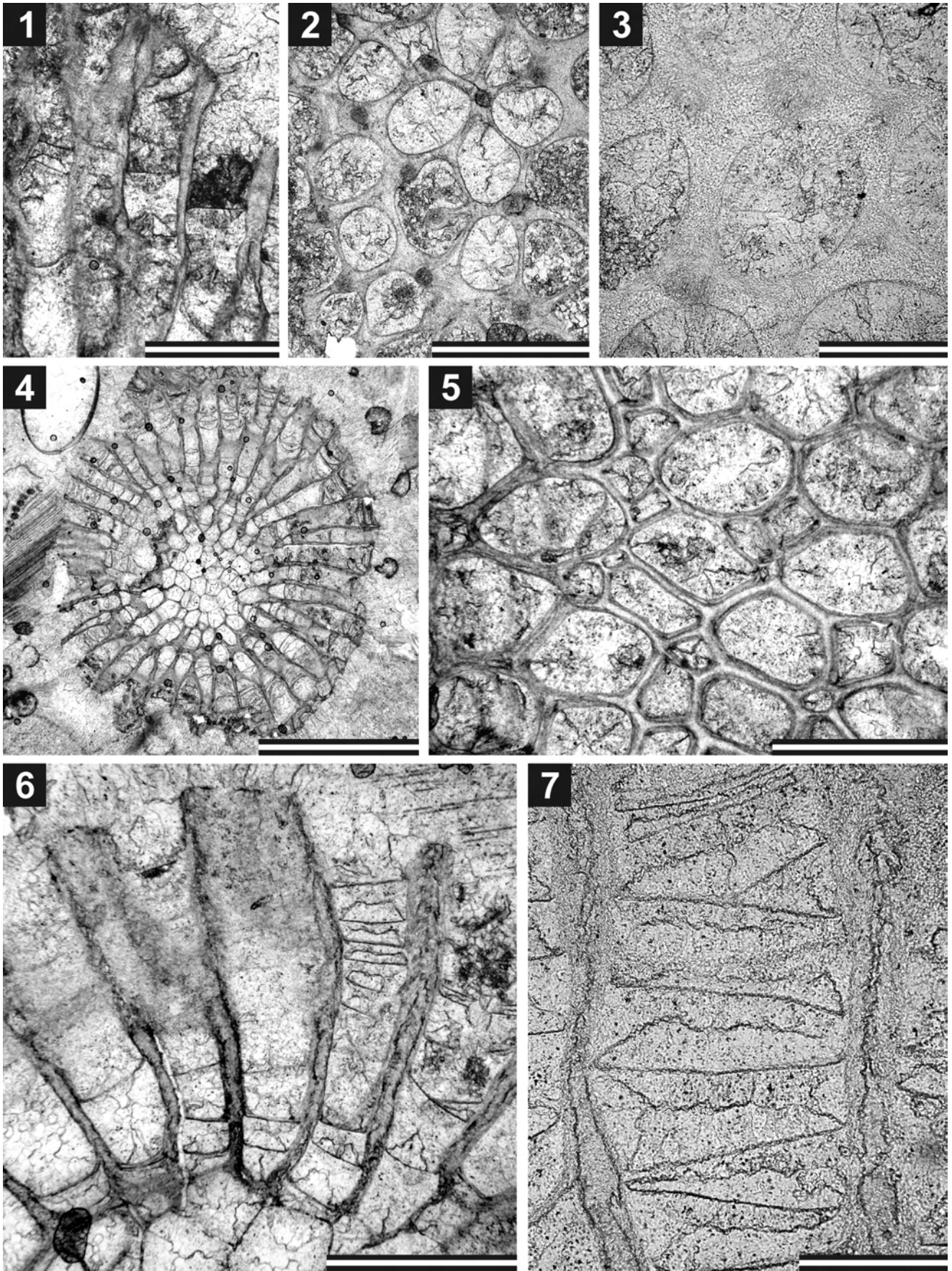
*Loxophragma fistulosum* n. sp.

Fig. 4 - Paratype GZG.IN.0.010.558b, cross section, scale bar = 2 mm;

Fig. 5 - Holotype GZG.IN.0.010.558p, tangential section, scale bar = 0.5 mm;

Fig. 6 - Paratype GZG.IN.0.010.558r, longitudinal section, scale bar = 0.5 mm; Fig. 7 - Paratype GZG.IN.0.010.558n, longitudinal section, scale bar = 0.2 mm.





distinctly separated; endozones 0.88-1.05 mm wide. Autozooeceia long in endozones, bending sharply in exozones. Autozooeceial apertures polygonal with rounded corners. Autozooeceial diaphragms abundant in exozones, straight or inclined, originating from the secondary lining of autozooeceial walls, spaced 10 to 17 on 1 mm of autozooeceial length. Exilazooeceia common, short, having polygonal apertures. Acanthostyles small, indistinct, locally common; locally absent. Autozooeceial walls granular, 0.005-0.010 mm thick in endozones; finely laminated, often with secondary lining, showing reversal V-shaped lamination without distinct zooeceial boundaries, 0.040-0.075 mm thick in exozones. Indistinct maculae consisting of slightly larger autozooeceia.

**Comparison.** *Loxophragma fistulosum* n. sp. is similar to *L. leptum* Boardman, 1960 from the Hamilton Group of New York. *L. leptum* differs from the new species in constant presence of large acanthostyles as well as in less abundant exilazooeceia. Furthermore, *Loxophragma leptum* possesses distinct maculae with significantly larger autozooeceia (megazooeceia, up to 0.50 mm in diameter vs. 0.17-0.25 mm in intermacular area), which were not observed in the new species.

#### Genus *Leptotrypella* Vinassa de Regny, 1921

Type species: *Chaetetes barrandei* Nicholson, 1874. Middle Devonian; Ontario (Canada).

**Diagnosis.** Branched colonies. Autozooeceia with polygonal to rounded-polygonal apertures. Autozooeceial diaphragms lacking in endozones; rare to common in exozones. Exilazooeceia rare. Acanthostyles long, common to abundant. Autozooeceial walls granular, thin in endozones; laminated, irregularly thickened in exozones (modified after Astrova 1978).

**Comparison.** *Leptotrypella* Vinassa de Regny, 1921 differs from *Leptotrypa* Ulrich, 1883 in having branched colony, and from *Anomalotoechus* Duncan, 1939 in having branched colonies and absence of diaphragms in endozones.

**Occurrence.** Middle Silurian to Lower Carboniferous; worldwide.

#### *Leptotrypella punctata* n. sp.

Pl. 4, figs 1-7; Appendix

**Etymology.** The specific name '*punctata*' refers to the punctate appearance because of abundant acanthostyles of the new species.

**Holotype.** GZG.IN.0.010.559p.

**Paratypes.** GZG.IN.0.010.554a, GZG.IN.0.010.558e, f-g, i, u, GZG.IN.0.010.559n (seven colonies).

**Type locality.** Zlatý Kůň, Czech Republic.

**Type stratum.** Koněprusy Limestone, Pragian (Lower Devonian).

**Diagnosis.** Thin branched colonies; bifurcation common; autozooeceial diaphragms rare to common, straight; exilazooeceia rare, small; acanthostyles abundant, small.

**Description.** Branched colonies. Branches 0.60-1.05 mm in diameter. Exozones 0.18-0.23 mm wide, endozones 0.24-0.60 mm wide. Autozooeceia long in endozones, bending at low angles in exozones. Autozooeceial apertures oval. Autozooeceial diaphragms rare to common, thin, straight. Exilazooeceia rare, short, restricted to exozones, rounded to oval in cross section. Acanthostyles small, long, abundant, 7-10 surrounding each autozooeceial aperture, growing from the base of the exozone, having distinct cores and laminated sheaths, protruding above colony surface. Autozooeceial walls granular, 0.010-0.015 mm thick in endozones; laminated with distinct zooeceial boundaries, 0.035-0.055 mm thick in exozones.

**Comparison.** *Leptotrypella punctata* n. sp. differs from other species of *Leptotrypella* in having thin colonies, rare exilazooeceia and abundant acanthostyles. It differs from the similar species *Leptotrypella uniserialis* Kopajevich, 1984 from the Middle Devonian of Mongolia in having smaller apertures (0.10-0.12 mm vs. 0.11-0.25 mm in *L. uniserialis*) and fewer mesozooeceia.

#### Family Eridotrypellidae Morozova, 1960

##### Genus *Microcampylus* Duncan, 1939

Type species: *Batostomella obliqua* Ulrich, 1890. Traverse Group (Middle Devonian); Michigan (USA).

**Diagnosis.** Branched or encrusting colonies. Autozooeceia parallel to longitudinal axis of the colony in endozone, gradually bending outward in exozone. Autozooeceial diaphragms in endozones lacking or very rare; variable in number in exozones. Exilazooeceia abundant. Acanthostyles variable in number, usually abundant. Autozooeceial walls thin in endozones, rapidly thickened in exozones. Tubules ("ca-

#### PLATE 4

All thin sections are from Koněprusy Limestone, Pragian (Lower Devonian) of Zlatý Kůň, Czech Republic.

*Leptotrypella punctata* n. sp.

Fig. 1 - Paratype GZG.IN.0.010.558e, cross section, scale bar = 0.5 mm;

Fig. 2 - Paratype GZG.IN.0.010.5581, cross section, scale bar = 0.5 mm;

Fig. 3 - Paratype GZG.IN.0.010.558e, cross section showing diaphragms and acanthostyles, scale bar = 0.2 mm;

Fig. 4 - Holotype GZG.IN.0.010.559p, longitudinal section, scale bar = 0.5 mm;

Fig. 5 - Paratype GZG.IN.0.010.558i, tangential section, scale bar = 0.2 mm;

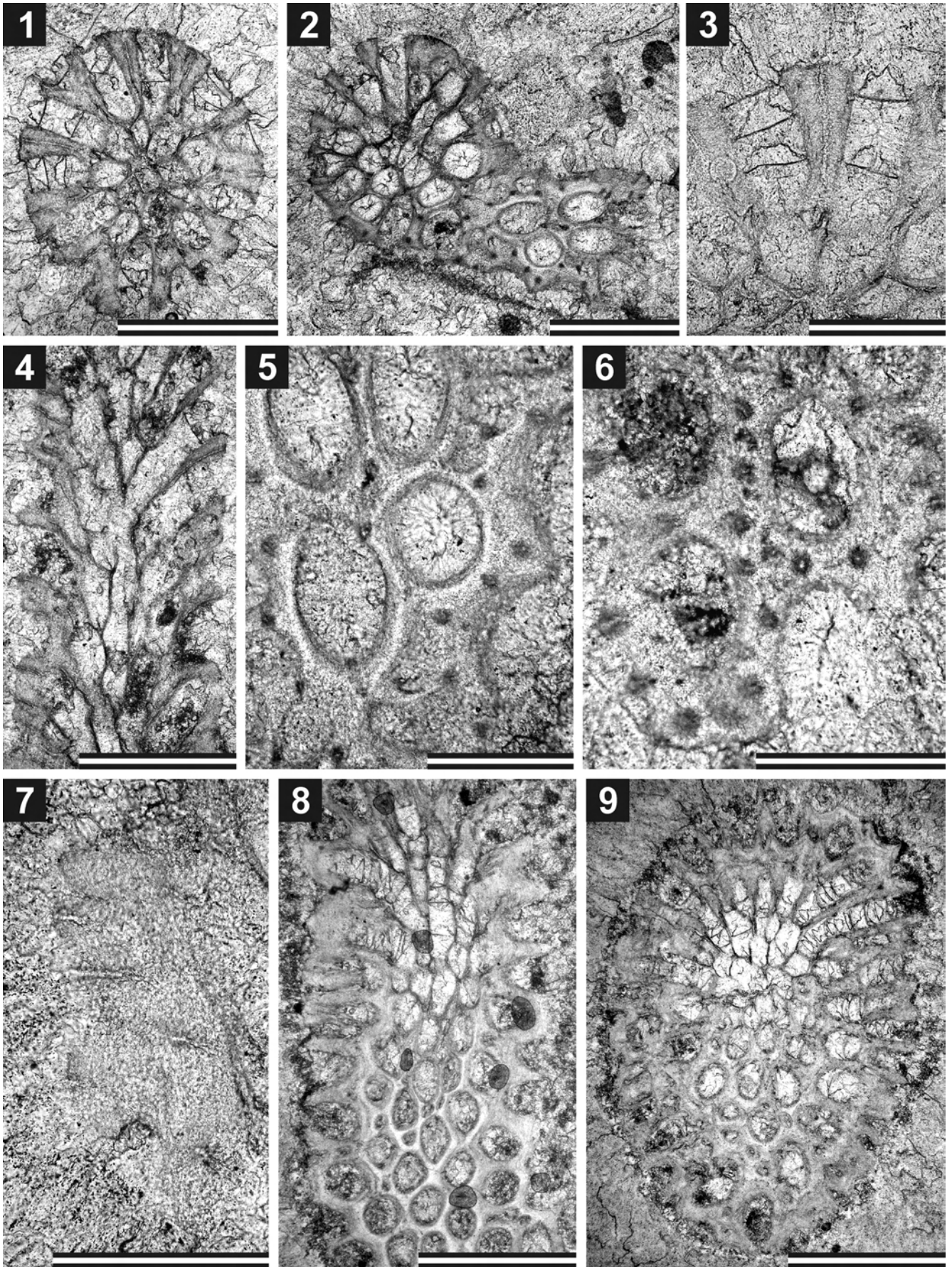
Fig. 6 - Holotype GZG.IN.0.010.559p, tangential section, scale bar = 0.2 mm;

Fig. 7 - Holotype GZG.IN.0.010.559p, longitudinal section, scale bar = 0.2 mm.

*Microcampylus obscurus* n. sp.

Fig. 8 - Paratype GZG.IN.0.010.560f, oblique section, scale bar = 1 mm;

Fig. 9 - Holotype GZG.IN.0.010.560d, oblique section, scale bar = 1 mm.



pillaries" according Astrova 1978) in autozooeical walls, representing minute deflections of the cortex (Boardman, pers comm., 2008).

**Comparison.** *Microcampylus* Duncan, 1939 differs from *Eridotrypella* Duncan, 1939 in having abundant exilazoecia and presence of microacanthostyles in autozooeical walls of exozones.

**Occurrence.** Lower Devonian (Lochkovian) of Czech Republic, Traverse Group (Middle Devonian) of Michigan, USA and Eifelian (Middle Devonian) of Germany (Ernst, in press).

***Microcampylus obscurus* n. sp.**

Pl. 4, figs 8-9, Pl. 5, figs 1-4; Appendix

**Etymology.** The specific name '*obscurus*' refers to the exilazoecia of the new species which are sealed by the skeletal material (derived from Latin '*obscurus*' = cryptic).

**Holotype.** GZG.IN.0.010.560d.

**Paratypes.** GZG.IN.0.010.560c, e-h (two colonies).

**Type locality.** Zlatý Kůň, Czech Republic.

**Type stratum.** Koněprusy Limestone, Pragian (Lower Devonian).

**Diagnosis.** Thin branched colonies; bifurcation common; autozooeical diaphragms abundant, straight or inclined; exilazoecia abundant, small, commonly sealed by skeleton; acanthostyles abundant, small.

**Description.** Branched colonies. Branches 1.08-1.95 mm in diameter. Exozone 0.56-0.68 mm wide, endozone 0.45-0.60 mm wide. Autozooeica long in endozone, bending at low angles in exozone. Autozooeical diaphragms straight or inclined, rare to common in endozones, abundant, densely spaced in exozones. Autozooeical apertures polygonal with rounded corners. Exilazoecia abundant, originating at the base of exozone, narrow, commonly sealed by skeleton at colony surface, oval to polygonal in cross section. Acanthostyles small, with narrow hyaline cores and wide laminated sheaths, indenting autozooeica. Autozooeical walls fibrous, 0.015-0.025 mm thick in endozones; thick, showing indistinct lamination without distinct zooeical boundaries, 0.060-0.084 mm thick in exozones. Maculae not observed. Tubules ("capillaries" of authors) in autozooeical walls common, 0.010-0.015 mm in diameter.

**Comparison.** *Microcampylus obscurus* n. sp. is similar to *M. minutulus* Duncan, 1939 from the Traverse Group (Middle Devonian) of Michigan, but differs from it in having less abundant mesozoecia and presence of abundant diaphragms in autozooeica. Another similar species *Microcampylus ovatus* Duncan, 1939 has fewer autozooeical diaphragms than *M. obscurus* n. sp.

Family Dyscritellidae Dunaeva & Morozova, 1967

Genus *Dyscritella* Girty, 1911

Type species: *D. robusta* Girty, 1911. Lower Carboniferous; Arkansas (USA).

**Diagnosis.** Branched and incrusting colonies with abundant acanthostyles and exilazoecia. Autozooeica parallel to longitudinal direction of the colony in endozone; gradually bending outward in exozone. Autozooeical diaphragms in autozooeica lacking or rare; lacking in exilazoecia. Exilazoecia circular to angular in cross section and separated from the autozooeica and from each other by thick walls. Two sizes of acanthostyles may be present: one set large with few per autozooeica, the other set is small with several around each autozooeicum. Autozooeical walls granular, thin in endozones; laminated, rapidly and evenly thickening in exozones (modified after Astrova, 1978).

**Comparison.** *Dyscritella* Girty, 1911 differs from *Dyscritellina* Morozova in Dunaeva & Morozova, 1967 by rare or absent diaphragms and less differentiated acanthostyles.

**Occurrence.** Devonian to Permian; worldwide.

***Dyscritella bohémica* n. sp.**

Pl. 5, figs 5-9; Appendix

**Etymology.** The specific name '*bohémica*' refers to the finding of this species in Bohemia.

**Holotype.** GZG.IN.0.010.559p.

**Paratypes.** GZG.IN.0.010.559a, c, l (two colonies).

**Type locality.** Zlatý Kůň, Czech Republic.

**Type stratum.** Koněprusy Limestone, Pragian (Lower Devonian).

**Diagnosis.** Branched colonies; bifurcation common; exilazoecia common, short; acanthostyles abundant, large.

**Description.** Branched colonies. Branches 2.26-2.56 mm in diameter. Endozone 0.90-1.06 mm wide, exozone 0.60-0.83 mm wide. Autozooeica long in endozone, bending at low angles in exozone. Autozooeical

PLATE 5

All thin sections are from Koněprusy Limestone, Pragian (Lower Devonian) of Zlatý Kůň, Czech Republic.

*Microcampylus obscurus* n. sp.

Fig. 1 - Holotype GZG.IN.0.010.560d, longitudinal section, scale bar = 0.2 mm;

Fig. 2 - Paratype GZG.IN.0.010.560f, tangential section, scale bar = 0.5 mm;

Fig. 3 - Holotype GZG.IN.0.010.560d, tangential section showing aperture and mural spines, scale bar = 0.2 mm;

Fig. 4 - Paratype GZG.IN.0.010.560h, longitudinal section showing exilazoecium, scale bar = 0.2 mm.

*Dyscritella bohémica* n. sp.

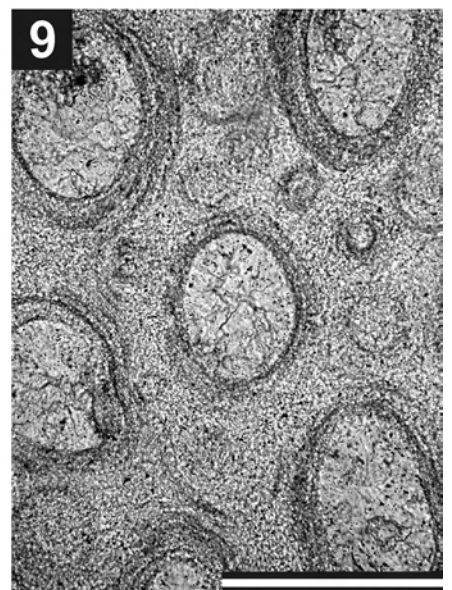
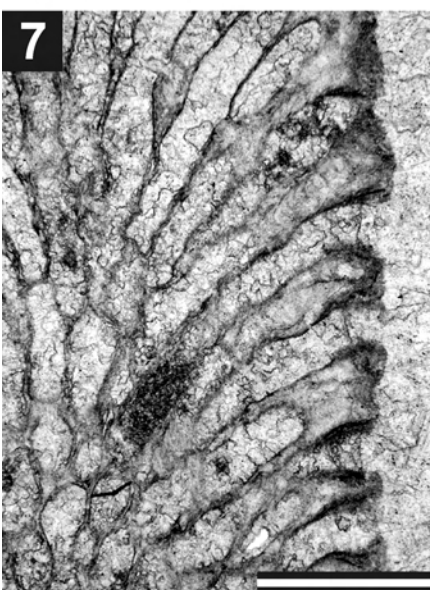
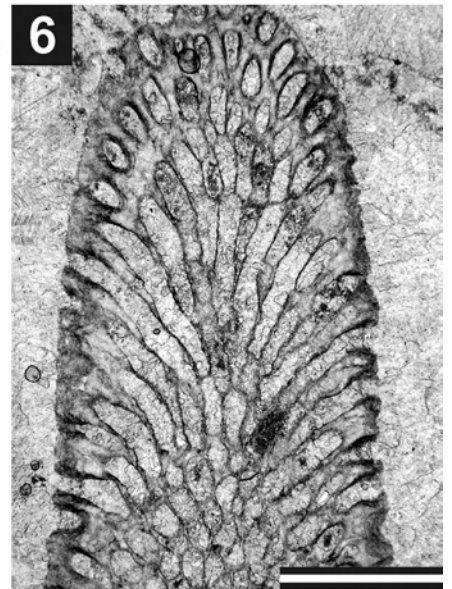
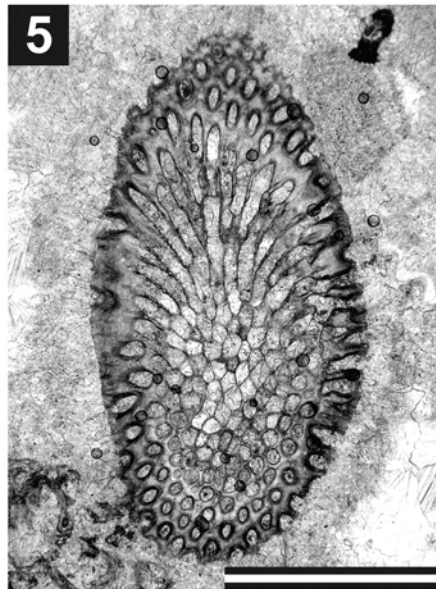
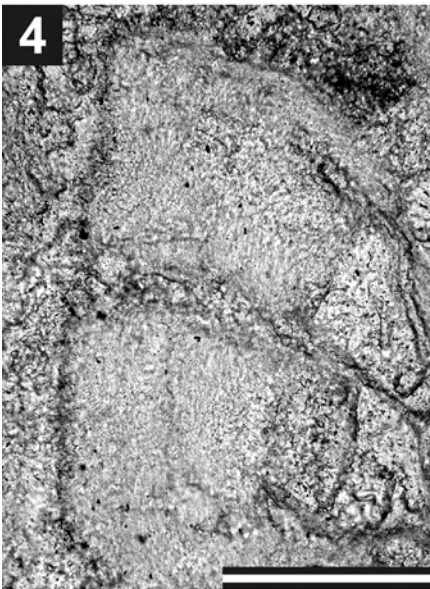
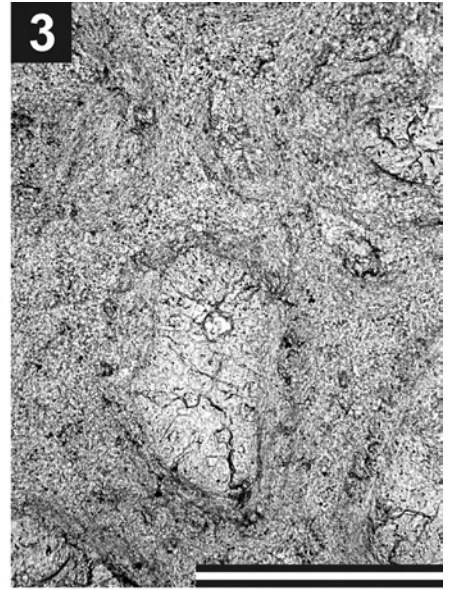
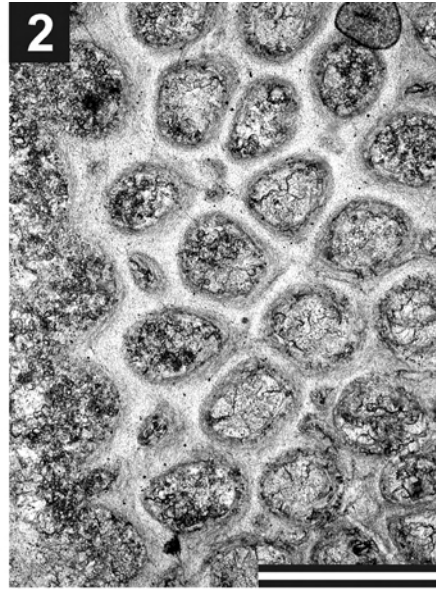
Fig. 5 - Paratype GZG.IN.0.010.559e, oblique section, scale bar = 2 mm;

Fig. 6 - Holotype GZG.IN.0.010.559p, longitudinal section, scale bar = 1 mm;

Fig. 7 - Holotype GZG.IN.0.010.559p, longitudinal section, scale bar = 0.5 mm;

Fig. 8 - Paratype GZG.IN.0.010.559a, tangential section, scale bar = 0.5 mm;

Fig. 9 - Holotype GZG.IN.0.010.559p, tangential section showing acanthostyles, scale bar = 0.2 mm.



apertures polygonal with rounded corners. Exilazooecia common, short, rounded to oval in cross section. Acanthostyles large, 3-6 surrounding each autozooeical aperture; having indistinct cores and laminated sheaths. Autozooeical walls granular, 0.005-0.015 mm thick in endozones; thick, showing indistinct lamination without distinct zooecial boundaries, locally with weak monilae-shaped thickenings, 0.075-0.120 mm thick in exozones. Maculae not observed.

**Comparison.** *Dyscritella bohémica* n. sp. is similar to *D. devonica* Dunaeva, 1968 from the Givetian (Middle Devonian) of Altai Mountains. The new species has smaller autozooeical apertures (0.06-0.11 mm vs. 0.15-0.21 mm in *D. devonica*) and larger acanthostyles (0.040-0.080 mm vs. 0.015-0.020 mm in *D. devonica*).

#### Order Cryptostomida Vine, 1884

Suborder **Rhabdomesina** Astrova & Morozova, 1956

Family Arthrostylidae Ulrich, 1882

Genus *Paracuneatopora* gen. n.

Type species: *Paracuneatopora striata* gen. n., n. sp. Czech Republic; Pragian (Lower Devonian).

**Etymology.** The genus name refers to the similarity with the genus *Cuneatopora*.

**Diagnosis.** Branched colonies, rarely dichotomous. Autozooeica short, growing from a distinct medial axis, abruptly bending, having triangular cross sections in endozones. Hemisepta absent. Autozooeical diaphragms occurring. Heterozooecia absent. Paurostyles abundant, densely spaced, arranged in regular strait rows between apertures, forming low ridges on colony surface. Extrazooecial skeleton well developed, laminated.

**Comparison.** *Paracuneatopora* gen. n. is similar to the genus *Cuneatopora* Siegfried, 1963. However, autozooeica in *Cuneatopora* are longer and strongly curved in the transition between endo- and exozone. *Cuneatopora* also possesses metazooecia and styles arranged in a rhombic pattern between autozooeica. Colonies of *Cuneatopora* are segmented, not known to branch, whereas at least one colony of *Paracuneatopora* shows branching at right angles.

**Occurrence.** Zlatý Kůň, Czech Republic; Koněprusy Limestone, Pragian (Lower Devonian); Khemissn'Ga, Mouissat Plateau, Morocco; Pragian (Lower Devonian) (Bigey 1994).

#### *Paracuneatopora striata* gen. n. n. sp.

Pl. 6, figs 1-6; Appendix

1994 *Cuneatopora* sp. Bigey, p. 18, pl. 1, fig. 15.

**Etymology.** The specific name refers to longitudinal arrangement of paurostyles (derived from Latin *striatus* - striated).

**Holotype.** GZG.IN.0.010.560b.

**Paratypes.** GZG.IN.0.010.553f, GZG.IN.0.010.558 a-c, e, f, j, l, r, s, GZG.IN.0.010.559o, GZG.IN.0.010.560a (twelve colonies).

**Type locality.** Zlatý Kůň, Czech Republic.

**Type stratum.** Koněprusy Limestone, Pragian (Lower Devonian).

**Occurrence.** As for genus.

**Diagnosis.** As for genus.

**Description.** Branched colonies. Branches strait, dichotomizing at right angles, 0.42-0.84 mm in diameter. Autozooeica short, growing at angles of about 25-28° from medial axis; semicircular in cross section at their base; having short narrow vestibule; arranged in 8-11 rows on branches. Autozooeical apertures narrow, arranged in weakly alternating rows. Occasionally 1-2 basal diaphragms occurring in autozooeica. Paurostyles abundant, densely spaced, arranged in regular strait rows between apertures. Extrazooecial laminated skeleton well-developed.

**Comparison.** As for genus.

Family Rhabdomesidae Vine, 1884

Genus *Orthopora* Hall, 1886

Type species: *Trematopora regularis* Hall, 1884. Lower Devonian; USA.

**Description.** Branched colonies. Autozooeica short, budding from more or less distinct medial axis in spiral order. Autozooeical diaphragms rare to absent. Both superior and inferior hemisepta commonly present. Autozooeical apertures oval, arranged regularly in alternating rows on the colony surface. Walls granu-

#### PLATE 6

All thin sections are from Koněprusy Limestone, Pragian (Lower Devonian) of Zlatý Kůň, Czech Republic.

*Paracuneatopora striata* gen. n., n. sp.

Fig. 1 - Holotype GZG.IN.0.010.560b, tangential section, scale bar = 0.2 mm;

Fig. 2 - Holotype GZG.IN.0.010.560b, tangential section, scale bar = 1 mm;

Fig. 3 - Paratype GZG.IN.0.010.559n, cross section, scale bar = 0.5 mm;

Fig. 4 - Paratype GZG.IN.0.010.559o, longitudinal section, scale bar = 0.5 mm;

Fig. 5 - Paratype GZG.IN.0.010.553f, longitudinal section, scale bar = 0.5 mm;

Fig. 6 - Paratype GZG.IN.0.010.553f, longitudinal section showing paurostyles, scale bar = 0.1 mm.

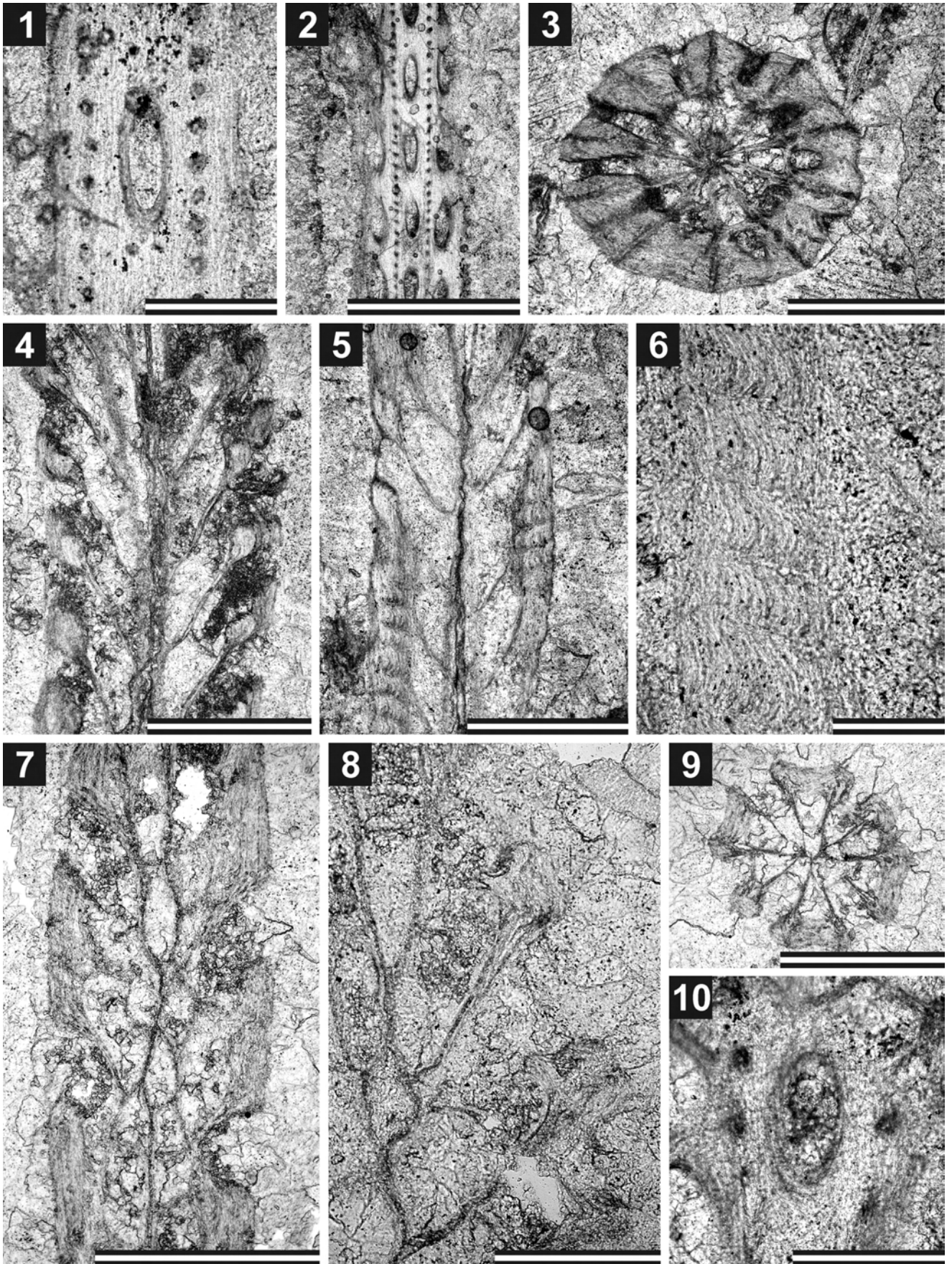
*Orthopora tenuis* n. sp.

Fig. 7 - Paratype GZG.IN.0.010.559t, longitudinal section, scale bar = 0.5 mm;

Fig. 8 - Paratype GZG.IN.0.010.558r, longitudinal section, scale bar = 0.2 mm;

Fig. 9 - Paratype GZG.IN.0.010.558n, cross section, scale bar = 0.5 mm;

Fig. 10 - Holotype GZG.IN.0.010.553b, tangential section, scale bar = 0.2 mm.



lar in the endozone; laminated in exozone. Paurostyles abundant, prominent. Acanthostyles present, less abundant than paurostyles.

**Comparison.** *Orthopora* Hall, 1886 differs from *Trematella* Hall, 1886 in absence of metazoecia and in presence of well developed hemisepta.

**Occurrence.** Silurian to Carboniferous of North America, Europe and China.

***Orthopora tenuis* n. sp.**

Pl. 6, figs 7-10; Appendix

**Etymology.** The specific name '*tenuis*' refers to the thin colonies of the new species (derived from Latin '*tenuis*' = thin).

**Holotype.** GZG.IN.0.010.553b.

**Paratypes.** GZG.IN.0.010.558r, GZG.IN.0.010.559t (two colonies).

**Type locality.** Zlatý Kůň, Czech Republic.

**Type stratum.** Koněprusy Limestone, Pragian (Lower Devonian).

**Diagnosis.** Branched colonies; bifurcation common; superior and inferior hemisepta well developed; paurostyles abundant; acanthostyles absent.

**Description.** Branched colonies, 0.48-0.53 mm in diameter. Branch bifurcation common. Cross-sections of branches circular. Autozoecia short, budding from indistinct medial axis in spiral order. Autozoecial diaphragms absent. Long superior hemisepta present, curved proximally; inferior hemisepta long, positioned beneath superior hemisepta, curved distally. Autozoecial apertures oval, arranged regularly in alternating rows on the colony surface. Walls in the endozone granular, 0.010-0.015 mm thick; laminated in exozone. Paurostyles abundant, prominent, 0.020-0.025 mm in diameter, arranged in longitudinal rows between apertures. Acanthostyles absent.

**Comparison.** More than 30 species of *Orthopora* are known from the Silurian to the Carboniferous of North America, Europe and China. However, the most of them were described without thin sections and with few measurements. *Orthopora tenuis* n. sp. is similar to *Orthopora regularis* (Hall & Simpson, 1874) from the Lower Devonian (Lochkovian to Eifelian) of USA (New York and Ohio). The only measurable difference between the two species is the branch diameter, which is smaller in present material (0.48-0.53 mm vs. ca. 0.90 mm in *O. regularis*, measured from Blake, 1983: 574-575, fig. 285c). *Orthopora limata* Astrova, 1964 from the Lower Devonian (Lochkovian) of Ukraine has thicker branches (0.70-1.00 mm vs. 0.48-0.53 mm in present *O. tenuis*), and smaller apertures (0.05-0.07 mm vs. 0.06-0.08 mm in present species).

**Palaeobiogeographic relationships of the fauna from Zlatý Kůň**

The bryozoan fauna from the Lower Devonian of Bohemia belongs to the Bohemian/Hercynian facies of the Rhenish-Bohemian Province of the Old World Realm (Bigey 1985). Several Bohemian fenestrate species were found elsewhere in the Lower Devonian of Europe outside of the Prague Basin: France (Bigey 1972, 1973) and Spain (Suárez Andrés 1998, 1999).

Most genera occurring in Lower Devonian of Bohemia are widely distributed in the Devonian. Some few genera show a restricted distribution in the European area. The genus *Cyclopecta* Bornemann, 1884 is known exclusively from the Lower and Middle Devonian of Europe. Three species were reported from the Lower Devonian of Czech Republic, and two species are known from the Middle Devonian of Germany. The type species *Cyclopecta winteri* Bornemann, 1884 and *C. sp.* were also recorded from the Lower-Middle Devonian of Spain (Suárez Andrés 1998). The genus *Utropora* Počta, 1894 is also known from the Middle Devonian of Transcaucasia (Morozova & Lavrentjeva 1998) and in the Carboniferous of China (Xia & Liu 1986).

Several genera were originally described from the Middle Devonian Traverse Group of Michigan, USA: *Chondraulus* Duncan, 1939, *Microcampylus* Duncan, 1939, *Anomalotoechus* Duncan, 1939, *Atactotoechus* Duncan, 1939, *Loxophragma* Boardman, 1960. *Chondraulus* and *Microcampylus* are known exclusively from the Traverse Group, whereas other genera are also known from Europe, Siberia and China through the Devonian. The new genus *Paracuneatopora* gen. n. occurs also in the Lower Devonian (Pragian) of Morocco (Bigey 1994).

A closer comparison of the Lower Devonian bryozoan fauna of Bohemia with contemporary faunas of neighbouring areas appears difficult because of the shortage of taxonomic studies in the Devonian of Europe and North Africa. Lower Devonian rocks of Morocco and Spain contain abundant bryozoans which remain unstudied. More investigations of this topic are necessary.

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## Appendix

## Descriptive statistics

Abbreviations: N = number of measurements, X = mean, SD = standard deviation, CV = coefficient of variation, MIN = minimal value, MAX = maximal value.

*Leioclema elegans* n. sp.

	N	X	SD	CV	MIN	MAX
Branch Width, mm	16	2.23	0.391	17.59	1.64	3.20
Exozone Width, mm	12	0.71	0.225	31.62	0.30	1.08
Autozooeical Aperture Width, mm	30	0.14	0.018	12.68	0.11	0.18
Aperture Spacing, mm	30	0.26	0.025	9.86	0.22	0.30
Mesozooecia Width, mm	30	0.09	0.019	19.96	0.06	0.14
Mesozooecia per Aperture	20	6.9	1.252	18.15	5.0	9.0
Acanthostyle Diameter, mm	30	0.04	0.006	15.21	0.03	0.05
Acanthostyles per Aperture	30	4.3	0.828	19.40	3.0	6.0

*Monotrypa bohémica* Prantl, 1933.

	N	X	SD	CV	MIN	MAX
Autozooeical Aperture Width, mm	30	0.40	0.103	25.81	0.28	0.60
Aperture Spacing, mm	30	0.45	0.117	26.20	0.30	0.63

*Atactotoechus divulgatus* n. sp.

	N	X	SD	CV	MIN	MAX
Branch Width, mm	10	4.53	1.026	22.66	3.20	6.40
Exozone Width, mm	10	0.55	0.094	16.98	0.44	0.70
Autozooeical Aperture Width, mm	20	0.14	0.019	14.13	0.11	0.19
Aperture Spacing, mm	20	0.23	0.028	12.23	0.20	0.30
Autozooeical Aperture Width, mm (macular area), mm	20	0.24	0.038	16.05	0.20	0.32
Aperture Spacing, mm (macular area), mm	20	0.36	0.042	11.75	0.29	0.46
Exilazooecia Width, mm	20	0.06	0.024	40.22	0.03	0.12
Acanthostyle Diameter, mm	20	0.030	0.005	15.29	0.025	0.035
Acanthostyles per Aperture	16	2.9	0.719	25.00	2.0	4.0

*Anomalotoechus* cf. *typicus* Duncan, 1939.

	N	X	SD	CV	MIN	MAX
Autozooeical Aperture Width, mm	30	0.19	0.020	10.55	0.14	0.23
Aperture Spacing, mm	30	0.26	0.030	11.40	0.20	0.36
Exilazooecia Width, mm	10	0.07	0.017	23.42	0.04	0.09
Acanthostyle Diameter, mm	20	0.059	0.008	12.92	0.045	0.070
Acanthostyles per Aperture	20	2.85	0.933	32.75	2.00	5.00
Exozonal Wall Thickness, mm	10	0.03	0.010	31.16	0.02	0.05

*Loxophragma fistulosum* n. sp.

	N	X	SD	CV	MIN	MAX
Branch Width, mm	4	3.49	0.666	19.09	2.80	4.30
Endozone Width, mm	4	1.40	0.527	37.67	1.05	2.18
Autozooeical Aperture Width, mm	25	0.23	0.028	11.93	0.18	0.29
Aperture Spacing, mm	25	0.30	0.043	14.41	0.23	0.42
Exilazooecia Width, mm	10	0.09	0.027	29.35	0.05	0.12
Exozonal Wall Thickness, mm	10	0.06	0.012	21.06	0.040	0.075
Autozooeical Diaphragms per 1 mm	10	13.7	3.129	22.84	10.0	17.0

*Leptotrypella punctata* n. sp.

	N	X	SD	CV	MIN	MAX
Branch Width, mm	9	0.85	0.164	19.39	0.60	1.05
Endozone Width, mm	9	0.35	0.108	31.17	0.24	0.60
Autozooeical Aperture Width, mm	15	0.11	0.009	8.44	0.10	0.12
Aperture Spacing, mm	15	0.19	0.029	14.97	0.14	0.24
Exilazooecia Width, mm	10	0.05	0.008	15.17	0.04	0.06
Acanthostyle Diameter, mm	15	0.025	0.004	16.19	0.020	0.030
Acanthostyles per Aperture	7	8.4	1.272	15.10	7.0	10.0

*Microcampylus obscurus* n. sp.

	N	X	SD	CV	MIN	MAX
Branch Width, mm	4	1.52	0.310	20.38	1.08	1.8
Autozooeical Aperture Width, mm	25	0.14	0.018	13.59	0.11	0.18
Aperture Spacing, mm	25	0.25	0.023	9.35	0.22	0.32
Exilazooecia Width, mm	25	0.06	0.013	22.67	0.04	0.08
Autozooeical Diaphragms per 1 mm	4	19.5	1.548	7.95	17.7	21.4

*Dyscritella bohémica* n. sp.

	N	X	SD	CV	MIN	MAX
Autozooeical Aperture Width, mm	25	0.08	0.010	13.34	0.06	0.11
Aperture Spacing, mm	25	0.21	0.027	12.75	0.14	0.25
Exilazooecia Width, mm	20	0.06	0.010	17.10	0.05	0.08
Acanthostyle Diameter, mm	20	0.06	0.011	20.65	0.04	0.08
Acanthostyles per Aperture	20	4.5	1.000	22.22	3.0	6.0

*Paracuneatopora striata* gen. n. n. sp.

	N	X	SD	CV	MIN	MAX
Branch Width, mm	13	0.57	0.137	23.99	0.42	0.84
Autozooeical Aperture Width, mm	20	0.06	0.005	8.06	0.05	0.07
Aperture Spacing Along Branch, mm	20	0.36	0.011	3.17	0.34	0.38
Aperture Spacing Across Branch, mm	15	0.18	0.022	12.19	0.14	0.22
Paurostyle Diameter, mm	20	0.024	0.002	10.00	0.020	0.025
Paurostyle Spacing, mm	20	0.06	0.007	12.37	0.04	0.07

*Orthopora tenuis* n. sp.

	N	X	SD	CV	MIN	MAX
Autozooeical Aperture Width, mm	10	0.076	0.007	9.20	0.060	0.080
Aperture Spacing Along Branch, mm	4	0.26	0.010	3.92	0.24	0.26
Aperture Spacing Across Branch, mm	5	0.22	0.015	6.68	0.20	0.24
Paurostyle Diameter, mm	10	0.023	0.003	11.23	0.020	0.025