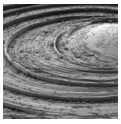
Lingulate brachiopods from the Chýnice Limestone (upper Emsian, Barrandian; Czech Republic)

MICHAL MERGL & LENKA FERROVÁ



Lingulate brachiopod fauna of the Chýnice Limestone (Zlíchov Formation, Emsian; Czech Republic) were examined. Ten species have been observed, of which *Acrosaccus vertex, Schizotreta vaneki, Havlicekion frydai,* and *Opsiconidion coralinus* are described here as new taxa. Shell microornaments of several of the taxa were examined and it indicated that some show prominent changes during shell growth. Uniformity of microornaments in particular species is evidenced. Both findings suggest that microornaments can be used as a significant feature in determination of separate species. Composition of the fauna indicates a close relationship to the Eifelian lingulate fauna of the Barrandian area. • Key words: Discinidae, Biernatidae, shell microornamentation, taxonomy, Chýnice Limestone, Emsian

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During the Emsian, carbonate sedimentation with shoreface to offshore facies prevailed in the Barrandian area. Apart from the grey micritic, offshore Zlíchov Limestone, which represents the lower and middle part of the Emsian, the pink to red-brown Chýnice Limestone also belongs to middle Emsian. The Chýnice Limestone are mostly crinoidal, biodetritic, roughly stratified limestones (Svoboda & Prantl 1948), which abound with rich and abundant fauna including corals, cystoids, crinoids, trilobites, gastropods, cephalopods, brachiopods and many other groups (Chlupáč *et al*. 1979, 1998; Kovanda *et al*. 1984).

The most famous locality of the Chýnice Limestone is located near Bubovice village, on the hillside of the Čerinka elevation. The general geological setting of the locality is well known (Kovanda 1984). In the Čeřinka locality, the Chýnice Limestone is about 10 meters thick and occupies the top level of the Zlíchov Formation. Detail biostratigraphical and lithological study is currently in progress and will be published by one of authors (L. F.). Chlupáč (1983) referred the fauna of the Chýnice Limestone to the *Orbitoproetus-Scabriscutellum* trilobite assemblage. Its trilobites and brachiopods have been reviewed by Havlíček & Vaněk (1996), and other invertebrate groups have more recently been studied (Frýda 2001; Frýda *et al*. 2008, 2009). Biostratigraphically the Chýnice Limestone may be characterized by goniatites (*Mimagoniatites*), conodonts (*Polygnathus groenbergi*; Klapper 1977) and dacryoconarid tentaculites. The Chýnice Limestone pertains to the upper part of the *Nowakia barrandei* Zone and to the following *Nowakia elegans* Zone (Chlupáč *et al*. 1979). The aim of the present work is a taxonomic description and evaluation of the lingulate brachiopods as a supplement to data presented by Havlíček & Vaněk (1996). The Čeřinka locality is the type locality of the remarkable genus *Chynithele*, but other lingulate brachiopods have also been observed there.

Material and methods

Brachiopods have been sampled from rock debris and limestone excavated from a new trench in Čeřinka locality. In total, *ca* 40 kg of limestone have been etched by a 10% dilution of acetic acid. In total, 385 determinable specimens, mostly incomplete valves, were yielded, together with abundant conodonts, conulariids, phyllocarid crustaceans, vertebrate bones and foraminiferas. Brachiopod shells are white in colour and extremely fragile. Small fragments prevailed over more complete part of shells in the residues, but this feature is a likely result of fragmentation during etching of the rock. No abraded shells have been observed and valves collected by hammering are mostly complete. Complete but isolated valves of micromorphous taxa (biernatids, *Opatrilkiella*) are fairly common. Some shells

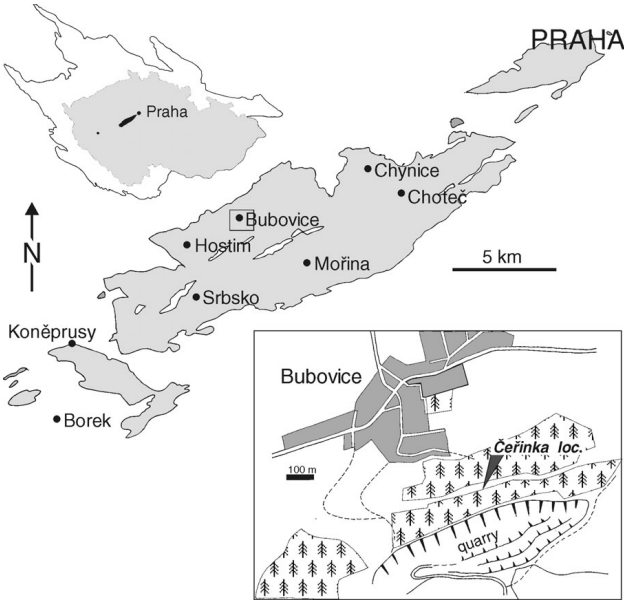


Figure 1. Sketch map of the Devonian rocks of the Prague Basin, with marked locality Čeřinka near Bubovice. Modified after Chlupáč *et al.* (1986).

show desquamation of the superficial layers or exfoliation of the first-formed shell. However, many other shells show fine details, including microornamentation of the first-formed and mature shells.

Systematic palaeontology

Repository. – All specimens, including the types, are housed in the palaeontological collections of the Department of Biology in the University of West Bohemia in Plzeň (PCZCU), in the palaeontological collections of the Czech Geological Survey, Prague (CGS), and in the palaeontological collections of the Museum of Dr. H. Horák in Rokycany (3RO). Abbreviations: H – height, L – length, W – width, n – number of species.

Order Lingulida Menke, 1828
Superfamily Linguloidea Menke, 1828
Family Obolidae King, 1846
Subfamily Obolinae King, 1846

Genus *Kosagittella* Mergl, 2001

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

***Kosagittella* sp.**
Figure 2

Material. – Eight dorsal and one ventral valve, three fragments.

Description. – Shell elongate oval, moderately thick-walled relative to its size, 3–3.5 mm long. Estimation of the adult size is based on fragments because the largest intact dorsal valve is only 2.2 mm long.

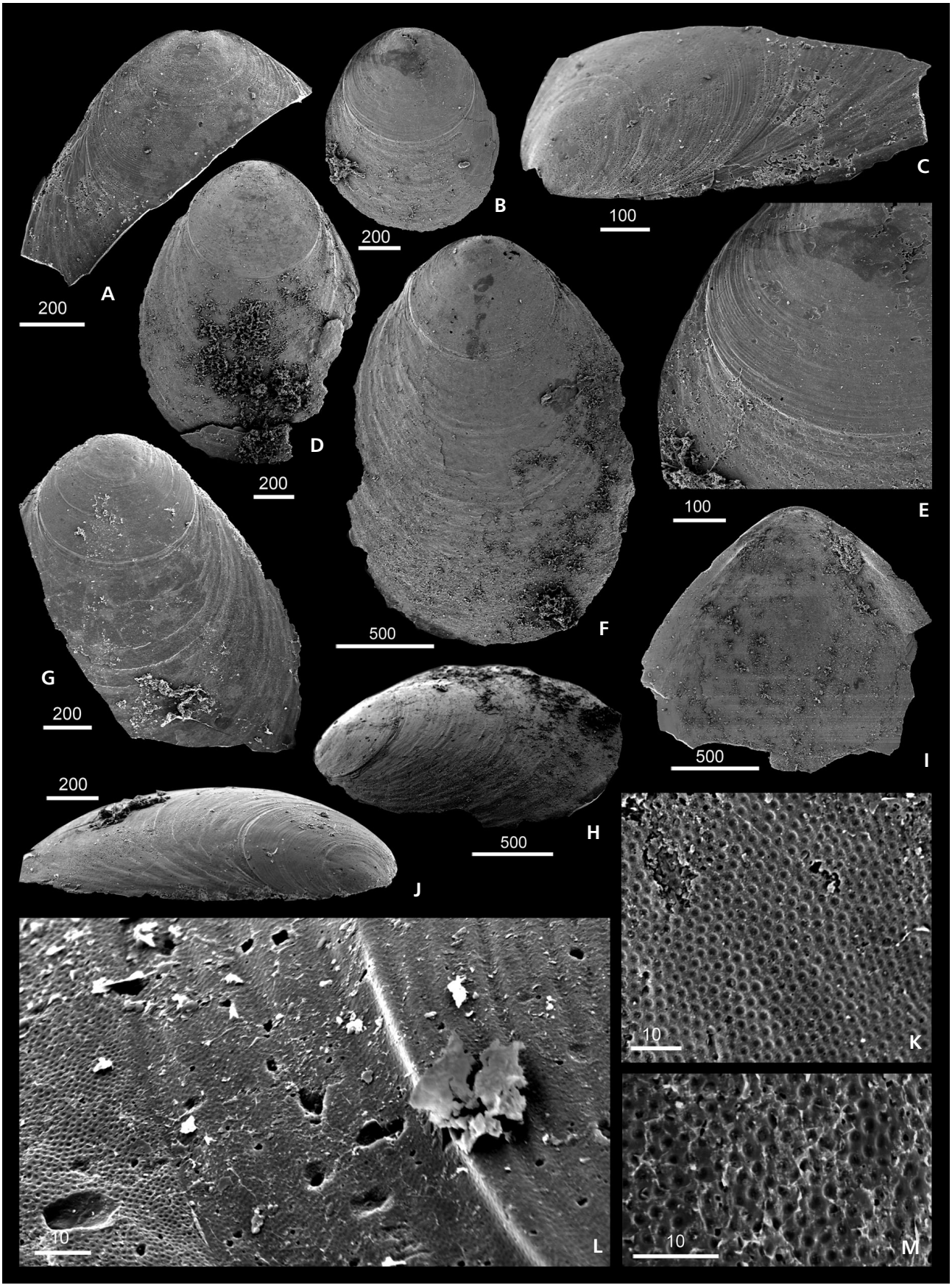
The maximum width in the dorsal valve is at about midlength, L/W ratio ranges from 1.53 in small to 1.30 in larger valves measured (n = 4), respectively. Posterior margin is evenly rounded, formed by an edge of the brephic shell. The valve is moderately convex axially as well as transversally. The brephic shell is subcircular, 600 μm wide, with L/W ratio of about 0.90, gently convex in both profiles, posteroaxially having a low subcircular node. The periphery of the brephic shell is distinct and raised above the surface of the mature shell. The surface of the brephic shell bears concentric and evenly sized regular growth lines that anterolaterally become more distinct (Fig. 2E, G). The mature shell is covered by narrowly spaced, prominent growth lines.

The interior of the dorsal valve is poorly known, with a very low and broad dorsal median groove resting on a steeply sloping posterior valve floor. Median groove is bordered by narrow, moderately swollen propareas of almost the same length. The visceral area is weakly defined, having a rhomboidal outline. Slightly diverging vascula media are present near the shell axis from the midlength.

The ventral pseudointerarea is very short, with a deep pedicle groove and posterolaterally sloping propareas.

Microornamentation of distinct circular pits covers the entire surface of a mature shell. Pitted microornamentation has not been observed in the early brephic shell. However, a weak pitting is discernible in peripheral parts of the brephic shell, indicating a secretion of vesicles by epithelial cells before the secretion of the mature shell (Fig. 2L, right). Vesicles were smaller, possibly more discoidal, and were more deeply embedded in the glycocalyx layer leaving only shallow imprints at the first-formed lamina of the primary layer. Moderately distinct shallow pits appear just near the periphery of the brephic shell (Fig. 2L, middle). Pits become much more prominent immediately at the junction of the brephic and mature shells (Fig. 2L, left). There is a rapid increase in size of the spheroid vesicles,

Figure 2. *Kosagittella* sp., Chýnice Limestone, Čerinka. • A, C – incomplete dorsal valve, PCZCU 1746. • B, E, K – small dorsal valve with distinct brephic shell, contact of brephic and mature shells, and detail of microornament of mature shell, PCZCU 1744. • D – small dorsal valve, PCZCU 1749. • F, H – large dorsal valve, and side view, PCZCU 1745. • G, J, L, M – incomplete large dorsal valve, side view, transition of brephic shell to mature shell showing different microornamentation, and detail of pitting on mature shell, PCZCU 1747. • I – dorsal valve, interior, PCZCU 1748. Length of bar in μm.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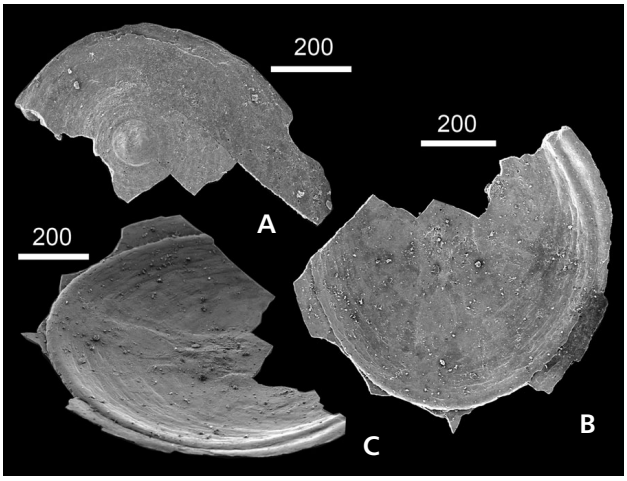


Figure 3. *Paterula* sp., Chýnice Limestone, Čeřinka. • A – incomplete dorsal valve exterior, PCZCU 1751. • B, C – incomplete dorsal valve interior, and oblique view, PCZCU 1750. Length of bar in μm.

leaving deep hemispherical imprints (Fig. 2L, left). The pits of 2 μm diameter are arranged in a honeycomb pattern on the mature shell with considerable regularity, having the same size, shape and interspaces at a particular shell growth stage (Fig. 2K, M).

Remarks. – The specimens are similar to *Kosagittella pulsatilla* Mergl, 2008 from the *Acanthopyge* Limestone (Eifelian) of the Prague Basin. Due the paucity of material and lack of sufficient data on the ventral valve, the taxonomic position of specimens from the Chýnice Limestone is left open. The microornamentation of the new specimens is identical with that described in the individuals from the *Acanthopyge* Limestone. Hemispherical pits are common in linguloid surfaces (Cusack *et al.* 1999, Williams 2003) but their presence in the brephic shell is a peculiar feature of *Kosagittella*.

Occurrence. – Less common species in the Chýnice Limestone. It is known mainly from the micritic limestone.

Family Paterulidae Cooper, 1956

Genus *Paterula* Barrande, 1879

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

***Paterula* sp.**
Figure 3

Material. – Three fragments.

Remarks. – Due to their convexity and outline, the fragments are similar to *P. holynensis* Mergl, 2001 but the material is not sufficient for a formal description and comparison. Data on the Devonian representatives of the genus is limited (Jaeger *et al*. 1969, Mergl 2001). Presence of *Paterula* Barrande, 1879 in the micritic limestone together with tabulate and rugose corals is peculiar, because the genus is usually present in deep water biofacies (Mergl 1999). Apart from data presented by Mergl (1999, 2001), there is also evidence of the occurrence of the genus in the Motol and Kopanina formations (Wenlock and Ludlow) of the Barrandian, indicating long-term persistence of this genus in the basin.

Occurrence. – Rare species in the Chýnice Limestone.

Superfamily Discinoidea Gray, 1840
Family Discinidae Gray, 1840

Genus *Acrosaccus* Willard, 1928

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

***Acrosaccus vertex* sp. nov.**
Figures 4, 5

2008 *Acrosaccus* sp. – Mergl, p. 288, fig. 6A–J.

Holotype. – Dorsal valve figured here in Fig. 4I, L, N, O (PCZCU 1759).

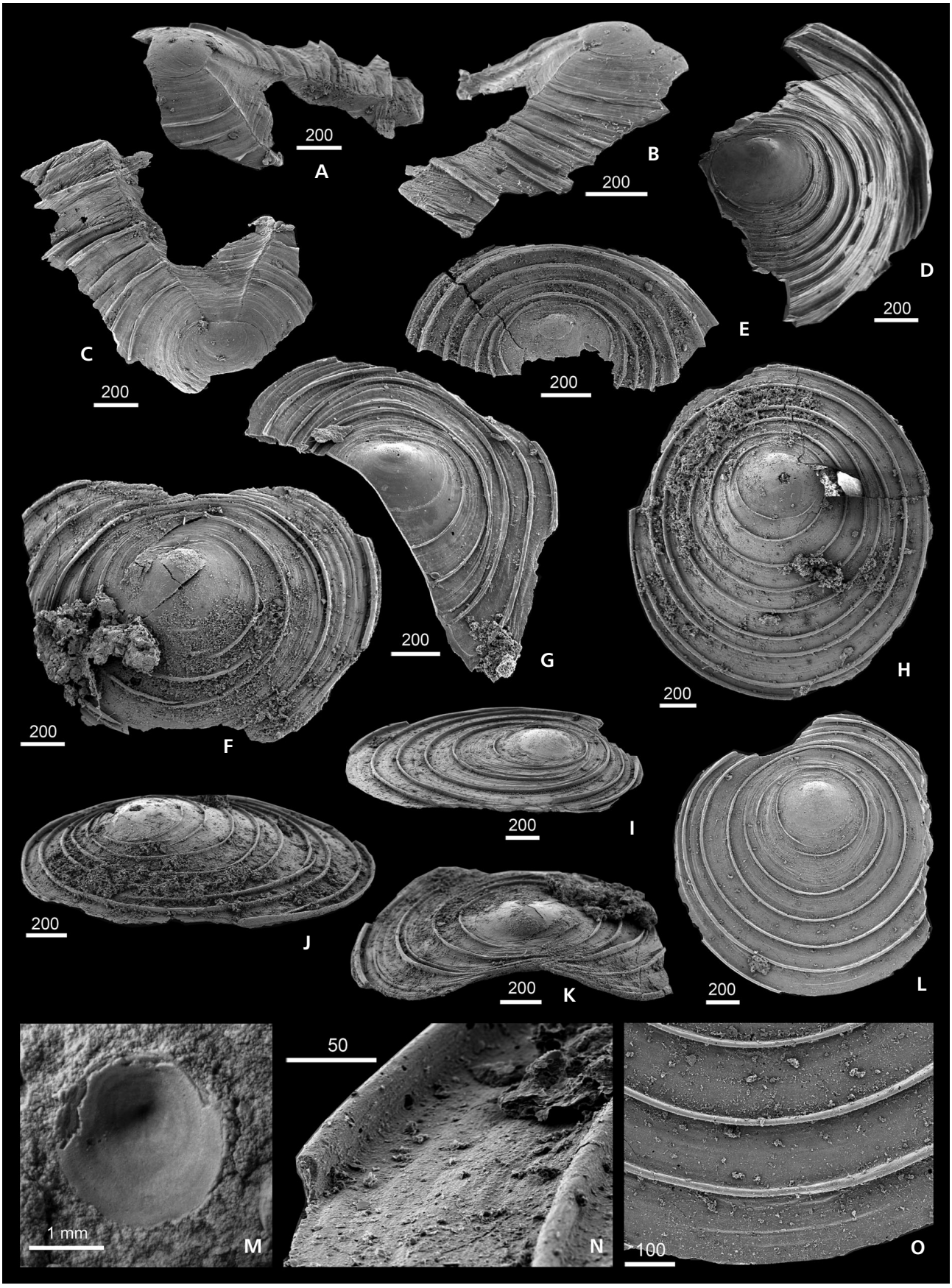
Paratype. – Ventral valve figured here in Fig. 4A–C (PCZCU 1754).

Type horizon. – Emsian, Zlíchov Formation, Chýnice Limestone, *Nowakia elegans* Zone.

Type locality. – Čeřinka hillside, Bubovice, Central Bohemia.

Name. – After *vertex* (Latin), a whirl, after a shape of shell.

Figure 4. *Acrosaccus vertex* sp. nov., Chýnice Limestone, Čeřinka. • A–C – paratype, incomplete ventral valve, exterior and side views, PCZCU 1754. • D – incomplete dorsal valve, exterior with exfoliated brephic shell, PCZCU 1755. • E – incomplete dorsal valve, exterior, PCZCU 1756. • F, K – incomplete transverse dorsal valve, exterior, and posterior view, PCZCU 1760. • G – incomplete dorsal valve exterior with preserved brephic shell, PCZCU 1757. • H, J – elongate dorsal valve, exterior, and side view, PCZCU 1758. • I, L, N, O – holotype, circular dorsal valve, exterior, side view, detail of lamellose rugellae, and ornament, PCZCU 1759. • M – interior of dorsal valve, 3RO 86269. If not otherwise stated, length of bar in μm.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Material. – 17 dorsal and 3 ventral valves, three indeterminable fragments.

Diagnosis. – Small, thin to moderately thick shelled *Acrosaccus,* with moderately strong rugellate ornamentation, and broadly triangular pedicle track having a planar listrium.

Description. – The largest complete valve is 2 mm wide, but the shell can probably be larger (probably 4–5 mm based on fragments), thin shelled, considerably variable in convexity and outline. The shell is rectimarginate, but some individuals have prominent irregularity at the posterior or lateral margins (Fig. 4K). The outline is generally subcircular to elongate oval, often with small irregularities.

The dorsal valve is mild to moderately conical, with the apex situated in the posterior third. Outline ranges from elongate oval (Fig. 4H) or almost circular (Fig. 4L) to slightly transverse (Fig. 4F). There are disturbances of shell symmetry (Fig. 4G). Regularly developed shells have evenly curved margins, with the posterior margin slightly less curved than lateral and anterior ones. The convexity of the dorsal valve ranges from very low to moderately high. Some valves have a low conical aspect (Fig. 4D). The visceral area is poorly impressed, with central muscle scars almost imperceptible. Very weakly impressed subparallel *vascula media* are present along the shell axis.

Ornamentation of the dorsal valve consists of high concentric rugellae, arranged at almost regular intervals. Some rugellae are interrupted and disconnected while others are seemingly continuous (Fig. 4H, J). Rugellae have a thin base but swollen rounded crests, being about three times taller than wide. Rugellae are weakly inclined anteriorly, showing shallow excavation at the base of their anterior walls. Interspaces are much wider than rugellae, having a flat bottom with several low, weak growth fila on their surface.

The ventral valve is low conical, with a flat, posterior slope except for a weakly convex apical part. The brephic shell is transversally oval, low convex, 400 μm wide, with distinct growth lines. The proximal part of the listrium is broadly triangular, flat and evenly expanding posteriorly. The posterior part of the pedicle track is unknown. The surface of listrium is weakly differentiated, with sides having coarser growth lines than the narrower axial part. There is an acute edge at the junction of the listrium and mature shell (Fig. 5E), with a narrow strip lacking pitted microornamentation. Ornamentation of the ventral valve is similar to that of the dorsal valve, with prominent growth rugellae separated by broader interspaces having irregular growth fila.

Microornaments consist of oval, poorly ordered pits on the surface of the first-formed shell (Fig. 5J, K). These pits are restricted to the transversally oval, dome-shaped part of the juvenile shell, which is approximately 110–120 μm wide and 90–100 μm long. It is defined posteriorly and posterolaterally by a raised edge but having a poorly defined anterior periphery. The pits of the first formed shell are shallow, *ca* 2 μm long, mostly concave, with smooth interspaces. The brephic shell at the contact with the first-formed shell is covered by smaller, *ca* 1 μm size, circular pits arranged in feebly defined radial rows (Fig. 5G, H). Subcircular, 1–2 μm, uniformly sized and somewhat irregular pits densely cover the mature shell. Sets of these pits are arranged in radiating, often fused rows, separated by smooth interspaces having a rheomorphic surface. The rows of pits continue over the crests of rugellae and interspaces. More distant parts of the mature shell have uniform pitting on the whole surface.

The exfoliated brephic shell in one specimen (Figs 4D, 5D) shows the underside of the brephic shell with an imprint on the first-formed lamina of the early mature shell. There is a distinct dome-shaped area corresponding to the first-formed shell. Its anterior periphery bears radiating lines. There are three subcircular areas, two laterals and one anterior, with a three-lobate area inbetween. The domed area is posteriorly bound by a transverse ridge with a deep furrow behind.

Remarks. – The new species differs from all previously formally described species from the Silurian and Devonian of the Prague Basin. However, the specimens described as *Acrosaccus* sp. from the *Acanthopyge* Limestone (Eifelian) by Mergl (2008) probably belong to the same or another but closely related species. The most similar species to the new species is *A. bubovicensis* (Mergl, 2001) of Wenlock age. This stratigraphically older species differs from *A. vertex* sp. nov. by a narrow pedicle track, coarsely rugellate ornamentation with narrower interspaces and a clearly central dorsal apex. Microornamentation of the brephic and mature shell of the new species is almost identical with the microornamentation of *Acrosaccus* sp. (Mergl 2008). This indicates uniformity and conservatism of microornamentation in a particular taxon over a long period (middle Emsian to Eifelian). Unlike *Acrosaccus vertex* and *A*. sp., the imprints of siliceous tablets in the first-formed shells are unknown in other genera in the Čeřinka locality.

Occurrence. – Common species in the type locality.

Genus *Chynithele* Havlíček, 1996

Type species. – *Chynithele ventricona* Havlíček, 1996; Zlíchov Formation, Emsian, Devonian; Czech Republic.

Chynithele ventricona Havlíček, 1996

Figure 6

2001 *Chynithele ventricona* Havlíček, 1996. – Mergl, p. 26, pl. 20, figs 12, 15, 22 (see for further synonymy).

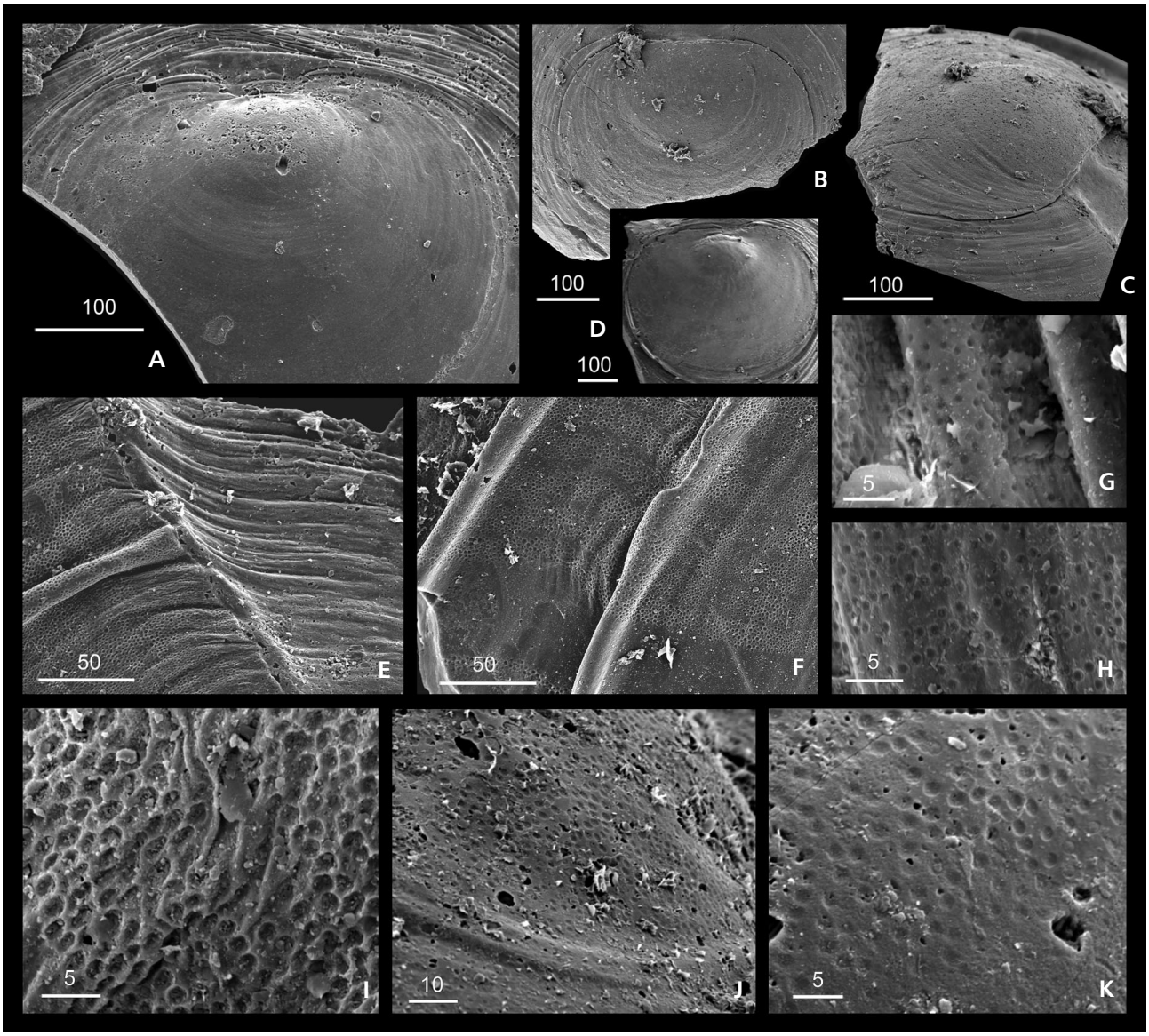


Figure 5. *Acrosaccus vertex* sp. nov., Chýnice Limestone, Čeřinka. • A, G, H, K – dorsal valve, brephic shell (A), pitting on brephic shell (G, H) and imprints of siliceous tables of the first-formed shell (K), PCZCU 1757. • B, C, E, F, I, J – ventral valve, brephic shell (B, C), detail of pseudointerarea and mature shell (E), microornament of mature shell (F), pitting of mature shell (I) and imprints of siliceous tablets of the first-formed shell (J), PCZCU 1754. • D – dorsal valve, the first layer of mature shell showing underside of exfoliated brephic shell, PCZCU 1755. Length of bar in μm.

Material. – 37 dorsal and 45 ventral valves.

Description. – Havlíček (1996) and Mergl (2001). The detailed data about microornament pattern and yet undescribed morphology will be published elsewhere.

Remarks. – In the original description of Havlíček (*in* Havlíček & Vaněk 1996) this author presented the general morphology of a characteristically plano-convex shell without comments on microornamentation and internal morphology. A detailed study of the ornaments confirms that the profiles of concentric rugellae on the dorsal valve of *C. ventricona* rapidly change during growth of the individual. The early rugellae have a subcircular to elongate-oval profile with the base attached to the almost flat surface of the dorsal valve (Fig. 6P). Subsequent rugellae show a T-shaped profile, with a larger upper shelf facing the shell margin, and a shorter but thicker shelf facing the shell apex (Fig. 6Q). The anterior shelf is never deeply undercut or excavated. Interspaces between rugellae are deep, having shallowly concave profiles. Rugellae of *C. amoena* Mergl, 2008 from the *Acanthopyge* Limestone (Eifelian) show a different profile. Although the rugellae also have a T-shaped profile, they are generally less robust, and the up-

per anterior shelf is moderate to deeply, but always, excavated (Mergl 2008; Fig. 7C, F). Although this difference is weak and seemingly unimportant, it has been observed in all specimens from the Chýnice and Acanthopyge limestones, respectively, and confirms the validity of both species. Another difference between *C. ventricona* and *C. amoena* concerns the outline of the dorsal valves. There is a less rounded posterior margin in *C. amoena* compared with *C. ventricona*. Therefore, the outline of *C. ventricona*, despite some morphological variability, is more circular than in *C. amoena*.

Profiles of rugellae in the specimens formerly referred to as C. *ventricona* from the Suchomasty Limestone (upper Emsian), including the type specimen of *Discina surgens* Barrande, 1879, are unknown (Mergl 2001). Therefore, it is unclear whether these specimens belong to *C. ventricona*, or to *C. amoena,* or represent a separate species.

Occurrence. – An abundant species in the Chýnice Limestone. It is known mainly from the micritic limestones.

Genus *Lochkothele* Havlíček & Mergl, 1988

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

Lochkothele sp.

Figure 7

Material. – One dorsal valve and three incomplete ventral valves.

Description. – The shell is thin-walled, *ca* 4 mm long in the largest but imperfect specimen. Shell outline is almost circular, with L/W ratio of 0.96 in a single complete dorsal valve. The dorsal valve apex is at 10% of the valve length, having a steeply backward inclined brephic shell. Axial profile of the dorsal valve is weakly convex, but the posterior (post-apical) slope is almost planar. The ventral valve is low conical, with the apex situated at *ca* 40% of the valve length. The anterior slope is almost straight. The posterior slope is gently convex. The pedicle track is narrow, 100 μm wide, short and continuing posteriorly as a thin internal pedicle tube opened by a small circular inner foramen near the posterior margin. The bottom of the pedicle track is undifferentiated being formed by a deeply concave listrium. Its surface bears distinct growth lines. The ventral valve interior shows a deeply impressed visceral area near the posterior edge of the elevated central muscle scars.

Ornamentation consists of poorly defined concentric lines, with coarser concentric growth fila spaced at regular intervals of 100 to 200 μm. Microornamentation is unknown.

Remarks. – Although the species is left in an open taxonomic position, its generic affiliation is doubtless. It differs from *L. intermedia* (Barrande, 1879), Radotín Limestone of the Lochkov Formation (Lochkovian), only by its smaller size, which is less than 50% of the size of *L. intermedia*. The earliest known *Lochkothele* is from the Wenlock (Homerian) of England (Mergl 2006), and already it can be seen that this species, due to size, profile and ornamentation was closely related to the Devonian representatives.

Occurrence. – A rare discinid in the Chýnice Limestone in Čeřinka test pit. It has been matched by three specimens from red micritic limestone at the Čeřinka quarry.

Genus *Opatrilkiella* Mergl, 2001

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

Opatrilkiella kobyla Mergl, 2008

Figures 8, 9

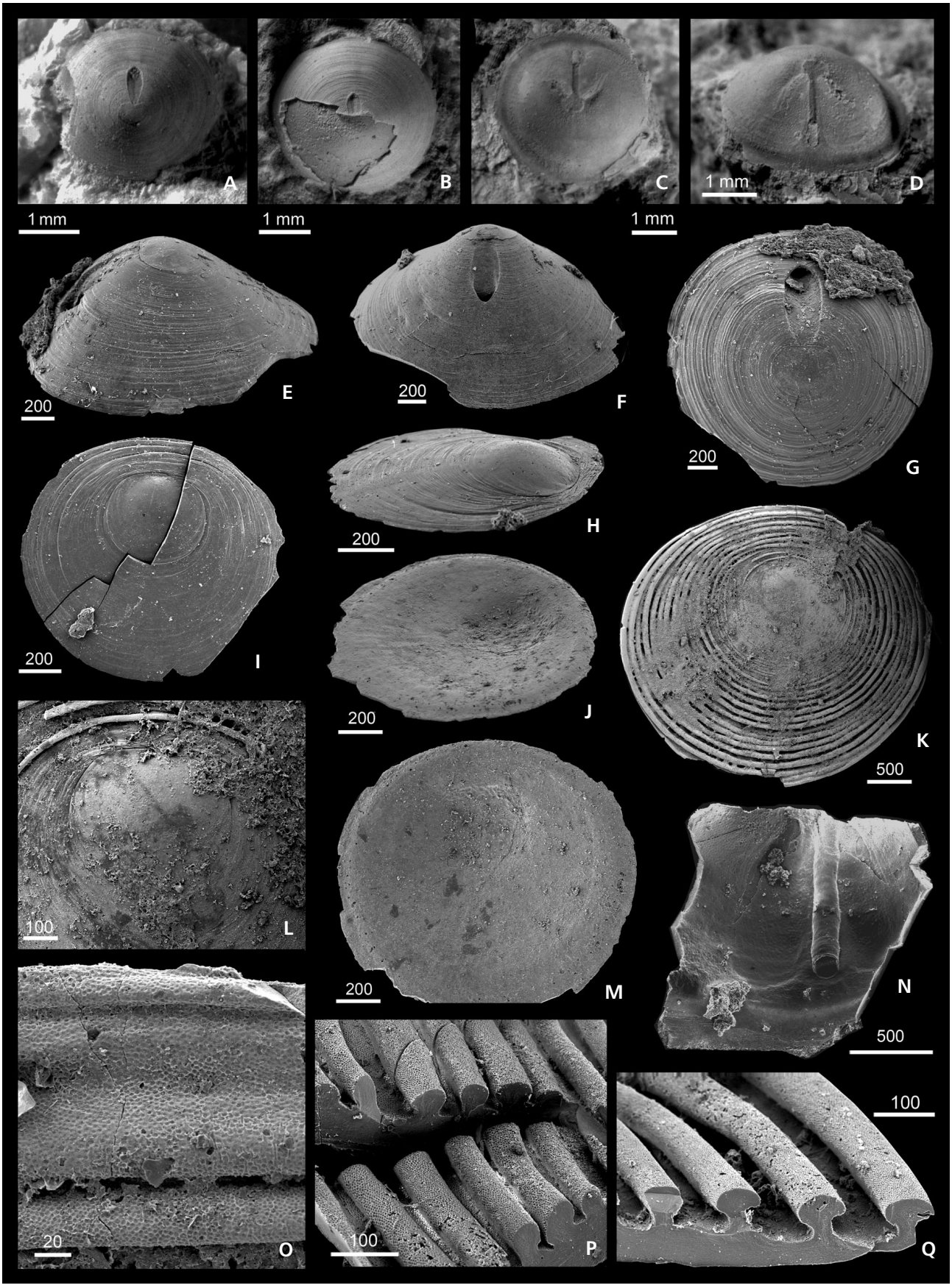
2001 *Opatrilkiella* (?) sp. B. – Mergl, p. 30, pl. 24, fig. 10.
2008 *Opatrilkiella kobyla* sp. nov. – Mergl, p. 290, figs 8, 9.

Material. – 81 dorsal and 47 ventral valves.

Description. – See Mergl (2008).

Remarks. – Newly collected specimens from the Chýnice Limestone are morphologically undistinguishable from the specimens derived from the *Acanthopyge* Limestones (Eifelian). They are also strongly variable in a shell shape, with the outline ranging from circular (Fig. 8G), pentagonal (Fig. 8D) to elongate oval (Fig. 8F). There is tendency for change from a more narrow outline in small specimens

Figure 6. *Chynithele ventricona* Havlíček, 1996, Chýnice Limestone, Čeřinka. • A – ventral valve, exterior, CGS LF 001. • B – partly exfoliated ventral valve, exterior, CGS LF 002. • C, D – ventral valve, interior, and posterior view showing internal pedicle tube, CGS LF 003. • E–G – ventral valve, exterior in side, posterior and apical views, PCZCU 1771. • H – dorsal valve exterior in oblique view, PCZCU 1776. • I – dorsal valve, exterior, PCZCU 1774. • J, M – dorsal valve interior, oblique and dorsal views, PCZCU 1775. • K, L, O – dorsal valve, exterior, detail ob brephic shell, and microornament, PCZCU 1772. • N – interior of incomplete ventral valve showing pedicle tube, PCZCU 1773. • P – dorsal valve, detail of rugellate ornament of dorsal valve, PCZCU 1777. • Q – dorsal valve, detail of rugellate ornament showing gradual change of profiles with age, PCZCU 1778. If not otherwise stated, length of bar in μm.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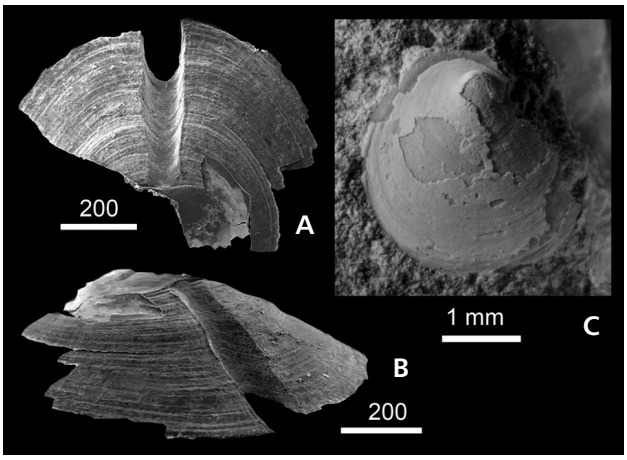


Figure 7. *Lochkothele* sp., Chýnice Limestone, Čeřinka. • A, B – fragment of ventral valve, exterior showing pedicle track, PCZCU 1791. • C – dorsal valve, exterior, 3RO 86184. Length of two bars in μm.

to a more broad outline in larger ones. The outline of the pedicle track is correspondingly variable, but generally it is posteriorly moderately diverging (Fig. 8A, B) on a steep posterior slope. The ornamentation of specimens from the Chýnice Limestone is also similar, with arrays of composite rheomorphic folds superimposed onto irregular concentric fila (Fig. 8N, O).

A pair of subparallel grooves extending from the anterior termination of the pedicle slit probably represents the imprints of pedicle nerves (Fig. 8K). Broadly divergent proximal parts of *vascula lateralia* are deeply impressed in the dorsal valve (Fig. 8J), but obscure in the ventral valve. Dorsal *vascula media* are comparatively smaller, with proximal parts impressed as short, widely divergent (at 35–40° angle to each other) narrow canals. A broad and flat rim which is devoid of setal follicle imprints suggest presence of only weak setae. A concentric subperipheral row of deep, circular, uniformly sized pits has been observed in one large specimen (Fig. 9A).

The interior of newly collected specimens show thick deposits of secondary shell material below muscle attachment sites and deeply impressed visceral areas with clear impressions of epithelial cells in both valves (Fig. 8K, M). The shallow epithelial cell imprints are also discernible on the anteromedian shell floor (Fig. 9E). These are slightly larger and more elongate imprints compared with imprints below muscles (Fig. 9F). In general, epithelial cell mould size ranges from 12 to 18 mm. The cells were externally mostly hexagonal in outline and were regularly spaced. Deeper, larger and less regularly arranged pits, laterally bordering the pedicle track (Fig. 9D) and at the apical chamber of the dorsal valve (Fig. 8J, M) are probably imprints of epithelial cells with a semiglobose surface. The epithelial cell imprints are also distinct on the inner face of the listrium (Fig. 9D).

Unlike the specimens from the *Acanthopyge* Limestone, the early brephic shell of all the presently studied specimens is smooth, without any imprints of siliceous tablets of the first-formed shell. This feature indicates, that the first-formed shell, evidenced in the genus in both stratigraphically earlier (*O. minuta* Mergl, 2001 of the Přídolian age) or later species (*O. kobyla* of the Eifelian age) cannot always be impressed on the early brephic shell. Presence of these pits cannot be used with conviction as a taxonomically important feature. It is not logical that live individuals of *O. kobyla* (collected from the Chýnice Limestone) lacked siliceous tablets when the stratigraphically younger population of the same species (collected from the *Acanthopyge* Limestone) show their imprints in the first-formed phosphatic layer of the brephic shell.

Occurrence. – The most abundant discinid in the Chýnice Limestone. It is common both in the crinoidal and micritic limestones. It is similarly common in the *Acanthopyge* Limestone (Eifelian).

Genus *Praeoehlertella* Mergl, 2001

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

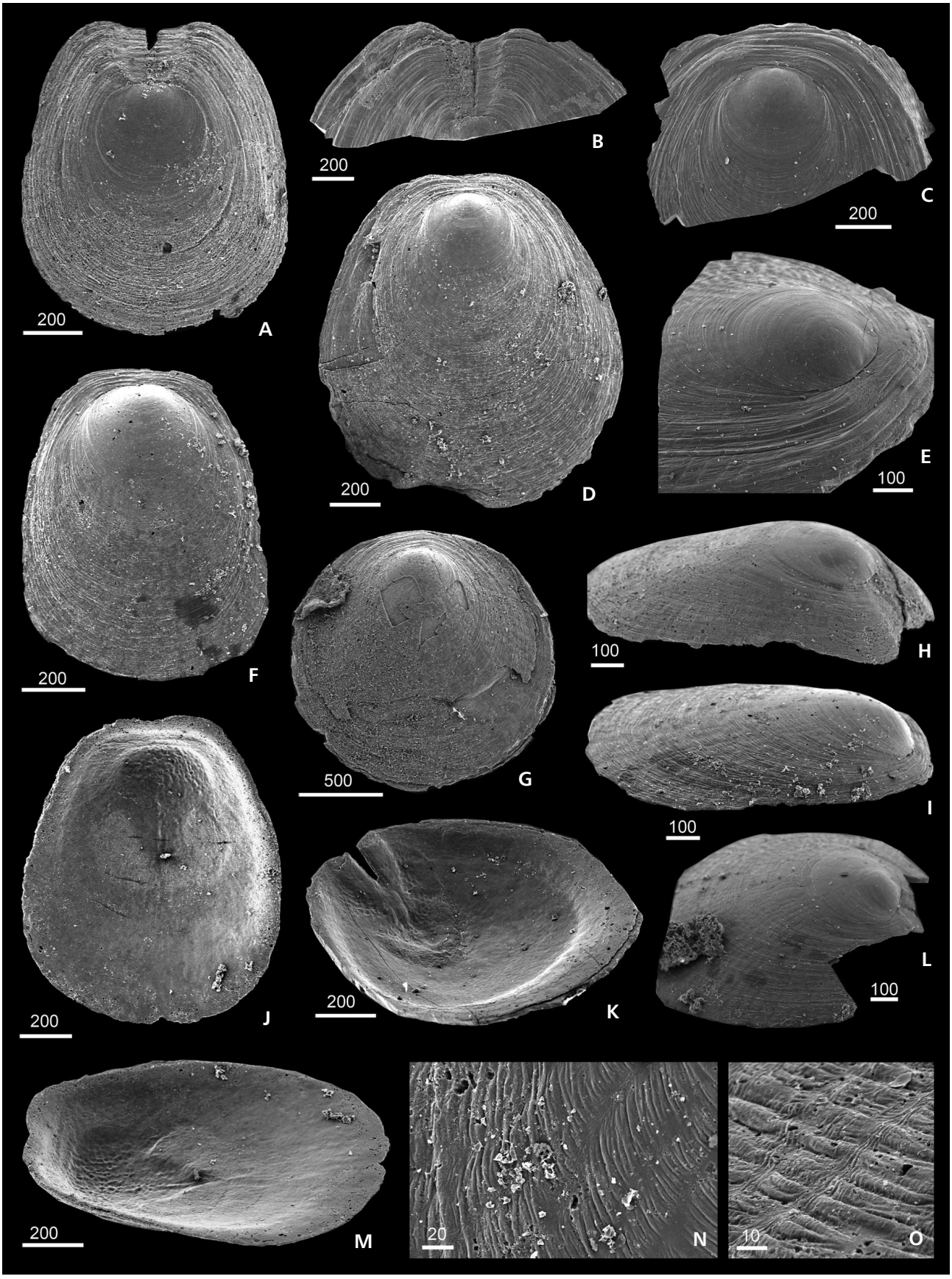
Praeoehlertella sp.

Figure 10

Material. – One dorsal and one fragment of ventral valve.

Description. – The shell is elongate oval, 3 mm long (an actual 4 mm length is inferred from growth lines), thick-walled relative to size. The dorsal valve has a submarginal apex, situated at 20% of the valve length. The valve is gently convex in transverse profile and weakly convex axially with a flat anterior part. The posterior slope is steep. The brephic shell is gently inclined backward. It has a subcircular outline,

Figure 8. *Opatrilkiella kobyla* Mergl, 2008, Chýnice Limestone, Čeřinka. • A – ventral valve, exterior, PCZCU 1764. • B – incomplete large ventral valve, exterior, PCZCU 1767. • C, E – incomplete dorsal valve, exterior and oblique views showing brephic shell, PCZCU 1766. • D – dorsal valve, exterior, PCZCU 1761. • F, I – dorsal valve, exterior, and side view, PCZCU 1770. • G – dorsal valve, exterior, PCZCU 1765. • H, O – ventral valve, side view of exterior, and detail of microornament of mature shell, PCZCU 1769. • J, M – dorsal valve, interior, and side view, PCZCU 1763. • K – ventral valve, interior, PCZCU 1768. • L, N – ventral valve, oblique view of exterior, and detail of microornament of mature shell, PCZCU 1762. Length of bar in μm.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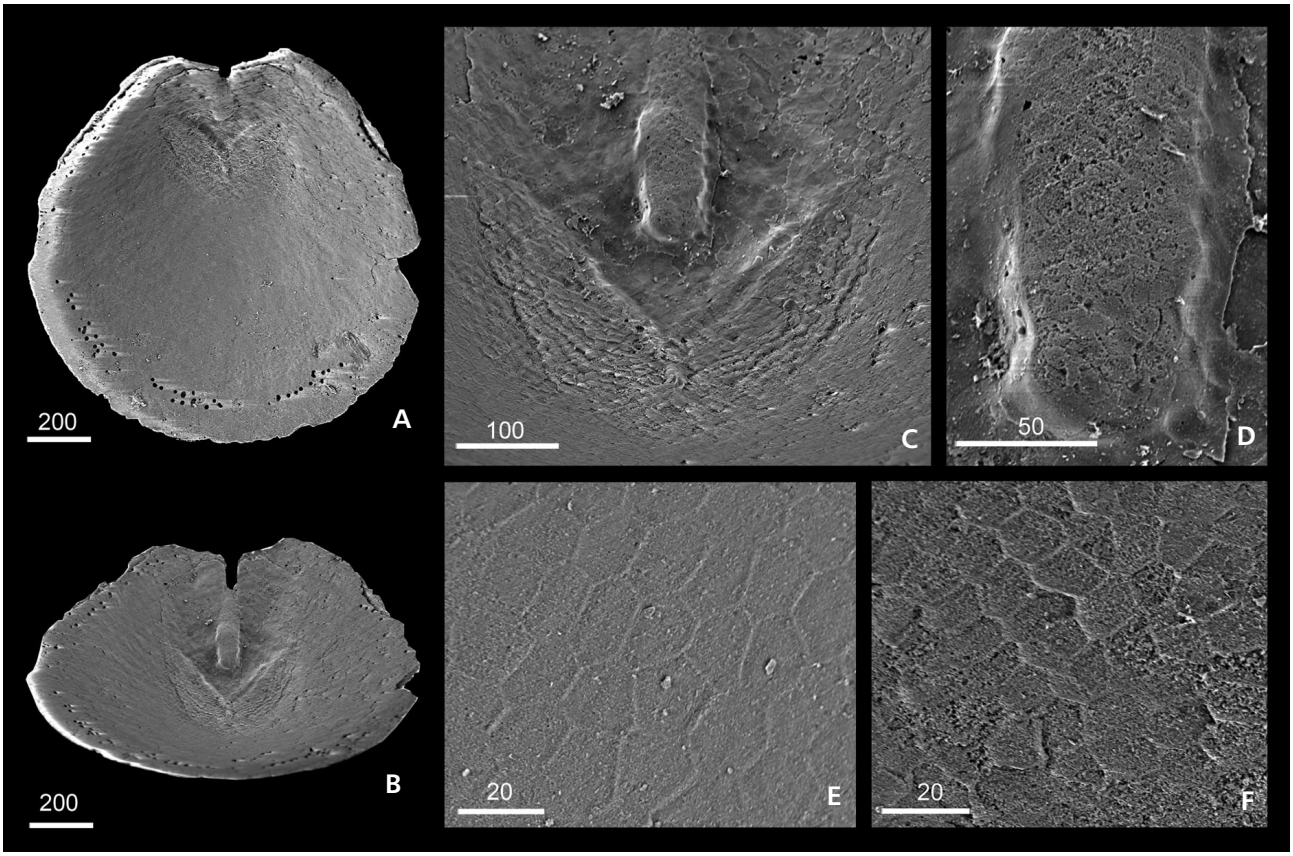


Figure 9. *Opatrilkiella kobyla* Mergl, 2008, Chýnice Limestone, Čeřinka. • A–F – ventral valve, interior with row of pits (A), anterodorsal view (B), detail of ventral muscle scar (C), epithelian cell moulds below listrium (D), the same in anterolateral sector (E) and on muscle scar (F), PCZCU 1792. Length of bar in μm.

550 μm wide. The brephic shell is weakly convex, with borders demarcated by coarse concentric bands anteriorly and distinct elevated edges posteriorly. Its surface is smooth, with weak concentric bands in the anterior half. Imprints of siliceous tablets have not been observed.

The ventral valve is poorly known. A single fragment (Fig. 10C) that most likely belongs to the same species shows a deep, slit-like, narrow and almost evenly wide pedicle track that from its midlength gently tapers posteriorly. The listrium forms narrow rapidly sloping lateral plates, and a narrow median strip. The inner edge of the median strip indicates that it had not been fused with the edge of the opposite median strip. The pedicle track most likely opened at a narrow strip along the axis.

Ornamentation of the dorsal valve consists of low growth bands, which posteriorly and posterolaterally form low, unevenly sized and densely crowded rugellae. Anteromedianly these rugellae continue into low ridges (Fig. 10F). Interspaces between rugellae or bands, respectively, are narrow, shallow anteromedialy but deep, slit-like posteriorly and posterolaterally. Ornamentation of the ventral valve consists of low concentric and somewhat irregular bands on the posterolateral slope.

The mature shell is densely covered by shallow circular pits arranged in a honeycomb-pattern. Pits regularly cover the entire shell surface. Pits are *ca* 3 μm in size, being encircled by high ridges. The pits never form distinct radiating strips separated by smooth rheomorphic interspaces which is common in other discinids.

Remarks. – Two incomplete valves do not warrant erection of a new species, but indicate existence of another but rare discinid in the Chýnice Limestone. The minute fragment of the ventral valve is referred to the dorsal valve because of the same microornamentation. The dorsal valve shows morphological similarity to *Praeoehlertella umbrosa* Mergl, 2001, which is a common species in black shale intercalations in the Dvorce-Prokop Limestone of the Praha Formation (*Monograptus atopus* Zone) in the Stydlé Vody quarry (Mergl 2001). Unfortunately, the superficial microornamentation of *P. umbrosa* is so far unknown. The genus *Praeoehlertella* probably exemplifies deep water discinids. Its rare occurrence in the Chýnice Limestone fits well with a shallow water origin of the limestone at the Čeřinka locality.

Occurrence. – A rare discinid in the Chýnice Limestone.

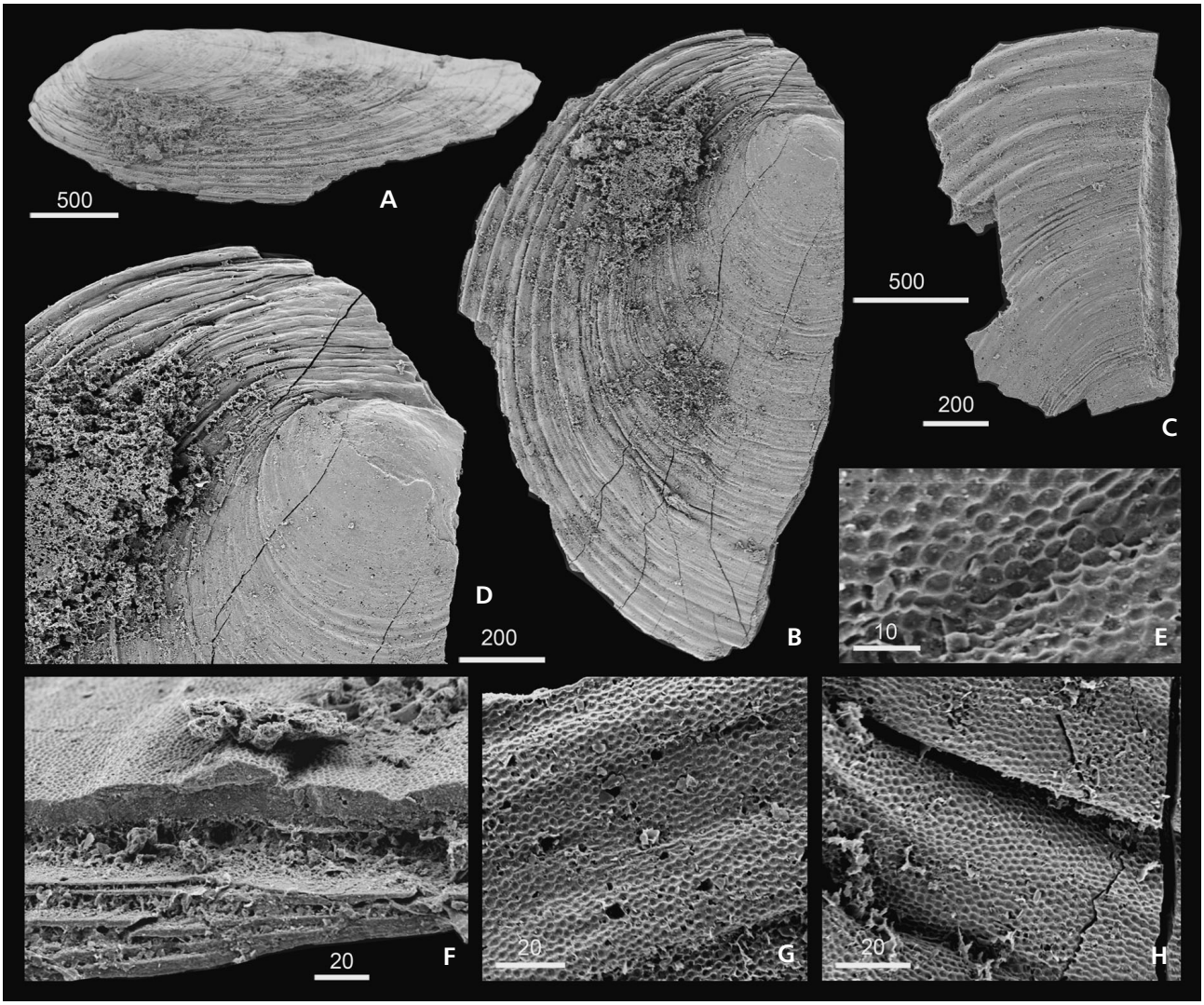


Figure 10. *Praeoehlertella* sp., Chýnice Limestone, Čeřinka. • A, B, D–F, H – dorsal valve, exterior in side view, exterior, detail of brephic shell, pitted microornament, profile of low rugellae, and detail of ornament of mature shell, PCZCU 1752. • C, G – fragment of ventral valve with side of listrium, and detail of microornament, PCZCU 1753. Length of bar in μm.

Genus *Schizotreta* Kutorga, 1848

Type species. – *Orbicula elliptica* Kutorga, 1846; Volkhov or Kundan, Ordovician; northwestern Russia.

***Schizotreta vaneki* sp. nov.**
Figures 11, 12

Holotype. – Dorsal valve figured here in Fig. 11B, C (3RO 85826).

Paratype. – Ventral valve figured here in Fig. 11D, F, G, J (3RO 85641).

Type horizon. – Emsian, Zlíchov Formation, Chýnice Limestone, *Nowakia elegans* Zone.

Type locality. – Čeřinka hillside, Bubovice, Central Bohemia.

Name. – In honour to J. Vaněk, a prominent Czech palaeontologist.

Material. – Four dorsal valves, three ventral valves and several fragments.

Diagnosis. – Shell broadly oval, medium sized; ventral valve without internal pedicle tube, with a narrow pedicle track having posteriorly a semi-closed pedicle notch; dorsal apex marginal; ornamentation of sparse, distant, concentric lamellae that are often interrupted.

Description. – The shell is ventri-biconvex, with moderate

thick wall, 5.5 mm long in the largest specimen. Shell outline varies from broadly oval to subcircular, with maximum width at midlength.

The dorsal valve is weakly convex axially and transversally, with evenly rounded margins. L/W = 1.11 to 1.18 (n = 3). The apex is marginal, with the brephic valve gently inclined backwards. The visceral area is weakly impressed, rhomboidal, and occupying 40% of the valve length, with a deep umbonal chamber. A narrow strip, a rudiment of the dorsal pseudointerarea, is seen along the posterior margin. There is complete set of muscle imprints (Fig. 12). The slope of the umbonal chamber is anteriorly crossed by a weak transverse groove, probably the site of posterior oblique muscles. Two pairs of scars, suggesteing posterior adductor and oblique internal muscles, are located near the lateral tips of the transverse groove. The much larger paired oblique imprints of anterior adductors are seen at about one third of the valve length. A much smaller pair of scars, suggesting the site of oblique lateral muscles, are located anteromedialy from the anterior adductor scars. Proximal parts of *vascula lateralia* are moderately divergent and well impressed. Proximal parts of *vascula media* are subparallel, broad, clearly impressed anteriorly to the midlength (Figs 11A, B, 12).

Ornamentation of the dorsal valve consists of seemingly regular, thin concentric rugellae, which often die out axially. Rugellae are uniformly sized, thin and having swollen crests. Some rugellae extend from the posterior margin, but the new rugellae more frequently originate by intercalation in the posterolateral sector of the valve. The interspaces are broad, with an irregularly rheomorphic surface.

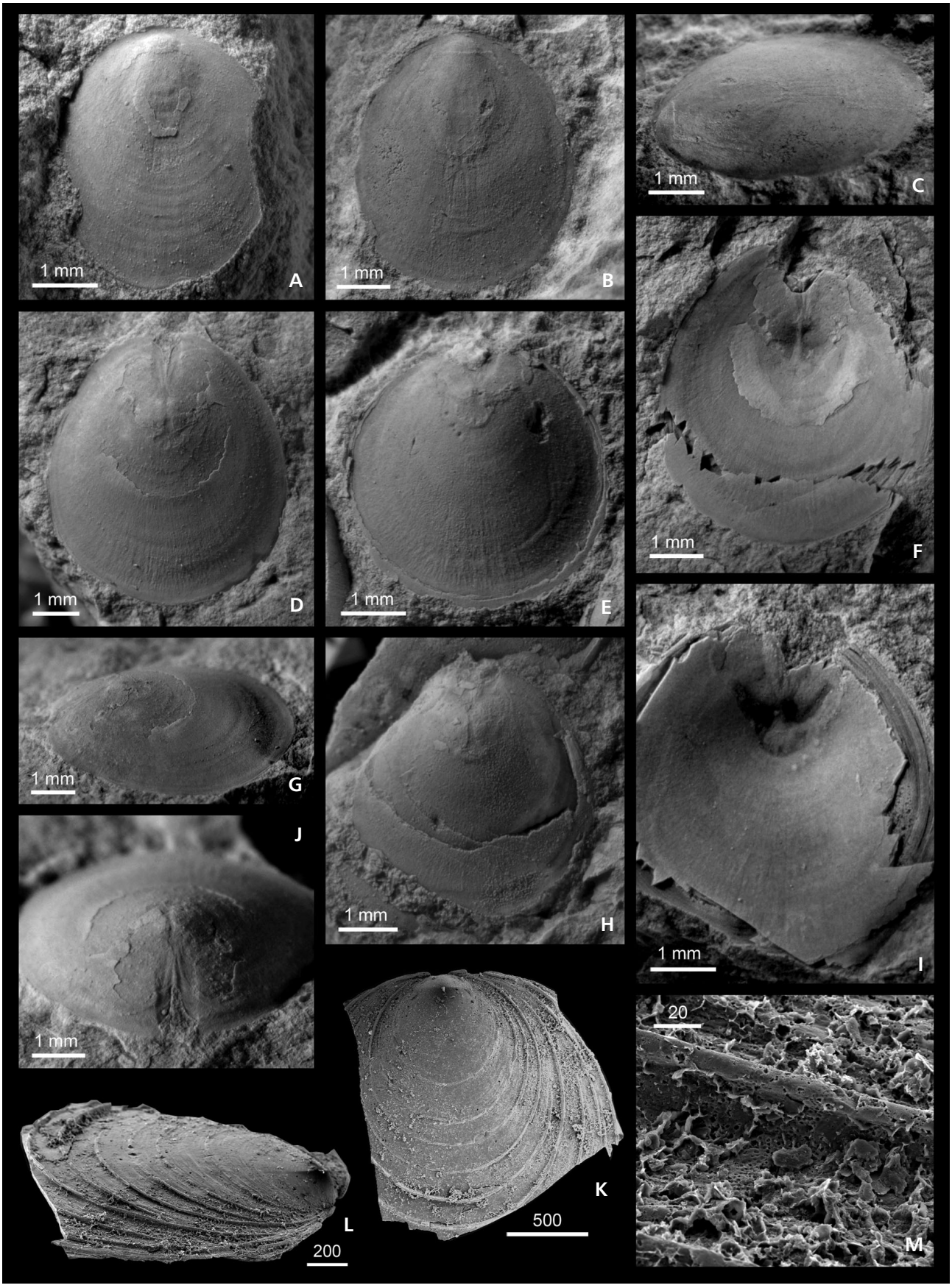
The ventral valve is low conical, with H/L = 0.19 to 0.2 (n = 2), with the apex being at 35% of the valve length. Anterior and lateral slopes are flat, the posterior slope is feebly convex. The pedicle track is weakly defined by shallow, almost evenly wide flattening of the valve surface, and also marked by a different ornamentation. The listrium consists of flat lateral plates with growth lines curved apically and a narrower, shorter and gently convex axial plate. There is a subtriangular notch near the posterior margin, which is tapered posteriorly by short lateral extensions of the shell. The visceral area is poorly impressed, anterolaterally having small, narrow, converging anterior adductor muscle scars. A shallow subcircular pit, anteriorly limited by crescent scars of the oblique internal muscles, protrudes between scars of the anterior adductors. A large, weakly defined area, laterally limited by a pair of small composite scars of posterior adductor, posterior oblique and oblique lateral muscles, is located in the posterolateral part of the visceral area. Proximal parts of pallial markings are indistinct but radially disposed terminal canals are perceptible along the periphery of the valve.

Ornamentation of the ventral valve consists of concentric distant low rugellae, similar but somewhat coarser than in the dorsal valve. Interspaces bear distinct irregular rheomorphic growth lines. Microornamentation consists of radial bands of circular pits, but is otherwise poorly known.

Remarks. – The gross morphology of the new species fits well into the generic concept of *Schizotreta* but there is clear difference in absence of pedicle tube in *S. vaneki* sp. nov. and marginal position of the dorsal apex. The new species has a flat but well differentiated listrium. The pedicle of a live animal most likely protruded between the posterior edge of the listrium and short non-mineralised organic sheet, which was laterally supported by a short, wing-like extension of mineralised shell (Fig. 11J). The posteriorly open pedicle notch is a diagnostic feature of the Trematidae Schuchert, 1893, but it is unlikely that the species can be referred to this family. A clear differentiation of the listrium into lateral plates and an axial plate, which is reminiscent and possibly homological to the pedicle groove and inner propareas of lingulids, is also known in other discinids and it is not unique in trematids (Baliński & Holmer 1999). The microornamentation of the new species consists of radial bands of circular vesicular pits. This type of microornament is consistently attributed to the Discinidae, while in Trematidae the microornamentation of a mature shell lacks deep pitting of circular pits arranged in discrete rows, with exception of *Opatrilkiella*, which has been reassigned to the Discinidae by Williams (2003).

Elongate-oval discinids from the Silurian and Devonian of the Prague Basin have been referred by Mergl (2001) to *Orbiculoidea* d'Orbigny, 1847, but most likely these belong to the *Schizotreta* evolutionary clade. All these species, namely *O. bohemica* (Barrande, 1879), *O. karlstejnensis* Mergl, 1996, and one so far undescribed species from the Požáry Formation, although similar to the new species, but clearly differing in the presence of an internal pedicle tube and a subcentral apex on their dorsal valves. Also the British species, *Schizotreta walkeri* Mergl 2006, of Wenlock age (Mergl 2006) shows a long internal pedicle tube and a submarginal dorsal apex. Presence of the pedicle tube in these species is likely to be dependent on shell size. Young specimens of *O. karlstejnensis* and others have a short pedicle track, which continues posteriorly into

Figure 11. *Schizotreta vaneki* sp. nov., Chýnice Limestone, Čeřinka. • A – dorsal valve, internal mould, 3RO 85727. • B, C – holotype, dorsal valve, internal mould and side view, 3RO 85826. • D, F, G, J – paratype, ventral valve, internal mould, interior, side view and detail of posterior slope with pedicle track, 3RO 85641. • E, I – ventral valve, internal mould, and interior with muscle scars, 3RO 85827, 3RO 85828. • K–M – incomplete dorsal valve, exterior, side view and detail of microornament, PCZCU 1781. If not otherwise stated, length of bar in μm.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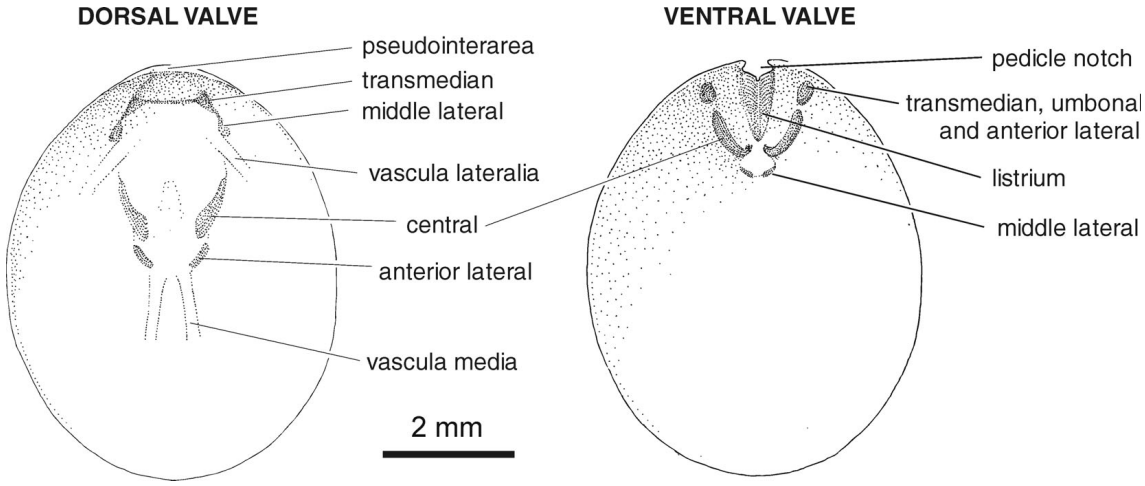


Figure 12. *Schizotreta vaneki* sp. nov. Reconstruction of dorsal valve (A) and ventral valve (B) interiors. Terminology after Holmer & Popov (2000).

a distinct internal pedicle tube. Juvenile shells have a pedicle notch and closure of the posterior margin and the formation of the pedicle tube began when the shell achieved a specific size. The new species from the Emsian age can indicate, that the lack of the pedicle tube and the reduction of the mineralised shell along the posterior margin, leaving only a narrow organic sheet, are of a paedomorphic origin in stratigraphically younger taxa derived from the ancestral tube-bearing *Schizotreta*.

Occurrence. – A rare discinid in the Chýnice Limestone.

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

Genus *Havlicekion* Mergl, 2001

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

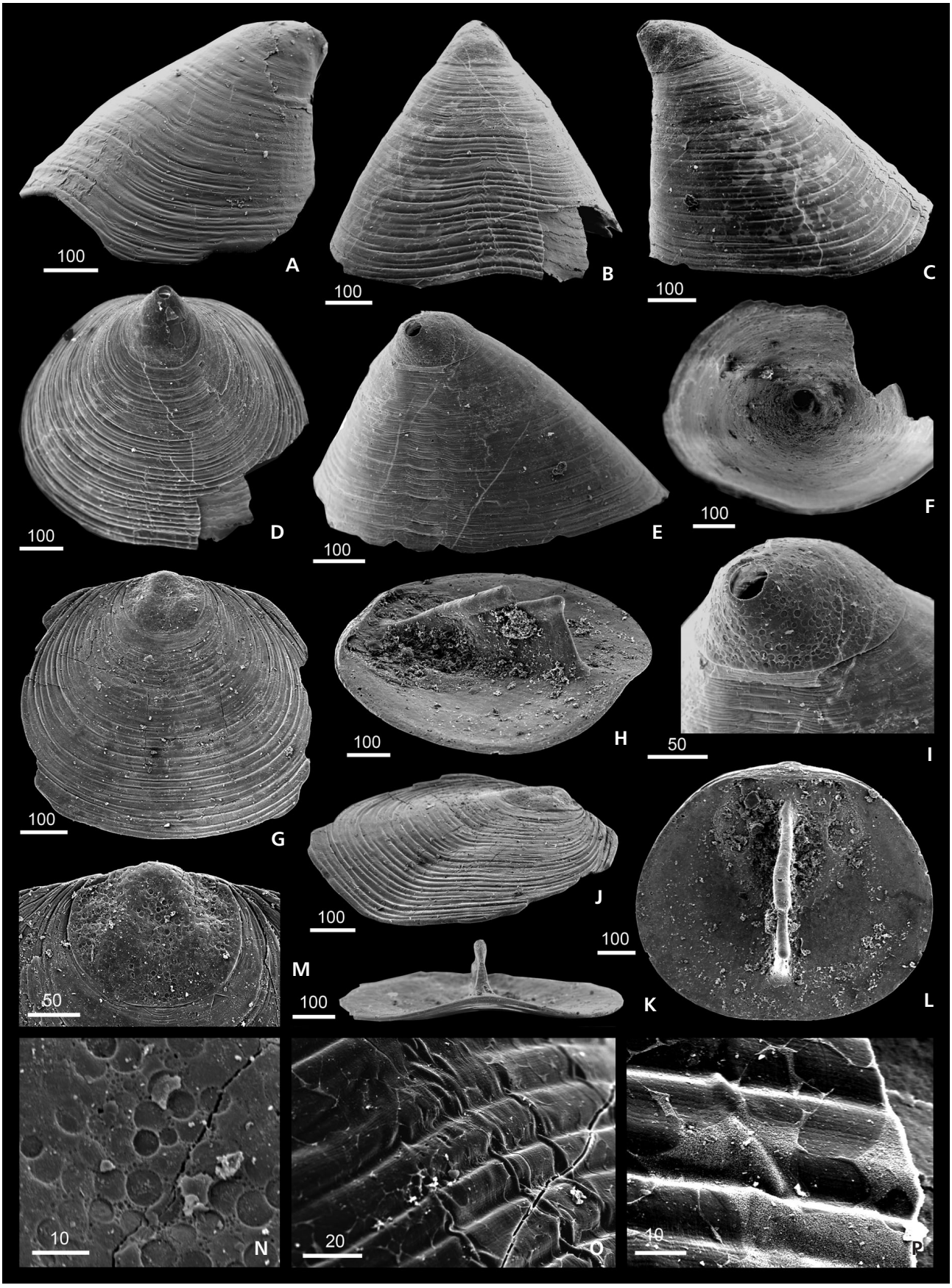
Remarks. – Importance of the microornamentation of the larval and mature shells has been briefly mentioned in the original diagnose (Mergl 2001). New data by Williams (2003) concerning the larval shell pitting of *Opsiconidion* Ludvigsen, 1974 and *Havlicekion* show that circular flat-based imprints are accompanied by much smaller hemisphaerical interspatial pits. These smaller pits are also evidenced from the new *Opsiconidion* material from the Chýnice Limestone (Fig. 14N). The larger circular pits do not overlap one another and interspaces between perfectly circular, flat-based imprints bear much smaller, but uniformly sized interspatial pits. In *Havlicekion*, there is a mosaic of overlapping unevenly sized circular or lunate, flat-based imprints and the interspaces show a mosaic of pits of variable size, corresponding both to interspatial pits and hemispherical imprints (*sensu* Williams 2003; text-fig. 5). Indeed, the mosaic of *Havlicekion* is more complex than that in *Opsiconidion*.

Ornamentation of the post-larval shell of *Havlicekion* comprises regular, low rugellae separated by narrower, deep and rounded interspaces (Fig. 13B, G). The microornamentation on these rugellae is unknown in all formerly described species of the genus. In *Havlicekion frydai* sp. nov. a flat top of each rugella bears fine concentric striation, finely but clearly impressed into an otherwise smooth surface (Fig. 13O, P). The striation is remarkably regular. The striae are *ca* 2 μm apart, numbering approximately twenty on an average-sized rugella. Whether this non-rheomorphic striation is also present in other species of *Havlicekion* in unclear and needs further investigation. This microornamentation is unique among acrotretoid brachiopods, being undescribed by previous workers (Williams & Holmer 1992).

***Havlicekion frydai* sp. nov.**
Figures 13, 14J, K

Holotype. – Dorsal valve figured here in Fig. 13G, J, M, N (PCZCU 1783).

Figure 13. *Havlicekion frydai* sp. nov., Chýnice Limestone, Čeřinka. • A – ventral valve, oblique view, PCZCU 1779. • B–E, I, O, P – paratype, ventral valve, exterior in anterior, lateral, top and oblique views, detail of larval shell, detail of ornament near anterior margin, and detail of microornament, PCZCU 1780. • G, J, M, N – holotype, dorsal valve, exterior, oblique view, detail of larval shell, and detail of pitting, PCZCU 1783. • H, L – dorsal valve, interior, oblique and dorsal views, PCZCU 1788. • K – dorsal valve, anterior view, PCZCU 1782. Length of bar in μm.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Paratype. – Ventral valve figured here in Fig. 13B–E, I, O, P (PCZCU 1780).

Type horizon. – Emsian, Zlíchov Formation, Chýnice Limestone, *Nowakia elegans* Zone.

Type locality. – Čeřinka hillside, Bubovice, Central Bohemia.

Name. – After J. Frýda, a prominent Czech palaeontologist.

Material. – 60 dorsal and 51 ventral valves.

Diagnosis. – *Havlicekion* with a transversely oval dorsal valve, having a prominent sulcus; dorsal septum high, blade-like, having a weak lower rod and robust, thick and shorter upper rod; anterior tip of lower rod asymmetrical; ornamentation of prominent growth fila with superimposed fine concentric striae at regular intervals.

Description. – The shell 1.35 mm wide in the largest specimens. The shell is thick-walled relative to size, with a clearly unisulcate commissure.

The dorsal valve is transversely oval, W/L ratio = 1.08 in the largest valve, with broad, subangular and rapidly widening sulcus. Flanks are flat. Maximum width situated slightly anterior to the midlength. The dorsal pseudointerarea is weakly apsacline, occupying 35% of valve width, with small propareas and a broad, suboval and rather deep median groove. Anterior edge of the interarea is forward slightly convex. The visceral area is well defined by a less smooth surface and a gently concave shell floor. The triangular median septum is blade-like, occupying almost 85% of valve length. Its anterior base is more anterior than the tip of the lower rod. Its height equals to about 22% of shell length. The upper rod is shorter, more robust than the lower rod, occupying two-thirds of septal length. The tip of the lower rod is somewhat asymmetrical, rounded, directed non-perpendicularly toward the shell periphery. The tip of the upper rod is rounded, directed much more anteroventrally. The base of the septum extends from a low median buttress that is conjunct with short transverse ridges delimiting a pair of deeply impressed semicircular pits. Cardinal muscle scars are large, oblique, anteriorly widening, with a surface moderately higher than the adjacent shell floor. The scars occupy 60% of width and *ca* 30% of the length of the valve. Large anterocentral muscle scars laterally border the median septum having a gently concave profile. There is a distinct oblique ridge between the central and anterocentral scars. Periphery of the valve is thickened into a flat, smooth brim. The shape of the dorsal valve and especially the dorsal septum undergo rapid changes during ontogeny. The small valves have a subcircular or rounded subpentagonal outline. The septum is much lower than in the adult shell with a weak rod. Muscle scars, a median buttress and a pair of pits laterally adjacent to the base of the septum, are poorly developed in young shells.

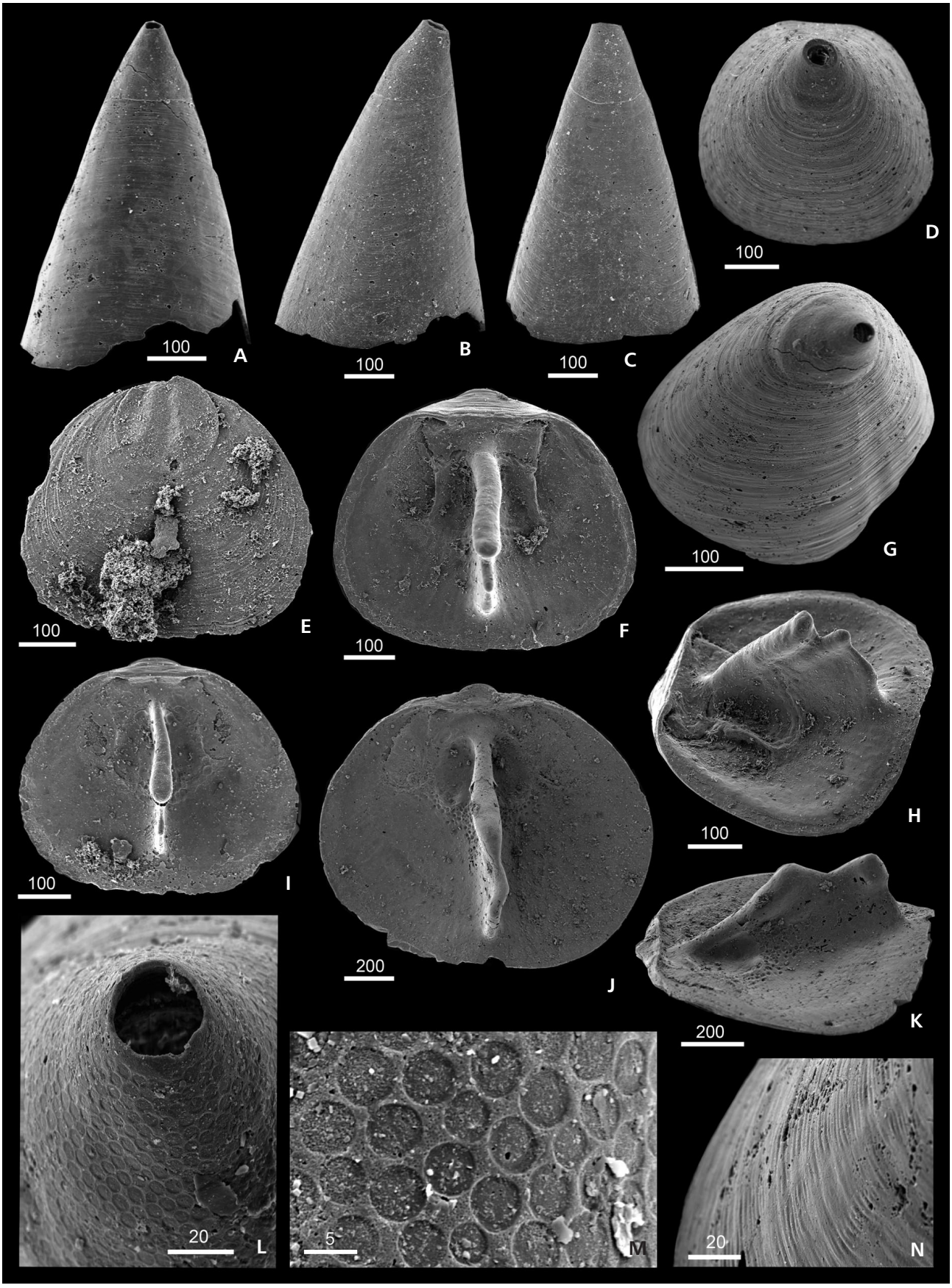
The dorsal larval shell is 180–200 μm wide and 150–180 μm long, with an evenly rounded and raised margin. There is a low axial posterior node and a pair of low anterolateral nodes. The imprint of the internal side of the larval shell is visible in two dorsal valves with exfoliated larval shells. There are two anterolateral shallow chambers and a posterior shallow chamber, all corresponding to external nodes. The low ridge forming the base of the dorsal median septum was already present in the early post-larval shell.

The ventral valve is highly conical but less so than in other biernatids. The apical angle is *ca* 75° in lateral view. The ventral pseudointerarea is catacline, narrowly triangular, with coarser growth fila that cover the remaining shell surface. 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 boundary of the larval shell is clearly defined by a swollen edge and weak depression on the anterior slope. The internal pedicle foramen is circular (Fig. 13F). The interior lacks the apical process and muscle imprints. The length of the pedicle opening indicates a fairly thick shell wall in the apical region.

Ornamentation of the larval shell consists of overlapping circular and lunate flat-based pits of uneven size. There are pits from 2 to 5 μm in diameter, with larger pits dominating. Interspaces bear hemispherical pits of different sizes. The post-larval shell bears regularly arranged concentric rugellae, increasing in size with growth. Rugellae are most prominent anteromedialy. Regularity of rugellae decreases near the pseudointerarea. Long, fine 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 species is closely related to the ancestral *H. splendidus* Mergl, 2001 from the Dvorce-Prokop Limestone (Pragian). The new species differs in a more

Figure 14. *Opsiconidion coralinus* sp. nov., Chýnice Limestone, Čeřinka. • A, B, G, L–N – paratype, ventral valve, exterior, posterior view, side view, oblique view, apical view showing larval shell, detail of pitting and detail of mature shell ornament, PCZCU 1789. • C, D – ventral valve, anterior and apical views, PCZCU 1790. • E – holotype, dorsal valve, exterior, PCZCU 1784. • F, H – dorsal valve, interior, dorsal and oblique views, PCZCU 1785. • I – dorsal valve, interior, PCZCU 1786. • J, K – *Havlicekion* sp., dorsal valve, interior, dorsal and oblique views, PCZCU 1787. Length of bar in μm.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deeply sulcate and more transverse dorsal valve and in the development of the dorsal septum. The upper rod of the new species is more robust, having much more ventrally projecting tip. The blade-like septum of the new species also bears a weaker lower rod. The dorsal pseudointerarea of *H. frydai* is shorter and the propareas more clearly differtiated from the median groove. The dorsal larval shell overhangs the posterior margin in the new species, unlike in *H. splendidus*. The species *H. holynensis* Mergl, 2001 (Lochkovian) differs from the new species by a less sulcate and almost circular dorsal valve and a higher dorsal septum, which is not supported by a clearly developed median buttress and also by a higher conical ventral larval shell with a ventrally directed pedicle foramen. The affinity of *H. holynensis* is less clear and the species should be referred to *Opsiconidion* Ludvigsen, 1974. The species *Opsiconidion robustum* Brock, Engelbretsen and Dean-Jones, 1995 of Pragian age has been referred to *Havlicekion* by Mergl (2001). This Australian species differs from the new species by a less unisulcate commissure and more posteriorly directed ventral apex. The microornamentation of the mature shell is unknown in *H. robustum*.

Some dorsal valves significantly exceed the average size of dorsal valve in *H. frydai*. These valves (Fig. 14J, K) could belong to the gerontic specimens of *H. frydai* but they could also belong to another larger species of the same genus.

Occurrence. – An abundant discinid in the Chýnice Limestone. It is common in the crinoidal limestone but scarce in micritic limestone.

Genus *Opsiconidion* Ludvigsen, 1974

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

Remarks. – A serious problem that one can meet is the description of a new species of this genus. All the so far described species of *Opsiconidion* (Ludvigsen 1974; Cocks 1979; Mergl 1982, 2001; Biernat 1984; Popov *et al*. 1994; Brock *et al.* 1995; Valentine *et al.* 2003) show similar general morphology, with a limited number of diagnostic morphological features. The differences for separation of a particular species mostly concerns the incline of the ventral valve, shape of the ventral pseudointerarea, direction of the pedicle foramen, shell outline, commissure or the nature of the dorsal median septum. Despite the general similarity and variability of populations derived from particular samples, these species probably represent real separate biological entities. The shell features in particular samples are rather more homogenous than heterogenous. The genus comprises the successful group of micromorphous organophosphatic brachiopods from the Middle Ordovician to Upper Devonian. The species richness of the genus is likely to be due to adaptation to diverse microhabitats. This adaptation probably led to the repeated development of separate species by peripatric speciation at different time and in diverse marine environments. It is likely, that there should be tens of species of the genus so far undescribed.

Opsiconidion coralinus sp. nov.

Figure 14A–I, M–O

Holotype. – Dorsal valve figured here in Fig. 14E (PCZCU 1784).

Paratype. – Ventral valve figured here in Fig. 14A, B, G, L–N (PCZCU 1789).

Type horizon. – Emsian, Zlíchov Formation, Chýnice Limestone, *Nowakia elegans* Zone.

Type locality. – Čeřinka hillside, Bubovice, Central Bohemia.

Name. – *Coralinus* (Latin), concerning nature of marine habitat with rich coral fauna.

Material. – Four dorsal and six ventral valves, three small fragments.

Diagnosis. – *Opsiconidion* with subpentagonal outline, tall ventral valve, narrow, flattened, and almost catacline ventral pseudointerarea, two obsolete rods in high dorsal septum, and weak growth lines.

Description. – The shell is 0.5 mm wide in the largest specimens, but there are fragments suggesting larger size, with shell width over 1 mm. The shell is thin-walled relative to size, with an almost rectimarginate unisulcate commissure. The shell outline is subpentagonal, with clearly less rounded anterior margin.

The dorsal valve is subpentagonal, with a W/L ratio = 1.12 (n = 2) in the largest valve, with a flattened broadly triangular median sector. Flanks are flat. Maximum width situated in the anterior third. The dorsal pseudointerarea is weakly apsacline, occupying 50% of the valve width, with small propareas and a broad, triangular and shallow median groove. The anterior edge of the interarea is straight. The visceral area is well defined. The triangular median septum is blade-like, about 85% as long it is high and almost 50% as long as the shell (Fig. 13F, H). The upper rod is shorter, more robust than the lower rod, occupying two-thirds of the septal length. The lower rod is less distinct, having about half the diameter of the upper rod. The tips of both rods are

rounded. Cardinal muscle scars are large, oblique, anteriorly widening and weakly impressed. Smaller and more deeply impressed anterocentral muscle scars are deeply concave, separated from adjacent central scars by a raised ridge. There is a distinct brim along the shell periphery.

The dorsal larval shell is *ca* 170 μm wide and 150 μm long, with an evenly rounded and raised margin. There are two lateral nodes divided by a median cleft. The larval shell clearly overhangs the posterior margin (Fig. 13F).

The ventral valve is highly conical, with H/W ratio = 1.50 (n = 2). The apical angle is *ca* 30° in lateral view. The ventral pseudointerarea is almost catacline, narrowly triangular and weakly depressed, with a very weak but visible interridge (Fig. 14G). The surface of the pseudointerarea has more distinct growth fila than those present on the remaining shell surface. Anterior and lateral slopes are slightly convex and straight, respectively. The anterolateral and anterior part of the valve margin is evenly rounded. The posterior margin is straight. The edge of the larval shell is less clearly defined, without any distinct step on the shell surface. The ventral larval shell is acutely conical, having a circular pedicle opening that is weakly posteroventrally directed. The interior lacks an apical process and muscle imprints.

Ornamentation of the larval shell consists of regularly spaced, circular flat-based pits of almost uniform size. The pits are 4 to 5 μm in diameter, with a prevalence of the larger pits. Pits are not overlapping, and there are slightly raised interspaces between them, covered by much smaller hemispherical pits (Fig. 13L, M). The post-larval shell bears weak growth lines, crossed by scarce, radially disposed coarser rheomorphic folds.

Remarks. – The new species is closely similar to Eifelian *O. decessus* Mergl, 2001 (Choteč and *Acanthopyge* limestones, Choteč Formation). *O. decessus* differs from *O. coralinus* by a narrower ventral pseudointerarea and a plate-like, narrowly triangular upper rod in the dorsal valve median septum. The ventral valve of *O. decessus* is higher, more acute and more symmetrically conical. Despite these differences, both species together with *Opsiconidion* sp. C of Pragian age (Mergl, 2001), are closely related and it justifies the suggestion that they belong to the same evolutionary clade.

Occurrence. – A less common species in the Chýnice Limestone. It is known mainly from the micritic limestone.

Conclusion

New observation indicates a remarkable uniformity in the peri-reefal lingulate brachiopod associations in the middle Emsian (Chýnice Limestone) to Eifelian (*Acanthopyge* Limestone) in the Prague Basin. Both associations are dominated by micromorphous biernatids and small discinids, whereas moderate-sized discinids and lingulates are absent. There are only minor differences concerning the presence of some taxa, especially the abundance of micromorphous oboline *Microbolus* in the *Acanthopyge* Limestone. The evolutionary affinity of fauna of the Chýnice Limestone and Acanthopyge Limestone, exemplified by rhynchonelliformean brachiopods, has already been noted by Havlíček (*in* Havlíček & Vaněk 1996).

The lingulate faunas of the Chýnice Limestone and Acanthopyge Limestone most likely represent an "average" fauna of the peri-reefal environment of Emsian and Eifelian age. It is logical to suggest the occurrence of the same or closely related taxa also in the Suchomasty Limestone of the Pragian Basin. It is probable, that the related lingulate association could also be observed in the Emsian to Eifelian peri-reefal sediments outside Central Europe.

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