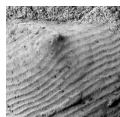


Devonian craniide brachiopods from the Prague Basin, Czech Republic

MICHAL MERGL & KLÁRA SAZIMOVÁ



Craniide brachiopods are generally rare in the Lower and early Middle Devonian sediments of the Prague Basin of the Czech Republic. Only three craniid species were described by J. Barrande in the 19th century. Subsequently, several species were recognized and figured, but remained formally undescribed by Havlíček & Vaněk (1998). A current revision of the material stored in three palaeontological collections confirms the validity of the species *Discina plicosa*, and *D. transversa* described by Barrande (1879); their lectotypes were selected. The new genus *Urbicrania* is erected, with two new species, *U. limbata*, and *U. egressa*. Six other species, referred to the genera *Deliella*, *Petrocrania*, and *Propatella* are left in open nomenclature. The craniides from the Prague Basin point to moderate phenotypic plasticity, with shell shape affected by a host morphology. A clear influence of microrelief of the host substrate was observed in one species. • Key words: Craniide brachiopods, Devonian, Prague Basin, Czech Republic.

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The order Craniida Waagen, 1885 includes a small group of brachiopods, which are unique by primary acicular and secondary laminar punctate layers of the dorsal valve, and orthodoxly inarticulated condition of the shell. Their convex to subconical dorsal valve is invariably calcified while the ventral valve often lacks the secondary shell or is entirely periostracal. With the earliest record in the Lower Ordovician, the craniides were always a minor group in marine ecosystems, but survive to the present day (Bassett 2000). Their fossils records are rather marginal, with overuse of the name *Crania* Retzius, 1781.

The first craniides from the Prague Basin were described by Barrande (1879). He assigned several species to the genera *Discina* Lamarek, 1819 and *Crania* Retzius, 1781. In Devonian rocks, he (in original spelling) described *Discina transversa* Barr. (therein, pl. 99, case 3, figs 1–3) from the Koněprusy Limestone (Pragian) from Koněprusy, *Discina praepostera* Barr. (therein, pl. 99, case 7, fig. 1) from the Dvorce-Prokop Limestone from Praha-Braník, and *Discina plicosa* Barr. (therein, pl. 101, case 2, figs 1–7) from the Dvorce-Prokop Limestone from Praha-Braník, and Koněprusy Limestone from Koněprusy. He described the craniide species *Discina radians* Barr. and *Discina obsoleta* Barr. (therein, pl. 102, case 8, figs 1–8) from the Upper Ordovician of the Beroun area. To the genus *Crania*, Barrande (1879) assigned only the species *Crania inexpectata* Barr. (therein, pl. 110, case 5)

from the Upper Ordovician, and *Crania? bohémica* Barr. (therein, pl. 95, case E) from the Lower Devonian, probably coming from the Zlíchov Formation. However, the internal morphology of the latter indicates its discinid affinity.

The Ordovician craniides were revised by Havlíček (1972, 1994a). He re-assigned two species, *Crania inexpectata* and *Discina obsoleta*, to *Petrocrania* Raymond, 1911. Both species are abundant in the Upper Ordovician of the Prague Basin, spanning some Sandbian units (Libeň, Letná, and Bohdalec formations). Both species preferred a fixosessile habit, with conulariid tests as the preferred substrate. More rare occurrences of craniides come from other Ordovician units. Havlíček (1994b) reported rare shells of *Philhedra* Koken, 1889 from the Kosov Formation (Hirnantian). Similarly, rare occurrences of *Propatella* Grubbs, 1939 and *Deliella* Halamski, 2004 come from the uppermost Králův Dvůr Formation (Katian) (Mergl 2012, Holmer *et al.* 2013). Mergl (2002) described the new species *Petrocrania caputium* Mergl, 2002 from the Mílina Formation (Tremadocian). Recently, a short report on the Silurian craniide was published by Mergl & Sazimová (2025).

Apart from Barrande (1879), only Havlíček & Vaněk (1998) figured and briefly commented on the occurrence of craniide brachiopods of Pragian age. They illustrated some types of Barrande (1879) together with some new

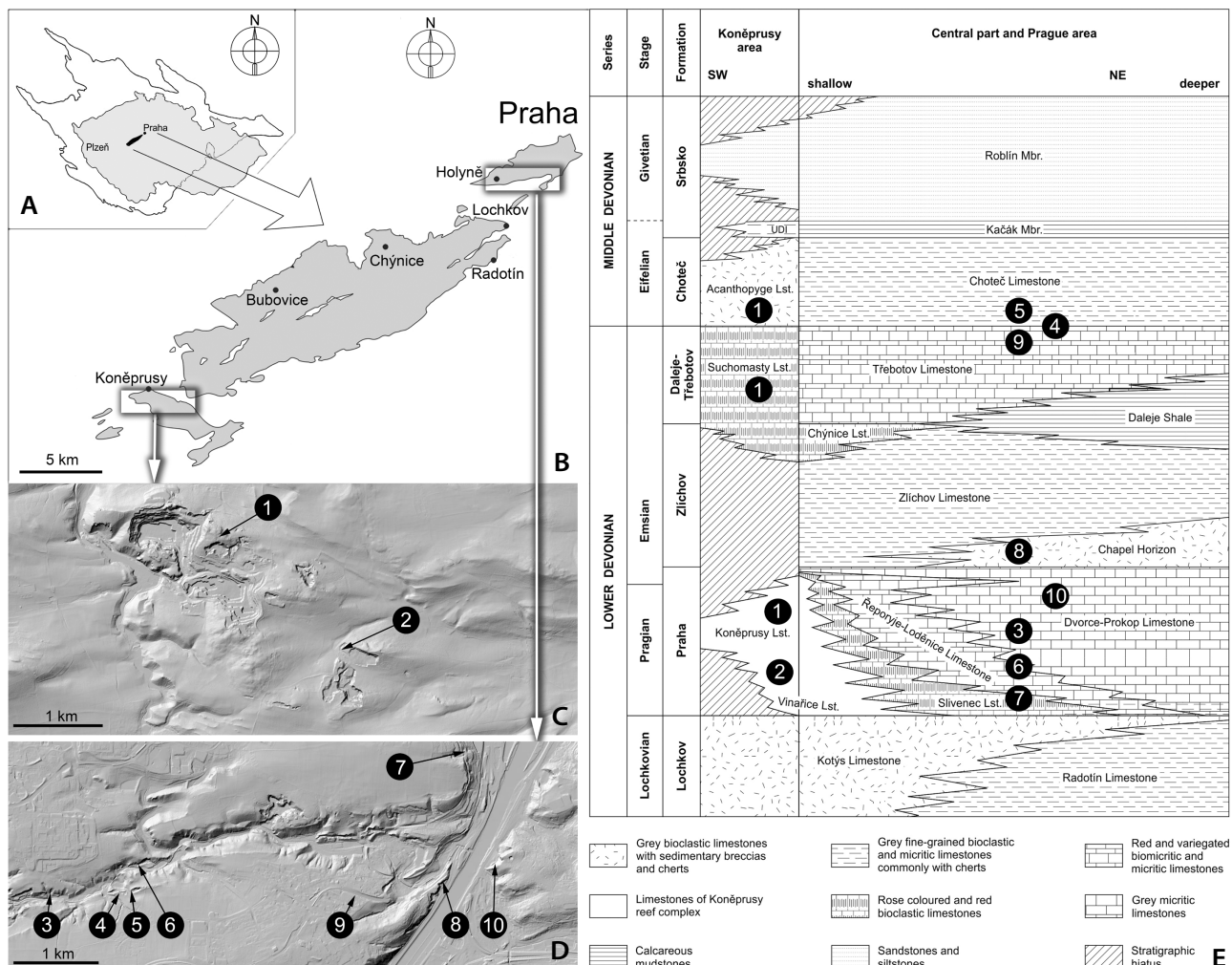


Figure 1. A – geographical setting of the Devonian (A) in the Bohemian Massif (white area) and the Czech Republic (gray area). • B – the Devonian in the Prague Basin. • C – relief of the Koněprusy area with marked localities 1 and 2. • D – relief of the SW territory of Prague with marked localities 3 to 10. • E – stratigraphy of the Devonian in the Prague Basin with approximate position of the localities. Modified after Chlupáč (1998b), Vaškaninová & Kraft (2014), and after <https://ags.cuzk.cz/arcgis2/rest/services/dmr5g/ImageServer>.

specimens, and introduced three new genera and two new species names: *Bulbocrania merope* nom. nud. (Havlíček & Vaněk 1998, text-Fig. 5), *Urbicrania limbata* nom. nud. (Havlíček & Vaněk 1998, pl. 1, figs 4, 8, 16), and *Plicosocrania plicosa* (Barr.) (Havlíček & Vaněk 1998, pl. 1, figs 3, 5, 6). However, there is only a short comment on their stratigraphic occurrences, and their formal descriptions are completely missing. Therefore, these names are *nomina nuda*. Havlíček & Vaněk (1998) explained that they intended to complete a study of Silurian and Devonian craniids of the Prague Basin in the next future in cooperation with Michael Bassett. However, this planned work was never published. The craniide specimens sampled by V. Havlíček are currently stored in the palaeontological collection of Museum of Dr. Bohuslav Horák in Rokycany. However, compared with other brachiopod groups, the craniide specimens are

quite scarce in his collection. The specimens from the Havlíček's collection, together with the specimens in the collection of J. Barrande stored in the National Museum, Prague, and the specimens sampled by the first author (MM), form a background for the present study.

The aim of our work, apart from the formal descriptions of new taxa, is to revise the types of Barrande (1879), and to comment on craniide names erected by Havlíček & Vaněk (1998). We adopted, rejected, or newly defined some previous suggestions made by these authors.

Material and methods

Most of the studied craniide brachiopods were isolated and picked from residues obtained by gentle washing and sieving of deeply weathered micritic limestones ("white

beds”). Other specimens, mostly in old collections, were sampled by hammering hard limestone. Therefore, among the material of craniides from the Prague Basin, three mode of preservation can be distinguished.

Well-preserved specimens come from the washings of deeply weathered micritic limestone beds. The soft loose residue (“white beds”) is rich in calcite fossils, mainly crinoid ossicles, and shells of brachiopod and gastropods. In these residues, the craniide shells are represented by loose specimens that clearly show the external and internal morphology, and the structure of a shell wall.

A few internal moulds come from weathered but still solid limestone, exhibiting some internal structures. Other specimens from hard limestone are preserved as internal moulds, some having partially preserved the original shell fabric/microstructure. However, this mode of preservation conceals some internal features. The substantial part of the specimens, due to the mode of preservation and the rarity of individuals, is left in an open taxonomic position. These specimens are assigned to *Petrocrania* Raymond, 1911. We use this genus, which effectively has become a ‘wastebasket’ taxon for the Palaeozoic craniides (Holmer *et al.* 2013), although it is clear that some of the Bohemian species belong to particular genera. Nevertheless, we want to avoid the introduction of poorly defined taxa given the current state of knowledge.

The exact geographical and stratigraphical locations of all newly sampled specimens are sufficiently well constrained because the beds of deeply weathered limestone have a limited extent in rock exposures. The exact localities of Barrande’s material are less clear, although approximate sites of his localities are known (Chlupáč 1999, 2003). The stratigraphical and geographical distributions of the material are shown in Figure 1.

Unless stated otherwise, the specimens were whitened by ammonium chloride prior to optical photography. Only the loose specimens from washings were examined using a scanning electron microscope (SEM). Specimens were mounted on stubs, coated by gold, and studied and photographed in a vacuum chamber in SEM JEOL 7401. The ultrasonic cleaning of specimens was avoided because test specimens were falling apart during the process.

The figured specimens are stored in the palaeontological collections of the National Museum, Prague (prefix L), in the palaeontological collections of the University of West Bohemia (prefix PCZCU), and in the collection of the Museum of Dr. Bohuslava Horák at Rokycany (prefix MBH), where the brachiopod collection of V. Havlíček is located. To avoid confusion, the original numbers used in the collection of V. Havlíček (prefix VH) are mentioned in parallel with the current collection numbers in the figure captions.

Abbreviations: Dv – dorsal valve; L – length; W – width.

Geological setting

We refer to Chlupáč (1996, 1998a, b, 2003) who provided overviews of the litho- and biostratigraphy, summarized ranges of index fossils, and listed the references on various aspects of the Devonian in the Prague Basin. In the basin, the reef biofacies are preserved only in a small area in the SW part of the Devonian infill (Fig. 1B). Bioclastic, mostly crinoidal limestones are developed along the NW limb of the basin. The deeper-water, mostly micritic red and light-to dark-grey limestones are situated mostly along SE part of the basin. The siliciclastic deposition occurred more locally, mostly related to the Daleje, Choteč, and Kačák events (Chlupáč & Kukal 1988), with a culmination in the Givetian, when carbonate sedimentation was terminated.

The systematic descriptions of the brachiopods, related biofacies, and benthic communities were provided by Havlíček & Vaněk (1998) for the Pragian, Havlíček (1998) for the Lower Emsian, and Havlíček & Kukal (1990) for the Upper Emsian and the Eifelian. Data on distributions of other stratigraphically important fossils (trilobites, goniatites, dacryoconarids, conodonts) at the studied localities were provided by Chlupáč (1977, 1983a), Šnajdr (1980), Chlupáč & Turek (1983), Bouček (1964), Lukeš (1989), Slavík (2004), and Berkyová (2009). Lists of the Devonian localities, including the original names used by J. Barrande, were published by Chlupáč (1983b, 1999, 2003).

The craniides derive from the following localities (where the exact site is known, the WGS84 coordinates are mentioned):

1) Koněprusy, Zlatý Kůň (Fig. 1C: 1); old quarries on a slope and the summit of the Zlatý kůň elevation; Pragian, Praha Formation, Koněprusy Limestone; Upper Emsian, Daleje-Třebotov Formation, Suchomasty Limestone, and Eifelian, Choteč Formation, *Acanthopyge* Limestone. Some specimens of J. Barrande came from the Koněprusy Limestone, whereas others also came from the Suchomasty or *Acanthopyge* limestones; material in the collection of V. Havlíček exclusively came from the Koněprusy Limestone.

2) Měňany, Plešivec (49° 54' 22.020" N, 14° 5' 17.466" E) (Fig. 1C: 2); exposures near W margin of the abandoned quarry; Pragian, Praha Formation, Koněprusy Limestone; collection of V. Havlíček only.

3) Praha-Holyně, U Kantiny Quarry (50° 1' 54.571" N, 14° 20' 23.211" E) (Fig. 1D: 3); Pragian, Praha Formation, weathered Dvorce-Prokop Limestone (“white beds”); collection of V. Havlíček and the new material.

4) Praha-Holyně, old trench (50° 1' 58.109" N, 14° 21' 3.935" E) (Fig. 1D: 4); Upper Emsian, Daleje-Třebotov Formation, Třebotov Limestone (“white beds”); collection of V. Havlíček and the new material.

5) Praha-Holyně, Prastav Quarry (50° 2' 0.230" N, 14° 21' 15.477" E) (Fig. 1D: 5); Eifelian, Choteč Formation, Choteč Limestone, basal limestone beds; collection of V. Havlíček.

6) Praha-Klukovice, Červený lom Quarry (50° 2' 9.835" N, 14° 21' 11.655" E) (Fig. 1D: 6); Pragian, Praha Formation, weathered Řeporyje Limestone ("white beds") in W part of the quarry; collection of V. Havlíček and the new material.

7) Praha-Smíchov, Konvářka, small old quarry (now destroyed) (50° 3' 7.997" N, 14° 24' 16.286" E) (Fig. 1D: 7); Pragian, Praha Formation, weathered Slivenec Limestone ("white beds"); collection of V. Havlíček and the new material.

8) Praha-Barrandov, UKapličky Quarry (50° 2' 19.376" N, 14° 24' 13.959" E) (Fig. 1D: 8); Lower Emsian, Zlíchov Formation, weathered limestone of the Chapel Coral Horizon ("white beds"); collection of V. Havlíček.

9) Praha-Barrandov, road cut (50° 2' 8.374" N, 14° 23' 30.744" E) (Fig. 1D: 9); Upper Emsian, Daleje-Třebotov Formation, Třebotov Limestone, and Eifelian, Choteč Formation, Choteč Limestone, basal limestone beds ("white beds"); the new material comes from three stratigraphic levels (samples Barr: -250, -220, and -160 cm below the Daleje-Třebotov/Choteč formations boundary).

10) Praha-Braník, old quarries (Fig. 1D: 10); Pragian, Praha Formation, Dvorce-Prokop Limestone; collection of J. Barrande.

Systematic part

Class Craniata Williams *et al.*, 1996
Order Craniida Waagen, 1885
Superfamily Craniidea Menke, 1828
Family Craniidae Menke, 1828

Genus *Deliella* Halamski, 2004

Type species. – *Deliella deliae* Halamski, 2004; Eifelian, Skaly beds; Holy Cross Mountains, Poland.

Deliella cf. *rhenana* (Dahmer, 1930)

Figure 2A, B, E

Material. – One loose valve, PCZCU 3006.

Description. – The incomplete dorsal valve is 3 mm long, subcircular or asymmetrically trapezoidal in outline, with partly damaged margins (Fig. 2B). The shell is moderately thick, subconical, with straight slopes. The posterior slope is steeper than the anterior slope. The apex is clearly

posterocentral, pointed, and directed posterodorsally (Fig. 2A). The ornamentation consists of coarse, uniformly sized radial ribs separated by slightly wider interspaces. There are 42 ribs along the shell periphery (Fig. 2B). Ribs terminate by solid prone spines along growth lamellae (Fig. 2E). New ribs originate by intercalation. The interior is unknown.

Remarks. – The species is rather similar to the *Deliella rhenana* (Dahmer, 1930), but our specimen is much smaller than the holotype, and is similar by size and number of ribs to the juvenile specimen figured by Franke (2012, pl. 1, fig. 3). The type species *D. deliae* Halamski, 2004 differs in having finer and more numerous radial ribs (Halamski 2004, Halamski & Baliński 2013).

Occurrence. – Upper Emsian, Daleje-Třebotov Formation, Třebotov Limestone; locality 4.

Deliella sp.

Figure 2F–G

Material. – One dorsal valve, MBH 70586.

Description. – The dorsal valve is very poorly preserved, with an unclear periphery. It is 1.7 mm wide, subcircular in outline, with a posterocentral beak. The presence of fine radial ribs, estimated at *ca.* 40, is noticeable from the dark radial lines visible within the shell wall (Fig. 2G). The ribbed external surface is strongly corroded, but bases of numerous prone (?) spines are noticeable.

Remarks. – The specimen differs from *Deliella* cf. *rhenana* by its smaller and a thinner shell with finer ornamentation. The weakly defined external ribbing (Fig. 2F) resembles the ornamentation of *Merglia* Franke, 2012, but our material is of poor quality.

Occurrence. – Pragian, Praha Formation, Řeporyje Limestone; locality 6.

Genus *Petrocrania* Raymond, 1911

Type species. – *Craniella meduanensis* Oehlert, 1888; Upper Devonian of Ferques, France.

Petrocrania transversa (Barrande, 1879)

Figure 3

1879 *Discina transversa* Barr.; Barrande, pl. 99, case 3, figs 1–3.

1879 *Discina praepostera* Barr. – Barrande, pl. 99, case 7.

1998 *Petrocrania praepostera* (Barr.). – Havlíček & Vaněk, pl. 1, fig. 13.

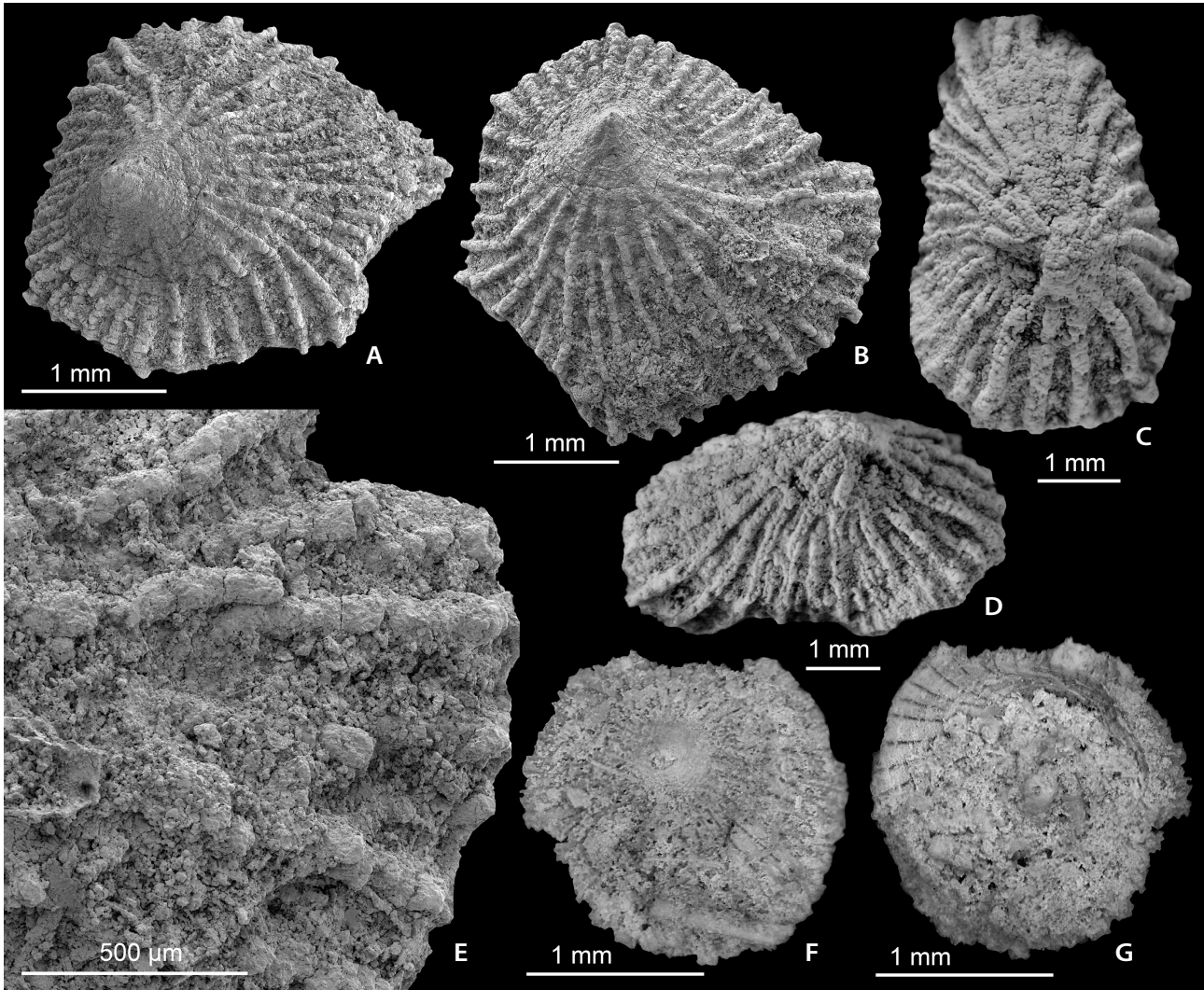


Figure 2. A, B, E – *Deliella* cf. *rhenana* (Dahmer, 1930), dorsal valve in oblique posterolateral (A), and dorsal (B) views, and detail of the ornamentation, PCZCU 3006. Age: Upper Emsian, Daleje-Třebotov Formation, Třebotov Limestone. Locality: Praha-Holyně. SEM micrographs, gold-coated. • C, D – *Propatella* sp., dorsal valve in dorsal (C), and oblique lateral views (D), MBH 97544, (coll. VH 10978). Age: Lower Emsian, Zlichov Formation, Coral Chapel Horizon. Locality: Praha-Barrandov, U Kapličky Quarry; figured by Havlíček (1998), pl. 2, fig. 6. Specimen coated with ammonium chloride, reflected-light photographs. • F, G – *Deliella?* sp., dorsal valve exterior (F) and interior (G), MBH 70586 (coll. VH 10978). Age: Pragian, Praha Formation, Řeporyje Limestone. Locality: Praha-Klukovice. Reflected-light photographs, uncoated specimens.

Lectotype (herein designated). – The dorsal valve, figured by Barrande (1879) in pl. 99, case 3, figs 2a and enlarged 2a, stored in the National Museum, Prague (L 16266), re-figured herein in Fig. 3A.

Type horizon and locality. – Pragian, Praha Formation, Koněprusy Limestone; Koněprusy.

Material. – Four dorsal valves, the types of Barrande (L 16264–16267), and three dorsal valves from Havlíček’s collection (MBH 69874, MBH 64875, MBH 69919).

Diagnosis. – Thin-walled craniide with a transversally oval outline, a submarginal dorsal apex, and a very low

and steep posterior slope; posterior margin straight, anterior margin weakly rounded; ornament of fine growth lines; shell ornamentation often replicates that of the host.

Description. – The dorsal valve is transversely oval in outline, thin-walled, 5 mm wide and 3.8 mm long in the largest complete specimen. The straight part of the posterior margin occupies about 50% of the shell width and passes into evenly rounded lateral margins (Fig. 3A–C, G). The anterior margin is weakly rounded. The apex is submarginal, forming the highest point of the shell (Fig. 3H). The steep, planar, broadly triangular posterior slope continues into weakly convex flanks (Fig. 3A, G, H).

A weak triangular flattening is present in some specimens on the anterior slope (Fig. 3G, H).

The ornament consists of fine growth lines of uniform size. Three valves exhibit structures copied from a host surface. Weak terrace lines are present on the posterior slope of the valve MBH 69919 (Fig. 3G). A similar structure obliquely crossing the shell and forming a serrate margin is developed in the specimen L 16267 (Fig. 3C). The weakly diverging fine ridges, reflecting the radial costellation of a strophomenacean shell, cover the surface of the shell MBH 69874 (Fig. 3D, E). These structures indicate an ability of the mantle epithelium to copy the host structure into the ornamentation of the epibiont individual, but they have no taxonomic value.

Remarks. – Barrande referred *Discina transversa* to three specimens from the Koněprusy area. The lectotype (Fig. 3A), preserved in a piece of white crinoidal bioclastic limestone, almost surely comes from the Koněprusy Limestone (Praha Formation). Two other specimens (Fig. 2F, I) likely come from the Suchomasty Limestone (Upper Emsian) or the *Acanthopyge* Limestone (Eifelian). Their surrounding rocks are formed by a yellowish (specimen L 16264) or a pinkish (specimen L 16265) micritic limestone. The suggested Pragian age of the lectotype is also supported by data attached to the specimens stored in Havlíček's collection. They possess clear locality and stratigraphy data, coming from the Koněprusy Limestone in the Plešivec Quarry. *Discina praepostera* Barrande, 1879, differs from other specimens of *P. transversa* only by superimposed oblique terrace ridges. Other specimens of *P. transversa*, preserved in weakly weathered micritic limestones, come from the Prague area (Klukovice, Braník). They have well-constrained stratigraphy, coming from the Dvorce-Prokop Limestone (Barrande's type material, 1879; L 16267) and the Řeporyje Limestone (MBH 69919) of Pragian age.

Occurrence. – Pragian, Praha Formation, Koněprusy, Dvorce-Prokop, and Řeporyje limestones; localities 1, 2, 6, and 10.

***Petrocrania? plicosa* (Barrande, 1879)**

Figures 8I–M, P

1879 *Discina plicosa* Barr.; Barrande, pl. 101, case 2, figs 1, 2, 5–7.

1998 *Plicosocrania plicosa* (Barr.). – Havlíček & Vaněk, pl. 1, fig. 3.

Lectotype. – The dorsal valve, figured by Barrande (1879) in pl. 99, case 3, figs 1a, and enlarged 1a, stored in the National Museum, Prague (L 16282), re-figured herein in Fig. 8M.

Type horizon and locality. – Pragian, Praha Formation, Dvorce-Prokop Limestone; Praha-Braník.

Material. – Five dorsal valves, all belonging to the type material of Barrande (1879) (L 16280, L 16282, L 24436–24438).

Diagnosis. – The dorsal valve is low coniform and thin-walled, with a postero-central apex, an extended posterior margin and a weakly defined limbus; ornamentation consisting of inconspicuous growth lines.

Description. – The shell is low coniform, thin-walled, with rather regular outline, reaching 5–6 mm in width in available specimens. The apex is postero-central, slightly pointed. The margins are evenly rounded, apart from a less curved posterolateral part. The posterior margin is slightly extended posteriorly (Fig. 8L, M). The flanks, anterior and posterior slopes are nearly straight. The ornamentation consists of inconspicuous growth lines. Muscle scars are distinct only in specimens L 24436 (Fig. 8K), which does not come from the Praha Formation; this shell may belong to a different species. The limbus is weakly developed but evenly sized with a distinct rim in two specimens (Fig. 8L, M).

Remarks. – Barrande (1879) referred seven dorsal valves to *Discina plicosa* Barr. Four valves come from Praha-Braník and three from the Koněprusy area. The lectotype, L 16282, (Fig. 8M), certainly comes from the Praha Formation due to the locality name, and the yellowish micritic limestone in which the shell is preserved. Considering the same mode of preservation and the same locality name of the specimen L 16280 (Fig. 8L), the same age is suggested. Unfortunately, the interiors of both shells are nearly featureless, having only a weakly defined limbus. The specimen L 24438 (Fig. 8I, J) also comes from the Praha Formation, because the host of this adhered craniide shell is the shell of *Cryptonella melonica* (Barrande, 1847). This terebratulide brachiopod occurs only in the Koněprusy Limestone. Indeed, this unequivocally confirms Pragian age of the craniide specimen. The specimen L 24436 (Fig. 8K) is preserved in a piece of micritic limestone, with abundant trilobite fragments and a few dacryoconarid shells. The fragment of the proetide trilobite, likely *Unguliproetus unguloides unguloides* (Barrande, 1846), confirms the Lower Emsian age of this craniide specimen. Considering the associated fossils, this shell comes from the Suchomasty Limestone of the Daleje-Třebotov Formation. Therefore, it is quite probable, that this third shell belongs to a different craniide species.

Two shells of Barrande (L 16281, L 16283) (Fig. 8N, O) have a subtrapezoidal outline, with a sulcate anterior

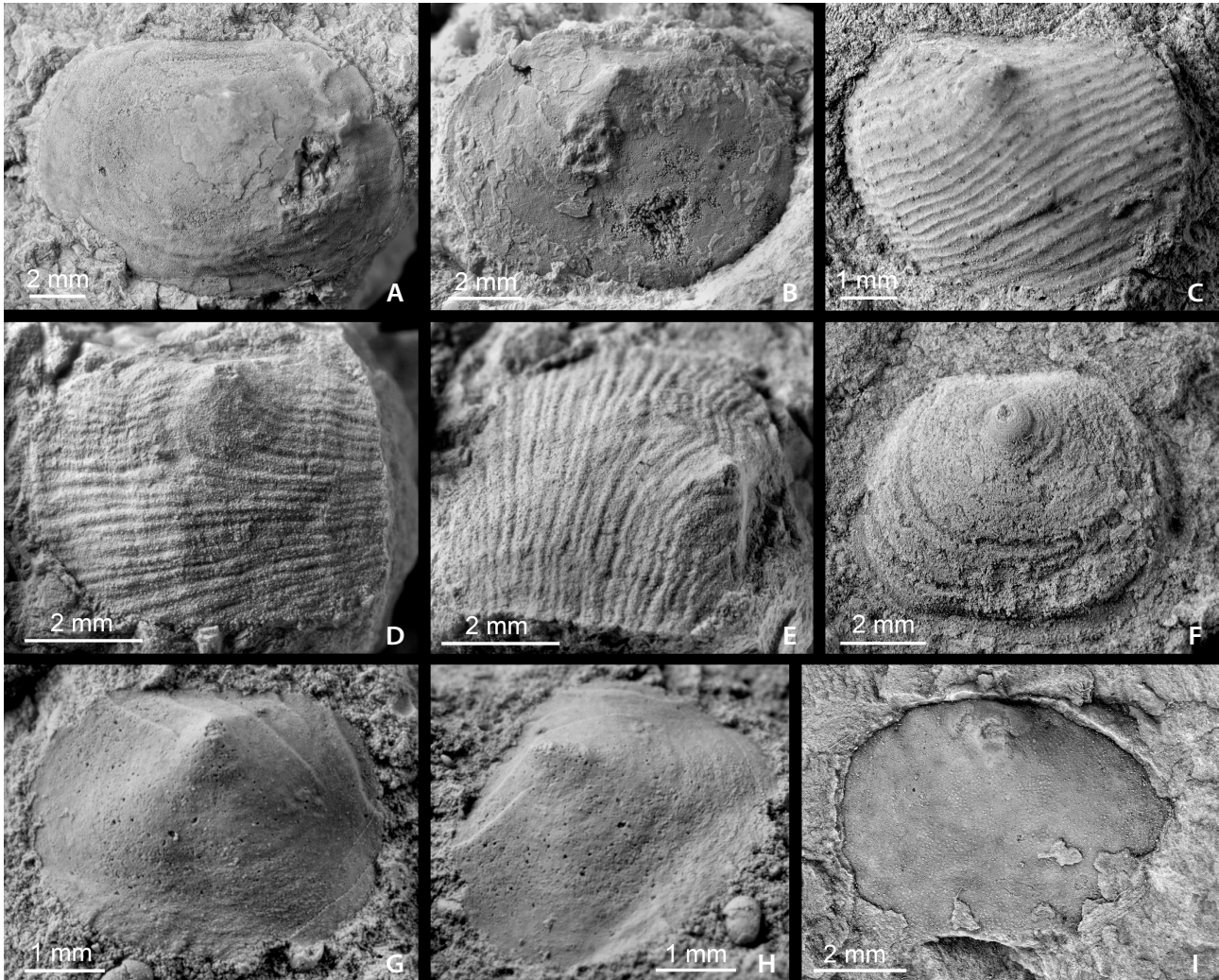


Figure 3. A–I – *Petrocrania transversa* (Barrande, 1879). A – lectotype, dorsal valve, internal mould, L 16266, figured by Barrande (1879) in pl. 99, case 3, fig. 2. B – dorsal valve, internal mould, MBH 69875 (coll. VH 10987b). C – dorsal valve, the type of *Discina praepostera* (Barr.), internal mould, L 16267, figured by Barrande (1879) in pl. 99, case 7. D, E – dorsal valve with original shell in dorsal (D), and oblique lateral (E) views, MBH 69874 (coll. VH 10987a). F – dorsal valve with corroded original shell, L 16264, figured by Barrande (1879) in pl. 99, case 3, fig. 1. G, H – dorsal valve, internal mould in dorsal (G) and oblique anterolateral views (H), MBH 69919 (coll. VH 12080). I – dorsal valve with muscle scars, internal mould (L 16264), figured by Barrande (1879) in pl. 99, case 3, fig. 3. Age: Pragian, Praha Formation, Koněprusy Limestone (A, B, D, E); Dvorce-Prokop Limestone (C), Řeporyje Limestone (G, H); Upper Emsian or Eifelian, Daleje-Třebotov Formation or Chotěč Formation, Suchomasty or Acanthopyge limestones (F, I). Localities: Koněprusy (A, F, I), Koněprusy, Plešivec Quarry (B, D, E), Praha-Braník (C), Praha-Klukovice (G, H). All specimens coated with ammonium chloride, reflected-light photographs.

slope. Currently, these specimens are assigned to the species *Urbicrania?* sp.

Havlíček & Vaněk (1998) introduced the new genus name *Plicosocrania* for the species *Discina plicosa*. However, besides three illustrations (Havlíček & Vaněk 1998, pl. 1, figs 3, 5, 6), the authors gave no formal diagnosis and description of the genus. They also did not select the lectotype of *Discina plicosa*. The name *Plicosocrania* is therefore considered *nomen nudum*. Moreover, two illustrated specimens (L 16283, L 16281) (Barrande, 1879, pl. 1, case 2, figs 5, 6, re-figured herein in Fig. 8N, O) are currently assigned to *Urbicrania?* sp. These shells

have a different morphology from the specimen L 24438, and from the lectotype selected herein. We agree with Havlíček & Vaněk (1998), that *D. plicosa* is difficult to assign to any of the defined craniide genera (Basset 2000, Franke 2012, Holmer *et al.* 2013). However, the type material of *Discina plicosa* is rare and not well-preserved enough. Thus, the material is not suitable for the erection of the new genus, and we left this species, with some doubts, in *Petrocrania* Raymond, 1911.

Petrocrania? *plicosa* (Barrande, 1879) is distinguishable from *P. transversa* (Barrande, 1879) by the extended posterior margin, a less transverse outline, a weak but

distinct limbus, and a more central dorsal apex. A large, rare craniide, described herein as *Petrocrania* sp. B (Fig. 4F–L) could represent a large individual of *P.?* *plicosa*. It shares the similar outline with an extended posterior margin, a similarly thin shell, a similarly weak limbus, and a weakly impressed adductor muscles. Its considerably large size can be related to life in a reef environment.

Occurrence. – Pragian, Praha Formation, Dvorce-Prokop Formation; locality 10.

***Petrocrania* sp. A**

Figure 4A–E

? 1998 *Bulbocrania merope* n. sp. (MS); Havlíček & Vaněk, text-fig. 5 (*nomen nudum*).

Material. – Two dorsal valves and one (?) ventral valve from Havlíček's collection (MBH 69911, MBH 69921, MBH 70556).

Description. – The dorsal valve is subcircular to roundly subquadrate, slightly convex longitudinally and transversally, thick-walled, and 7 mm wide, with a wavy surface and unevenly rounded margins (Fig. 4A, C, D). The maximum width lies slightly anterior to the midlength. The apex is poorly defined, subcentral. The valve interior is distinguished by two deeply impressed muscle scars. The posterior adductors are large, obliquely oval, bordered by a rim elevated above the valve floor (Fig. 4B). The anterior adductors are slightly smaller, obliquely oval, converging to the midline, located posterocentrally (Fig. Fig. 4B). Traces of vascula lateralia are weakly impressed (Fig. 4B). The valve interior is marginally bordered by a narrow, poorly defined limbus, which is near the posterior margin interrupted by a wide and weak groove (Fig. 4B).

The ornamentation consists of irregularly undulated growth lines (Fig. 4D). The parallel grooved structure of a substrate is impressed in the central part of the subplanar valve (Fig. 4E), which could represent the ventral valve of the same species.

Remarks. – The species differs from other craniides in the Prague Basin by a fairly large size, uneven and variable outline and convexity, and the thick shell wall of the dorsal valve, which bears deeply impressed muscle scars. The drawing of the preserved interior of a craniide was figured by Havlíček & Vaněk (1998, text-fig. 5) under the name *Bulbocrania merope* n. sp. (MS). This name, owing to the rarity and no formal description of the material, should be considered *nomen nudum*. Moreover, the drawing is not sufficiently informative, because it lacks a scale, locality and stratigraphical data. The species *Bulbocrania*

merope is mentioned only among the list of fossils in the Koněprusy Limestone (Havlíček & Vaněk, 1998, p. 50). The drawing is much like the specimen MBH 70780 in Havlíček's collection (Fig. 8A), which comes from Praha-Smíchov (Konvářka) (see also Havlíček & Vaněk 1998, pl. 1, fig. 5).

The specimens are similar to a craniide *Petrocrania cassis* (Zeiler, 1857), revised by Franke (2012), by a thick shell, a subcircular to subquadrate outline, moderate convexity, and deeply impressed muscle scars. The Bohemian specimen differs by anteriorly converging anterior adductor scars and a less impressed myophragm between the muscle scars.

Occurrence. – Pragian, Praha Formation, Koněprusy Limestone; locality 1.

***Petrocrania* sp. B**

Figure 4F–L

Material. – Two dorsal valves from Havlíček's collection (MBH 69920, MBH 70555).

Description. – The dorsal valve is subcircular (Fig. 4K) to roundly triangular (Fig. 4F), with slightly extended posterior margin, thin-walled relative to its size, 15 mm wide and 15 mm long. The rounded apex is subcentral. Margins are regularly rounded (Fig. 4F, K). The posterior slope is slightly concave (Fig. 4I), the anterior slope and flanks are poorly convex, with weak asymmetry (Fig. 4G, H, I). The visceral area is poorly defined, with weakly impressed muscle scars. The ill-defined posterior adductors are located posterolaterally (Fig. 4F). The anterior adductors are not perceptible. The narrow limbus is weak but clearly defined around whole valve (Fig. 4G, H).

The ornamentation consists of several coarser concentric growth bands (Fig. 4I, K). The regular fine growth fila are preserved on one shell (Fig. 4L).

Remarks. – Both available specimens differ from the *Petrocrania* sp. A by a more regular shell outline, and the strikingly thin shell wall with accordingly weakly impressed musculature. Other known craniides from the Prague Basin have much smaller shell sizes.

Occurrence. – Pragian, Praha Formation, Koněprusy Limestone; localities 1 and 2.

***Petrocrania* sp. C**

Figure 8F–H

Material. – Three dorsal valves preserved as internal moulds from Havlíček's collection (MBH 85093, MBH 85094, MBH 85111).

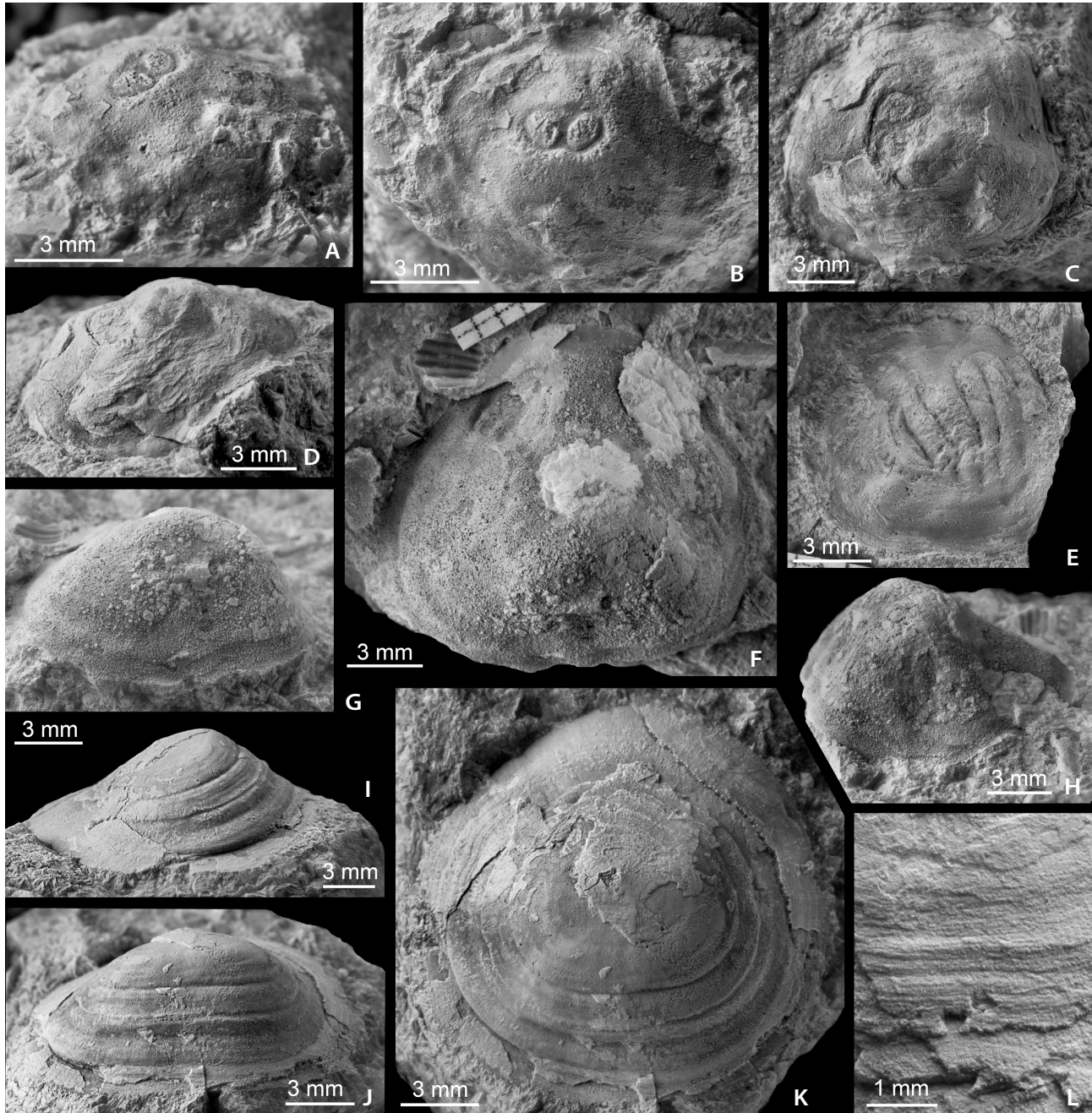


Figure 4. A–E – *Petrocrania* sp. A. A, B – dorsal valve, internal mould in oblique posterolateral (A) and dorsal (B) views, MBH 69921 (coll. VH. 10910b). C, D – dorsal valve with partially preserved shell in dorsal (C) and oblique anterior (D) views, MBH 70556 (coll. VH 10983b). E – dorsal valve, MBH 69911 (coll. VH 10992). • F–L – *Petrocrania* sp. B. F–H – dorsal valve, internal mould, in dorsal (F), oblique anterolateral (G), and lateral (H) views, MBH 69920 (coll. VH 10910a). I–L – dorsal valve, internal mould with remains of original shell in dorsal (K), lateral (I), and anterior (J) views, and detail of ornamentation (L), MBH 70555 (col. VH 10983a). Age: Pragian, Praha Formation, Koněprusy Limestone (all). Localities: Koněprusy, Zlatý kůň (A–H), Koněprusy, Plešivec quarry (I–L). All specimens coated with ammonium chloride, reflected-light photographs.

Description. – The dorsal valve is elongate oval, thin-walled, with a truncate posterior margin. Sides and the anterior margin are evenly rounded (Fig. 8G). The valve is slightly wider than long, reaching a maximum width of 6 mm. The apex is distinctly posterior, elevated above a high, triangular, rather narrow posterior slope (Fig. 8F,

G, H). Two pairs of adductor scars are weakly impressed. The anterior pair is small, situated anteriorly to the apex (Fig. 8F, G). The posterior adductor scars are smaller, located near the sides of the posterior slope.

Remarks. – The species is poorly known, but differs from

other Bohemian craniids by a combination of a thin shell without sulcus and limbus, a truncate posterior margin, and evenly rounded sides.

Occurrence. – Eifelian, Choteč Formation, Choteč Limestone; locality 5.

Genus *Propatella* Grubbs, 1939

Type species. – *Propatella magnacostata* Grubbs, 1939; Silurian, Wenlock, Niagara Group; Illinois, USA.

Propatella sp.

Figure 2C, D

Material. – One silicified dorsal valve from Havlíček's collection (MBR 67544).

Description. – The dorsal valve is coniform, strongly elongate, with a subcentral apex. The size is small, with a maximum diameter of 5 mm. The apex is likely inclined posterodorsally. The ornamentation consists of radial ribs of uniform size, undivided, 30 in number, with new ribs originating by an intercalation. The size of a rib is uniform along its whole length. The interspaces are as wide as the ribs. When their size achieves the size of ribs, the new ribs are intercalated (Fig. 2C, D).

Remarks. – The shell is referred to *Propatella* Grubbs, 1939 due to unbranching ribs which exhibit a narrow slit along their crest (Fig. 2D). These slits on the silicified valve are interpreted as the traces after hollow sutured marginal spines which created the ribs. The Silurian *Propatella palmaria* Basset *et al.*, 2013 is similarly variable in the outline and convexity as the Bohemian specimen.

Occurrence. – Lower Emsian, Zlíčov Formation, Coral Chapel Horizon; locality 8.

Urbicrania gen. nov.

Type species. – *Urbicrania limbata* sp. nov.; Pragian,

Praha Formation, Řeporyje Limestone; Prague Basin, Czech Republic.

Etymology. – *Urbi* (Latin) – to the city, an area of occurrence.

Diagnosis. – Small, low, subconical, moderately to thick-walled dorsal valve; apex central to anterocentral, ornament of regularly spaced concentric bands; flat and broad limbus; modal outline clearly trapezoidal, with straight posterior margin; variable outline deviations due to substrate structure; adductor scars posteriorly to the apex, with larger anterior adductor.

Description. – The new genus is characterised by a combination of a small size, a relatively massive shell, and a conspicuous limbus. Its trapezoidal outline is not usual among craniids. The similarly outlined genus *Acanthocrania* Williams, 1943 differs by papillae and small hollow spines on a shell surface. *Lepidocrania* Cooper & Grant, 1974 has strongly lamellose ornament, but has a subquadrate outline, and its surface is covered by stout spines. *Valvidathyrus* Helmcke, 1940, has a thin shell with only fine growth laminae.

Apart from two new species, *Petrocrania* sp. (Mergl & Sazimová 2025) is assigned to the new genus. The small craniide cemented to the brachiopod interior, and having a trapezoidal outline, figured by Mergl (2021, fig. 6p) likely belongs to the new genus.

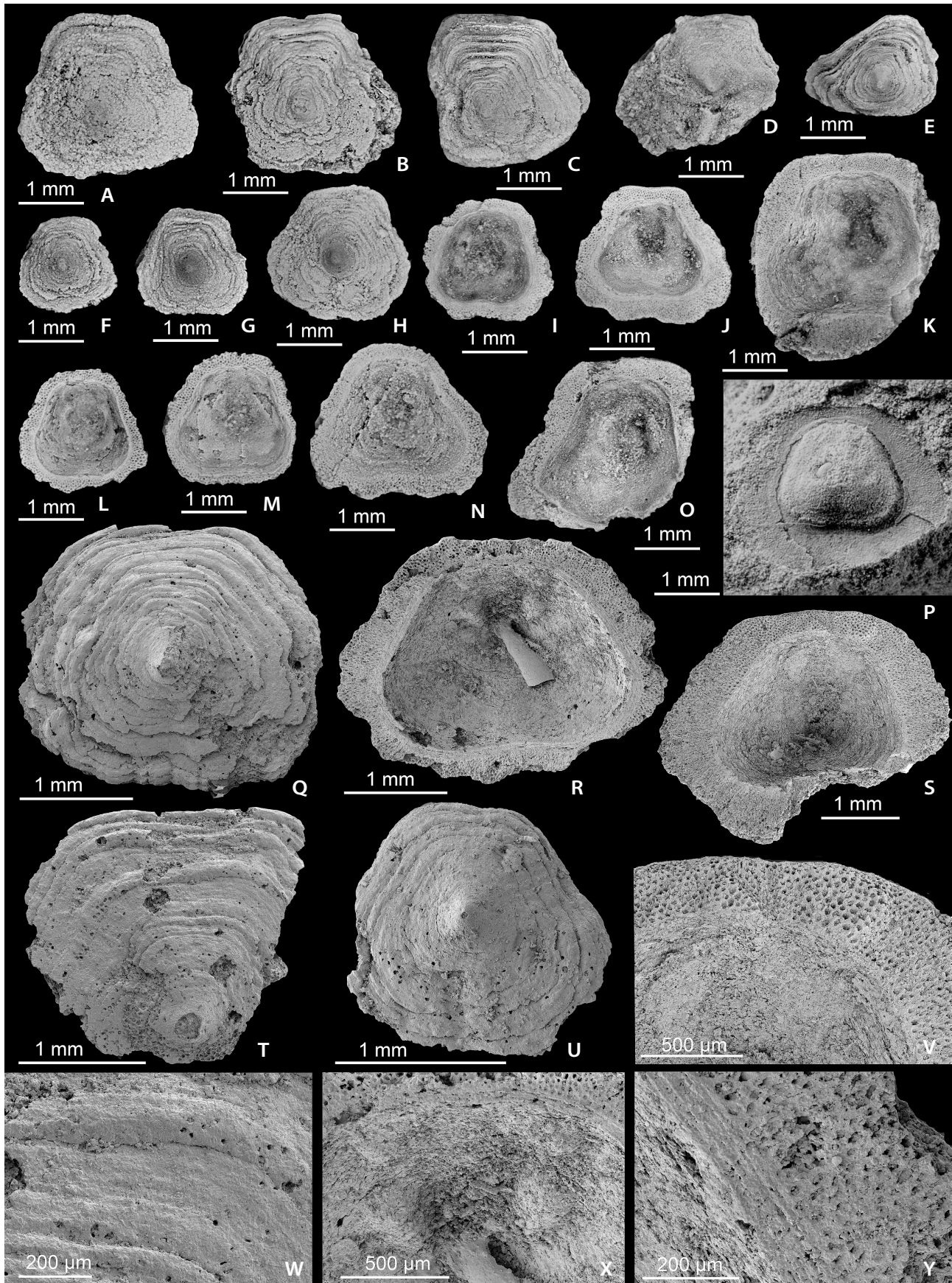
Species included. – *Petrocrania* sp. Silurian, Ludfordian, Kopanina Formation (Mergl & Sazimová 2025). *Urbicrania limbata* sp. nov.; Devonian, Pragian, Praha Formation, Dvorce-Prokop and Řeporyje limestones. *Urbicrania egressa* sp. nov.; Devonian, Upper Emsian, Daleje-Třebotov Formation, Třebotov Limestone.

Urbicrania limbata sp. nov.

Figures 5, 6

Types. – Holotype: Dorsal valve, figured in Fig. 5Q, stored in the University of West Bohemia at Plzeň (PCZCU

Figure 5. *Urbicrania limbata* sp. nov. A – dorsal valve, exterior, PCZCU 1485. B – dorsal valve, exterior, PCZCU 1484. C – dorsal valve, exterior, MBH 70717 (coll. VH 9769). D – asymmetrical dorsal valve, exterior, PCZCU 1483. E – asymmetrical dorsal valve, exterior, MBH 70720 (coll. VH 9769). F – small dorsal valve, exterior, PCZCU 1482. G – small dorsal valve, exterior, PCZCU 1481. H – medium-sized dorsal valve, exterior, PCZCU 1480. I – medium-sized dorsal valve, interior, PCZCU 1479. J – medium-sized dorsal valve, interior, MBH 70721 (VH 9769). K – asymmetrical dorsal valve, interior, MBH 70723 (VH 9769). L – medium-sized dorsal valve, interior, PCZCU 1478. M – medium-sized dorsal valve, interior, PCZCU 1477. N – dorsal valve, interior, PCZCU 1476. O – large partly broken dorsal valve, interior, MBH 70722 (VH 9769). P – dorsal valve, internal mould, MBH 67180 (coll. VH 12721), figured by Havlíček & Vaněk (1998), pl. 2, fig. 16. Q – holotype, dorsal valve, exterior, PCZCU 1492. R, X, Y – paratype, dorsal valve, interior (R), muscle scars (X), and detail of the limbus (Y), PCZCU 1491. S, V – dorsal valve, interior (S) and detail of posterior limbus (V), PCZCU 1490. U – small dorsal valve, exterior, PCZCU 1489. T, W – dorsal valve, posterior slope (T) and its ornamentation (W), PCZCU 1488. Age: Pragian, Praha Formation, Dvorce-Prokop Limestone (C, E, J, K, O, P), Řeporyje Limestone (A, B, D, F–I, L–N, Q–Y). Localities: Praha-Klukovice, Červený lom Quarry (A, B, D, F–I, L–N, Q–Y); Praha-Holyně, U Kantiny Quarry (C, E, J, K, O); Praha-Smíchov, Konvářka (P). Specimens coated with ammonium chloride, reflected-light photographs (A–P), SEM micrographs, gold-coated (Q–Y).



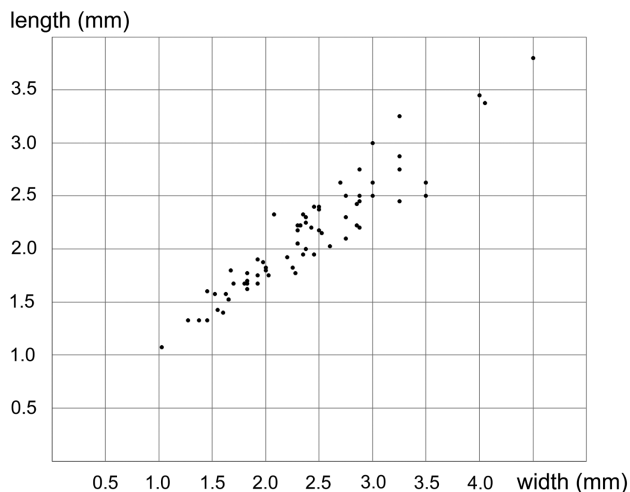


Figure 6. *Urbicrania limbata* sp. nov. Dorsal valves, the scatter plot of shell length versus shell width. Material comes from localities Praha-Klukovice (Červený lom Quarry: 61 specimens) and Praha-Holyně (U kantiny Quarry: 9 specimens).

1492). Paratype: Dorsal valve, figured in Fig. 5R, X, Y, stored in the University of West Bohemia at Plzeň (PCZCU 1491).

Type horizon and locality. – Devonian, Pragian, Praha Formation, Řeporyje Limestone; Praha-Klukovice, Červený lom Quarry, west wall.

Material. – More than 150 loose specimens from “white beds”, mostly from Havlíček’s collection (MBH 67180, MBH 67298, MBH 67322, MBH 70586–70694, MBH 70715–70751), and from new material (PCZCU 1476–1492); other specimens are without catalogue numbers.

Etymology. – *Limbus* (Latin) – with a margin; referring to a prominent limbus.

Diagnosis. – Thick-walled *Urbicrania* ornamented with concentric, clearly elevated, closely spaced convex bands and very wide limbus.

Description. – The dorsal valve is low conical, thick-walled. The maximum width is 4 mm, but the widths of most of the measured specimens cluster are around 2 mm (Fig. 5A–O). DvW/DvL is about 50% but there is a great

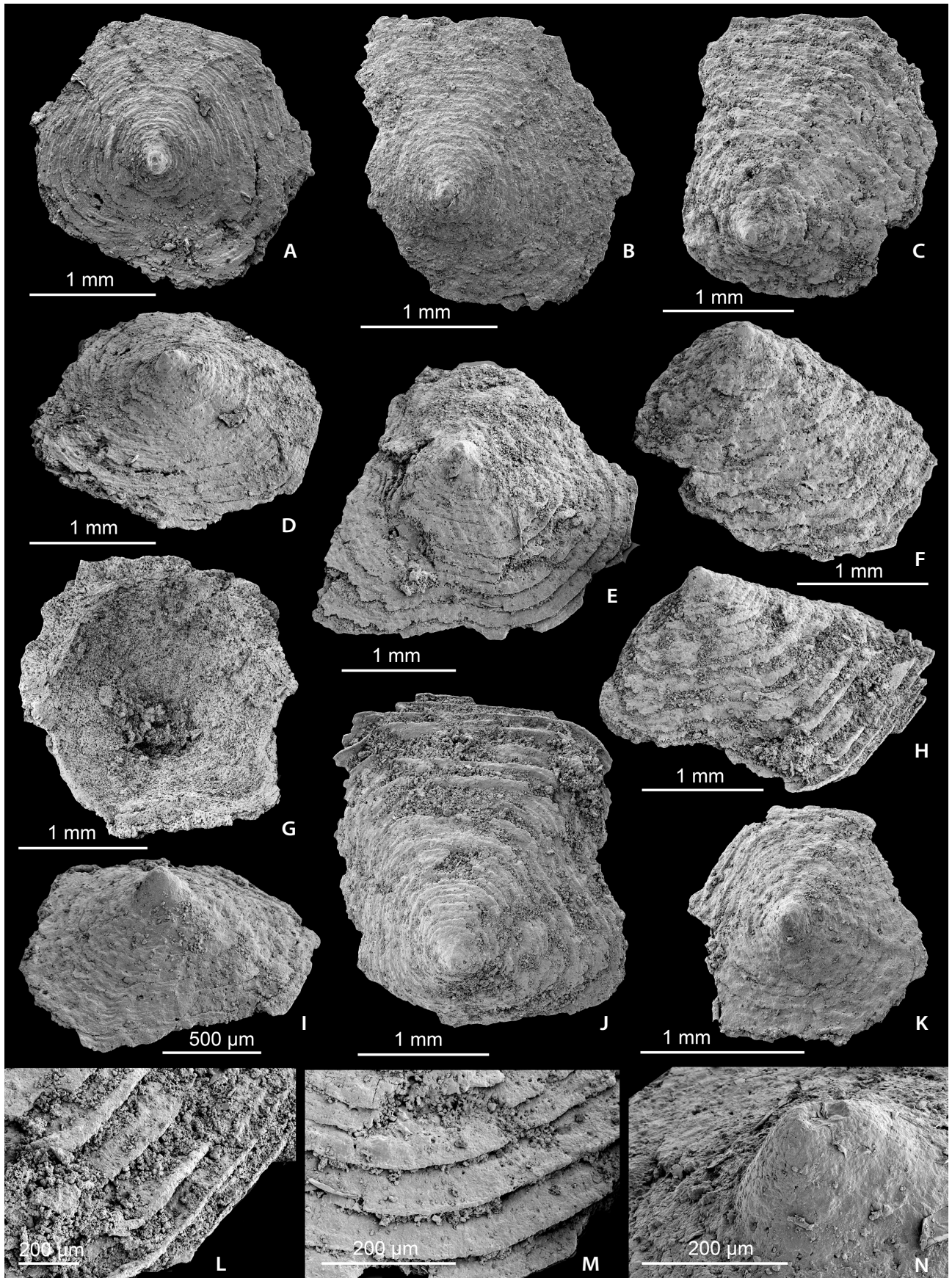
individual phenotypic plasticity in examined specimens (Fig. 6). The outline is markedly trapezoidal, with shells having a nearly straight posterior margin, almost straight anterior margin, and straight to weakly concave sides enclosing an angle of approximately 60° . The connection between these straight sections are evenly rounded anteriorly as well as in the posterolateral corners. The maximum width is in the anterior one-third. However, the outline of the shell is clearly influenced by substrate relief (Fig. 5D, E). The modal outline is developed on the shells resting on an originally planar substrate. The apex is subcentral, in some individuals also weakly anterocentral (Fig. 5A–C, F–H, Q). The anterior slope is steep, straight to gently concave in profile. The posterior slope is weakly convex. Flanks are weakly convex to subplanar. A very broad limbus is developed along the whole margin of the valve, reaching its maximum width near the antrolateral corners (Fig. 5P, S). The limbus occupies nearly 50% of the valve width. The minimum width of the limbus is at the posterior margin. The surface of the limbus is planar, having clearly visible openings of uniformly sized pores (Fig. 5V, Y). The lamellar secondary shell is clearly thinner than the primary shell (Fig. 5Y).

The dorsal valve interior has a poorly defined visceral area. Two pairs of adductor scars are placed on the interior of the posterior slope (Fig. 5K, R, X). The paired anterior scars are larger than the posterior pair. All scars are moderately elevated above the valve floor (Fig. 5X). Each scar has an elongate-oval outline.

The external ornamentation consists of clearly defined concentric growth bands, four to five in small shells (Fig. 5F, G, U), but 10 to 11 in large specimens (Fig. 5A–C, T). The width of bands regularly increases toward the shell margin (Fig. 5B, Q, T). The bands are more elevated and more crowded on the posterior slope (Fig. 5Q, T) than on the flanks and the anterior slope. Fine growth lines cover the elevated surface of growth bands (Fig. 5W).

Remarks. – The species is distinguished by a small size and a considerably wide limbus. Having a trapezoidal outline and posteriorly located adductor scars, the species is easily distinguishable from other discinids of the Praha Formation. The variation on the outline is illustrated in Fig. 5A–N. The modal outline and convexity is distinctly trapezoidal and low coniform, respectively (Fig. 5F–H, L–N). In samples, one can observe very asymmetrical

Figure 7. *Urbicrania egressa* sp. nov. A, D – holotype, dorsal valve, exterior, dorsal (A) and oblique posterolateral (D) views, PCZCU 1499. B – dorsal valve, exterior, PCZCU 1498. C, F – dorsal valve, exterior, dorsal (C) and posterolateral (F) views PCZCU 1497. E, M – dorsal valve, exterior, oblique posterolateral view (E), and detail of ornamentation (M), PCZCU 1493. G – dorsal valve, interior, PCZCU 1496. H, J, L – paratype, dorsal valve, exterior, oblique posterolateral (H) and dorsal (J) views, and detail of ornamentation on the posterior slope (L), PCZCU 1494. I, K, N – small dorsal valve, exterior, oblique posterolateral (I) and dorsal (K) views, and detail of the apex (N), PCZCU 1495. Age: Upper Emsian, Daleje-Třebotov Formation, Třebotov Limestone. Locality: Praha-Barrandov, road-cut, stratigraphic levels (samples) Barr: –250 (E, H–N), Barr: –220 (A, B, D), and Barr: –170 (C, F, G). SEM micrographs, gold-coated (all).



specimens (Fig. 5D, E, K) and specimens having a moderately high cap-like shape.

Occurrence. – Pragian, Praha Formation, Dvorce-Prokop, Řeporyje, and Slivenec limestones; localities 3, 6, and 7.

***Urbicrania egressa* sp. nov.**

Figure 7

Types. – Holotype: Dorsal valve, figured in Fig. 7A, D stored in the University of West Bohemia at Plzeň (PCZCU 1499). Paratype: Incomplete dorsal valve, figured in Fig. 7H, J, L, stored in the University of West Bohemia at Plzeň (PCZCU 1494).

Type horizon and locality. – Devonian, Upper Emsian, Daleje-Třebotov Formation, Třebotov Limestone; Praha-Barrandov, road cut.

Material. – Eight loose dorsal valves, mostly incomplete (figured PCZCU 1493–1499) and one shell preserved in weathered limestone.

Etymology. – *Egressus* (Latin) – going out; referring to a weak ornamentation.

Diagnosis. – Moderately thick-walled *Urbicrania* ornamented with concentric, shelf-like bands separated by distinct interspaces; limbus distinct.

Description. – The dorsal valve is subconical, moderately thick-walled. The maximum (estimated) width is 3 mm (Fig. 7J). DvW/DvL is around 50%. The outline is markedly trapezoidal, with shells having a nearly straight posterior margin. Posterolateral margins are straight and posteriorly converging. The anterior margin is slightly rounded. The apex is anterocentral in position, pointed. At the summit of the apex, a small pit is visible in all examined specimens (Fig. 7K, N). The anterior slope is

steep to very steep, slightly convex. The posterior slope is straight to weakly convex. Flanks are weakly convex to subplanar. The distinct limbus is developed but does not occupy more than one-fourth of the valve width. The surface of the limbus is planar, having clearly visible openings of uniformly sized pores. The dorsal valve interior has a poorly defined visceral area and muscle scars, which are located in the posterior half of the valve.

The external ornamentation consists of clearly defined growth bands, which are extended into stepwise arranged, shelf-like concentric rugellae. The interspaces are narrow but clearly defined.

Remarks. – The species differs from *Urbicrania limbata* in having a thinner dorsal valve, a narrower limbus, and lamellose, stepwise arranged concentric growth bands. The apex of *U. egressa* is more pointed and appears to be situated more anteriorly than the apex of *U. limbata*.

Occurrence. – Upper Emsian, Daleje-Třebotov Formation, Třebotov Limestone; localities 4 and 9.

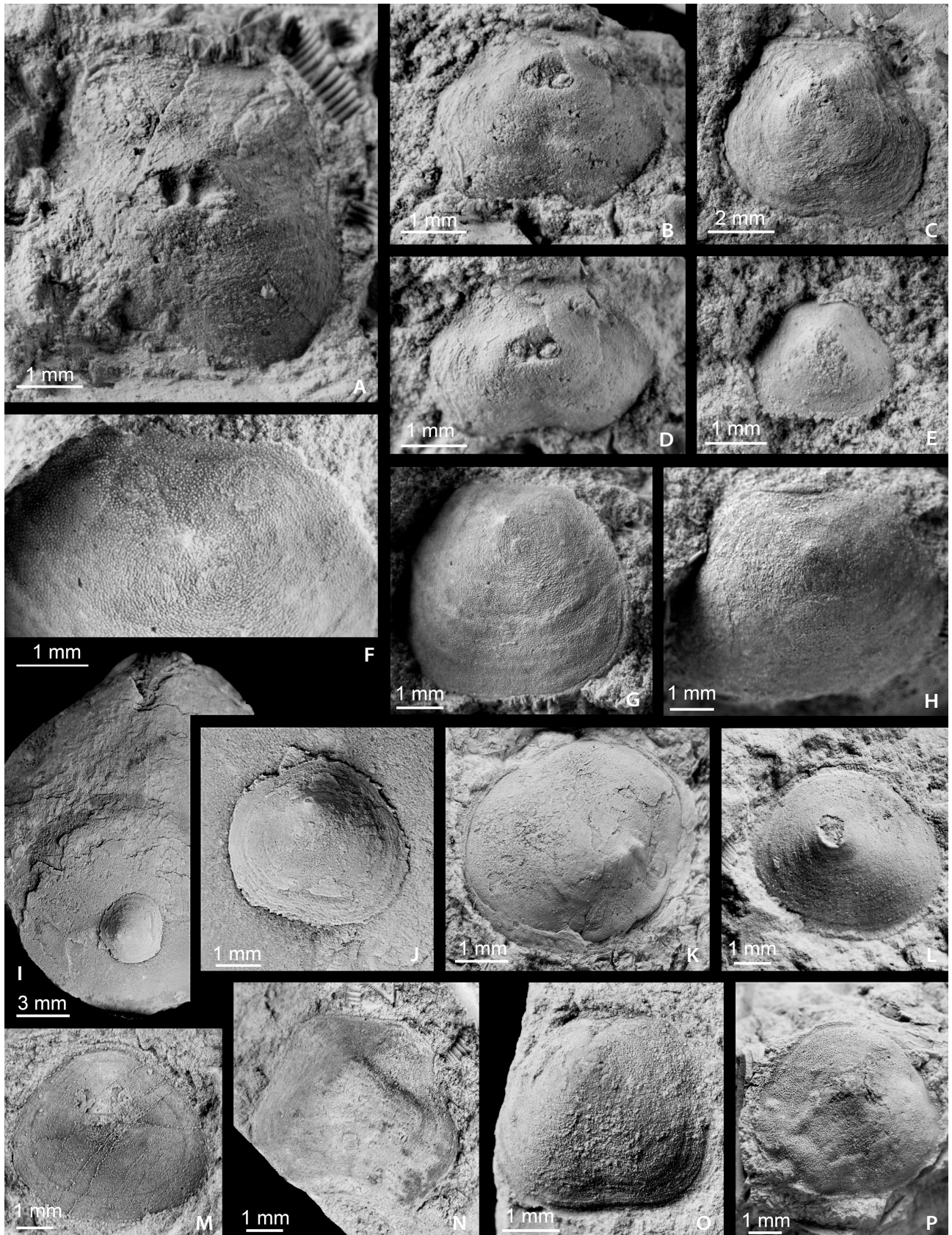
***Urbicrania?* sp.**

Figure 8A–E, N, O

Material. – Four dorsal valves from Havlíček's collection (MBH 67259, MBH 69831, MBH 70780, MBH 70781), and two dorsal valves from the type collection of Barrande (1879) (L 16281, L 16283).

Description. – The shell is small, up to 4.5 mm wide in the largest specimen, thinly walled, symmetrical. The dorsal valve is subconical with a trapezoidal outline (Fig. 8C). The posterior margin is truncated, with a straight part occupying approximately 50% of the shell width. The maximum shell width lies anterior to the midlength. The apex is postero-central and distinct (Fig. 8C). The flanks and the anterior slope bear weak concavity, forming a shallow emargination on the sides and the anterior

Figure 8. *Urbicrania?* sp. A – dorsal valve, internal mould, MBH 70780 (coll. VH 10676a); figured by Havlíček & Vaněk (1998) as *Plicosocrania plicosa* (Barr.), pl. 2, fig. 5. B, D – dorsal valve, internal mould in dorsal (B), and posterodorsal (D) views, MBH 70781 (coll. VH 1076b) C – dorsal valve, MBH 67259 (coll. VH 10675a), figured by Havlíček & Vaněk (1998) as *Plicosocrania plicosa* (Barr.), pl. 2, fig. 6. E – small dorsal valve, MBH 69831 (coll. VH 12072). N – dorsal valve, internal mould, L 16283, figured by Barrande (1879) in pl. 101, case 2, fig. 4. O – dorsal valve, internal mould, L 16281, figured by Barrande (1879) in pl. 101, case 2, fig. 3. Age: Pragian, Praha Formation, Dvorce-Prokop Limestone (A–D, N, O), and Slivenec Limestone (E). Localities: Praha-Smíchov, Konvářka (A–D), Praha-Klukovice (E), Praha-Braník (N, O). All specimens coated with ammonium chloride, reflected-light photographs. • F–H – *Petrocrania* sp. C. F, G – dorsal valve, internal mould, dorsal view (G), and oblique posterior view showing muscle scars (F), MBH 85094 (coll. VH 13555b). H – dorsal valve, internal mould, MBH 85111 (coll. VH 13546). Age: Eifelian, Choteč Formation, Choteč Limestone, lower part. Locality: Praha-Holyně, Prastav Quarry (F–H). All specimens coated with ammonium chloride, reflected-light photographs. • I–M, P – *Petrocrania?* *plicosa* (Barrande, 1879). I, J – dorsal valve attached on the surface of *Cryptonella melonica* (Barrande 1847), L 24438, figured by Barrande (1879) in pl. 101, case 2, fig. 6. K – dorsal valve, internal mould with distinct muscle scars, oblique posterolateral view, L 24436, figured by Barrande (1879) in pl. 101, case 2, fig. 5. L – dorsal valve, internal mould with broken apex, L 16280, figured by Barrande (1879) in pl. 101, case 2, fig. 2. M – lectotype, dorsal valve, L 16282, figured by Barrande (1879) in pl. 101, case 2, fig. 1. P – dorsal valve, L 24437, figured by Barrande (1879) in pl. 101, case 2, fig. 7. Age: Pragian, Praha Formation, Koněprusy Limestone (I–K, P), Dvorce-Prokop Limestone (L, M). Localities: Koněprusy (I–K, P), and Praha-Braník (I, P). All specimens coated with ammonium chloride, reflected-light photographs.



margin, and producing four weak plications on the external shell shape. The external ornamentation is featureless. The posterior adductor scars are large, shallow, obliquely oval, situated at the borderlines between the convex flanks and the flat posterior slope. The anterior scars are smaller, formed by two elevated projections posterior to the shell midlength but anterior to the shell apex (Fig. 8A, B, D).

Remarks. – The species is distinguished by a shallow concavity on the flanks and the anterior margin (Fig. 8B–D, N, O) and highly elevated anterior adductor scars (Fig. 8A, B, D). Two specimens of this species were by Havlíček & Vaněk (1998) assigned to *Plicosocrania plicata* (Barr.), but the genus name is invalid. The genus *Plicosocrania* was never defined and must be considered *nomen nudum*. The species name *plicata* refers to specimens with a different shell morphology. Barrande (1879, pl. 101, case 2, figs 1–6) referred to *Discina plicata* seven specimens. Currently selected lectotype of *Discina plicata* (Barr.), the first of the seven illustrated specimens of Barrande (1879), has a different morphology than the two other specimens in the case 2. Two dorsal valves, L 16281 and L 16283, exhibit concavities on flanks and the anterior slope, as possessed by the specimens in Havlíček's collection. Because Havlíček & Vaněk (1998) did not select the lectotype of *Discina plicata*, and the specimens having plications externally resemble the new genus *Urbicrania*, we propose the name *Urbicrania?* sp. for these specimens. Unlike *Urbicrania limbata* and *U. egressa*, the species *Urbicrania?* sp. has no limbus, and its muscle scars have a different arrangement. The specimens assigned to *Urbicrania?* sp. likely represent the new species and, probably, the new genus, but the material is not adequate for their formal definition.

Occurrence. – Pragian, Praha Formation, Dvorce-Prokop, Řeporyje, and Slivenec limestones; localities 6, 7, and 10.

Discussion

Overall, the Silurian and Devonian craniide brachiopods are poorly known. Authors generally assigned observed craniides to the genera *Petrocrania*, *Acanthocrania*, and *Philhedra*. With a few exceptions (Huene 1899, Halamski 2004, Franke 2012, Bassett *et al.* 2013), the craniides are only marginal research subject pasted to the extensive taxonomic studies (*e.g.* Kozłowski 1929, Rodriguez & Gutschick 1967, Cooper & Dutro 1982, Perry 1984, Halamski & Baliński 2013, Halamski *et al.* 2022). Poorly featured shells, a small size, and poor preservation have made this brachiopod group less attractive for elaborate taxonomical studies. The advent of scanning electron microscopy brought new opportunities for their

study. Bassett *et al.* (2013) demonstrated an intricate external morphology and a previously unrecognized morphological diversity of craniides from the Silurian of Gotland.

The craniides from the Prague Basin are much poorer preservation than those from Gotland. However, loose shells from strongly weathered limestones provided sufficiently numerous and well-preserved shells. This material, together with overall rare craniides collected by V. Havlíček in 20th century, enables a revision of species described by Barrande (1879). Compared with the craniides from Gotland, the craniides in the Prague Basin have a lower morphological diversity, with very rare occurrence of ribbed craniides (*Deliella*, *Propatella*). The craniides from Bohemia generally exhibit a rather stable shell outline. This stability is likely related to the deeper and therefore calmer habitat of these nearly micromorphic craniides during the deposition of the Slivenec, Řeporyje, and Dvorce-Prokop limestones. In contrast, rare findings of large craniides from in the Koněprusy area suggest favourable living conditions in more agitated and oxygenated waters in a local reef complex. Their size several times exceeds the shell size of craniides from the micritic limestones, which were deposited in a deeper and likely slightly hypoxic environment.

The peak of diversity of craniides seems to be during the Pragian in the Prague Basin. However, this may reflect sampling bias because deeply weathered limestone residua suitable for wet sieving occur mainly in Pragian strata and are rare or absent in formations of different age. Outside of washed residues, recovery of craniid shells is very limited, so their abundance in most assemblages is difficult to assess. Nevertheless, even where extraction of shells is easier, such as in Silurian marly deposits on Gotland (Bassett *et al.* 2013), craniides remain rare.

Conclusions

A revision of craniide brachiopods, including the types of J. Barrande (1879) confirms the presence of 11 species in the Devonian of the Prague Basin. The validity of *Discina plicosa*, and *D. transversa*, erected by Barrande (1879), was confirmed. Both species and three other species are assigned to *Petrocrania*. Very rare ribbed craniides *Deliella* and *Propatella* are described for the first time from the area. The new genus *Urbicrania*, with two new species, *U. limbata*, and *U. egressa*, is erected.

The craniides appear to be rare in the reef environment in Bohemia, but specimens from reefal facies attain larger shell size, which likely reflects adaptation to higher-energy and better-oxygenated conditions. Unlike to the well-known craniides from the Silurian of Gotland, the small-sized Bohemian craniides are morphologically less

diverse. This is likely related to a more stable, a deeper, and likely also a slightly hypoxic environment, where a minute shell size and a smooth shell were the optimal adaptation.

Acknowledgement

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