Emsian–Eifelian lingulate brachiopods from the Daleje-Třebotov Formation (Třebotov and Suchomasty limestones) and the Choteč Formation (Choteč and Acanthopyge limestones) from the Prague Basin; the Czech Republic

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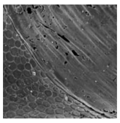

Taxonomic composition and stratigraphic distribution of lingulate brachiopod taxa around the Emsian/Eifelian boundary of the Prague Basin were examined. Twelve species have been determined and the presence of others is suggested. The prevalence of micromorphic biernatids, *Havlicekion* and *Opsiconidion*, in all the studied samples is significant. A mode of life for biernatids, especially from the genus *Opsiconidion*, is discussed. A new Devonian occurrence of the siphonotretid *Orbaspina* is recorded. Lingulate brachiopods do not display any significant change around the Emsian/Eifelian boundary or at the Basal Choteč Event (Middle Devonian, Eifelian, *costatus* Zone) and thus confirm the general uniformity of lingulate faunas in the Lower and early Middle Devonian. • Key words: Brachiopoda, Linguliformea, Biernatidae, *Opsiconidion*, *Orbaspina*, Emsian, Eifelian, Basal Choteč Event, Prague Basin.

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Although highly fragmentary in preservation, a moderately diverse fauna of organophosphatic brachiopods has recently been found together with conodonts around the Emsian/Eifelian boundary in the Prague Basin. Only a few linguliformean taxa had been reported from this interval by previous authors (Barrande 1879, Mergl 2001a). With a few exceptions, modern descriptions (Mergl 2001a) are based on specimens collected from the Prastav quarry in Praha – Holyně, the reference section for the Lower/Middle Devonian boundary. The aim of this paper is to produce a detailed description of the Emsian–Eifelian lingulate brachiopods and improve the correlation of the conodont and linguliformean brachiopod distributions based on the new data gathered from several sections in the Prague Basin.

Investigation of the autecology of biernatids is difficult and only little has become known since the first discussion by Cocks (1979). Another goal of this paper is therefore to shed more light on biernatids ecology based on new distributional observations.

Geological setting

The lingulate brachiopod faunas presented herein were sampled from the Třebotov and Suchomasty limestones (Daleje-Třebotov Formation, Lower/Middle Devonian, upper Emsian–Eifelian) and Choteč and Acanthopyge limestones (Choteč Formation, Middle Devonian, Eifelian). The following sections were sampled (Fig. 1): Praha – Barrandov (road cut), Praha – Holyně (Prastav quarry), Choteč (Na Škrábku quarry), Chýnice (Jelínek mill quarry), Karlštejn (U Němců section), Suchomasty (Červený quarry). For the stratigraphy of the sections studied see Berkyová (2009) and references therein.

The Třebotov Limestone unit was defined by Svoboda & Prantl (1947) and redefined by Chlupáč (1957). It is represented by light, medium to thin-bedded, bioturbated, skeletal wackestones and packstones with abundant dacryoconarid tentaculites (mostly styliolinids), ostracods, nautiloids, ammonoids, trilobites, brachiopods,

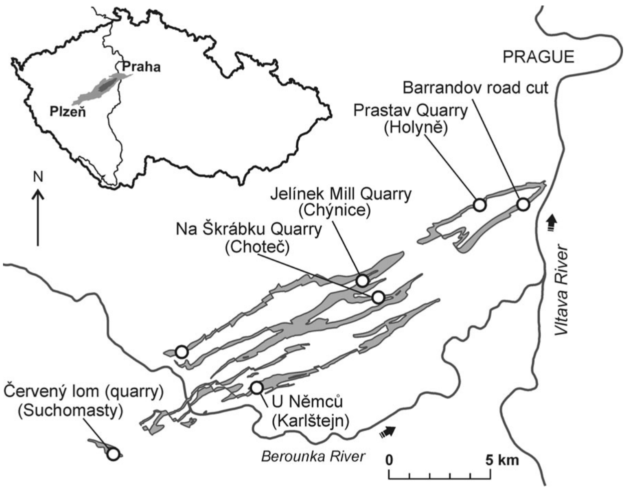


Figure 1. Schematic map showing the location of the Prague Basin in the Czech Republic and the distribution of the Daleje-Třebotov and Choteč formations with positions of the sampled sections. Drawing of Daleje-Třebotov and Choteč formations distribution is based on geological maps 1:25,000 published by Czech Geological Survey. Slightly modified after Berkyová (2009).

echinoderms, and subordinate bivalves. The fragmentary preservation of diverse benthic invertebrates, well preserved plankton, the intense bioturbation, and the lack of sedimentary features indicating current activity suggests relatively deep, well oxygenated, soft bottom sea floor with high biological activity below the storm wave base (see also Chlupáč 1977, 1983). A different environment was established in the shallow water Koněprusy area, where the Suchomasty Limestone, the stratigraphic equivalent of the Třebotov Limestone, was deposited. The depositional environment of the Suchomasty Limestone was interpreted by Havlíček & Kukal (1990, p. 111) as "shallow water, temporarily agitated, temporarily quiet", distant from a high-energy platform margin, with an abundant benthic fauna, especially rich in trilobites, brachiopods and crinoids. A profound basin-wide lithologic change from light, bioturbated skeletal wackstones to dark peloidal grainstones indicates the boundary between the Třebotov and Choteč limestones. The Choteč Limestone unit, defined by Svoboda & Prantl (1947) and redefined by Chlupáč (1957), reflects in its development and fossil content environmental stress linked to the important

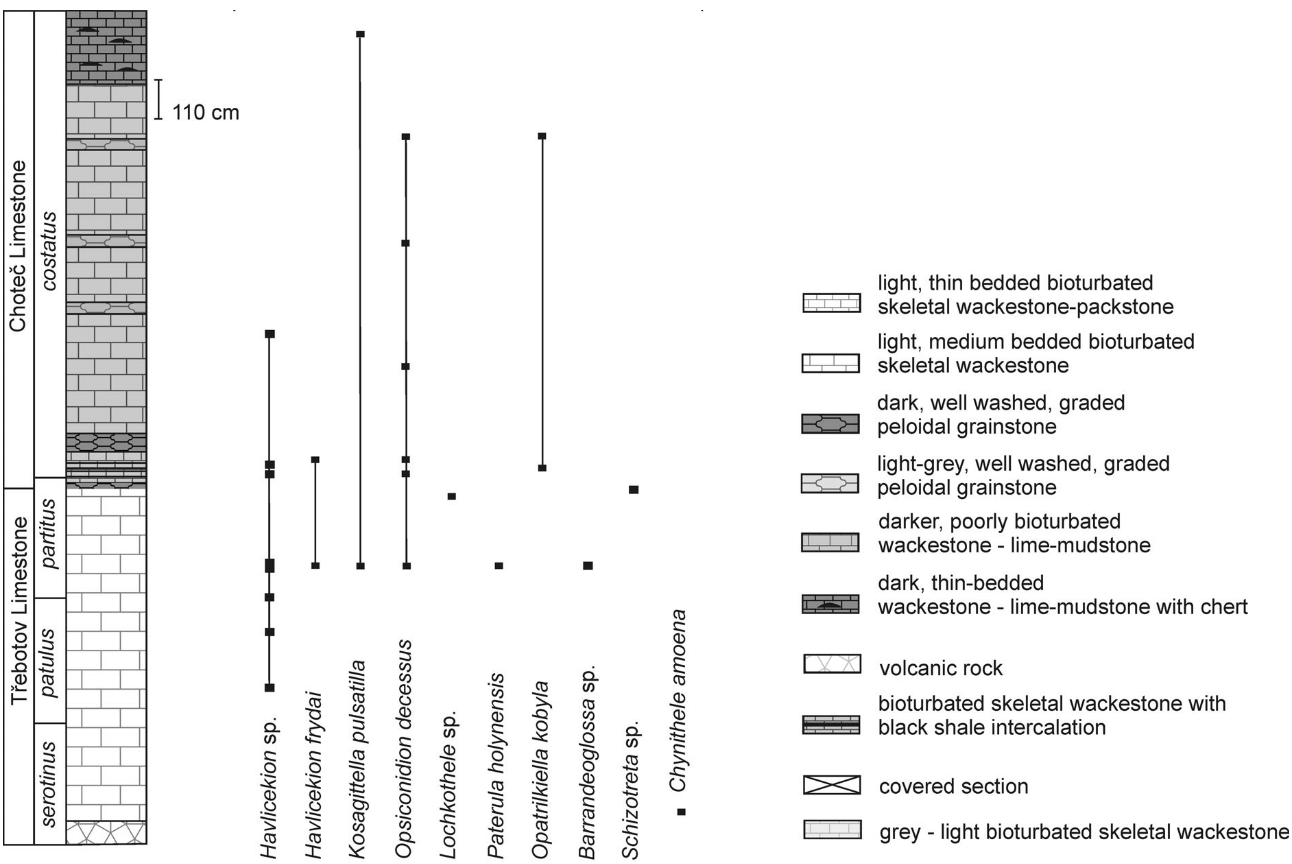


Figure 2. Simplified lithological column of the Na Škrábku quarry (Choteč) with brachiopod taxa ranges. The base of the *costatus* Zone is drawn according to the occurrence of *P.* sp. aff. *P. trigonicus* and *Nowakia* (*Dmitriella*) *sulcata sulcata*. For stratigraphic ranges of conodonts see Berkyová (2009).

eustatic transgressive event, known as the Basal Choteč Event (*e.g*., Chlupáč & Kukal 1986, 1988; Elrick *et al*. 2009; Koptíková 2010; Vodrážková *et al.* accepted for publication). The Choteč Formation consists of calciturbidites (dark, graded peloidal grainstones with crinoids and crinoidal grainstones with peloids alternating with dark burrowed/laminated lime-mudstones and burrowed/bioturbated light grey skeletal wackestones). Various types of peloids, micritized grains, accumulations of calcispheres and prasinophytes at specific levels represent characteristic features of this unit and are regarded as a result of environmental changes, *e.g*. higher nutrient load, linked to the Basal Choteč Event (Berkyová & Munnecke 2010). Apart from this, the Choteč limestone is characterised by an impoverished fossil content (see also Chlupáč *et al*. 1979; Chlupáč & Kukal 1986, 1988). Dacryoconarid tentaculites (styliolinids), nautiloid remains, trilobite exoskeletons and small unidentifiable skeletal debris represent the most common constituents. For the stratigraphic distribution of brachiopod taxa studied along with conodont zonation see Figs 2–6.

Methods

The extraction of phosphatic brachiopod shells from limestones followed a standard technique. This comprised dissolution of limestone in diluted acetic acid (6%), sieving and drying the residues, and handpicking the specimens under a binocular microscope. Separation in heavy liquid (sodium polytungstate) was carried out. SEM documentation was carried out at the Institute of Geology and Palaeontology, Charles University in Prague using a JEOL JSM-6380.

Repository

All specimens are housed in the palaeontological collections of the Czech Geological Survey, Prague (SB6–SB43).

Systematic section

Order Lingulida Waagen, 1885
Superfamily Linguloidea Menke, 1828
Family Obolidae King, 1846

Subfamily Glossellinae Cooper, 1956

Genus *Barrandeoglossa* Mergl, 2001a

Type species. – *Lingula fissurata* Barrande, 1879; Motol Formation, Wenlock, Silurian; Prague Basin, the Czech Republic.

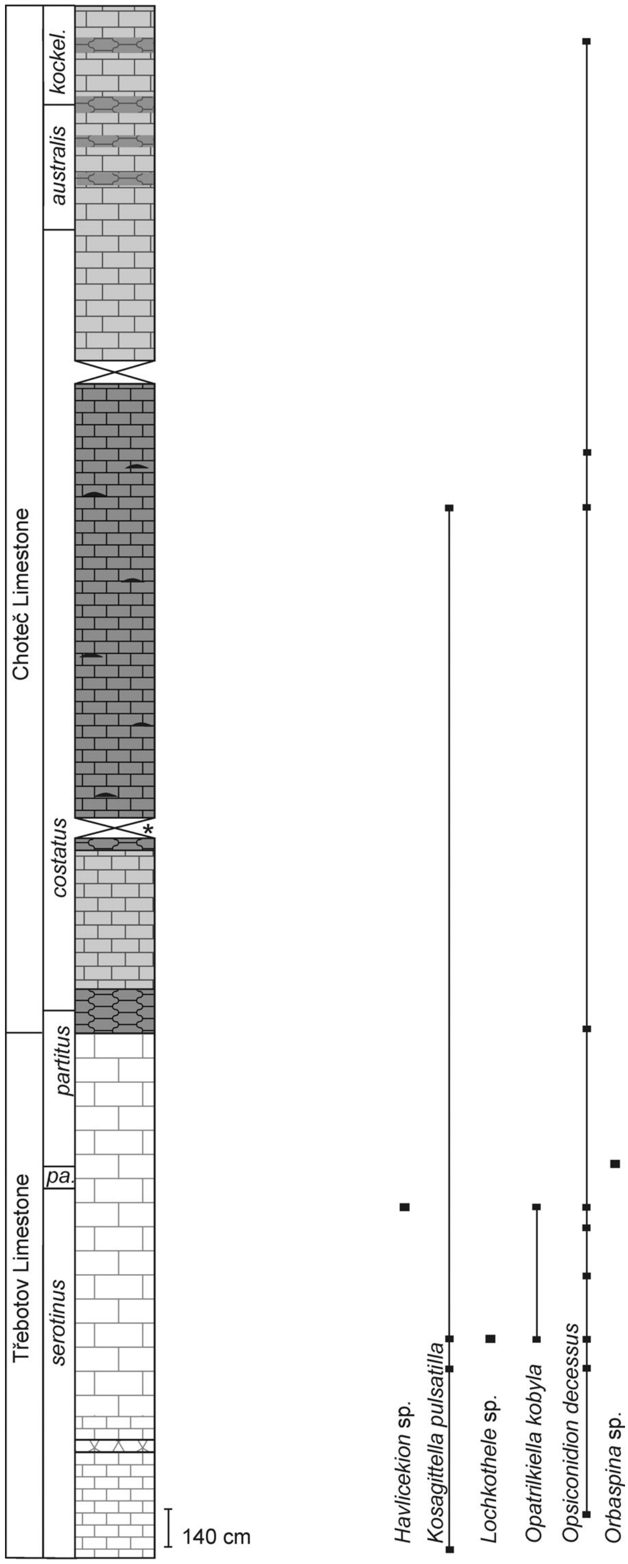


Figure 3. Simplified lithological column of the Jelínek mill quarry (Chýnice) with brachiopod taxa ranges. See legend in Fig. 2. For stratigraphic ranges of conodonts see Berkyová (2009). * not in scale, estimation of the covered interval is *ca* 6 m.

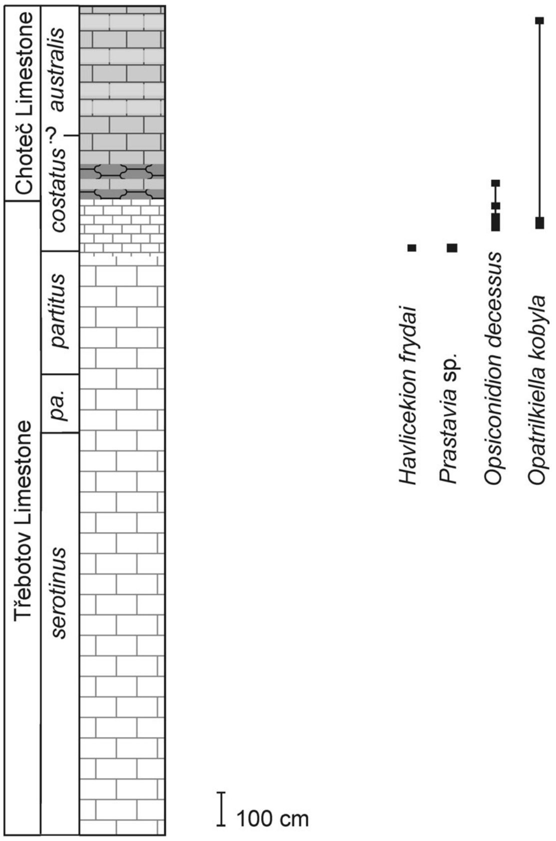


Figure 4. Simplified lithological column of the Barrandov road cut section (Praha – Barrandov) with brachiopod taxa ranges. The bases of the *patulus* and *partitus* zones were drawn according to data published by Zusková (1991). For stratigraphic ranges of conodonts see Berkyová (2009).

***Barrandeoglossa* sp.**
Figure 7A

Material. – Two incomplete valves, one fragment.

Description. – One incomplete dorsal valve probably represents a juvenile shell. It is 1.8 mm wide and weakly convex in transverse profile. The valve bears a subcircular, smooth larval shell, 800 μm long and 900 μm wide. The larval shell is bordered posterolaterally by a very short swollen brim extending from the posterior margin. Posterior and lateral margins are evenly rounded. The surface of the post-larval shell bears weak concentric fila that are axially subdued.

Remarks. – The shell is similar to that of *Barrandeoglossa perneri* Mergl, 2001a from the Lochkov Formation (*Monograptus uniformis* Zone) in outline and in the swollen posterior margin. It is the youngest report of the genus so far recorded.

Occurrence. – Choteč (Na Škrábku quarry), Třebotov Limestone, *partitus* Zone.

Subfamily Obolinae King, 1846

Genus *Kosagittella* Mergl, 2001a

Type species. – *Kosagittella clara* Mergl, 2001a; Kopanina Formation, Ludlow, Silurian; Prague Basin, the Czech Republic.

***Kosagittella pulsatilla* Mergl, 2008**
Figure 7B–D

2001a *Kosagitella* (?) *lingua* (Barrande, 1879) – Mergl, pp. 12, 13, pl. 3, figs 16–18.
2008 *Kosagitella pulsatilla* sp. nov. – Mergl, pp. 284–286, fig. 3A–Q.

Material. – Ten valves, mostly incomplete.

Description. – The shell is biconvex, elongate oval, fairly thick walled relative to the shell size, 1.6 mm long being the largest complete valve. The dorsal valve is elongate oval, 130% as long as wide in the single preserved complete shell, having a slightly pointed apex. The subcircular larval shell is about 400 μm wide, with distinct sides, raised boundary and smooth surface. The sides and anterior margins are evenly rounded, with the anterior third of the shell regularly semicircular in outline. The maximum width is located anterior to the midlength of the shell. The valve is gently and evenly convex transversally and axially. The dorsal interior is unknown.

The ventral valve has an outline similar to the dorsal valve but having a more pointed apex. The subcircular larval shell is gently convex. The ventral pseudointerarea is orthocline, short, gently inclined posteroventrally, without distinct flexure lines. The pseudointerarea is divided by a short, broad and shallow pedicle groove, which continues on the posterior slope of the visceral area as a gently expanding groove. The anterior edge of the propareas forms a high undivided steep slope.

Ornamentation consists of weak growth fila, distinct posterolaterally, which weaken anteriorly and axially. Microornamentation of the early mature shell consists of deep, hemisphaerical 3 μm sized evenly spaced pits.

Remarks. – Although rare and poorly preserved, the specimens can be unambiguously referred to *Kosagittella pulsatilla* Mergl, 2008, originally described from the Acanthopyge Limestone (Eifelian) of the Koněprusy area of the Prague Basin. The identity is also demonstrated by a characteristic pitted microornamentation of the post-larval shell (Fig. 7D) observed in all new specimens.

Occurrence. – Chýnice (Jelínek mill quarry), Třebotov and Choteč limestones, *serotinus*-*costatus* zones; Choteč

(Na Škrábku quarry), Třebotov and Choteč limestones, *partitus*-?*australis* zones (the presence of the *australis* Zone is based on the occurrence of conodont taxa *Polygnathus trigonicus* Bischoff & Ziegler, 1957 and *P. pseudofoliatus* Wittekindt, 1966); Suchomasty (Červený quarry), Acanthopyge Limestone, *costatus* Zone (zonal identification based on the occurrence of *Polygnathus* sp. aff. *Polygnathus trigonicus* Bischoff & Ziegler, 1957 reported by Klapper *et al.* 1978).

Family Paterulidae Cooper, 1956

Genus *Paterula* Barrande, 1879

Type species. – *Paterula bohemica* Barrande, 1879; Vinice Formation, Sandbian, Ordovician; Prague Basin, the Czech Republic.

***Paterula holynensis* Mergl, 2001a**
Figure 7G, K

2001a *Paterula holynensis* sp. n. – Mergl, pp. 18, 19, pl. 11, figs 9–13, pl. 12, figs 1–15.

Material. – One fragment.

Remarks. – The fragment shows distinctive microornamentation comprising rhomboidal pits on the post-larval shell (Fig. 7G) and can be referred to *P. holynensis* Mergl, 2001a. It is the first report of the genus from the Třebotov Limestone.

Occurrence. – Choteč (Na Škrábku quarry), Třebotov Limestone, *partitus* Zone.

Superfamily Discinoidea Gray, 1840
Family Discinidae Gray, 1840

Genus *Acrosaccus* Willard, 1928

Type species. – *Acrosaccus shuleri* Willard, 1928; Rich Valley Formation, Caradocian, Ordovician; Virginia, the USA.

***Acrosaccus* sp.**
Figure 7H, I

Material. – Four fragments, two from a ventral valve.

Description. – Small fragments of the thick-walled, low conical ventral valve showing a deep, spindle-shaped pedicle track with steeply sloping outer listrial plates.

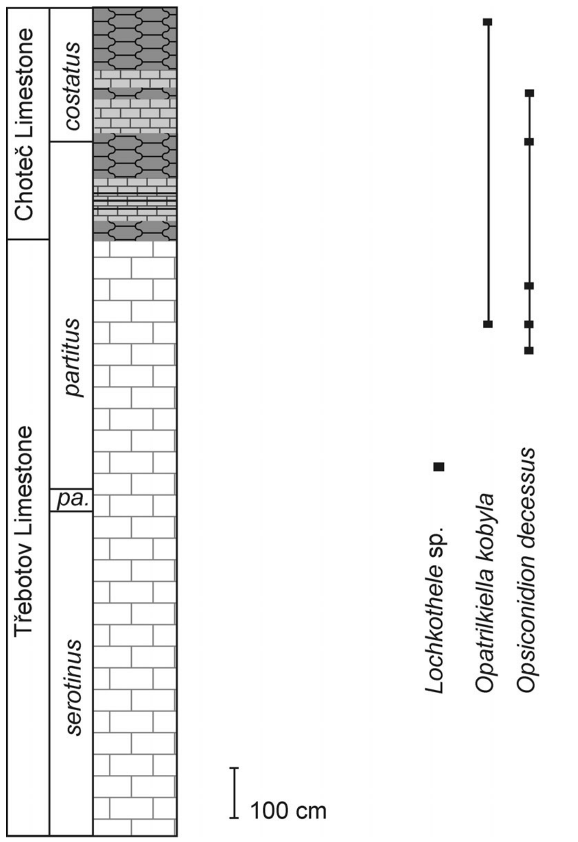


Figure 5. Simplified lithological column of the Prastav quarry (Praha – Holyně) with brachiopod taxa ranges. The bases of the *serotinus* and *patulus* zones are drawn according to data published by Klapper (1977). For stratigraphic ranges of conodonts see Berkyová (2009).

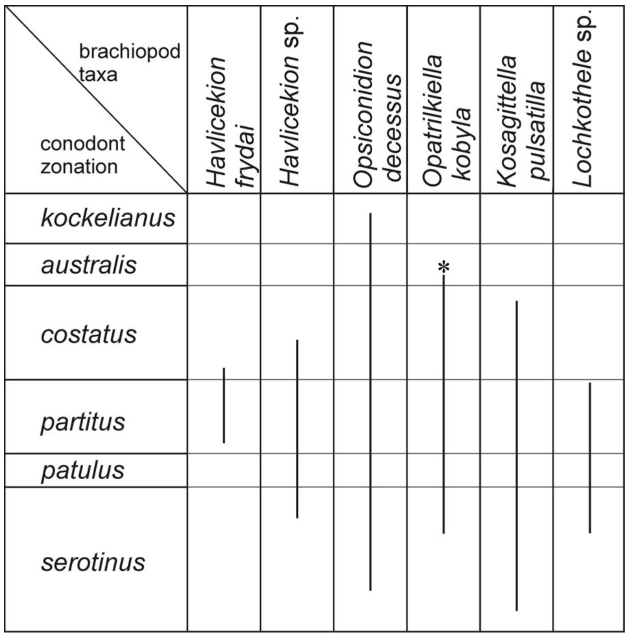


Figure 6. Stratigraphical ranges of the selected brachiopod taxa in the Prague Basin. * *australis* Zone is based of the occurrence of *Polygnathus pseudofoliatus* Wittekindt, 1966.

Ornamentation consists of progressively coarser, tall concentric and somewhat irregular rugellae separated by broader interspaces. The rugellae cover the posterior and lateral slopes of the valve. The ornamentation of the anterior slope is unknown.

Remarks. – The material indicates the presence of a thick-walled and medium-sized but yet undescribed discinoid with a low conical ventral valve in the Acanthopyge Limestone. Fragments are similar to some Silurian thick-walled representatives of the genus [*A. cocksi* Mergl, 2006, *A. bubovicensis* (Mergl, 2001a)]. Fragments are distinct from *Acrosaccus vertex* Mergl & Ferrová, 2008 reported from the Chýnice Limestone (Emsian) by the thick-walled shell and a narrow spindle-shaped pedicle track. *Acrosaccus* sp. from the Acanthopyge Limestone (Eifelian) (Mergl, 2008) also differs from our fragments due to its thin-walled shell.

Occurrence. – Suchomasty (Červený quarry), Acanthopyge Limestone, *costatus* Zone (zonal identification based on the occurrence of *Polygnathus* sp. aff. *P. trigonicus* reported by Klapper *et al.* 1978).

Genus *Chynithele* Havlíček *in* Havlíček & Vaněk, 1996

Type species. – *Chynithele ventricona* Havlíček *in* Havlíček & Vaněk, 1996; Zlíchov Formation, Emsian, Devonian; Prague Basin, the Czech Republic.

***Chynithele amoena* Mergl, 2008**
Figure 7E

2008 *Chynithele amoena* sp. nov. – Mergl, pp. 289, 290, fig. 7.

Material. – One dorsal valve.

Remarks. – Mergl (2008) discussed the morphology of this species and the differences between *C. amoena* and *C. ventricona*. There is a gradual change in details of the dorsal valve rugellate ornamentation from *Chynithele ventricona* Havlíček *in* Havlíček & Vaněk, 1996 (Chýnice Limestone, lower Emsian) to *C. amoena* (Acanthopyge Limestone, Eifelian). Our single specimen shows distant and less robust concentric rugellae, which justifies is attribution to *C. amoena*.

Occurrence. – Choteč (Na Škrábku quarry), Třebotov Limestone, *serotinus* Zone.

Genus *Lochkothele* Havlíček & Mergl, 1988

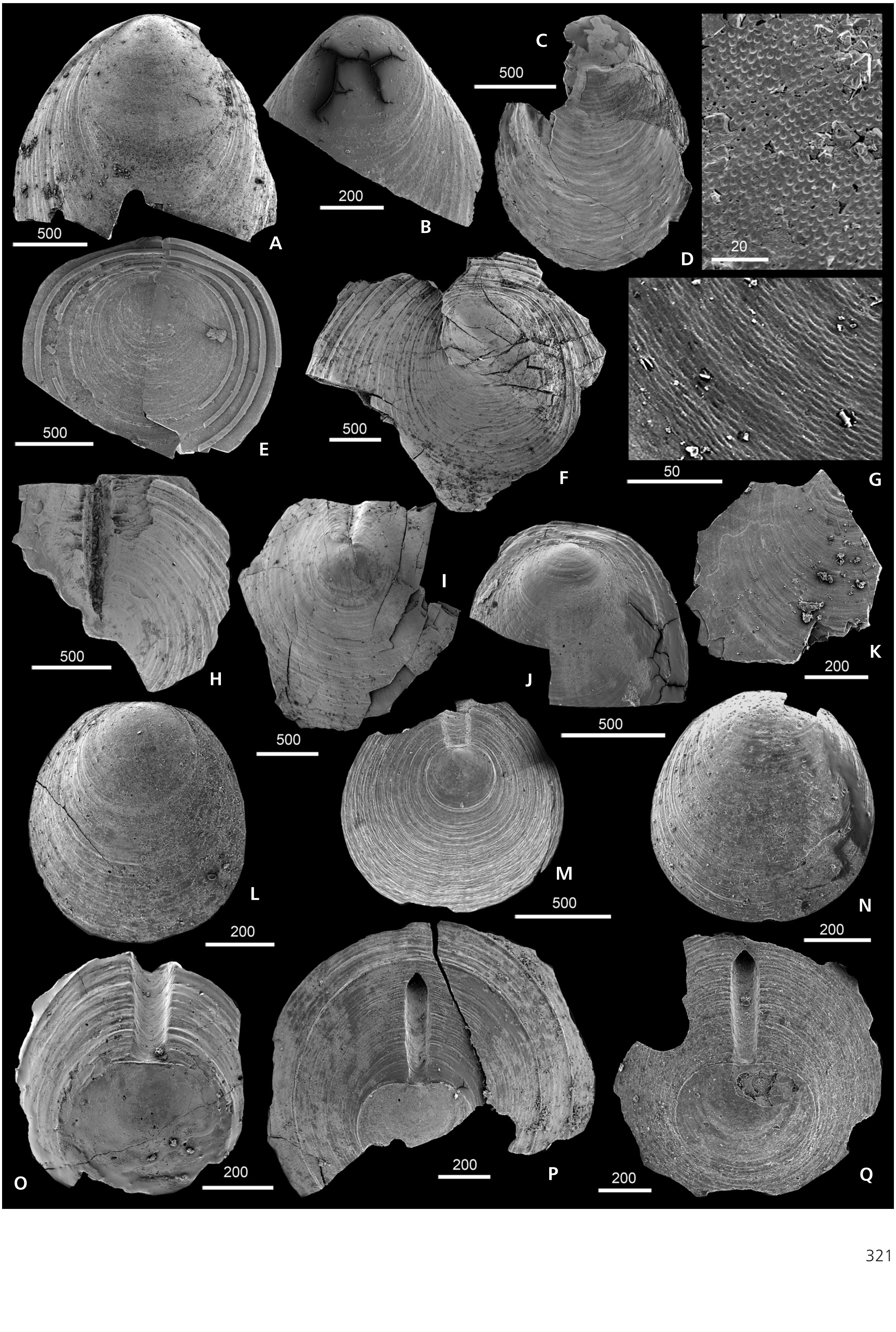
Type species. – *Discina intermedia* Barrande, 1879; Lochkov Formation, Lochkovian, Devonian; Prague Basin, the Czech Republic.

***Lochkothele* sp.**
Figure 7O–Q

Material. – Four fragments of ventral valves.

Description. – The shell outline is not well known, but judging from the fragments, it is subcircular to broadly oval, with the maximum width at about midlength of the shell. The ventral valve is low conical, with a distinct, slightly convex, and transversely oval larval shell that has a straight posterior edge. The pedicle track is a deeply incised, semicylindrical channel almost imperceptibly widening posteriorly with an acute triangular notch at the posterior end. Distinct,

Figure 7. A – *Barrandeoglossa* sp. Incomplete dorsal valve, exterior of SB6, Choteč (Na Škrábku quarry), Třebotov Limestone, lower Eifelian, *partitus* Zone. • B, C – *Kosagittella pulsatilla* Mergl, 2008. • B – incomplete ventral valve, exterior of SB7, Chýnice (Jelínek mill quarry), Třebotov Limestone, upper Emsian, *serotinus* Zone. • C – incomplete dorsal valve of SB8, Suchomasty (Červený quarry), Acanthopyge Limestone, Eifelian, *costatus* Zone (zone identification based on the occurrence of *P.* sp. aff. *P. trigonicus* Bischoff & Ziegler, 1957 reported by Klapper *et al*. 1978). • D – detail of microornament of postlarval shell of SB9, Chýnice (Jelínek mill quarry), Choteč Limestone, Eifelian, *costatus* Zone. • E – *Chynithele amoena* Havlíček, 1996. Dorsal valve, exterior of SB10, Choteč (Na Škrábku quarry), Třebotov Limestone, upper Emsian, *serotinus* Zone. • F – *Praeoehlertela* sp., dorsal valve, exterior of SB11, Suchomasty (Červený quarry), Acanthopyge Limestone, Eifelian, *costatus* Zone (zone identification based on the occurrence of *P.* sp. aff. *P. trigonicus* Bischoff & Ziegler, 1957 reported by Klapper *et al*. 1978). • G, K – *Paterula holynensis* Mergl, 2001, shell fragment of SB12 showing microornament, Choteč (Na Škrábku quarry), Třebotov Limestone, lower Eifelian, *partitus* Zone. • H–I – *Acrosaccus* sp., Suchomasty (Červený quarry), Acanthopyge Limestone, Eifelian, *costatus* Zone (zone identification based on the occurrence of *P.* sp. aff. *P. trigonicus* Bischoff & Ziegler, 1957 reported by Klapper *et al*. 1978). • H – incomplete ventral valve, exterior of SB14. • I – incomplete ventral valve, exterior of SB13. • J, L–N – *Opatrilkiella kobyla* Mergl, 2008. • J – incomplete dorsal valve, exterior of SB16, Praha – Barrandov (road cut), uppermost Choteč Limestone, Eifelian, ?*australis* Zone (zone identification based on the occurrence of *P. pseudofoliatus*, for discussion see Berkyová 2009). • L – dorsal valve, exterior of SB18, Chýnice (Jelínek mill quarry), Třebotov Limestone, upper Emsian, uppermost *serotinus* Zone. • M – ventral valve, exterior of SB17, Praha – Barrandov (road cut), uppermost Třebotov Limestone, Eifelian, basal *costatus* Zone. • N – dorsal valve, exterior of SB19, Chýnice (Jelínek mill quarry), Třebotov Limestone, upper Emsian, *serotinus* Zone. • O–Q – *Lochkothele* sp. • O – incomplete ventral valve, exterior of SB20, Suchomasty (Červený quarry), basal Acanthopyge Limestone, Eifelian, *partitus* Zone. • P – incomplete ventral valve, exterior of SB21, Chýnice (Jelínek mill quarry), Třebotov Limestone, upper Emsian, *serotinus* Zone. • Q – incomplete ventral valve, exterior of SB22, Praha–Holyně (Prastav quarry), Třebotov Limestone, Eifelian, basal *partitus* Zone. Length of bars in μm.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anteriorly convex growth lines cover the bottom of the pedicle track. Discrete listrial plates are absent. Ornamentation of the post-larval shell consists of fine concentric growth lines and fine rope-like rugellae arranged at broad intervals.

Remarks. – The unique shape of the pedicle track is the same as that observed by Mergl (2001a) in *Lochkothele intermedia* (Barrande, 1879) (Lochkovian, Lochkov Formation; Prague Basin) and *Lochkothele* sp. (Emsian, Chýnice Limestone, Prague Basin; Mergl & Ferrová 2009). Weak rugellae on the surface of the post-larval shell are also consistent with the attribution of all three fragments to *Lochkothele* Havlíček & Mergl, 1988, but their relationship to the type species is unclear.

Occurrence. – Choteč (Na Škrábku quarry), Třebotov Limestone, upper *partitus* Zone; Chýnice (Jelínek mill quarry), Třebotov Limestone, *serotinus* Zone; Praha – Holyně (Prastav quarry), Třebotov Limestone, basal *partitus* Zone; Suchomasty (Červený quarry), basal Acanthopyge Limestone, upper *partitus* Zone.

Genus *Opatrilkiella* Mergl, 2001a

Type species. – *Opatrilkiella minuta* Mergl, 2001a; Požáry Formation, Přídolí, Silurian; Prague Basin, the Czech Republic.

***Opatrilkiella kobyla* Mergl, 2008**
Figure 7J, L–N

2001a *Opatrilkiella* (?) sp. B. – Mergl, p. 30, pl. 24, fig. 10.
2008 *Opatrilkiella kobyla* sp. nov. – Mergl, p. 290, figs 8, 9.
2009 *Opatrilkiella kobyla* Mergl, 2008. – Mergl & Ferrová, p. 532, figs 8, 9.

Material. – Six dorsal and three ventral valves, several small fragments.

Remarks. – The recently collected specimens from the Choteč Limestone are morphologically consistent with the shells previously collected in the Acanthopyge and Choteč limestones (Eifelian). The distinctive ornamentation of the post-larval shell consisting of wrinkled concentric lines that are interrupted by arrays of composite rheomorphic folds, and the remarkable variability in outline has also been observed in the present specimens.

Occurrence. – Choteč (Na Škrábku quarry), Choteč Limestone, *costatus* Zone; Praha –Barrandov (road cut), uppermost Třebotov and Choteč limestones, basal *costatus*–?*australis* Zone (the latter zonal identification based on the occurrence of *P. pseudofoliatus*); Praha- Holyně (Prastav quarry), Třebotov and Choteč limestones, *partitus-costatus* zones; Chýnice (Jelínek mill quarry), Třebotov Limestone, *serotinus* Zone.

Genus *Praeoehlertella* Mergl, 2001a

Type species. – *Praeoehlertella umbrosa* Mergl, 2001a; Praha Formation, Pragian, Devonian; Prague Basin, the Czech Republic.

***Praeoehlertella* sp.**
Figure 7F

Material. – Two incomplete dorsal valves.

Description. – The valve is thick-walled, flat, with a gently convex submarginal apex. The outline is broadly oval, about 120% as long as wide, with maximum width at about the shell's midlength. The posterior margin is less rounded than the flanks. Ornamentation consists of distinct low concentric rugellae with sharp crests which are separated by flat wider interspaces. The rugellae slowly but constantly increase in size with shell growth.

Remarks. – The valve ornamentation is similar to that of the dorsal valve from the Acanthopyge Limestone (Eifelian) and referred to *Orbiculoidea* sp. by Mergl (2008). The only difference is the more elongate shell outline of the new specimen. The shell shape is also similar to *Praeoehlertella* sp. (Chýnice Limestone, Emsian; Prague Basin) (Mergl & Ferrová 2009) but differs by the more irregular and compressed rugellate ornamentation.

Occurrence. – Karlštejn (U Němců section), Choteč Limestone, *partitus* Zone; Suchomasty (Červený quarry), basal Acanthopyge Limestone, *partitus* Zone.

Order Acrotretida Kuhn, 1949
Superfamily Acrotretoidea Schuchert, 1893
Family Biernatidae Holmer, 1989

Genus *Havlicekion* Mergl, 2001a

Type species. – *Havlicekion splendidus* Mergl, 2001a; Praha Formation, Pragian, Devonian; Prague Basin, the Czech Republic.

***Havlicekion* sp. aff. *frydai* Mergl & Ferrová, 2009**
Figure 8A–I, K

Material. – Three dorsal and five ventral valves.

Description. – The shell is less than 1 mm wide in adults, thick-walled relative to size, with clearly unisulcate commissure.

The dorsal valve is transversely broadly oval, with a broad, weak and rapidly widening sulcus. The flanks are flat. The maximum width is situated slightly anterior to the midlength of the shell. The dorsal pseudointerarea is weakly apsacline, occupying about one-third of the valve's width, with small propareas and a broad, suboval and rather deep median groove. The visceral area is weakly defined. The triangular median septum is blade-like, occupying almost 90% of the valve's length. Its anterior base is more anterior than the tip of the lower rod. The upper rod is shorter, equally robust as the lower rod, occupying two-thirds of septal length. The tips of the rods are rounded. The base of the septum extends from a low median buttress. Cardinal muscle scars are large, oblique, widening anteriorly, with a surface moderately taller than the adjacent shell floor.

The ventral valve is highly conical, having catacline, narrowly triangular pseudointerarea with a narrow intertrough. The pseudointerarea bears coarse rope-like growth fila. Anterior and lateral slopes are gently convex. The ventral larval shell has a circular outline, having a circular pedicle opening that is posteroventrally directed. The short pedicle tube forms the highest point of the valve. The boundary of the larval shell is clearly defined and elevated above the surface of the post-larval shell.

Ornamentation of the larval shell consists of overlapping circular and lunate flat-based pits of uneven size. The pits are 2 to 5 μm in diameter, with a dominance of the larger pits. Interspaces bear hemispherical pits of different sizes. The post-larval shell bears regularly arranged concentric rugellae increasing in size with growth. The rugellae are most prominent on the anteromedian slope, becoming less prominent laterally. Long, fine, and meandering rheomorphic radial grooves are present in the median sector of the valve. The microornamentation of the post-larval shell consists of fine concentric striation, with striae 2 μm apart.

Remarks. – The new shells are very similar to the specimens described from the Chýnice Limestone (Emsian) by Mergl & Ferrová (2009). There are the same features which are discernible in the typical specimens of *H. frydai*: the prominent concentric rugellae on the external surface, the short dorsally directed tongue-like projection on the dorsal edge of the ventral pseudointerarea, and the overlapping pits on the surface of the larval shell. However, a slight difference exists in the direction of the external pedicle opening and convexity of the ventral larval shell. In the specimens from the Chýnice Limestone, the pedicle foramen is directed more posteriorly than in the newly collected specimens. The foramen is at about the same height as the apex of the larval shell. However, the pedicle openings of specimens from the Třebotov and Choteč limestones are more ventrally directed and clearly form the apex of the larval shell. It is hard to evaluate the taxonomic importance of this difference because there are no studies of biernatid larval shell variability. Unfortunately, the new material is less numerous and represented mostly by small-sized shells. Thus, the specimens are provisionally referred to *H. frydai* although it is possible that the shells from the Třebotov and Choteč limestones represents a separate species derived from *H. frydai*.

Occurrence. – Choteč (Na Škrábku quarry), Třebotov and Choteč limestones, *partitus-costatus* Zone [the latter zone identification based on the occurrence of *P*. sp. aff. *P. trigonicus* and *Nowakia* (*Dmitriella*) *sulcata sulcata* Roemer, 1843]; Praha – Barrandov (road cut), uppermost Třebotov Limestone, basal *costatus* Zone.

Havlicekion **sp.**
Figure 8J, L–N

Material. – Seven ventral valves.

Description. – The ventral valve is acutely conical, with a straight, steeply inclined anterior slope. The ventral pseudointerarea is catacline, weakly depressed and has a narrow intertrough defined by inflections of the growth fila. The anterior edge of the intertrough is straight and transverse. The larval shell is highly conical having straight anterior and lateral slopes. The posterior slope is catacline. There is a weak concentric subperipheral depression flanking the margin of the larval shell. The external pedicle opening is circular, 30 μm in diameter and directed ventrally.

The ornamentation of the mature shell consists of raised, uniformly sized concentric fila that are separated by interspaces of the same size and are interrupted and partitioned by long, straight rheomorphic radial lines on the anterior slope. The microornamentation of the larval shell consists of circular, often partially overlapping flat-bottomed pits of almost uniform size (*ca* 5 μm).

Remarks. – The specimens differ from some described species of *Havlicekion* by possessing less prominent ornamentation and an acutely conical ventral larval shell with a ventrally directed pedicle opening. However, these features indicate an affinity with *Havlicekion holynensis* Mergl, 2001a from the Kotýs Limestone (Lochkov Formation, Lochkovian) of the Prague Basin. This stratigraphically much older species also has a conical ventral larval shell and its mature shell ornamentation forms rather fine but distinct raised growth fila.

Occurrence. – Choteč (Na Škrábku quarry), Třebotov and Choteč limestones, *patulus*-*costatus* zones.

Genus *Opsiconidion* Ludvigsen, 1974

Type species. – *Opsiconidion arcticon* Ludvigsen, 1974; Emsian, Devonian; Yukon, Canada.

***Opsiconidion decessus* Mergl, 2001a**
Figure 9A–N

Material. – Almost fifty specimens (dorsal and ventral valves) in various degrees of preservation.

Remarks. – The new material comprises numerous but mostly fragmentary shells which have the typical features of the species: a tall, acutely conical ventral shell with weak growth lines, a weakly defined and narrow pseudointerarea (Fig. 9G), an acutely conical ventral larval shell with a ventrally directed apical pedicle opening (Fig. 9A, M), and a subpentagonal dorsal valve having a thin, tall and blade-like median septum with two rods (Fig. 9B, D). There is a minor difference in length and flattening of the upper rod between the original and new specimens (Mergl 2001a; pl. 31, figs 6, 7, 8, 16), but moderate variability in this feature is common even among shells from the same sample. Another distinct feature of this species is the rather uniform pitting of the larval shell (Fig. 9K, M, N). The large flat-bottomed pits are uniformly sized, circular, in contact with each other and in a honeycomb-like arrangement. Some crosscutting of large pits occurs only along the anterior margin of the larval shell (Fig. 9N). Interspaces between the flat-bottomed pits are weakly elevated and bear much smaller hemispherical pits. This rather large biernatid was formerly known only from the Choteč and Acanthopyge limestones of the Choteč Formation (Mergl 2001a, 2008).

Occurrence. – Choteč (Na Škrábku quarry), Třebotov and Choteč limestones, *partitus*-*costatus* zones; Chýnice (Jelínek mill quarry), Třebotov and Choteč limestones, *serotinus*-*kockelianus* zones; Praha – Barrandov (road cut), uppermost Třebotov and basal Choteč limestones, basal *costatus* Zone; Praha – Holyně (Prastav quarry), Třebotov and Choteč limestones, *partitus*-*costatus* zones.

Superfamily Siphonotretoidea Kutorga, 1848
Family Siphonotretidae Kutorga, 1848

Genus *Orbaspina* Valentine & Brock, 2003

Type species. – *Orbaspina gelasinus* Valentine & Brock, 2003; Wenlock, Silurian; New South Wales, Australia.

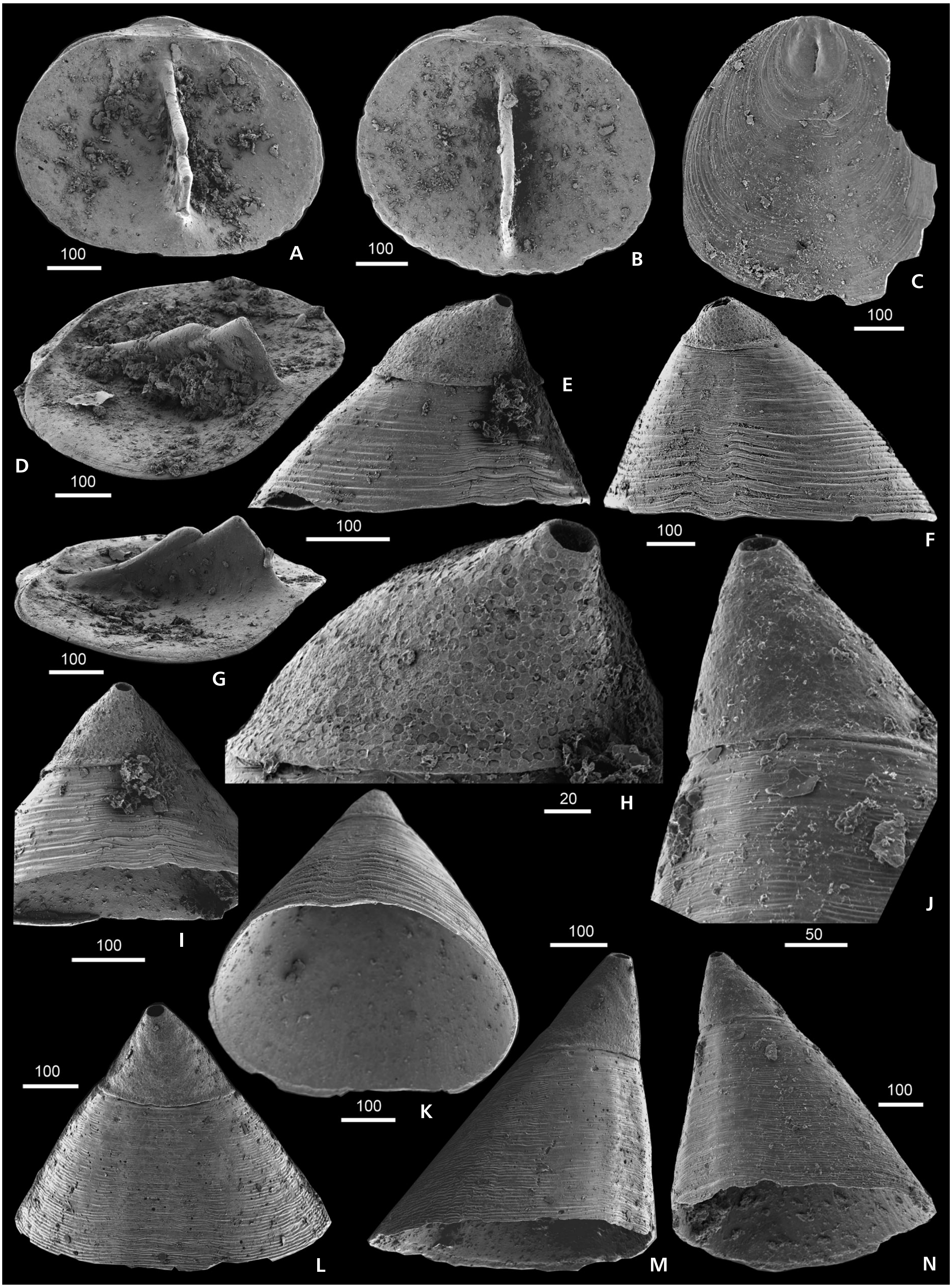
***Orbaspina* sp.**
Figure 10A–C

Material. – Two incomplete dorsal valves.

Description. – Based on the two incomplete dorsal valves, the adult shells grew up to approximately 1 mm in length. The dorsal valve is subcircular, with a posteriorly pointed apex. The valve is moderately vaulted convexly both transversely and axially, with a flattened narrowly triangular median sector. The brephic shell is subcircular, *ca* 180 μm wide, axially depressed in its anterior half, and possesses a raised posterior lobe and a pair of lower anterolateral lobes. The margins of the shell are weakly defined. The mature shell bears concentric rows of asymmetrical pits, uniformly sized over the whole shell. The pits are 15 to 20 μm wide, transversely elliptical and deepest in the posterior half. The dorsal valve interior has a short and deeply concave pseudointerarea.

Remarks. – The fragmentary preservation of the valves does not allow a comprehensive comparison with other Devonian siphonotretoids. The shells are most similar to *Orbaspina postera* (Mergl, 2001b) described from the Praha Formation (Pragian) in the Prague Basin. The Pragian species differs from other species referred to *Orbaspina* (*O. gelasinus* Valentine & Brock, 2003, *O. chlupaci* Mergl, 2003) by the absence of hollow spines. This feature has led Mergl (2001a, 2001b) to the incorrect attribution of *Orbaspina postera* to the genus *Dysoristus* Popov & Ushatinskaya, 1992 of the Dysoristidae Popov & Ushatinskaya, 1992. However, the general morphology of *Orbaspina postera* and the newly collected shells from the Třebotov

Figure 8. A–I, K – *Havlicekion* sp. aff. *frydai* Mergl & Ferrová, 2009. • A – dorsal valve, interior of SB23, Choteč (Na Škrábku quarry), Třebotov Limestone, Eifelian, *partitus* Zone. • B – dorsal valve, interior of SB24, Choteč (Na Škrábku quarry), Třebotov Limestone, Eifelian, *partitus* Zone. • C –dorsal valve, exterior of SB25, Choteč (Na Škrábku quarry), Choteč Limestone, Eifelian, *costatus* Zone (zonal identification based on the occurence of *P.* sp. aff. *P. trigonicus* Bischoff & Ziegler, 1957). • D – dorsal valve, interior of SB26, Choteč (Na Škrábku quarry), Třebotov Limestone, Eifelian, *partitus* Zone. • E, H, I – ventral valve, exterior, detail of larval shell and pseudointerarea of SB27, Choteč (Na Škrábku quarry), Třebotov Limestone, Eifelian, *partitus* Zone. • F, K – ventral valve, exterior and interior of SB28, Praha – Barrandov (road-cut), uppermost Třebotov Limestone, Eifelian, basal *costatus* Zone. • G – dorsal valve, interior, lateral view of SB23, Choteč (Na Škrábku quarry), Třebotov Limestone, Eifelian, *partitus* Zone. • J, L–N – *Havlicekion* sp., Choteč (Na Škrábku quarry), Třebotov Limestone, Eifelian, *partitus* Zone. • J, N – ventral valve, detail of larval shell and exterior of SB29. • L, M – ventral valve, pseudointerarea and lateral view of SB30. Length of bars in μm.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Limestone, especially their pitted surface, the flattened median sector, and the deeply concave dorsal pseudointerarea, are consistent with their assignment to the siphonotretids. The siphonotretid *Schizambonine* sp. B, described by Mergl (2001a) from the Třebotov Limestone of the Prastav Quarry (bed No. 5) in Praha – Holyně, lacks a clearly pitted surface and displays peripheral hollow tubes (Mergl 2001a; pl. 36, figs 11–14). These features differentiate *Schizambonine* sp. B from the newly sampled shells. It is likely that *Schizambonine* sp. B represents members of a different siphonotretine clade existing up to the earliest Middle Devonian.

Occurrence. – Chýnice (Jelínek mill quarry), Třebotov Limestone, lowermost Eifelian, lowermost *partitus* Zone.

Discussion

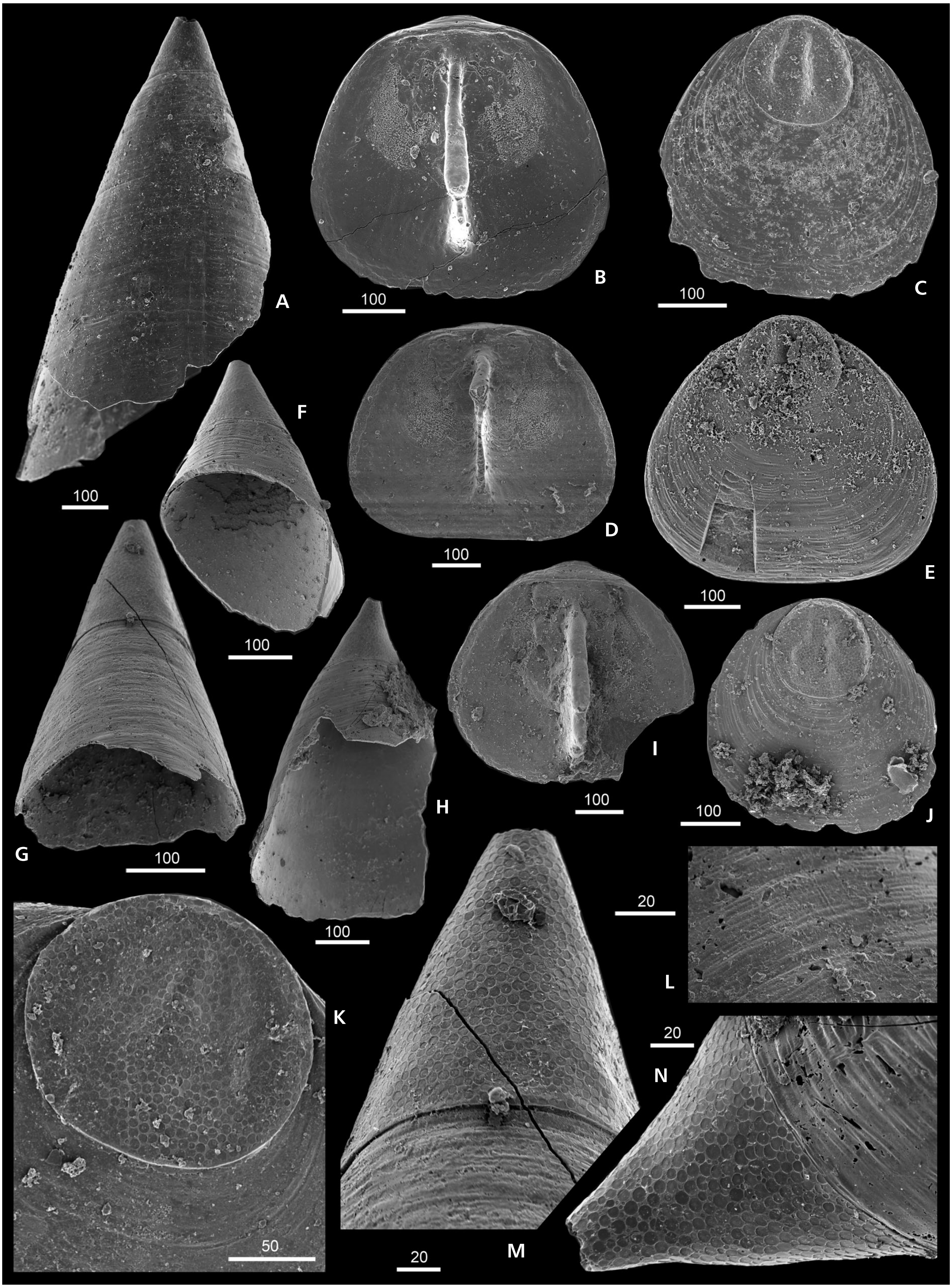
As Fig. 11 indicates, the brachiopod taxa were recovered mainly from autochthonous micritic limestones (Fig. 11A–C, F–I). The following taxa were recorded in both of the facies types, *i.e*. the micritic limestones and the grainstone facies (alochthonous calciturbidites): *Havlicekion* sp., *Kosagittella pulsatilla*, *Opatrilkiella kobyla* and *Opsiconidion decessus*, with *Schizotreta* sp. being recorded only in the grainstone facies. Occurrences of *Havlicekion* sp., *Kosagittela pulsatila* and *Opatrilkiella kobyla* in the grainstone facies were recorded only rarely. The most striking is the occurrence of the biernatid *Opsiconidion decessus*, which is common in the light bioturbated skeletal wackestones, dark burrowed lime-mudstones and wackestones, in peloidal packstones and also in crinoidal and peloidal grainstones. The obvious facies independence of this genus raises the question as to its mode of life.

Opsiconidion shell morphology and mode of life

Unlike the majority of acrotretoids, *Opsiconidion* has an almost smooth shell surface and a very narrow undepressed ventral pseudointerarea. The thin shell, absence of distinct growth lamellae, and a ventrally directed foramen piercing the top of an acutely conical larval shell are other typical features which distinguish the *Opsiconidion* shell. The almost regularly conical valve with a ventrally directed pedicle foramen is indicative of the ventral apex down attitude of *Opsiconidion* during life. The morphology would be different assuming that the shell faced towards the substrate by the ventral pseudointerarea; in such a case, the ventral pseudointerarea would be depressed and the pedicle foramen would be directed posteroventrally to posteriorly. There are many Cambrian and Ordovician acrotretides with such morphology: the genera *Acrotreta, Dactylotreta, Hadrotretata, Polylasma, Sasyksoria,* and *Torynelasma* are good examples. They have strongly depressed ventral pseudointerareas and their pedicle foramina are posteroventrally to posteriorly directed. The latter indicates that the pedicle served for adhesion to the substrate. The depressed ventral pseudointerarea indicates the preferred shell orientation during life. These acrotretoids probably selected epibenthic habitats on diverse firm or hard substrates. Sponges, conulariids, seaweeds or bioclasts have been documented or assumed as suitable substrates (Rowell & Krause 1973, Holmer 1989, Holmer *et al*. 2005, Mergl 2002).

When judging the *Opsiconidion* mode of life, the rock type, from which the taxon has been recovered, should be taken into account. From the following sediment types *Opsiconidion* has also been collected: marls (Biernat 1984), argillaceous limestones and marlstones (Popov *et al.* 1994), black massive limestone (Valentine *et al.* 2006), fine sediments (oxygenated environment) (Botting 2002), dark and grey micritic limestones (Mergl 2001a), mudstones to siltstones (Cocks 1979) and dark gray to black argillaceous limestones (Ludvigsen 1974). Mergl (2001a, 2008) and Mergl & Ferrová (2009) reported this genus also from grainstone and floatstone facies (Acanthopyge and Chýnice limestones, Prague Basin), however, only sporadically. Valentine *et al.* (2003) reported this genus from coarse-grained red limestone (shallow marine, moderate energy) and marly limestones. Judging from the published record regarding this genus, it appears reasonable to conclude that a muddy bottom was the original habitat for *Opsiconidion*. However, as mentioned above, *Opsiconidion* has been recovered from various facies types (Třebotov and Choteč limestones, Fig. 11). A similar distribution (occurrences in wackestones, lime-mudstones and grainstones) has been recorded in lower Devonian

Figure 9. A–N – *Opsiconidion decessus* Mergl, 2001. • A–D, F, G–H, L, M–N – Praha – Barrandov (road-cut), uppermost Třebotov Limestone, Eifelian, *costatus* Zone. • A – ventral valve, exterior of SB31. • B – dorsal valve, interior of SB32. • C – dorsal valve, exterior of SB33. • D – dorsal valve, interior of SB34. • F – ventral valve, exterior of SB35. • G, M – ventral valve, pseudointerarea and detail of larval shell of SB36. • H, N – ventral valve, exterior and larval shell with pitting of SB37. • L – ventral valve, detail of pseudointerarea of SB38. • E – dorsal valve, exterior of SB39. Chýnice (Jelínek mill quarry), Třebotov Limestone, upper Emsian, *serotinus* Zone. • I – dorsal valve, interior of SB40, Chýnice (Jelínek mill quarry), Třebotov Limestone, upper Emsian, *serotinus* Zone. • J – dorsal valve, exterior of SB41, Chýnice (Jelínek mill quarry), Choteč Limestone, Eifelian, *costatus* Zone. • K – dorsal valve, larval shell of SB42, Praha – Barrandov (road-cut), basal Choteč Limestone, *costatus* Zone. Length of bars in μm.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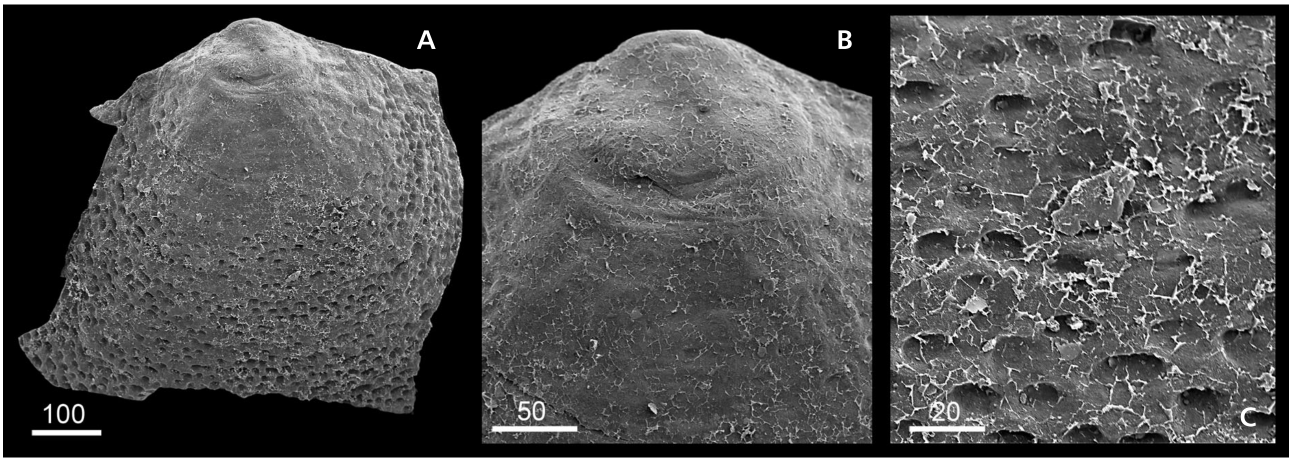

Figure 10. A–C – *Orbaspina* sp. Chýnice (Jelínek mill quarry), Třebotov Limestone, lowermost Eifelian, lowermost *partitus* Zone. • A–C – dorsal valve exterior, detail of the larval shell, and detail of pits of postlarval shell of SB43. Length of bars in μm.

sections in the Prague Basin, *e.g.*, U Topolů section and Černá rokle (Michael A. Murphy, personal communication). Similar facies independence of *Opsiconidion* and some other acrotretoids has been recorded in Argentina and the Canadian Arctic (Jen Duffy and Brian Chatterton, personal communication, manuscript in preparation). The grainstones of the Choteč Limestone represent calciturbidites, thus sediments transported from more shallow water environments down a slope. *Opsiconidion* occurs both in autochtonous (wackestones, lime-mudstones) and allochtonous facies (grainstones), which implies that the animal could have lived both on the muddy substrate in a deep, calm environment and on a coarse substrate in a shallow-water, moderately agitated environment. Another possible explanation exists, namely that *Opsiconidion* was epiplanktonic in its mode of life and thus independent on the lithofacial development.

Possibility 1: muddy substrate as a life habitat for *Opsiconidion*

A semi-infaunal mode of life for *Opsiconidion* in a calmer, deeper environment was suggested by Mergl (2001a, 2008). The shell morphology of *Opsiconidion,* with a tall thin conical ventral valve and a tall internal dorsal septum, seems an advantageous morphology for a sedentary habit on a soft substrate. Deep burrowing of the conical ventral valve could speculatively stabilize the shell in soft mud, having only the narrow commissural periphery of the shell elevated above the sediment/water interface. The pedicle of *Opsiconidion* could give significant support to the stability of an animal wedged between much smaller sediment particles. The remarkably extended posterior of micromorphic Devonian and Carboniferous brachiopods of the Lambdarinidae, Brunton & Champion, 1974, may represent an adaptation to a similar habitat in a low-energy soft substrate. *Labdarina* Brunton & Champion, 1974 and other cardiarinides are known from well-bedded micritic limestones (Bassett & Bryant 1993). The larva of *Opsiconidion* which possessed a conical shell, may have settled on any small grain on the sea bottom (*e.g.* a bioclast). Subsequent growth of the postlarval conical ventral valve compensated for the deposition of mud around and above this grain. In some samples of Silurian limestones in the Czech Republic, the juvenile shells of *Opsiconidion* are substantially more frequent than the adult shells. This indicates a high juvenile mortality of the local population. There can be various reasons for this juvenile mass mortality; we assume that such juvenile mortality could be explained by the inability to compensate for a rapid intake of mud.

The highly conical ventral valve of *Opsiconidion* also provided enough internal space for the effective functioning of the lophophore. A narrow slot opened between the almost buried conical valve and lid-like dorsal valve, the tall dorsal median septum separated the inhalant and exhalant currents, which created an effective adaptation to the life on muddy substrates. The filtration of oxygen-depleted water just above such a muddy bottom could have been a rather effective mode of life. A permanently growing bacterial mass in organic detritus-rich and oxygen-depleted near-bottom waters might have been the main food source of the *Opsiconidion* animal (see overview, *e.g.*, in Carney 1981, Osborne 2000). The higher risk of eradication of local populations by minor fluctuations in environmental factors was compensated for by a short life span. This argues for the successful R-strategy of *Opsiconidion*. The miniaturization of body size of the biernatids could represent an adaptation to life on an oxygen deficient bottom with a greater supply of organic detritus and nannoplankton (compare *e.g.*, with Jensen 1987, Soetaert *et al*. 2002).

Possibility 2: interstitial mode of life of *Opsiconidion*

Cocks (1979) and Bassett (1984) suggested that *Opsiconidion* could have lived interstitially. The size of *Opsiconidion* is comparable with the Recent *Gwynia capsula* (Jeffreys, 1859), the micromorphic terebratellacean that represents one of the rare cases of brachiopods living interstitially in marine sands (Swedmark 1971, Logan *et al.* 1997). This species adheres to sand grains on which the larvae settle.

Considering what has been published previously (Mergl 2001a, 2008; Mergl & Ferrová 2009), the biernatid *Havlicekion* could be a candidate for such an interstitial mode of life. It has a relatively low-conical, moderately thick ventral valve with a weakly depressed ventral pseudointerarea. Its shell surface is covered by fine but well developed concentric fila which strengthen the shell wall. Its shells are numerous in coarse-grained crinoidal limestones of the Kotýs, Chýnice and Suchomasty limestones in the Prague Basin. The attitude of *Havlicekion*, with the ventral apex down, was supported by fixation of the pedicle to a nearby grain. The pedicle was certainly a narrow cylinder near the apex but most likely had a small adhesive bulb or disk at the distal end. The length and the tubular form of an acrotretoid pedicle can be inferred from rare but preserved examples of tubular extensions of the larval shell (Bassett *et al.* 1999; Fig. 9-4). The raised fila on the shell surface enhance the resistance against shell breakage and increase the stability of a shell wedged between bioclasts.

As mentioned above, the morphology of *Opsiconidion* is different. Its ventral valve is a very tall, almost symmetrical cone having a subcircular commissural outline. The ventral pseudointerarea is very narrow and weakly depressed. The shell wall is thin, certainly more fragile than that of *Havlicekion*, externally almost smooth having delicate rhizomorphic folds but lacking coarser growth lines or lamellae. The foramen is small, circular, apical, piercing the top of the acutely conical larval shell. Shell morphology and distributional differences indicate different modes of life and environmental requirements of *Opsiconidion* and *Havlicekion.* These reasons argue against an interstitial habit of *Opsiconidion* in lime mud and, at least partially, against an interstitial habit in calcarenites.

Possibility 3: epiplantkonic mode of life of *Opsiconidion*

The presence of minute lingulate brachiopods in black graptolitic shales lead, *e.g.*, Barron & Ettensohn (1981), Ruedemann (1935), Schuchert (1911) and Williams & Lockley (1983) to the conclusion that certain phosphatic brachiopods might have been adapted to an epiplanktonic mode of life. Similarly Bednarczyk & Biernat (1978) and Rowell & Krause (1973) regarded the possibility of an epiplanktonic mode of life in certain acrotretoids as probable. Floating or attached seaweeds have been repeatedly proposed as a possible host for the brachiopods, however, without direct evidence: no acrotretoid brachiopods attached to algae have yet been reported. Havlíček *et al.* (1993) described various brachiopods (lingulids, strophomenids and orthids) in association with *Krejciella* algae in the Ordovician of the Prague Basin and suggested an epiplanktonic mode of life for these brachiopods. Similarly, Williams & Lockley (1983) reported one specimen of obolid brachiopod associated with an algal strand. For a critical overview on the epiplanktonic mode of life of certain brachiopods see, *e.g.*, Holmer (1989).

lithology / brachiopod species	wackestone A	lime-mudstone-wackestone B	packstone C	grainstone D	grainstone E	lime-mudstone-wackestone F	lime-mudstone-wackestone G	wackestone H	wackestone-packstone I
Havlicekion sp.	x			x				x	
Havlicekion frydai	x							x	
Kosagittella pulsatilla	x				x			x	x
Opsiconidion decessus	x	x	x	x	x	x		x	
Lochkothele sp.	x		x						
Prastavia sp.	x								
Opatrilkiella kobyla	x		x	x				x	
?*Prastavia* sp.	x								
Schizotreta sp.				x					
Acrosaccus sp.									x
Praeoehlertella sp.							x		x
Opatrilkiella sp.							x		
Orbiculoidea sp.									x

Figure 11. Distribution of the brachiopod taxa versus diverse types of limestone. A – bioturbated skeletal wackestone, Třebotov Limestone; B – burrowed lime-mudstone and wackestone, Třebotov Limestone; C – peloidal packstone with prasinophytes, Třebotov Limestone; D – graded peloidal grainstone with crinoid ossicles, Choteč Limestone; E – fine-grained, laminated peloidal grainstone, Choteč Limestone; F – dark, micritic limestone with chert, Choteč Limestone; G – dark micritic limestone with not abundant prasinophytes, Choteč Limestone; H – light gray, burrowed-bioturbated skeletal wackestone, Choteč Limestone; I – crinoidal wacke-packstone with peloids, Acanthopyge Limestone.

The adaptations of *Opsiconidion* such as a probably short-life span, a thin shell, an apical, ventrally directed foramen as well as its micromorphic size could represent adaptations to an epiplanktonic mode of life. Floating seaweeds similar to *Sargassum* might have served as potential hosts for *Opsiconidion* in the Prague Basin, although it is rather speculative, as remains of neither seaweed with *Opsiconidion* nor without have been recorded thus far. In recent seas, seaweeds and sea-grass are common substrates for various organisms, such as, *e.g.*, bryozoans, sponges, hydrozoans, barnacles, byssate bivalves, echinoderms (*e.g.*, Pinet 2009). These organisms are attached by means of encrustation, cementation, fleshy stalk, byssus or other alternative. *Opsiconidion* would have to have been attached only by means of its thin pedicle (judging from the pedicle foramen size). The question arises whether the symmetrically conical shape of its thin-walled shell was the appropriate morphology for such a habitat. A somewhat similar morphology exists in extant stalked barnacles (*e.g.*, *Lepas*) having fleshy stalks, but they have a much bigger body and their "shell" consists of small sclerites covering the soft body.

As an epiplanktonic animal, *Opsiconidion* should occur independent of facies. As implied from Fig. 11, this condition is obviously met in the Lower–Middle Devonian strata of the Prague Basin. It is noteworthy, however, that *Opsiconidion* is absent from the Silurian and Lower Devonian graptolitic shales of the Prague Basin, from which rare clusters of floating algae are known (Bouček 1941).

We cannot rule out that the distribution of *Opsiconidion* over a wide diversity of lithofacies was due to high environmental tolerance and the ability to find appropriate microhabitats in diverse environments including deep and oxygen deficient bottoms. It should also be kept in mind that this genus has been recorded especially in micritic facies not only in the Prague Basin but also elsewhere (see above).

Taken all together, there is no compelling evidence for an epiplanktic or a benthic (semi-infaunal) mode of life in *Opsiconidion*. A detailed study focusing on the distribution of *Opsiconidion* worldwide across more stratigraphic horizons might shed more light on this question. Because such data is so far lacking, we leave the question as to the mode of life of *Opsiconidion* open, although we regard the possibility of an epiplanktonic mode of life as attractive, especially considering its lithofacies independence and its micromorphic size. The attention should be directed, *e.g.*, to fossilized Silurian and Devonian algal rests, as to potential hosts of micromorphic brachiopods. Up to now, lingulate shells have been collected only from residues of acid-dissolved limestone and this technique largely obscures their paleoecology.

Conclusions

Lingulate brachiopods of the Třebotov and Choteč limestones and their equivalents (Emsian-Eifelian, Lower–Middle Devonian, *serotinus-kockelianus* zones) were the subject of our study. Twelve species from the following genera have been found in these strata: *Barrandeoglossa*, *Kosagitella*, *Paterula*, *Acrosaccus*, *Chynithele*, *Lochkothele*, *Opatrilkiella*, *Praeoehlertella*, *Havlicekion*, *Opsiconidion* and *Orbaspina*.

These ligulate brachiopods do not display any significant change in taxonomic composition and diversity neither around the Emsian/Eifelian boundary nor around the Basal Choteč Event (Middle Devonian, Eifelian, *costatus* Zone) and thus confirms the general uniformity of lingulate faunas in the Lower and early Middle Devonian.

Lithofacies distribution and ecology of these lingulate brachiopods has been discussed, with the emphasis on *Opsiconidion decessus*, which was recorded in various facies types. We left the question as to *Opsiconidion* mode of life open, although its facies-independent occurrences support an epiplantkonic mode of life.

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