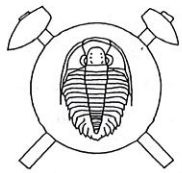
New and rare lingulate brachiopods from lower part of the Klabava Formation (Arenig, Lower Ordovician) of Prague Basin, Bohemia



Noví a vzácní lingulátní ramenonožci ze spodní části klabavského souvrství (arenig, spodní ordovik) z pražské pánve v Čechách (Czech summary)

(7 text-figs.)

MICHAL MERGL

Západočeská univerzita, Pedagogická fakulta, Katedra biologie, Klatovská 51, 320 13, Plzeň, Czech Republic

New lingulate brachiopod genera *Sedlecilingula* (type species *S. sulcata* sp. n.) and *Collarotretella* (type species *C. septata* sp.n.) are defined. Poorly known species of the genera *Lingulella, Palaeoglossa, Spondyglosella* and *Rowellella* are described or discussed. Comments on brachiopod associations, their stratigraphical age and environmental significance are given.

Key words: Brachiopoda, Lingulata, Ordovician, Arenig, Bohemia

Introduction

New collecting at localities in the area between Starý Plzenec and Strašice (southwestern limb of the Prague Basin, West Bohemia) discovered unusual faunules that are almost exclusively dominated by minute lingulate brachiopods. Faunules occur in red-brown to violet-brown siltstones and silty shales. Their taxonomic compositions differ from coeval brachiopod fauna of the Olešná Member, studied previously by Koliha (1918, 1924), Havlíček (1982) and Mergl (1981, 1986, 1994, 1995). New and distinct species of the orders *Lingulida* Waagen and *Siphonotretida* Kuhn are described and new data concerning the distribution of some formerly described taxa are presented here.

Material

All figured material is deposited in paleontological collections of the Museum of Dr. B Horák at Rokycany, Czech Republic (Accession No. 2/96/1-2/96/20) except for a single specimen housed in the Geological Survey, Prague (No. MM 011). Other studied material is deposited in the author's collection in the Department of Biology, University of West Bohemia, Plzeň.

Localities and fauna

Sedlec

Temporary excavations in the field eastward of the confluence of the Lhůtský and Tymákovský creeks in summer 1975 yielded unusual and specimen-rich assemblages of lingulate brachiopods. Their shells occur in violet-brown and yellow-grey shales with a substantial admixture of poorly sorted clastic material, which is derived from the local, early Ordovician volcanic center. Brachiopod valves are accumulated and often densely crowded on bedding planes of clayey laminae interbedded by sandy intercalations. The same fossil association, but much poorer in individuals, was collected in the upper slope of the deep short gorge just near the confluence of creeks, some 200 m south of the former site.

Brachiopod faunule is dominated by, as yet undescribed minute acrotretids and lingulids, *Orbithele undulosa* (Barrande). Other brachiopods are present but less common: *Sedlecilingula sulcata* sp. n., *Palaeoglossa* sp., *Rowellella* sp., *Elkania lineola* (Havlíček), *Kolihium* sp. and a poorly preserved minute siphonotretid. Other faunal components comprise *Sphenothallus* sp., a smooth conulariid, and problematic phosphatic tubes. This fossil assemblage comprises some elements which occur throughout the whole thickness of the Klabava Formation.

A slightly different association has been discovered in stratigraphically older beds in the same gorge, in a laminated dark brown-violet silty shales, 70-90 cm above a sandstone bed bearing graptolite fauna with *Clonograptus* (Mergl 1978, Kraft - Mergl 1979). Rare finds of brachiopods comprise an undescribed acrotretid, *Orbithele undulosa* (Barrande) and *Spondyglosella spondylifera* Havlíček. Another assemblage with *Palaeoglossa* sp., *Elkanisca obesa* (Havlíček), undeterminable acrotretids and a minute siphonotretid occurs some 50 cm above the former one. The age of the fauna is defined by the subjacent *Clonograptus* assemblage and the superposed grey-green micaceous shales of the *Corymbograptus v-similis* Biozone (Kraft - Mergl 1979) outcropping in the opposite side of the Lhůtský creek. Associated chitinozoans (Paris - Mergl 1984, Fatka 1993) indicate an early Arenig age. Consequently, these rocks are assigned an earliest Arenig age and a position 25-50 m above the base of the Klabava Formation.

Hrádek

The slopes of small gorge along the road from Hrádek to Strašice offer numerous, small discontinuous outcrops of brown-violet silty shales with interbeds of sandy material.

Generally, the thickness of sandstone beds decreases upward. Siltstones and silty shales outcropping in the higher part of the gorge yielded rich, fragmental lingulate brachiopod fauna. Undescribed acrotretaceans prevail along with *Pidiobolus minimus* Mergl, other brachiopods are less common but the taxonomic diversity is remarkably high: *Lingulella lata* Koliha, *Teneobolus gracilis* Mergl, *Rowellella* sp., *Elliptoglossa celdai* Mergl, *Elkanisca obesa* (Havlíček), *Celdobolus mirandus* (Barrande), *Collarotretella septata* sp. n., *Orbithele undulosa* (Barrande) and *Schizotreta* (?) sp. Other fossils are represented by rare conodonts. The early Arenig age of the fauna can be inferred from the position of the sample 10-20 m above the base of the Klabava Formation. The direct contact of the Klabava Formation with the subjacent Pavlovsko Formation is not exposed here.

Strašice

A temporary excavation in the field between the east margin of Strašice town and the hill with the Church of St. Vojtěch, in 1986 yielded red-brown siltstones and silty shales of the Olešná Member. Unlike other localities in the Strašice area, the brachiopod assemblage is unusual. Along with common species *Celdobolus mirandus* (Barrande) and undeterminable acrotretids, there are abundant *Lingulella lata* Koliha, *Teneobolus gracilis* Mergl, *Elkanisca obesa* (Havlíček), *Elliptoglossa celdai* Mergl, *Siphonotretella* sp. and *Orbithele undulosa* (Barrande), although *Leptembolon insons testis* (Barrande) is missing here. The exact stratigraphical position of the association is not evident but a stratigraphically higher part of the Olešná Member is likely. This assumption is based on the proximity to tuffites that were exposed in the same temporary excavation. These tuffites are restricted to the the upper part of the Klabava Formation and stratigraphically younger beds in the area.

Conclusion

The new brachiopod faunules differ from the uniform assemblage characteristic of the red-brown siltstones and shales of the Olešná Member. Absence of the common species *Leptembolon insons testis* (Barrande) and rarity or absence of siphonotretacean *Celdobolus mirandus* (Barrande) at the Hrádek and Sedlec localitites, respectively, indicates either different environments, or different stratigraphical ages, or alternatively the existence of a barrier which prevented the westward dispersion of these species. Different ages seem highly probable: all known occurrences of the *Leptembolon insons* Community are restricted to the lower part of the Olešná Member and the age of these occurrences cannot be compared directly with the graptolite-bearing sequences of the Klabava Formation due to the lack of common fossils. Thus, the westward transgression of the Klabava Formation could have occurred later, and the lower part of the Olešná Member has no equivalent in the clayey, graptolite-bearing sequence of the Klabava Formation. This assumption corresponds well with the higher stratigraphical position of the unique sample of Strašice, and the different brachiopod assemblages in the lower part of the Klabava Formation in the western part of the basin. It is necessary to point out the occurrence of elkaniids in the area; *Elkanisca obesa* (Havlíček) is a rare but widespread species in the Olešná Member and it is known from the Strašice and Hrádek localities and the lower part of gorge at the Sedlec locality. This species is absent in the younger brachiopod assemblage at Sedlec, where it is substituted by the species *Elkania lineola* (Havlíček). The known stratigraphical range of the latter is more extensive (*Corymbograptus v-similis* Biozone to the very top of the Klabava Formation) (Mergl 1994).

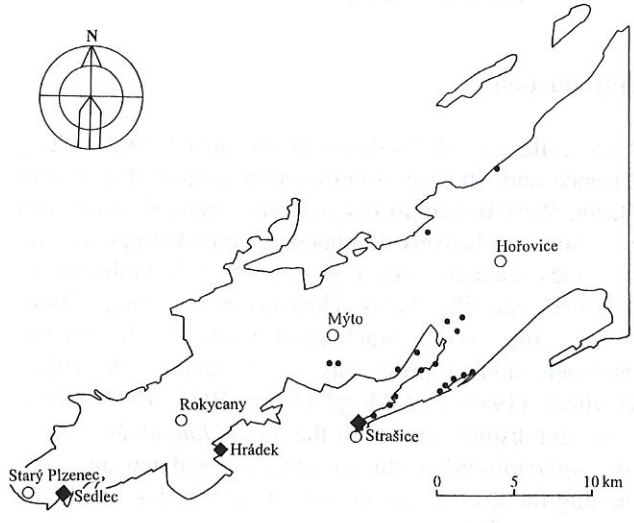


Fig. 1. Map of the western part of Prague Basin, showing described localities and outcrop of Ordovician rocks
Rectangles - studied localites, black circles - localites bearing distinct *Leptembolon insons* Community

Systematic part

Class *Lingulata* Gorjansky & Popov, 1985
Order *Lingulida* Waagen, 1885
Superfamily *Linguloidea* Menke, 1828
Family *Obolidae* King, 1846
Subfamily *Lingulellinae* Schuchert, 1893

Genus *Lingulella* Salter, 1866

Type species: *Lingula davisii* M'Coy, 1851.

Lingulella lata Koliha, 1924

Fig. 2:H-M

1924 *Lingulella insons* Barr. var. *lata* n. var.: Koliha, p. 39 and 56, pl. 2, figs. 10, 11.
1982 *Lingulella lata* Koliha, 1924: Havlíček, p. 42, pl. 3, figs. 10-12.

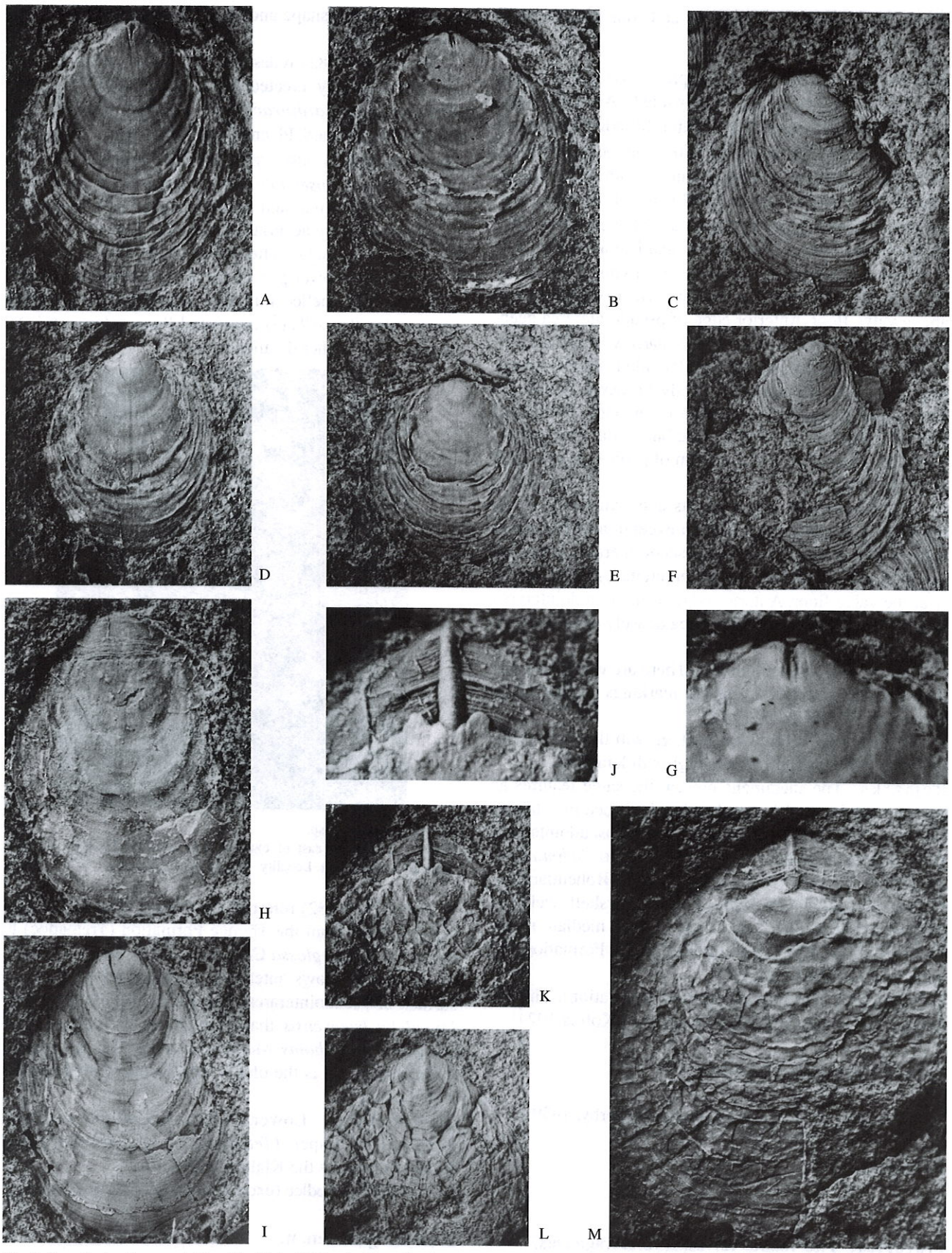


Fig. 2. *Spondyglosella spondylifera* Havlíček, 1980 - A - Ventral valve, internal mould, No. 2/96/1, x12. B, C - Ventral valve, internal mould (B) and latex cast of exterior (C), No. 2/96/2, x12. D - Dorsal valve, internal mould, No. 2/96/3, x12. E - Dorsal valve, internal mould, No. 2/96/4, x12. F - Dorsal valve, latex cast of exterior, No. 2/96/2, x12. G - Detail of ventral valve, internal mould, No. 2/96/2,, x30. *Lingulella lata* Koliha, 1924 H, I - Dorsal valve, internal mould (H) and latex cast of exterior (I), No. 2/96/5, x12. J - Detail of ventral pseudointerarea, internal mould, No. 2/96/6, x30. K, L - Ventral valve, internal mould (K) and latex cast of exterior (L), No. 2/96/6, x12. M - Ventral valve, internal mould, No. 2/96/7, x12. Age: Klabava Formation, lower part, 0.7 m above association with *Clonograptus* (A-G); the same formation, lithofacies Olešná Member, upper part (H-M). Localities: Sedlec (gorge) (A-G), Strašice (excavation) (H-M)

New material: Four ventral and four dorsal valves, several fragments.

Description: The largest complete valve is 7 mm long, subequally biconvex, and thin-walled. Available fragments indicate a length of 10-15 mm for adult specimens.

Ventral valve broadly oval, with acute beak, some 120 % longer than wide, with maximum width at midlength. Lateral and anterior margins evenly curved. Posterior margin with moderately pointed beak, apical angle 120°-130°. Valve weakly convex in transverse and lateral profiles.

Ventral pseudointerarea large, occupying 15 % of the valve length, orthocline, with flat surface slightly raised above valve floor. Anterior edge of pseudointerarea deeply excavated. Pedicle groove deep, narrow (less than 5 % of the valve width), almost parallel sided, weakly extending anteriorly. Propareas distinctly bordered by flexure lines, inner propareas larger than outer ones. Surface of propareas densely covered by fine but distinct and densely packed growth lines, the bottom of pedicle groove with weak growth lines.

Dorsal valve elongate oval, its convexity and outline the same as ventral valve with an exception of the dorsal beak, which is rounded. Dorsal pseudointerarea large, some 15 % as long as valve, undifferentiated, resting directly at the valve floor. Anterior edge of the pseudointerarea straight. Surface of pseudointerarea densely covered by fine growth lines.

Interiors not yet well known. There are no distinct impressions of muscles or pallial markings except those mentioned by Havlíček (1982).

Shell surface covered by weak growth lines and several (four to five) slightly coarser growth lamellae.

Remarks: The specimens present the same features as the type specimen of *L. lata* Koliha, described in detail by Havlíček (1982). The shape of the ventral pseudointerarea and pedicle groove is very similar to *Schmidtites* Schuchert - Le Vene (Puura, 1996). Unlike Bohemian specimens, the genus *Schmidtites* has a thick shell, well-impressed visceral area and weak dorsal median ridge.

Occurrence: Lower part of the Klabava Formation and upper part of Olešná Member.

Localities: Strašice (temporary excavation), Hrádek (gorge), Cerhovice (= the type locality of Koliha 1924).

Genus *Palaeoglossa* Cockerell, 1911

Type species: *Lingula attenuata* Sowerby, 1839.

Palaeoglossa sp.

Fig. 3

Material: Two ventral valves, several fragments.

Remarks: Despite fragmentary state of preservation, the species is distinct in its external ornamentation, which consists of fine concentric fila crossed in anterior and anterolateral sectors by radially arranged fila. Radial fila are of uniform size, shape and are 0.05 mm apart along anterior periphery.

Havlíček (1982) redescribed *P. pusilla* (Želízko), the species originally erected by Želízko (1921) from the *Schizograptus tardibrachiatus* Biozone (locality "U Blaženje" near Starý Plzenec) of the Klabava Formation. Havlíček (1982) also reported this species from the *Tetragraptus* cf. *pseudobigsbyi* Biozone. Poor preservation of type specimen and limited data given by Havlíček (1982) make more accurate comparison of both forms impossible at present. The upper part of the Klabava Formation and lower part of the Šárka Formation contain numerous thin-shelled lingulids [along with undescribed species also *P. pusilla* (Želízko) and *Palaeoglossa* sp.]. All species need further detailed revision.

Fig. 3. *Palaeoglossa* sp.
Ventral valve, latex cast of exterior, No. 2/96/8, x10. Age: Klabava Formation, lower part. Locality: Sedlec (excavation)

Havlíček (1982) referred the species *Lingulella bukovensis* Koliha from the Třenice Formation (Tremadoc) to the genus *Palaeoglossa* Cockerell. A new study of the type specimens shows anteriorly recurved growth lines on surface of pseudointerarea adjacent to pedicle groove of *Lingulella bukovensis* that supports its re-assignment to the genus *Teneobolus* Mergl. Consequently, the species *Palaeoglossa* sp. is the oldest representative of the genus in Bohemia.

Occurrence: Lower (*Corymbograptus v-similis* Biozone) to upper (*Tetragraptus* cf. *pseudobigsbyi* Biozone) parts of the Klabava Formation.

Localities: Sedlec (excavations), Klabava (Old castle).

Sedlecilingula gen. n.

Type species: *Sedlecilingula sulcata* sp. n.

Diagnosis: Shell of linguloid appearance, with distinct sulcus and emarginate anterior margin. Ventral pseudoin-

terarea orthocline, large, with defined propareas, anteriorly undercut, bisected by deep, moderately expanding and differentiated pedicle groove. Ventral interior with large raised muscle platform, finely pitted posterior part of visceral area and obscure pallial markings. Dorsal interior with distinct, anteriorly undercut apsacline pseudointerarea, no median ridge and paired umbonal scars. Exterior with raised concentric fila except for bottom of the sulcus, which has finely wrinkled surface and obscure radial plications.

Comparison: Some features of the new genus are similar to *Pseudolingula* Cooper. Both genera have large, raised ventral muscle platforms medially halved by a narrowly triangular sector extending from the bottom of the pedicle groove, a similar shape of pedicle groove, and divided ventral and dorsal umbonal scars. However, there are prominent differences; the new genus is sulcate, has a distinct propareas in the ventral pseudointerarea, a quite different dorsal pseudointerarea than is present in pseudolingulines (Holmer 1990) and has no dorsal median septum.

Small, but well developed apsacline dorsal pseudointerarea and presence of diverging grooves reflecting the flexure lines are features which indicate an attribution of *Sedlecilingula* to the *Lingullinae* Schuchert. However, another morphological features (large and deep pedicle groove, thickened ventral muscle platform) are characteristic of the *Pseudolingulinae* Holmer. Therefore, the early Ordovician form *Sedlecilingula* can be considered a connecting link among *Lingulellinae* and *Pseudolingulinae*.

The reduction of dorsal pseudointerarea and uprising of median septum is known in the genus *Rafanoglossa,* one of the oldest (Arenig) member of *Glossellinae* Cooper as well as in species *P. granulata* (Phillips), which is referred to pseudolingulines by Holmer (1990).

Species included: Type species only.

Sedlecilingula sulcata sp. n.

Figs. 4, 5

Holotype: Ventral valve, internal and external moulds, figured on Fig. 4: A,B,G, housed in the collections of the District Museum of Dr B. Horák in Rokycany, Acc. No. 2/96/9.

Type horizon: Lower Arenig, Klabava Formation, the lower part of the *Corymbograptus v-similis* Biozone.

Type locality: Sedlec, temporary excavation in the field above confluence of Lhůtský and Tymákovský Creeks.

Material: Three ventral and two dorsal valves, numerous fragments.

Description: Shell of medium size, 7.5 mm long, dorsi-biconvex, with moderate thick shell-wall.

Ventral valve elongate, moderately acuminate, subpentagonal in outline, about 125 % as wide as long; widest in anterior third. Commissure rectimarginate. Anterior margin weakly emarginate, antero-lateral part of margin strongly curved, lateral margins weakly curved, beak angle 110°-120°. Ventral sulcus distinct from midlength of valve, sulcus 25 % as wide as the valve in anterior margin. Valve evenly convex in lateral profile. Transverse profile in posterior half of the valve with steep flanks and flattened median part; in anterior half, there are distinctly convex flanks with concave axial part of the valve.

Pedicle groove deep, expanding anteriorly, with smooth axial part and raised sides, which are wrinkled by growth lines. Ventral pseudointerarea large, elevated above valve floor, undercut anteriorly. Surface of pseudointerarea covered by distinct growth lines, 0.02-0.03 mm apart. Distinct flexure lines are absent, but border between inner and outer propareas is marked by widely diverging groove crossed by growth lines. Inner propareas large, while outer propareas restricted to narrow strips along posterior margin; outer proparea less raised above the valve floor than inner proparea.

Interior of ventral valve with a large, thickened muscle platform, extending to the midlength of valve. The platform distinctly raised above valve floor and it is halved medianly by smooth, feebly expanding sector, which extends anteriorly from the bottom of the pedicle groove. Lateral sectors of muscle platform covered by coarse transverse ridges. Posterior part of visceral area densely covered by fine pits. Muscle scars poorly defined, paired umbonal scars lie laterally to internal opening of pedicle groove. Pallial markings not impressed.

Dorsal valve similar to ventral valve in outline but differs by more rounded beak and higher convexity. Dorsal pseudointerarea with distinct pseudointerarea, slightly but distinctly raised and anteriorly undercut. Anterior border of pseudointerarea broadly curved. Visceral area poorly defined. A pair of umbonal muscle scars is impressed in front of pseudointerarea, another two pairs of narrow, crescentic muscle scars (= transmedian, outside lateral and middle lateral muscles) are located posterolaterally.

External ornamentation of fine but distinct concentric fila, arranged in regular intervals on entire surface, 0.04-0.07 mm apart. Surface of the sulcus with irregularly wrinkled concentric fila and obscure radial plications, the latter five to seven in number. The continuous growth scarcely interrupted by growth lamellae, well marked internally but obscure externally.

Remarks: New species is particularly similar to species *Pseudolingula granulata* (Phillips) (= *P. spatula* Williams in Williams, 1974) from Weston Beds (Upper Llanvirn) of Shropshire (Lockley - Williams 1981). The latter differs by a strong dorsal median ridge, glosselid-like dorsal pseudointerarea and prominent external ornamentation and absence of ventral sulcus.

Occurrence: Lower (*Corymbograptus v-similis* Biozone) to middle (*Schizograptus tardibrachiatus* Biozone) parts of the Klabava Formation.

Localities: Sedlec (excavation), Starý Plzenec ("U Blažeje").

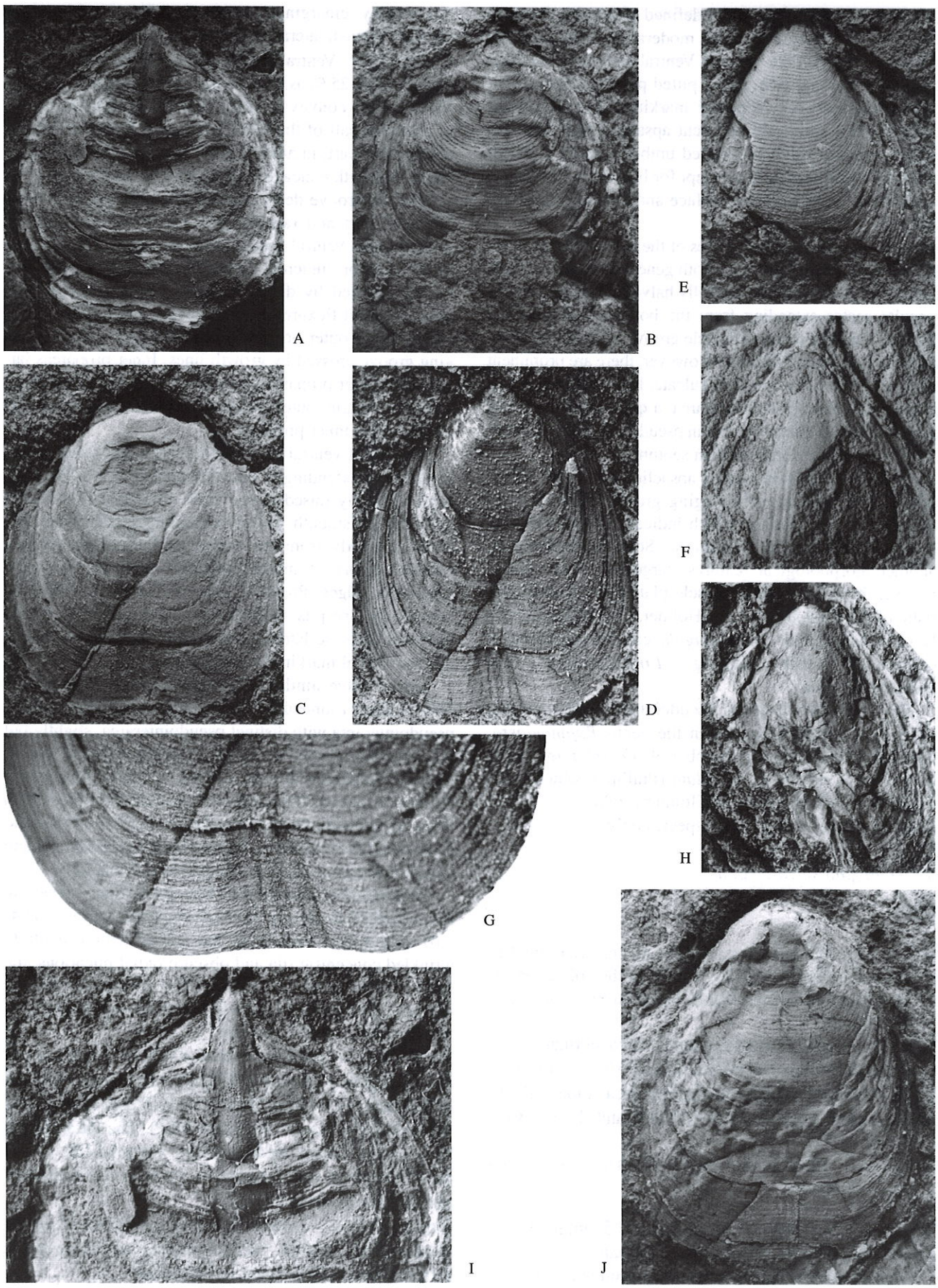


Fig. 4. *Sedlecilingula sulcata* sp. n. - A, B - Holotype, ventral valve, internal mould (A) and latex cast of exterior (B), No.2/96/9, x8. C, D - Ventral valve, internal mould (C) and latex cast of exterior (D), MM 011, x8. E, F - Incomplete dorsal valve, latex cast of exterior (E) and internal mould (F), No.2/96/10, x8. G - Detail of anterior margin and sulcus, latex cast of ventral valve exterior, MM 011, x20. H - Dorsal valve, internal mould, No.2/96/11, x8. I - Detail of ventral valve, holotype, No.2/96/9, x12. J - Ventral valve, latex cast of exterior, No.2/96/12, x8.
Age: Klabava Formation, lower part. Locality: Sedlec (excavation)

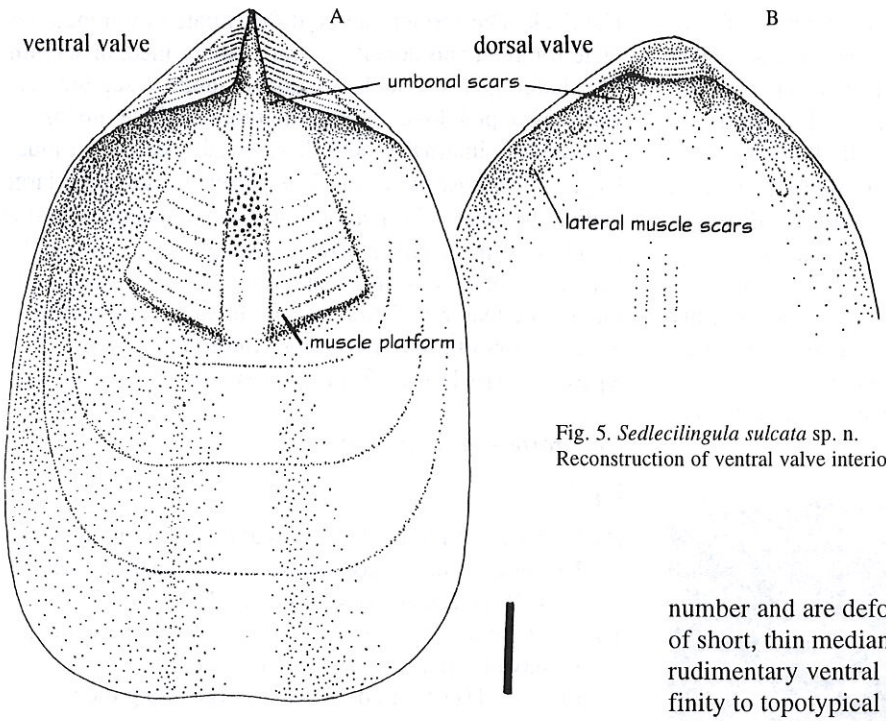


Fig. 5. *Sedlecilingula sulcata* sp. n.
Reconstruction of ventral valve interior (A) and dorsal valve interior (B). Bar 1 mm

Subfamily *Glossellinae* Cooper, 1956

Genus *Spondyglosella* Havlíček, 1980

Type species: *Spondyglosella spondylifera* Havlíček, 1980.

***Spondyglosella spondylifera* Havlíček, 1980**

Fig. 2:A-G

1980 *Spondyglosella spondylifera* sp. n.: Havlíček, p. 5, pl. 1, figs. 6, 9, 12, pl. 2, figs. 9, 11-13.

Material: Two ventral valves, four dorsal valves.

Description: Shell small, biconvex, thin-walled, the largest specimens almost 5 mm long.

Ventral valve broadly oval, 150-115 % as long as wide, widest at midlength. Lateral and anterior margins evenly rounded, posterior margin subtends 120°, beak weakly pointed. Valve weakly convex in transverse and lateral profiles, the deepest posteriorly.

Dorsal valve 110-120 % as long as wide, with rounded beak.

Ventral interior with rudimentary pseudointerarea, restricted to the tiny plate at the apex. Obscure pedicle groove continues anteriorly on the sloping crest of the short but distinct, low septum. Valve floor with radially disposed fine grooves. Dorsal valve interior without differentiated pseudointerarea. Very low median ridge extends from the midlength of visceral field toward anterior margin. Visceral area and muscle scars without distinct borders in either valve.

Exterior of shell covered by fine, prominent growth fila, slightly varying in size. Growth lamellae indistinct.

Remarks: Specimens from Bohemia are restricted in number and are deformed in shales, but the size, presence of short, thin median septum, absence of muscle scars and rudimentary ventral pseudointerarea indicate the close affinity to topotypical specimens of *Spondyglosella spondylifera* Havlíček. The type species was described by Havlíček (1980) from the Upper Tremadoc to Lower Arenig of the Montagne Noire. Occurrence of Bohemian specimens at the base of the Klabava Formation corresponds well to suggested late Tremadoc to early Arenig age of the species.

Occurrence: Lower part of the Klabava Formation (Horizon with *Clonograptus).*

Locality: Sedlec (gorge).

Family *Zhanatellidae* Koneva, 1986

Genus *Rowellella* Wright, 1963

Type species: *Rowellella minuta* Wright, 1963.

***Rowellella* sp.**

Fig. 6

Material: Five dorsal valves.

Description: Ventral valve unknown. Dorsal valve minute, elongate-oval in outline, 200 % as long as wide, widest at midlength. The outlines of the valves indicate assymetrical growth of some shells. Sides subparalell, with anterior partitions weakly converging, anterior margin almost straight, more or less truncated. Valve flat in posterior half except for narrow marginal belt which is markedly geniculate. Lateral profile slightly convex, with flat posterior part and feebly convex anterior half. Posterior margin and shape of pseudointerarea unknown.

Dorsal valve interior with slender, short median ridge located posteriorly to midlength. A pair of spindle-shaped central muscle scars weakly impressed anterior to midlength. Chevron-like arrangment of intervascular ridges is distinct along anterior periphery of the valve.

Exterior of valve bears prominent concentric rugellae of uniform size, 0.07-0.10 mm apart. Growth lamellae several in number, externally obscure but well marked on valve interior.
Remarks: *Rowellella* sp. is externally rather similar to the specimens assigned to *R. distincta* Bednarczyk from the lowermost layers of the Klabava Formation (Olešná Member) (Mergl 1995). However, the former is distinguished by a flat dorsal valve, less geniculate lateral and anterior margins, thinner shell walls and poorly impressed muscle scars in the dorsal interior. Similarly shaped, but poorly studied forms of *Rowellella* have been reported from the latest Tremadoc to upper Arenig of Baltic area and Poland by Biernat (1973), Bednarczyk (1986) and Holmer - Popov (1995).

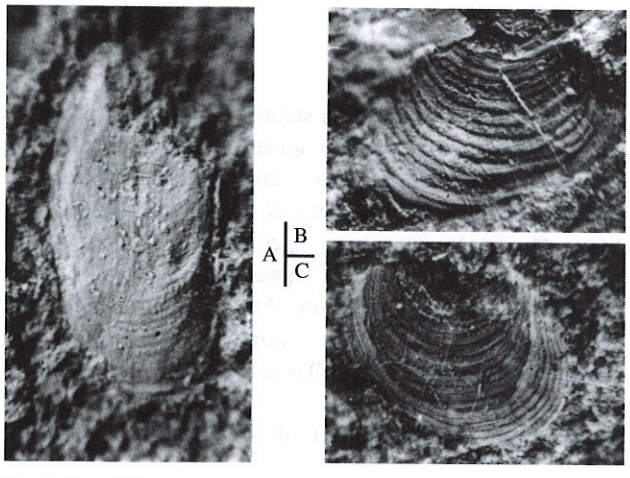


Fig. 6. *Rowellella* sp.
A - Dorsal valve, internal mould, No. 2/96/13, x20. B - Dorsal valve, external mould, No. 2/96/14, x20. C - Dorsal valve, external mould, No. 2/96/15, x20.
Age: Lower part of the Klabava Formation. Locality: Hrádek (gorge)

Occurrence: Lower part of the Klabava Formation.
Localities: Sedlec (excavation), Hrádek (gorge).

Order *Siphonotretida* Kuhn, 1949
Superfamily *Siphonotretoidea* Kutorga, 1848
Family *Siphonotretidae* Kutorga, 1848
Subfamily *Siphonotretinae* Kutorga, 1848

Collarotretella gen. n.

Type species: *Collarotretella septata* sp. n.

Diagnosis: Minute siphonotretacean with biconvex shell, posteroventrally directed pedicle foramen which expands considerably in the shell wall and is internally bounded by a thickened circular collar. Ventral pseudointerarea low. Dorsal valve without distinct pseudointerarea, deep umbonal chamber bisected by short but well-developed median septum. Exterior is devoid of strong spines, the bases of minute spines obscure.
Comparison: New genus is closest to genera *Siphonotretella* Popov - Holmer and *Siphonobolus* Havlíček. The former can be differentiated by minute pedicle foramen and dorsal interior without median septum. The latter genus also lacks dorsal median septum, has well-developed dorsal pseudointerarea, pedicle tube is expanded less internally and all referred species are much larger. *Eosiphonotreta* Havlíček differs in showing large pedicle foramen, absence of dorsal median septum and is about five times larger size. Extremely large, internally expanding pedicle foramen and dorsal median septum are the unique features distinguishing the new genus from other members of *Siphonotretinae* Kutorga.
Species inclued: Type species only.

Collarotretella septata sp. n.

Fig. 7

Holotype: Ventral valve, internal mould, figured in Fig. 7:B, housed in the collections of the District Museum of Dr B. Horák at Rokycany, Acc. No. 2/96/17.
Type horizon: Lower Arenig, lower part of the Klabava Formation, red-brown shales.
Type locality: Hrádek, small gorge along the road to Strašice.
Material: 4 ventral valves and 9 dorsal valves, preserved as internal and external moulds.

Description: Shell minute, 3-3.5 mm long, relatively thick-walled, subequally biconvex.

Ventral valve broadly oval, some 80 % as wide as long, with evenly rounded flanks and anterior margin. Posterior margin rounded, beak supramarginal. Maximum width at, or slightly anterior to, midlength. Transverse profile gently convex, lateral profile with pointed beak and gently convex and anteriorly sloping valve surface. Posterior slope catacline, low. Ventral pseudointerarea restricted to narrow strip along posterior margin, without pedicle groove. Pedicle foramen large, circular, directed posteroventrally.

Interior of ventral valve with large internal pedicle tube, penetrating the thickened beak. External pedicle foramen continues internally into expanding pedicle tube, the dorsal margin of which forms a subcircular, large collar raised above the valve floor. Inner surface of pedicle tube with distinct growth lines. Muscle scars and pallial markings not impressed, valve slightly swollen anterior to inner pedicle opening.

Dorsal valve subcircular to broadly oval, with maximum width at midlength. Transverse profile weakly convex, lateral profile with raised beak and evenly sloping anterior slope, anteromedian sector flattened. Posterior slope low, steep, the beak slightly extended beyond the posterior margin. Anterior, lateral and posterior margins evenly curved. Dorsal pseudointerarea linear, restricted to thickened posterior shell wall.

Dorsal interior with stout median septum restricted to umbonal chamber, being only 10 % as long as valve. No muscle scars are preserved.

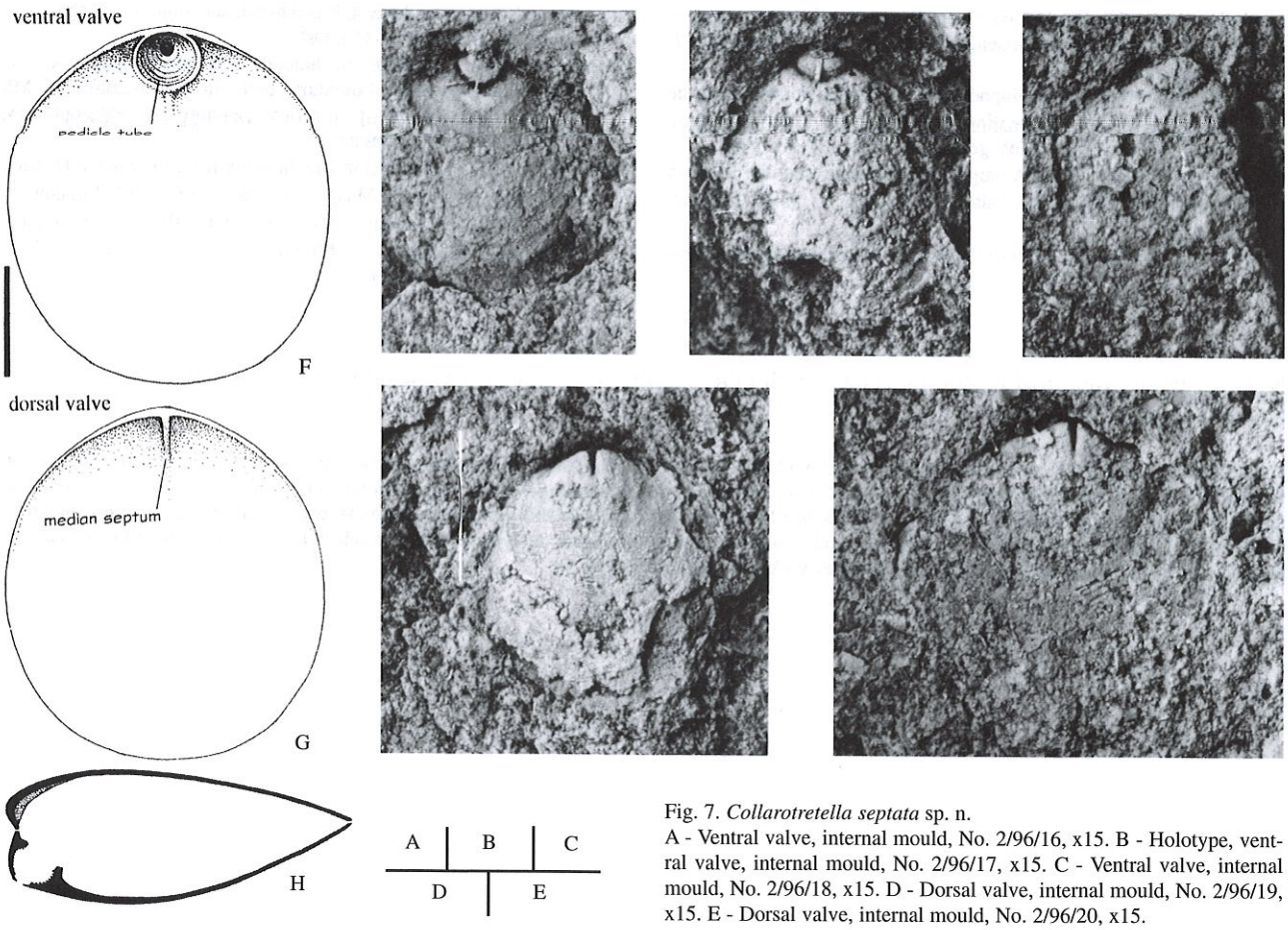


Fig. 7. *Collarotretella septata* sp. n.
A - Ventral valve, internal mould, No. 2/96/16, x15. B - Holotype, ventral valve, internal mould, No. 2/96/17, x15. C - Ventral valve, internal mould, No. 2/96/18, x15. D - Dorsal valve, internal mould, No. 2/96/19, x15. E - Dorsal valve, internal mould, No. 2/96/20, x15.
Age: Lower part of the Klabava Formation. Locality: Hrádek (gorge)

Collarotretella septata sp. n.
Reconstruction of ventral valve interior (F) and dorsal valve interior (G), and generalised section through shell (H) showing nature of pedicle opening (dorsal valve above, stipped area = median septum). Bar 1 mm

Outer shell surface poorly known due to the preservation. Umbonal region of ventral valve almost smooth. There are no distinct traces of superficial spines.

Remarks: The new species is assigned to family *Siphonotretidae* Kutorga with some doubts, because the shell exterior is poorly known. This is due to the mode of preservation; while other lingulates with phosphatic shells are well-preserved as internal and external moulds, all available external moulds of *Collarotretella septata* have corroded, slightly etched and whitened surface. The reason for this different preservation is unknown, but this may be a result of the internal fabric of the apatitic shell.

Occurrence: Type locality only.

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References

Bednarzcyk, W. (1986): Inarticulate brachiopods from the lower Ordovician in northern Poland. - Ann. Soc. geol. Poloniae, 56, 409-418. Warszawa.

Biernat, G. (1973): Ordovician inarticulate brachiopods from Poland and Estonia. - Palaeont. pol., 28, 1-120. Warszawa.

Fatka, O. (1993): Chitinozoans and acritarchs in latest Tremadoc-early Arenig sediments of the Prague Basin, Czech Republic. - Spec. Pap. Palaeont., 48, 29-36. London.

Havlíček, V. (1980): Inarticulate brachiopods in the Lower Ordovician of the Montagne Noire (South France). - Mem. Soc. Etud. Sci. Aude, 3-11. Carcassone.

- (1982): Lingulacea, Paterinacea, and Siphonotretacea (Brachiopoda) in the Lower Ordovician sequence of Bohemia. - Sbor. geol. Věd, Paleont., 25, 9-82. Praha.

Holmer, E. L. (1990): The systematic position of Pseudolingula Mickwitz and related lingulacean brachiopods. *In: D. I. Mackinnon - D. E. Lee - J. D. Campbell* (eds.): Brachiopods through time. - 15-21. Balkema. Rotterdam.

Koliha, J. (1918): Brachiopoda z krušnohorských vrstev. - Čas. Mus. Král. čes., 92, 128-139. Praha.

- (1924): Atremata z krušnohorských vrstev (dα). - Palaeontol. Bohem., 10. Praha.

Kraft, J. - Mergl, M. (1979): New graptolite fauna from the Klabava Formation (Arenig) of the Ordovician of Bohemia. Věst. Ústř. Úst. geol., 54, 5, 291-295. Praha.

Lockley, M. G. - Williams A. (1981): Lower Ordovician Brachiopoda from mid and southwest Wales. - Bull. Brit. Mus. nat. Hist., Geol. 35, 1, 1-78. London.

Mergl, M. (1978): Výsledky paleontologického výzkumu ordoviku v širším okolí Starého Plzence. - Sbor. Západočes. Muz., Přír., 28, 1978, 1-70.

- (1981): The genus Orbithele (Brachiopoda, Inarticulata) from the Lower Ordovician of Bohemia and Morocco. - Věst. Ústř. Úst. geol., 56, 5, 287-292. Praha.

- (1986): The Lower Ordovician (Tremadoc-Arenig) Leptembolon Community in the Komárov area (SW part of the Prague Basin; Bohemia). - Folia Mus. Rer. Nat. Boh. Occid., Geologica 24, 1-34. Plzeň.

- (1994): Inarticulate brachiopod genera Elkania Ford and Elkanisca in the Lower Ordovician of Bohemia. - Věst. Čes. geol. Úst., 69, 4, 47-55. Praha.
- (1995): New lingulate brachiopods from the Mílina Formation an the base of the Klabava Formation (late Tremadoc - early Arenig), Central Bohemia. - Věst. Čes. geol. Úst., 70, 2, 101-114. Praha.

Paris, F. - Mergl, M. (1984): Arenigian chitinozoans from the Klabava Formation, Bohemia. - Rev. Palaeobot. Palynol., 43, 33-65. Elsevier. Amsterdam.

Popov, L. E. - Holmer, L. (1994): Cambrian-Ordovician lingulate brachiopods from Scandinavia, Kazakhstan, and South Ural Mountains. - Foss. and Strata, 35, 1-156. Oslo.

Puura, I. (1996): Lingulate brachiopods and biostratigraphy of the Cambrian-Ordovician boundary beds in Baltoscandia. - MS Doctoral thesis, Dept. of Historical Geology and Palaeontology, Uppsala University. Uppsala.

Williams, A. (1974): Ordovician Brachiopoda from the Shelve District, Shropshire. - Bull. Brit. Mus. natur. Hist., Geol., 1-163. London.

Želízko, J. V. (1921): Äquivalente der untersilurische Euloma - Niobefauna bei Plzenec im Böhmen. - Videnskaps. Skrif., I, Mat. Natur. Kl., 10. Kristiania.

Noví a vzácní lingulátní ramenonožci ze spodní části klabavského souvrství (arenig, spodní ordovik) z pražské pánve v Čechách

V práci jsou popsány nové nebo málo známé taxony lingulátních ramenonožců z českého spodního ordoviku: nové rody *Sedlecilingula* (typový druh *S. sulcata*) a *Collarotretella* (typový druh *C. septata*). Nový materiál umožnil redeskripci druhu *Lingulella lata* a rozšířil údaje o geografickém a stratigrafickém rozšíření rodů *Palaeoglossa, Spondyglossella* a *Rowellella.* Společně s dalšími již dříve známými taxony se popsané druhy vyskytují v hnědofialových jílovitých břidlicích a prachovcích ve spodní části klabavského souvrství. Je vysloven předpoklad, že fauny jsou stratigraficky mladší než jim podobné fauny ze spodních poloh olešských vrstev v západní části pražské pánve.