Sbor. geol. věd	Paleontologie, 31	Pages 67—104	18 figs.	— tab.	12 pls.	Praha 1990 ISSN 0036-5297

Middle Cambrian inarticulate brachiopods from Central Bohemia

Středokambričtí inartikulátní ramenonožci ze středních Čech

Michal Mergl[1] - Petra Šlehoferová[2]

Received September 12, 1988

Inarticulate brachiopods
Taxonomy
Cambrian
Bohemia

1 : 50 000
12-14, 32, 34, 43

Mergl, M. - Šlehoferová, P. (1990): Middle Cambrian inarticulate brachiopods from Central Bohemia. — Sbor. geol. Věd, Paleont., 31, *67—104*. Praha.

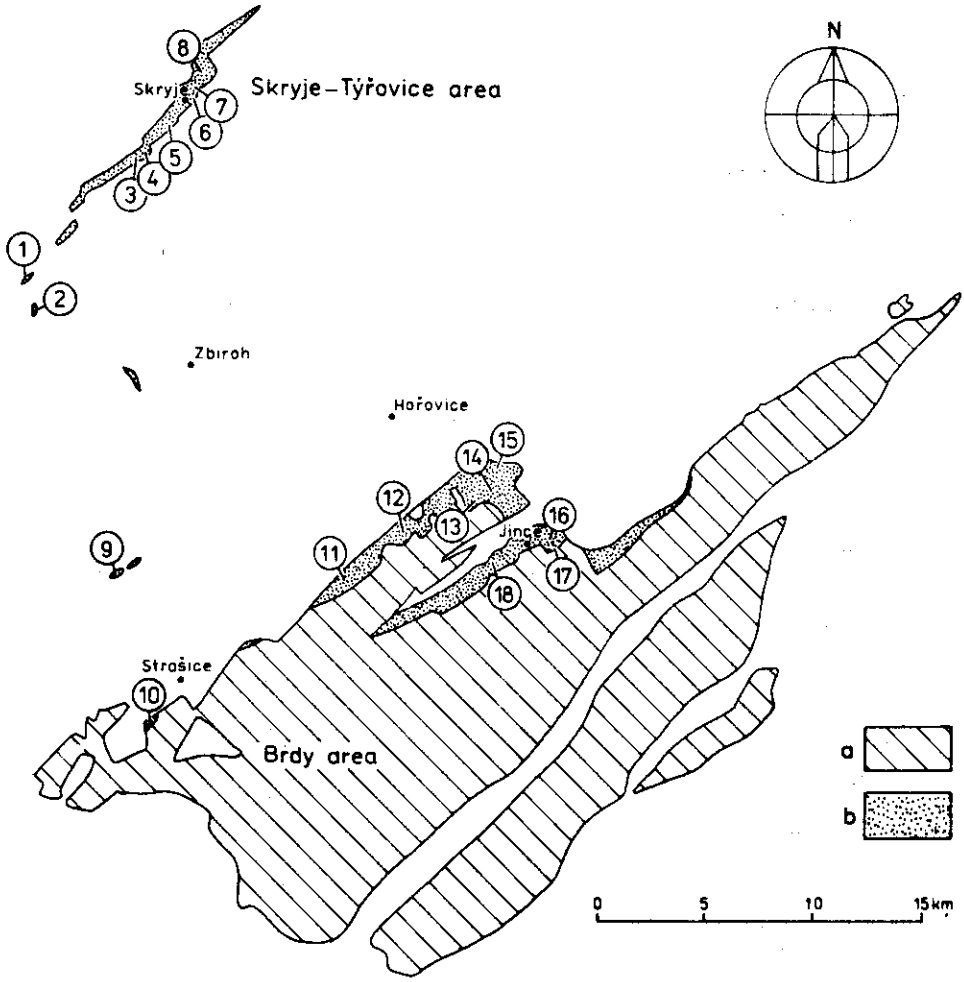
Abstract: Middle Cambrian inarticulate brachiopods comprise 14 species, which belong to 9 genera; *Lindinella* and *Luhotreta* are erected as new genera, Distribution of species is controlled by lithology and stratigraphic levels: sandy, shallow environment was inhabited by several lingulacean associations, whereas deeper parts of the basin were occupied by *Acrothele* and *Botsfordia* associations.

[1] *Pedagogická fakulta, třída 1. máje 51, 306 19 Plzeň*
[2] *Nad pískovnou 56, 140 00 Praha 4*

Introduction

The sediments of the Příbram-Jince Basin range from the Lower to the Upper Cambrian; of them, the Jince Formation is the sole unit yielding a rich marine fauna. The Jince Formations includes the nearly complete Middle Cambrian sequence in the Brdy area (Havlíček, 1971; Fatka, 1986), whereas in the smaller Skryje-Týřovice area this formation consists of the Eccaparadoxides pusillus Zone only. In addition, there are minor differences in the faunal content of the both areas (for main localities see fig. 1).

Inarticulate brachiopods are an uncommon but significant group of marine biotas in sediments of both areas. Rarity of brachiopods prevented complex study of them until the unpublished paper of Šlehoferová (1980). Barrande (1879) and Pompeckj (1896) described and figured several species which were with minor changes accepted



1. Distribution of Lower and Middle Cambrian rocks in Central Bohemia
a — Lower Cambrian, b — Middle Cambrian (Jince Formation).
Localities: 1 — Lohovice, 2 — Biskoupky, 3 — Skryje, Buchava quarry, 4 — Skryje, Č.hátko, 5 — Skryje, Dlouhá hora, 6 — Skryje, "Pod třešní", 7 — Skryje, Luh, 8 — Skryje, "Pod hruškou", 9 — Medový Újezd, 10 — Strašice, Kamenná Hill, "V Andělkách" Forest, 11 — Kvaň, Čihadlo, 12 — Beranec Hill, 13 — Rejkovice, western part of the village, 14 — Rejkovice, Hejdův dvůr, 15 — Rejkovice, Zelený mlýn, 16 — Jince, Vinice slope, 17 — Jince, southern part of Vinice slope, 18 — Jince, Vystrkov Hill

by Walcott (1912). Further, several species were described but not illustrated by Želízko (1911), and Koliha (1921); minute lingulaceans mentioned by Šuf (1926, 1927) have been neither described nor figured.

The present paper is based on material deposited at the National Museum, Prague (NM-L), at the Geological Survey, Prague (MM, MŠ, GS-YA),

at the Academy of Sciences, Prague (PEŠ), and at the District Museum of Rokycany (OMR, VH). We are greatly indebted to O. Fatka, V. Havlíček, J. Kraft, R. J. Prokop, and M. Šnajdr for loan of the material; to V. Kordule and F. Knížek for gifts of some nice brachiopod specimens. We are indebted to F. Stojaspal (Geologische Bundesanstalt, Vienna, Austria) for loan of Pompeckj's type specimen of *Acrothele quadrilineata*.

Preservation of brachiopods

The best brachiopod material comes from fine sandstones with carbonatic cement and from carbonatic nodules, which occur in some layers of the shale sequence. Brachiopods are not deformed and their original shell substance has not been disturbed. Nice internal and external moulds can be obtained by removing the phosphatic shell substance by hydrochloric acid. Inarticulate brachiopods in coarse sandstones display less favourable preservation. They have kept main features, but fine details of their internal an external morphology (muscle scars, pallial markings) cannot be examinated. Brachiopods from silty and clayey shales are preserved as composite moulds; many external features are usually impressed onto imprint of interior, and the valves are often strongly deformed.

Brachiopod associations

Brachiopod associations in the Brdy area

In the Brdy area, the fluviatile to lacustrine conglomerates and sandstones of the Chumava-Baština Formation were replaced by a deposition of clastic sediments of the Jince Formation in shallow marine environment. Coarse- to fine-grained sandstones near the base of the Jince Formation bear a low-diversity *Westonia ? fatkai* association.

Westonia ? fatkai association is dominated by *W. ? fatkai* and by rare *Botsfordia* sp. Their valves are always detached, usually broken, and form clusters in carbonate-rich intercalations. Brachiopods are accompanied by common, simple, vertical trace fossils of *Scolithos* type.

Lithology, taphonomy, trace fossils and low-diversity of association indicate intertidal to shallow subtidal rough-water environment (Fatka-Kordule-Mergl-Šarič, in press). This association was replaced by the more diversified *Botsfordia* association in the following sequence.

Botsfordia association is composed of *Botsfordia snajdri* (about 30 % of total brachiopod fauna), *Lingulella sufi* (about 50 %), and *Luhotreta pompeckji* (about 20 %); fragments of large lingulids are rare. Brachiopods with conjoint valves are rare, detached valves are often broken. Minute size of all brachiopods and their prevalence over trilobites are characteristic features of the *Botsfordia* association.

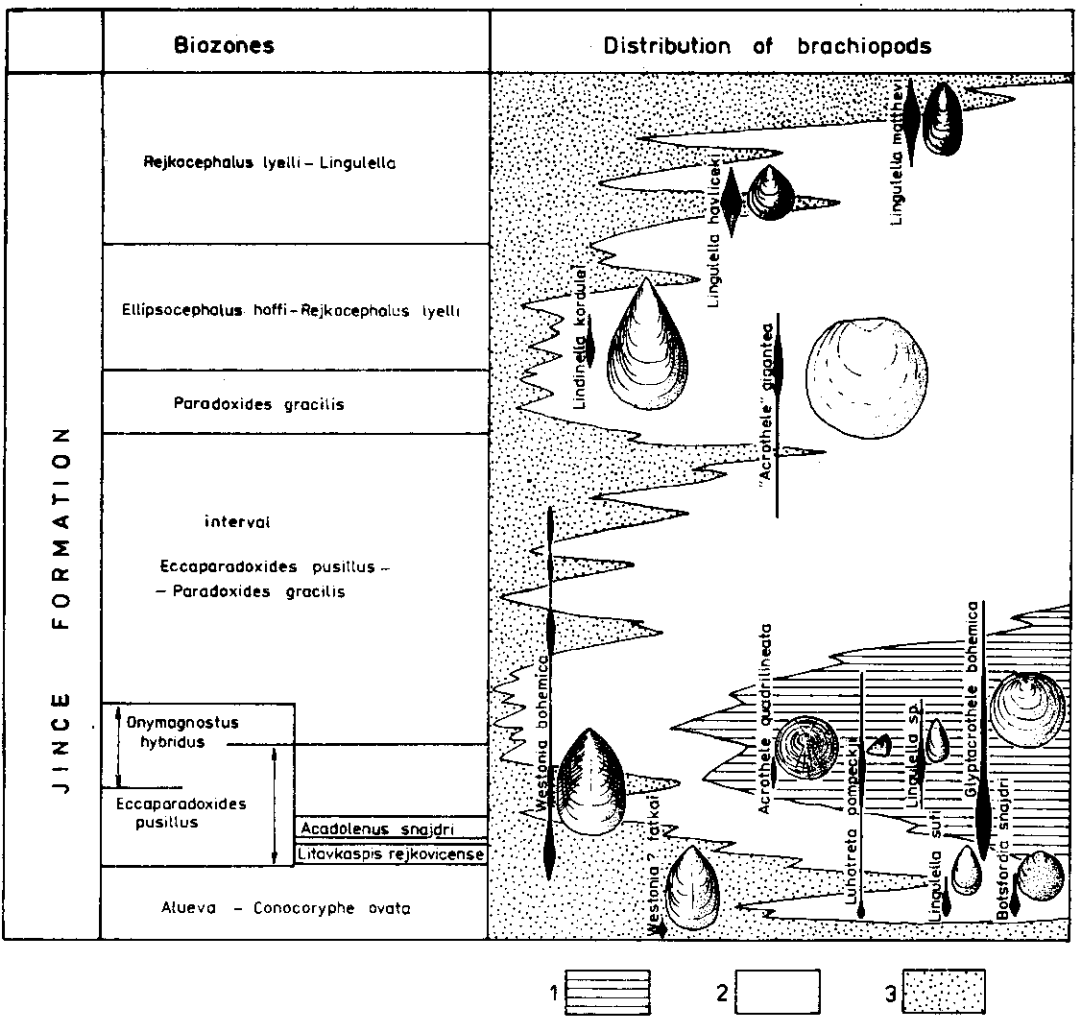
This association, recently discovered by O. Fatka, is accompanied by trilobites *Alueva, Conocoryphe, Ellipsocephalus, Kingaspis,* and *Rejkocephalus*; mitrate echinoderms (*Ceratocystis*) and ostracods are very rare. Low diversity of assemblage, its taphonomy, lithology, and presence of *Diplocraterion* ichnofossil indicate a rough-water, shallow subtidal environment (Fatka - Kordule - Mergl - Šarič, in press). The overlying sequence of silty to clayey shales of Eccaparadoxides pusilllus Zone, Onymagnostus hybridus Zone, and the interval between Eccaparadoxides pusillus to Paradoxides gracilis Zones contain a distinct *Acrothele* association.

Acrothele association is composed of *Acrothele quadrilineata* (less than 1 % of total brachiopod fauna), *Glyptacrothele bohemica* (about 30 to 80 %), *Luhotreta pompeckji* (10 to 60 %), and tiny lingulids (1 to 20 %). With an exception of *A. quadrilinata,* the percentual presences of species change in each sample from the other ones. Valves usually are not disturbed, rather common are finds of closed shells. Minute size of brachiopod shells, and their paucity in comparison with trilobites and echinoderms characterize this association.

Acrothele association is accompanied by highly diversified trilobite assemblage with *Eccaparadoxides, Hydrocephalus, Conocoryphe, Ptychoparia,* and *Jincella.* The lower part of the Eccaparadoxides pusillus Zone bears *Acadolenus, Ellipsocephalus, Litavkaspis, Skreiaspis, Rejkocephalus* a. o.; Onymagnostus hybridus Zone contains rich miomerid trilobites with *Dawsonia, Doryagnostus, Hypagnostus, Onymagnostus, Peronopsis, Phalagnostus* and *Phalacroma.* Echinoderms, articulate brachiopods (*Brahimorthis, Oligomys*), hyolithids, gastropods and ostracods (*Konicekion*) are rare. *Acrothele* association together with accompanying groups represent the richest benthic assemblage in the Brdy area; its occurrence is connected with the maximum deepening of the basin (Fatka, 1986). Westwards from the Jince area the amount of sandy intercalations increases (Havlíček, 1971); sandstone intercalations, occasionally with carbonatic cement contain large-lingulid *Westonia* association.

Westonia bohemica forms a low-diversity association with no other brachiopod species. Valves of this large lingulid are moderately thick, with well-developed divaricate pattern, which indicate infaunal, burrowing mode of life in a coarse sandy substrate (Savazzi, 1986). Abundance of valves varies: whereas they are rare near Jince, at the westernmost part of the basin their valves crowded bedding planes of sandstones.

Westonia association is accompanied by trilobites and echinoderms (*Stromatocystites*) near Jince, but the westernmost occurrence of *Westo-*



2. Stratigraphy and brachiopod distribution of the Jince Formation in the Brdy area (according to O. Fatka, 1986)
1 — clayey shales, *2* — silty shales to siltstones, *3* — sandstones

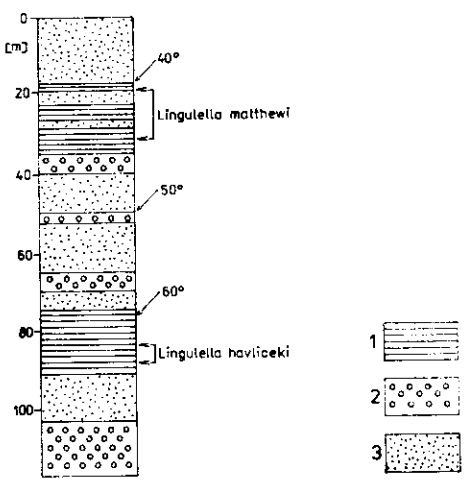
nia bohemica (Strašice, Kamenná Hill, "V Andělkách" Forest) is devoid of other macrofossils (Havlíček, 1960). Silty shales of Paradoxides gracilis Zone contain only *"Acrothele" gigantea* of brachiopods, although poorly diversified trilobites (*Conocephalina, Conocoryphe, Hydrocephalus, Paradoxides, Ptychoparia, Peronopsis* a. o.) and echinoderms (*Akadocrinus, Etoctenocystis, Lichenoides, Stromatosystites*) are common; hyolithids and ostracods are less frequent. The large lingulid *Lindinella* association appears at the lower part of Ellipsocephalus hoffi—Rejkoce-

phalus lyelli Zone, and is accompanied by trilobites *Ellipsocephalus* and *Rejkocephalus,* common minute hyolithids, and large crustaceans.

Lindinella association consists of *Lindinella kordulei* (about 90 % of total brachiopod fauna), *"Acrothele" gigantea* is less common. Shells of both species are large, usually unbroken, mostly with detached valves, although specimens with conjoint valves have also been found. Specimens of *Lindinella* with closed valves oriented obliquely to perpendicularly to the bedding planes are scarce but indicate an infaunal mode of life in the fine sandy substrate. In comparison with other preserved benthic biotas, brachiopods are uncommon (less than 5 % of all fossils).

The top of the Jince Formation bears two medium-sized lingulid associations. The lower part of Rejkocephalus lyelli — Lingulella Zone bears the *Lingulella havliceki* association.

Lingulella havliceki forms a low-diversity brachiopod association with dominance of the type species. Detached and often crushed valves of this medium-sized lingulid occur very frequently in some sandstone layers. Fragments of trilobite carapaces (*Ellipsocephalus, Rejkocephalus*) and ostracods (*Konicekion*) are rare.



3. Section of borehole Mý-XII with marked levels of *Lingulella havliceki* and *L. matthewi* associations (according to M. Šnajdr, 1957)
1 — silty shales, *2* — coarse sandstones, conglomerates, *3* — fine sandstones

The younger *Lingulella matthewi* association is known from Medový Újezd only, where it occurs about 40 metres above the earlier *Lingulella havliceki* association (fig. 3).

Lingulella matthewi forms a low-diversity brachiopod assemblage with high dominance of the type species; *Lindinella kordulei* is very rare. Specimens of *Lingulella* have always detached valves, but these are only rarely broken. Inarticulate brachiopods are accompanied by very frequent vertical trace fossils but other shelly fossils are exceptional (fragments of trilobite *Rejkocephalus*).

Both low-diversity *Lingulella* assemblages, increasing amount of vertical trace fossils, and a higher supply of terrigenous material indicate shallowing of the basin and deteriorating of the marine environment up to a nearly intertidal, maybe brackish one (Havlíček - Šnajdr, 1951; Fatka, 1986). This topmost part of the Jince Formation is overlain by conglomerates, greywackes and sandy shales of the Ohrazenice Formation which are devoid of the fossils.

Facies development and faunal distribution reflect a stratigraphically symmetric development of the Jince Formation in the Brdy area (Fatka, 1986). Large to moderate-sized lingulid associations occuppying sandy and silty bottoms appear mainly near the base and in the upper part of the formation. A relatively deep-water *Acrothele* association with highly diversified trilobite and echinoderm faunas occurs during the maximum deepening of the basin. This model of brachiopod distribution well corresponds with the presumed facies and depth zonation of trilobites and echinoderms suggested by Fatka (1986).

Brachiopod associations in the Skryje-Týřovice area

Marine sediments in the Skryje-Týřovice area are equivalent of the lower part of the Jince Formation (Havlíček, 1971) comprising mainly Eccaparadoxides pusillus Zone. The two oldest stratigraphical units, the Mileč Conglomerates and Sandstones, and the Týřovice Conglomerates and Greywackes yield the articulate brachiopod *Pompeckium* association.

The *Pompeckium* association consists of orthacean *Pompeckium kuthani, Jamesella perpasta* and *J. subquadrata*; inarticulate brachiopods are very scarce and occur in the Týřovice Greywackes only. They are represented by *Lindinella* sp., and minute undeterminable acrotretaceans. Valves of articulate brachiopods often cover bedding planes, and are always disarticulated and often broken; the relatively thin valves of *Lindinella* are crushed, too.

Accompanying fauna consists of the polymerid trilobites *Conocephalina, Ellipsocephalus, Perneraspis, Ptychoparia* and undeterminable paradoxids. *Helcionella* and other molluscs with conical shells are rare. These articulate brachiopods dominated the *Pompeckium* association occupied bottom in the proximity of beaches in intertidal to shallow subtidal environments (Kukal, 1971). The stratigraphic range of this association corresponds to the brachiopod Pompeckium kuthani Zone of Havlíček (1971). The younger Bohemiella romingeri Zone (Havlíček, 1971) comprises Skryje Shales and Vosník Conglomerates.

Whereas the latter are devoid of fossils, the greenish clayey shales, in places with sandy intercalations, bear a rich faunal assemblage which includes also the brachiopod *Bohemiella-Acrothele* association.

Bohemiella romingeri is dominant in this association; *Acrothele quadrilineata* is rare, *Glyptacrothele bohemica, Luhotreta pompeckji* and tiny lingulids are rather common in some layers. The valves of orthacean *Bohemiella* are usually complete, often crowded in the bedding planes, and its closed shells form monospecific clusters in some places. Inarticulate brachiopods display the same mode of preservation as in the *Acrothele* association in the Brdy area. The common occurrence of *Bohemiella* and the relative paucity of inarticulate brachiopods in comparison with trilobites characterize this brachiopod association.

The *Bohemiella-Acrothele* association occurs in an assemblage with richly diversified polymerid trilobites (*Agraulos, Conocoryphe, Ctenocephalus, Eccaparadoxides, Ellipsocephalus, Hydrocephalus, Jincella, Sao, Skreiaspis*), miomerid trilobites (*Condylopyge, Peronopsis, Phalagnostus, Phalacroma, Pleuroctenium, Skryjagnostus*), hyolithids (*Buchavalites, Maxilites, Oboedalites, Parentilites, Slapylites*), echinoderms (*Ceratocystis, Lichenoides, Trochocystites*) and molluscs (*Cambretina, Costipelagiella, Helcionella*). This benthic assemblage inhabited a deep-water environment influenced by a deposition of fluxoturbidites on a steep paleoslope of a deep trough (Kukal, 1971). Its taxonomic composition and mode of preservation is close to the contemporaneous *Acrothele* association in the Brdy area.

Systematic part

Lingulacea Menke, 1828

Obolidae King, 1846

Lingulellinae Schuchert, 1893

Lindinella gen. n.

Type species: *Lindinella kordulei* sp. n.

Diagnosis: Large obolid with tear-drop shaped outline, acutely pointed ventral beak, and moderate thick valves. Ventral pseudointerarea long, anteriorly undercut, divided by a deep, narrowly triangular pedicle groove into large propareas with distinct flexure lines. Dorsal pseudointerarea anteriorly undercut, with a wide, gently concave median depression. Visceral area weakly defined, narrowly triangular in outline, with poorly impressed muscle scars. External ornamentation consists of

coarse elevated concentric lines. On flanks, there are lines dichotomously or laterally branched, but in median sector, the lines are unbranched, with regular course parallel with growth lines.

Remarks: *Lindinella* internally recalls *Lingulella* and *Westonia* but the former has ornamentation of coarse elevated concentric lines, which is never developed in *Lingulella,* which has ornamentation of fine growth lines. *Westonia* has growth lines obliquely crossed by transverse terrace lines (Savazzi, 1986); this pattern is never developed at *Lindinella.*

Species assigned: *L. kordulei* sp. n.; Jince Formation, Brdy area. *L.* sp.; Jince Formation, Skryje-Týřovice area.

Lindinella kordulei sp. n.

Pl. I, figs. 1—5, pl. II, figs. 1, 2; text-figs. 4, 5

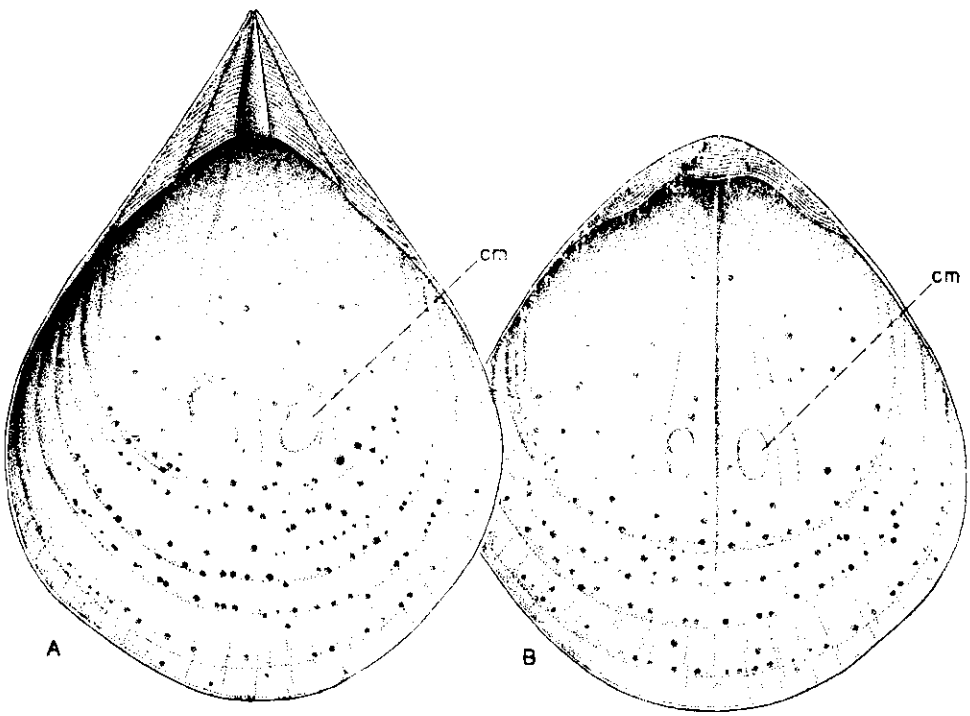
1975 *Lingulella* sp. n.; Šnajdr, p. 158.

Holotype: Pedicle valve figured on pl. I as figs. 1, 4, deposited in the Geological Survey, Prague (GS-YA 1290).
Type horizon: Jince Formation, Ellipsocephalus hoffi—Rejkocephalus lyelli Zone.
Type locality: Rejkovice, railway cutting near Zelený mlýn.
Name: After V. Kordule.
Material: 16 pedicle and 8 brachial valves.

Description: Shell large, biconvex, 13 mm wide in largest specimens. Pedicle valve widest at interior third, 115—145 % as long as wide, teardrop-shaped in outline. Ventral beak pointed, beak angle 60—65°. Anterior and lateral margins evenly rounded, posterolateral margins straight to weakly arched. The valve is gently convex in lateral and transverse profiles. Pedicle groove deep, long, U-shaped in transverse profile, strongly tapering posteriorly, with its bottom at the same level as valve floor. Large catacline ventral pseudointerarea anterolaterally passes into narrow strip bordering posterolateral margins of the valve, and attains nearly mid-length of the valve. Each proparea is divided by a strong flexure line into shorter inner, and much longer outer parts. The surface of pseudointerarea bears coarse growth lines weakly curved near pedicle groove. The bottom of pedicle groove is devoid of striation. Anterior margin of propareas undercut. Valve floor bears oval, poorly impressed central muscle scars and a narrow, weakly defined triangular visceral field. Visceral field occupies 40 % of valve length and is more distinct posteriorly than anteriorly.

Brachial valve shorter than pedicle valve, subpentagonal in outline, 115—120 % as long as wide. Anterior and lateral margins evenly rounded, posterolateral margin gently curved. Beak rounded. The valve is more

convex posteriorly than anteriorly in lateral profile, and is weakly convex, with shallow depression in transverse profile. Dorsal pseudointerarea long, weakly raised above valve floor, anteriorly undercut. Pseudointerarea medianly divided into two narrowly triangular propareas by wide, weakly concave median depression, which anteriorly extends into short tongue. Surface of pseudointerarea bears coarse growth lines. Central muscle scars minute, circular, weakly impressed at the centre of the valve. Fine and low median ridge extends just before median depression and reaches nearly anterior margin of the valve. Vascula media poorly impressed, running parallel posteriorly but gently divergent anteriorly. Fine terminal vascular canals are impressed along peripheries of both valves. Inner surface of both valves bear fine pitting irregularly arranged of following course of growth lines.

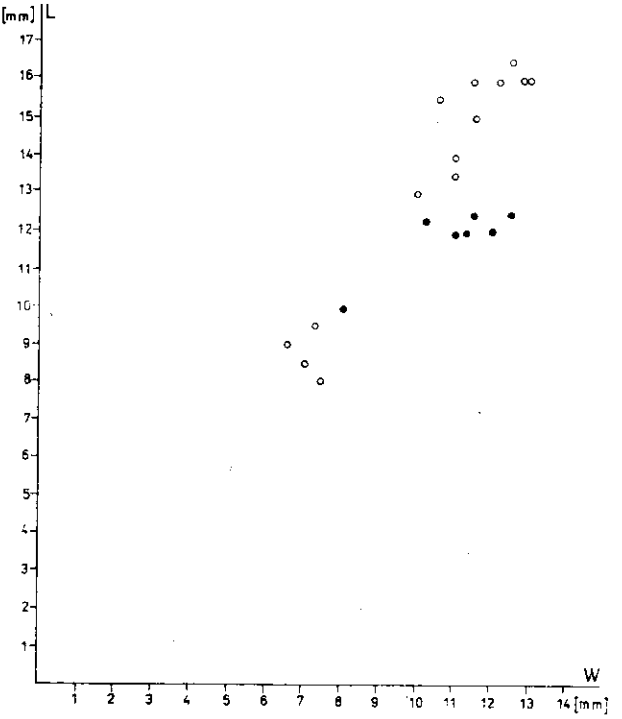


4. *Lindinella kordulei* sp. n.
A — interior of pedicle valve; B — interior of brachial valve; cm — central muscle scars

Ornamentation: Surface of shell covered by prominent elevated concentric lines, branching and rather irregular on flanks but unbranched and more regular in midsectors of the valves. The size of lines is uniform

on entire shell surface. Growth lamellae several in number, externally indistinct but internally marked by a thickening of the valve wall.

Occurrence: Brdy area; Ellipsocephalus hoffi—Rejkocephalus lyelli Zone: Jince (Vystrkov Hill), Rejkovice (railway cutting near Zelený mlýn); Rejkocephalus lyelli—Lingulella Zone: Medový Újezd (quarry).



5. Relationship between length versus width in *Lindinella kordulei* sp. n. L — length, W — width, *empty circles* — pedicle valve, *full circles* — brachial valve

Lindinella sp.

Pl. III, figs. 5—8

Material: one fragment of pedicle valve, 2 brachial valves.

Description: Shell large, 12 mm wide at adults, subequally biconvex. Pedicle valve poorly known. Posterior part of pedicle valve strongly convex in transverse profile. Ventral pseudointerarea forms narrow, high shelf bordering posterolateral margin of the valve, and is covered by coarse growth lines. Pedicle groove long and deep.

Brachial valve roundelly triangular to subpentagonal in outline, moderately convex in both profiles, with evenly rounded front margin. Beak rounded, with posterolateral margins subtending 90°. Dorsal pseudointerarea gently raised above valve floor, anteriorly undercut, with me-

dian depression weakly defined from propareas. Surface of pseudointerarea covered by coarse growth lines. Valve floor bears fine, long median ridge, extending over midlength of the valve. Feebly impressed central muscle scars laterally bounded by faint ridges and located at the centre of the valve.

Ornamentation: Surface of valves densely covered by coarse concentric lines of equal size, with the same pattern as in *Lindinella kordulei*.

Comparison: *Lindinella* sp. differs from *L. kordulei* by shorter dorsal pseudointerarea and more rounded outline.

Occurrence: Skryje-Týřovice area; Týřovice Greywackes, Pompeckium kuthani Zone: Lohovice.

Westonia Walcott, 1901

Westonia bohemica (Koliha, 1921)

Pl. II, figs. 3—6, pl. III, figs. 1—4; text-figs. 6, 7

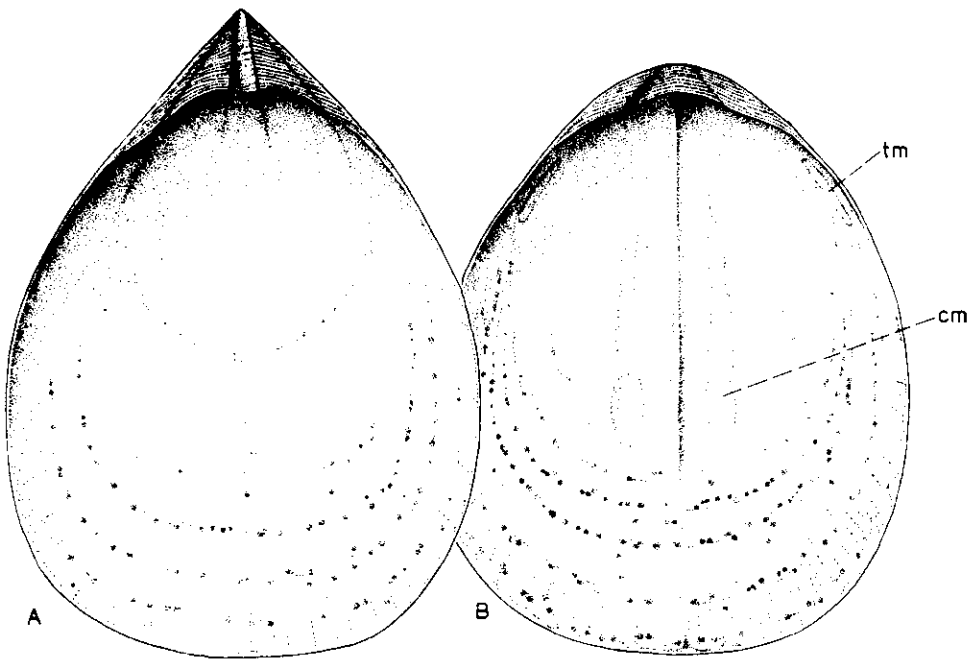
1911 *Lingulella* nov. sp.; Želízko, p. 5.
1921 *Lingulella bohemica* n. sp.; Koliha, p. 30.
1980 *Westonia bohemica* (Koliha, 1921); Šlehoferová, p. 27, pl. 2, figs. 6—9.

Lectotype: Specimen with both valves, selected from the original Koliha's material, figured herein on pl. II, fig. 3, deposited in the National Museum, Prague (NM-L 18202).
Type horizon: Jince Formation, interval between Eccaparadoxides pusillus and Paradoxides gracilis Zones.
Type locality: Jince, Vystrkov Hill.
Material: 22 pedicle and 14 brachial valves.

Description: Shell large, equally biconvex, thick-walled, 12 mm wide in the largest specimen. Pedicle valve subpentagonal to widely teardrop-shaped in outline, 115—150 % as long as wide, widest anteriorly to midlength. In transverse profile, beak region is strongly convex but convexity decreases anteriorly. In lateral profile, the valve is evenly and weakly convex. Lateral margins gently arched, anterior margin evenly rounded with less curved middle part. Beak pointed, postelolateral margins subtend 80—85°. Shallow, gently widening sulcus is developed near anterior margin. Ventral pseudointerarea orthocline, short, anteriorly undercut, 65—70 % as wide as valve. Pedicle groove deep, U-shaped in transverse profile, moderately widening anteriorly. The bottom of pedicle groove gently raised above valve floor with anterior part undercut. Propareas narrowly triangular, bordering posterolateral margins of the valve. Each proparea is divided by flexure line into inner and shorter, and outer, narrower and longer parts. Anterior edges of propareas sub-

tend 110—120°. Surface of propareas is covered by coarse densely crowded growth lines, distinct also on the flanks of pedicle groove. Visceral area poorly defined, occupying posterior half of the valve.

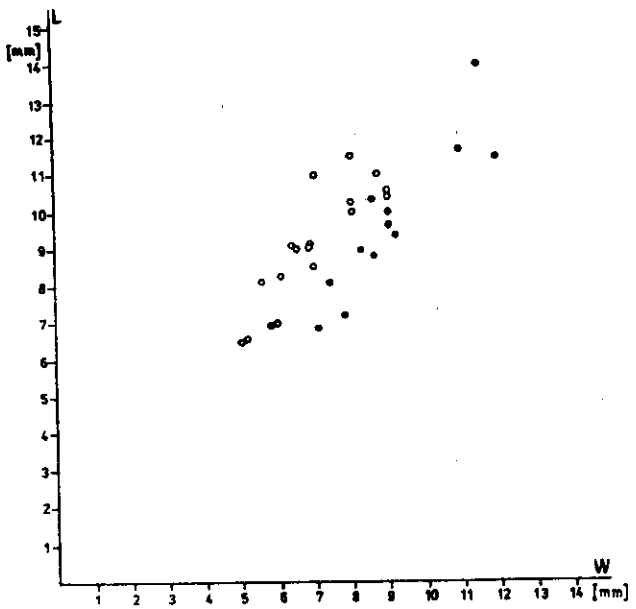
Brachial valve of subpentagonal outline, 115—130 % as long as wide, widest anteriorly to midlength. The valve is convex as or slightly more than the pedicle one, with median sector nearly flat, passing anteriorly into shallow sulcus. Beak rounded, lateral margins gently arched, front margin rounded with less curved middle part. Dorsal pseudointerarea short, anteriorly undercut, gently raised above valve floor. Median depression shallow, wide, laterally bounded by the deflection of the growth lines. Anterior edge of median depression concave anteriorly. Surface of pseudointerarea bears coarse growth lines. Visceral field poorly defined. Large, oval, paired central muscle scars poorly impressed anteromedianly, and very close to each another. Transmedian muscle scars are narrowly elliptical, poorly impressed laterally in front of pseudointerarea. Fine median ridge originating at the beak extends over midlength of the valve. Vascular system poorly impressed, with paired, gently widening vascula media, which are located laterally to the median ridge. Vascula terminalia radially arranged along peripheries of both valves. Inner surfaces



6. *Westonia bohemica* (K o l i h a , 1921)
A — interior of pedicle valve; B — interior of brachial valve; cm — central muscle scars; tm — transmedian muscle scars

of both valves bear minute circular pits, which are commonly arranged in concentric bands.

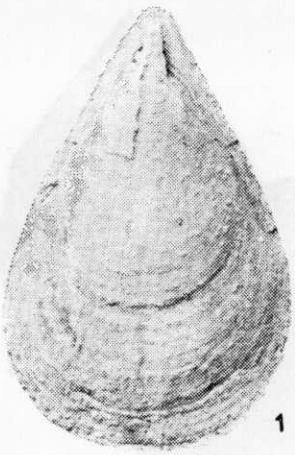
Ornamentation consists of coarse elevated growth lines of uniform size, which cover in regular intervals the entire surface of the shell. Oblique terrace lines of the same size as the growth lines are developed in lateral sectors of the valves. Terrace lines form regular network-like pattern (pl. II, figs. 5, 6). Median sector of the valves is devoid of terrace lines; this sector is about 30 % as wide as the valve in posterior part, but expands anteriorly and attains 60 % of the valve width near front margin.

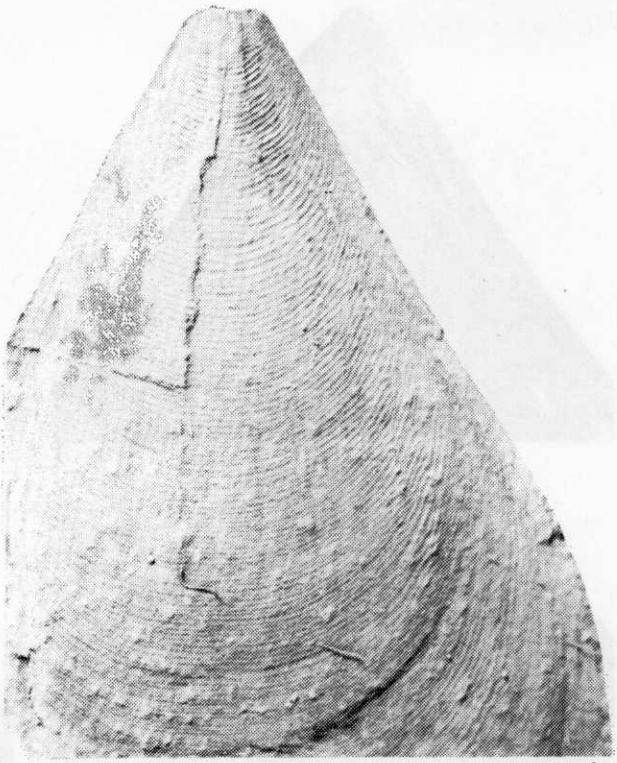


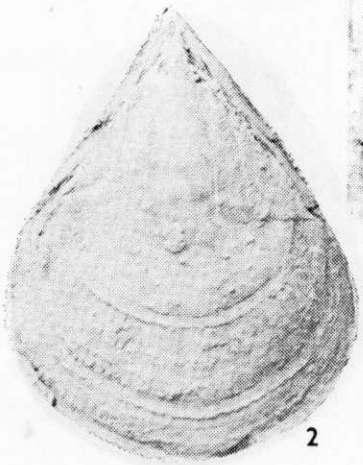
7 Relationship between length versus width in *Westonia bohemica* (Koliha, 1921)
L — length, W — width, *empty circles* — pedicle valve, *full circles* — brachial valve

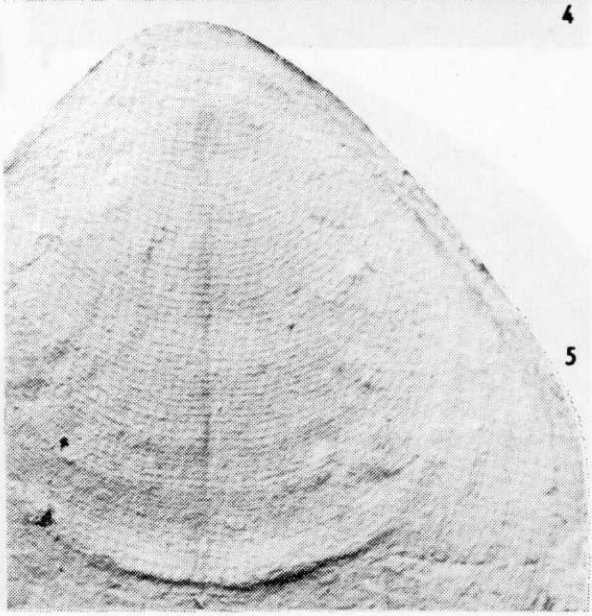
Comparison: *W. bohemica* may be distinguished by the shape of its terrace lines; there is never a developed zig-zag pattern common in some species (*W. aurora* (Hall), *W. ella* (Hall - Whitfield), and terrace lines do not cover the entire posterior part of the valve as in *W.? elongata* Walcott, *W. iphis* Walcott or *W. finlandensis* Walcott.

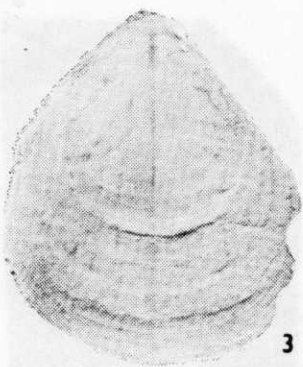
Occurrence: Brdy area; Eccaparadoxides pusillus Zone and interval between Eccaparadoxides pusillus and Paradoxides gracilis Zones: Strašice (Kamenná Hill, "V Andělkách" Forest), Beranec Hill, Jince (Vystrkov Hill), Rejkovice (Hejdův dvůr).


1

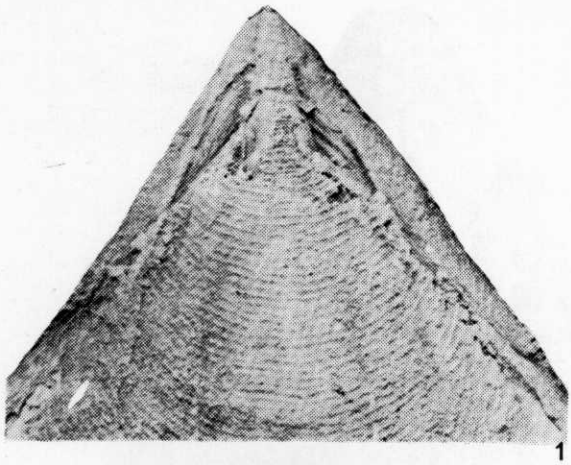

4


2

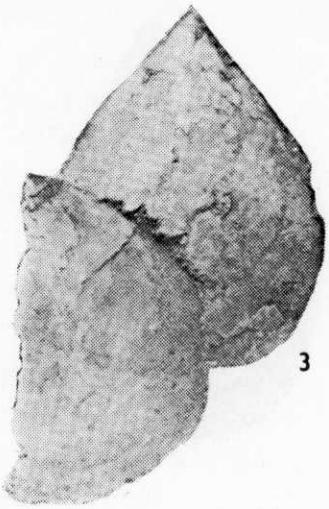

5


3

Pl. II

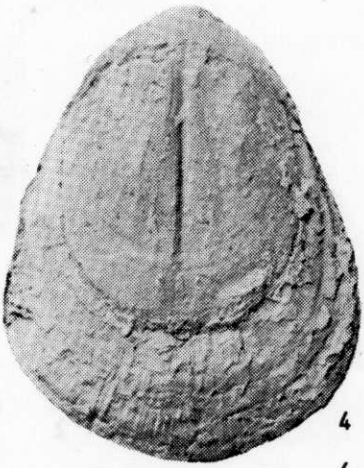


1



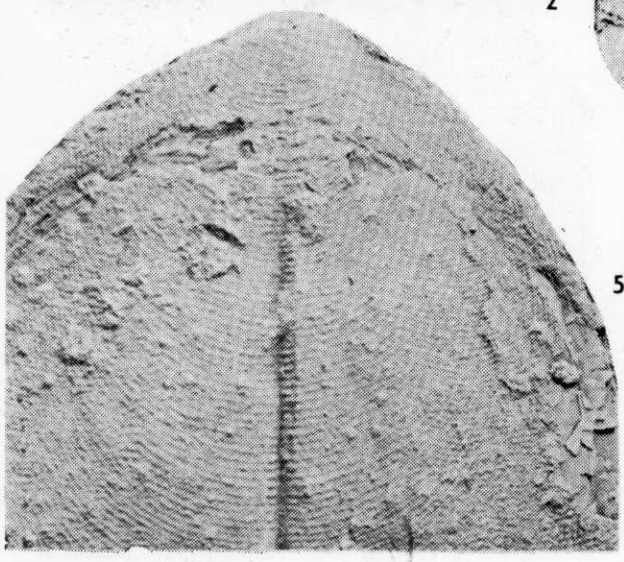
3

2

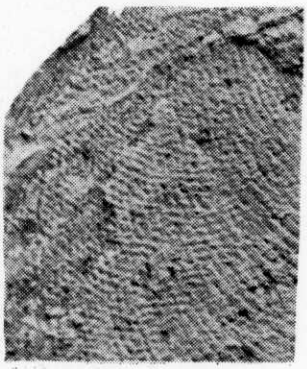


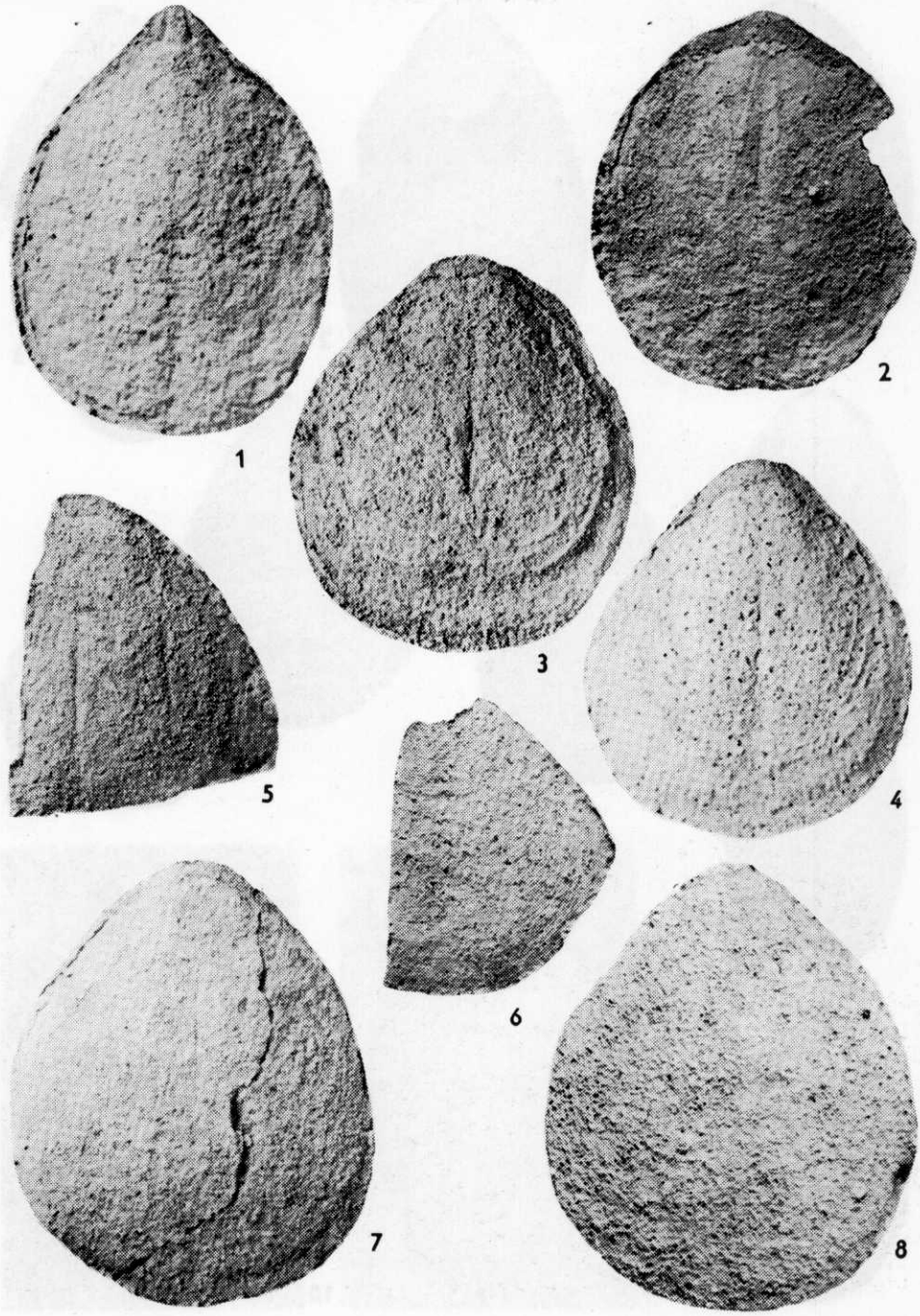
4

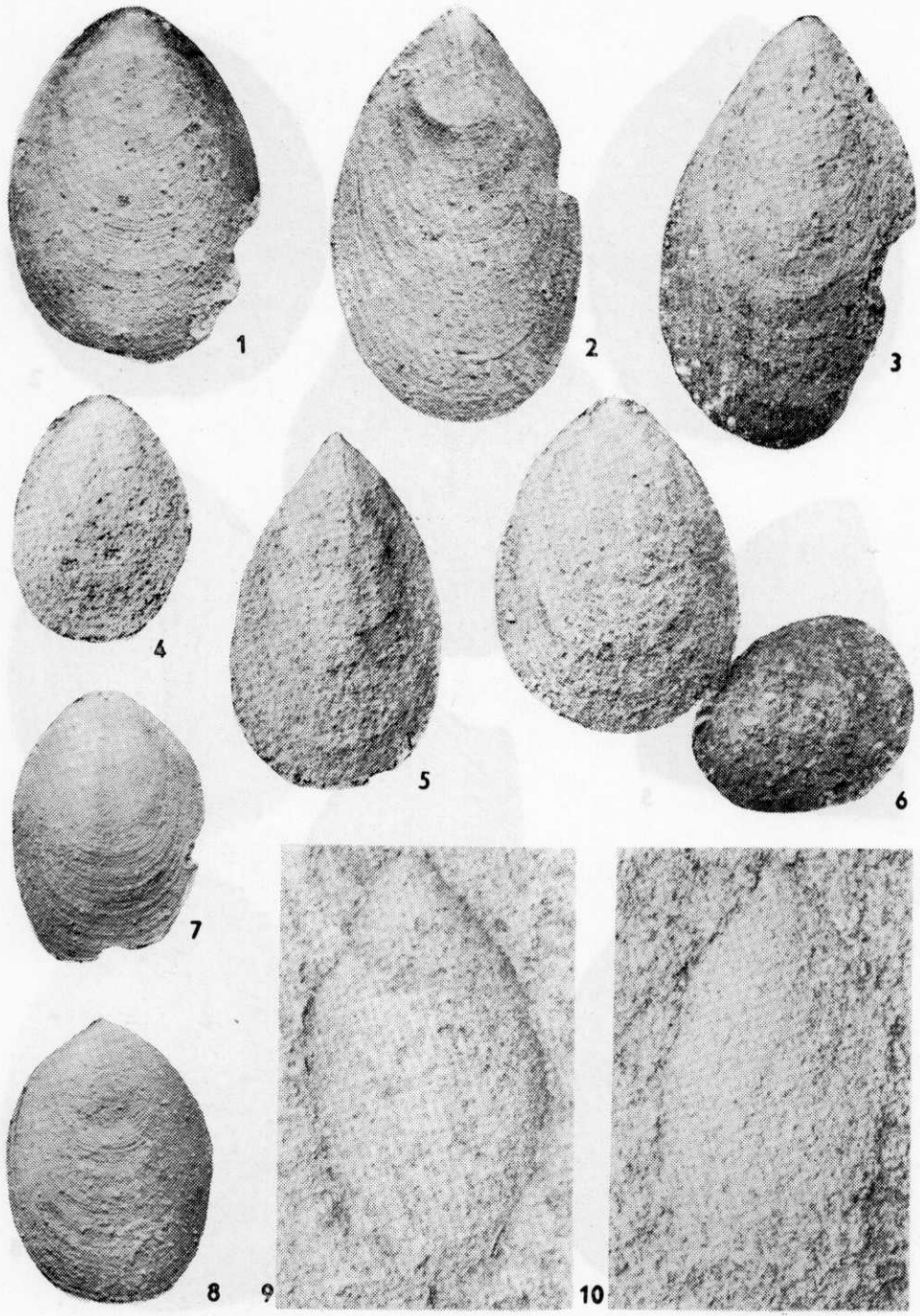
6

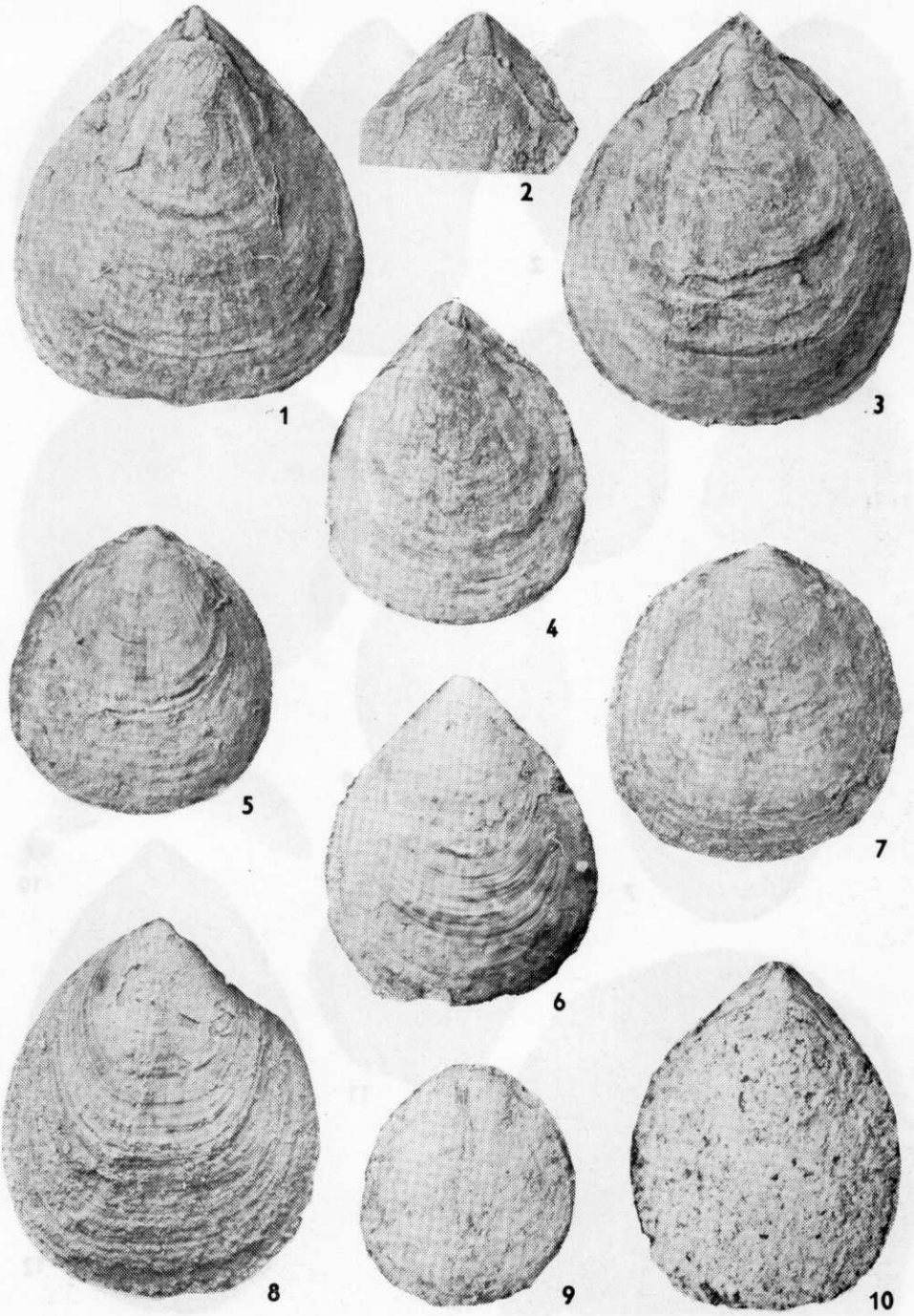


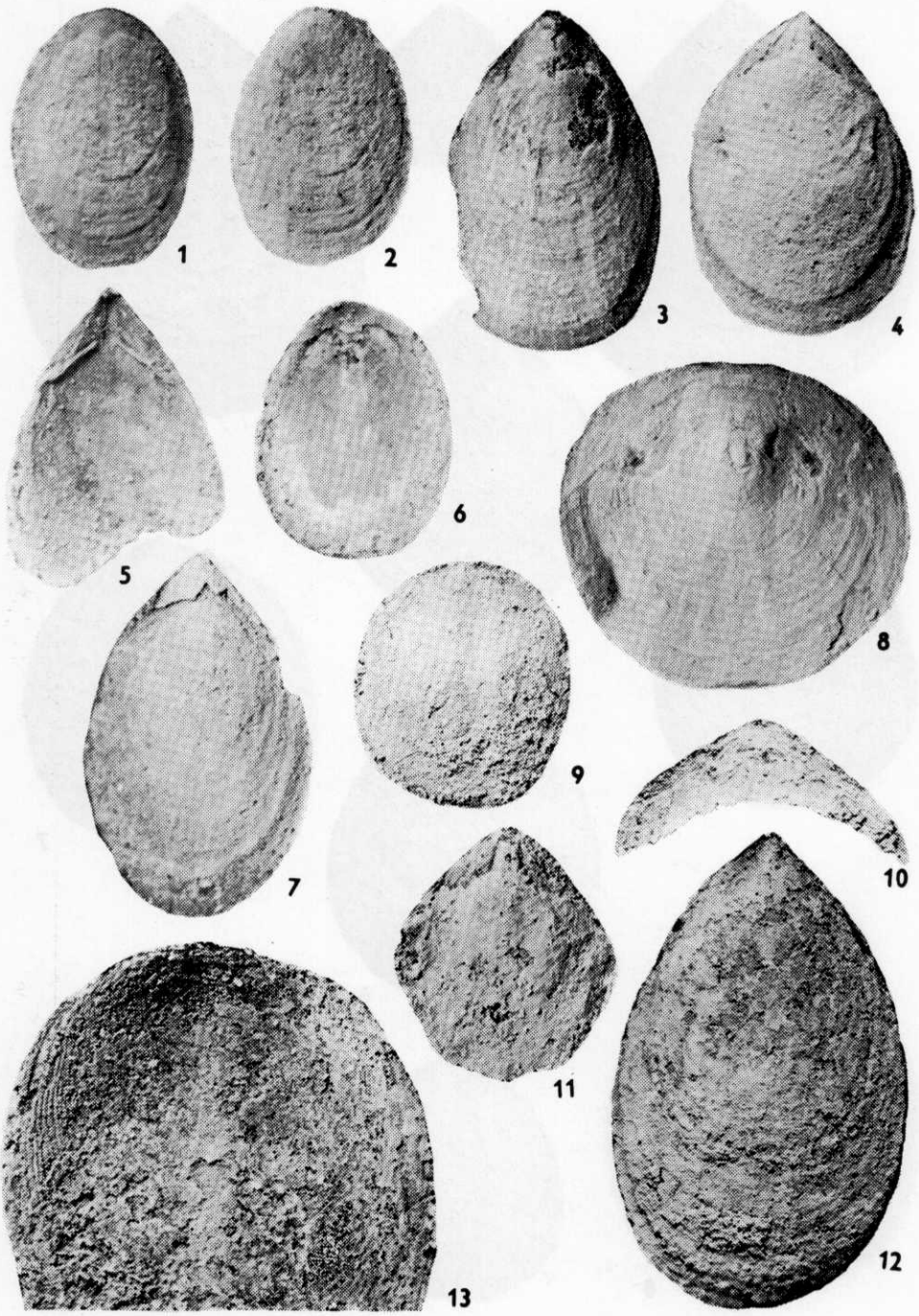
5

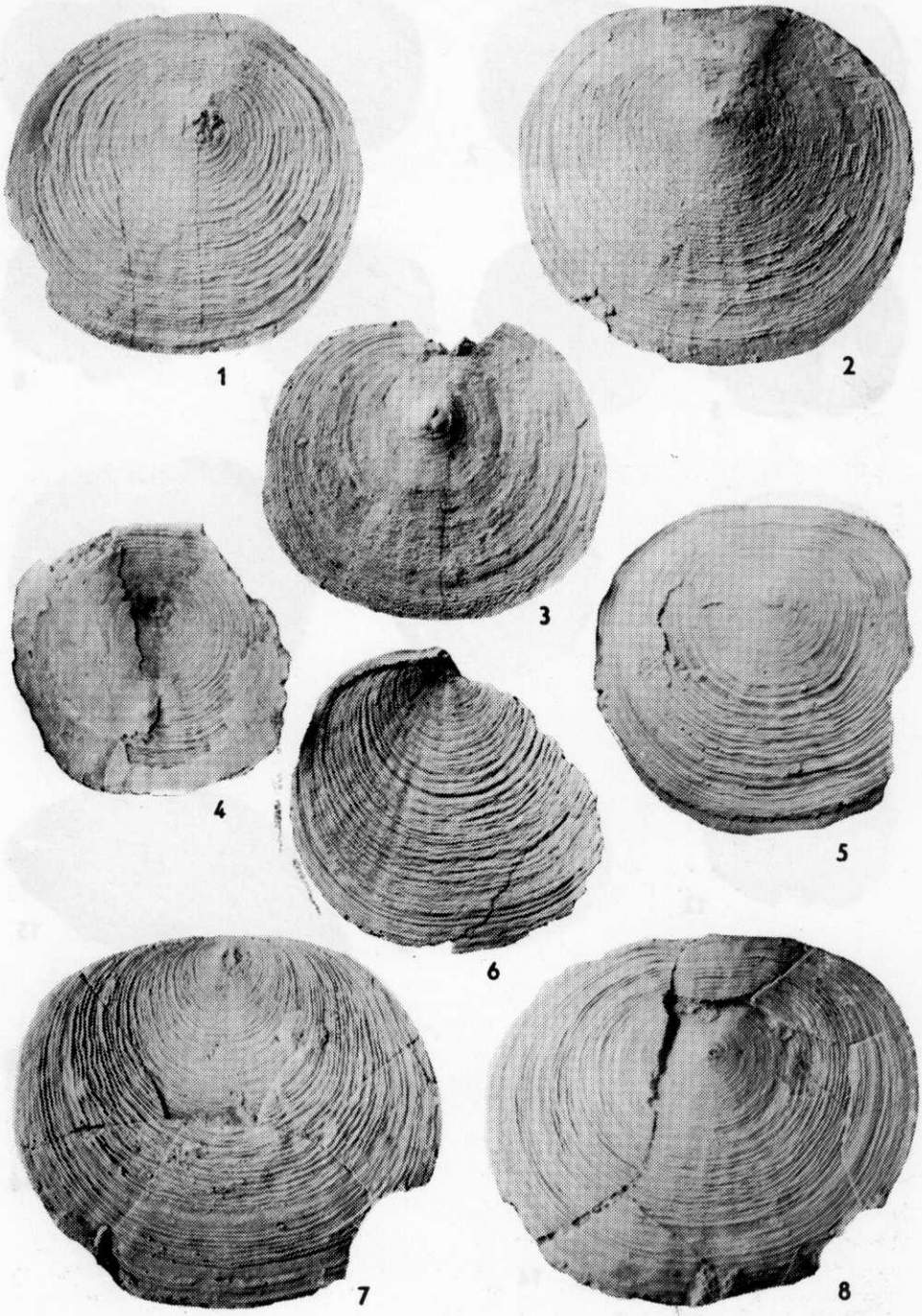


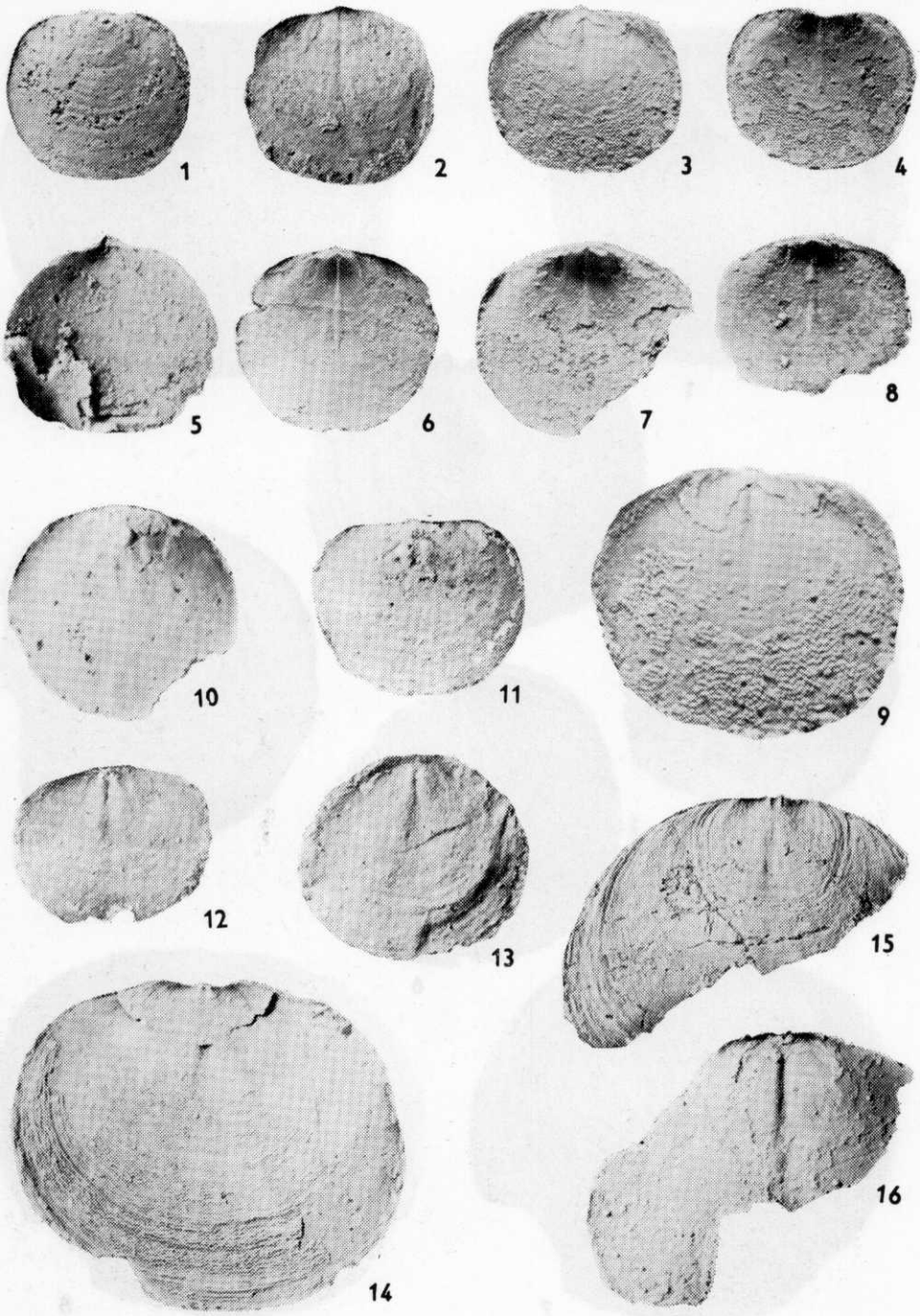

1
2
3
4
5
6
7
8

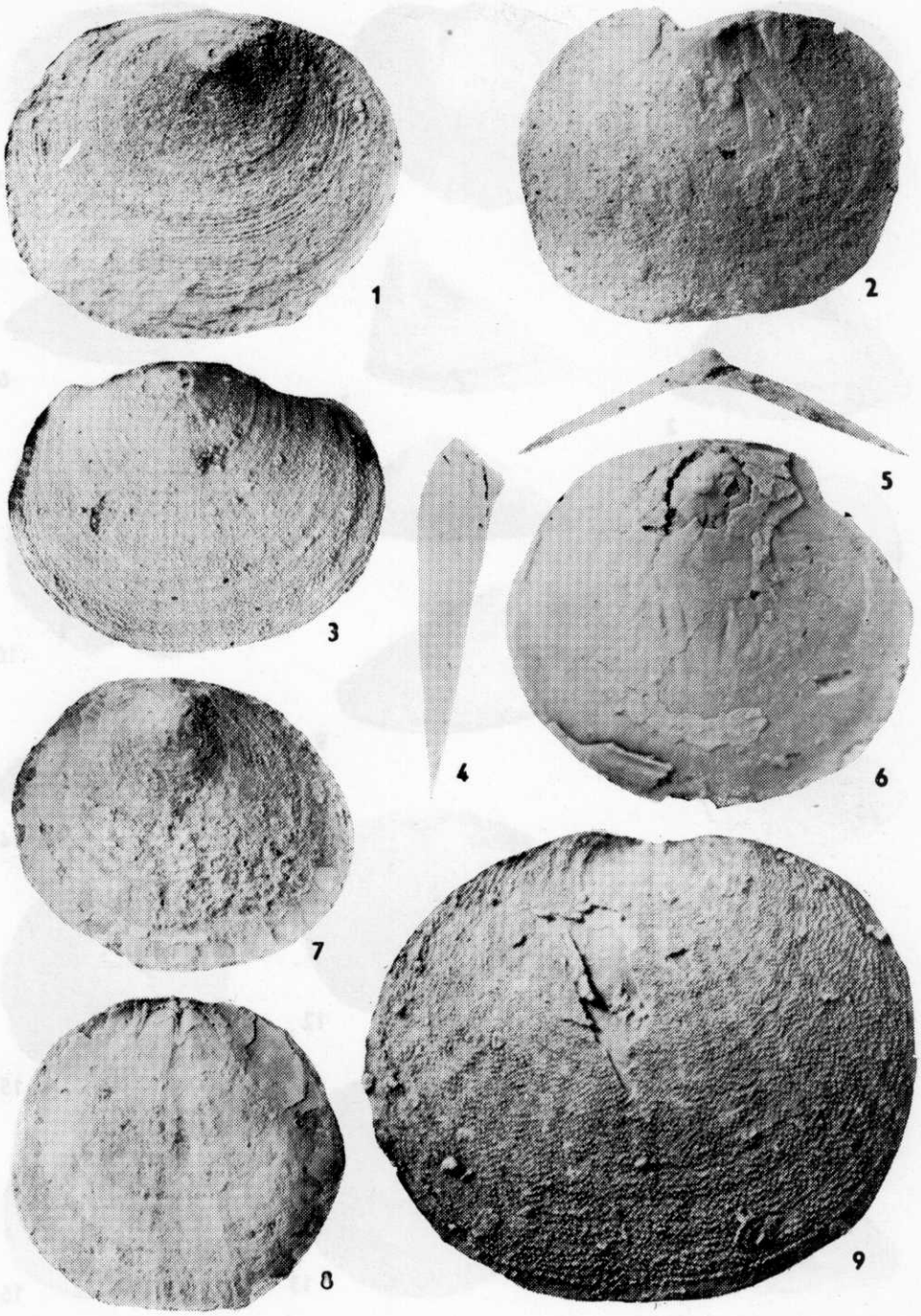

1
2
3
4
5
6
7
8
9
10

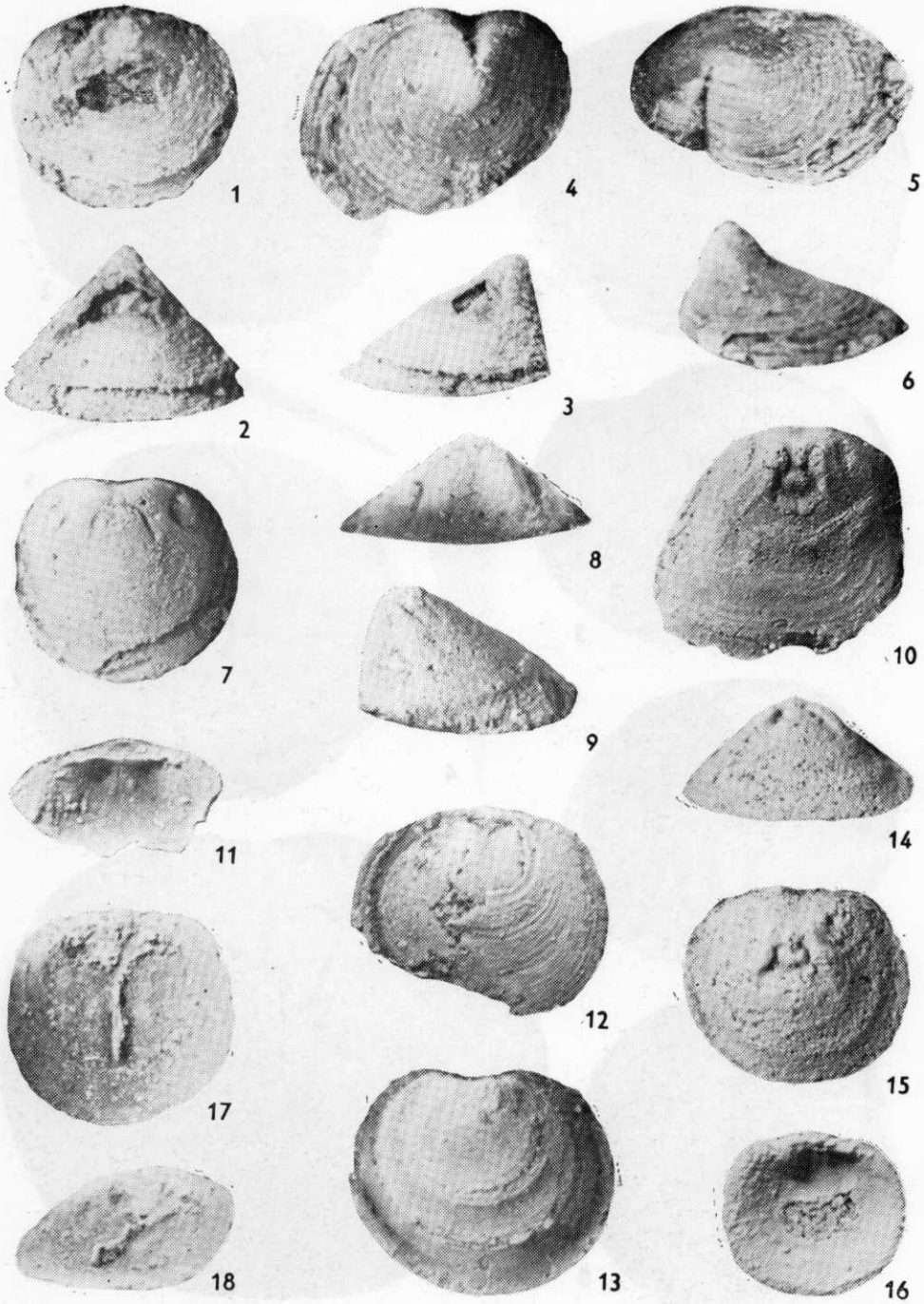

1
2
3
4
5
6
7
8
9
10

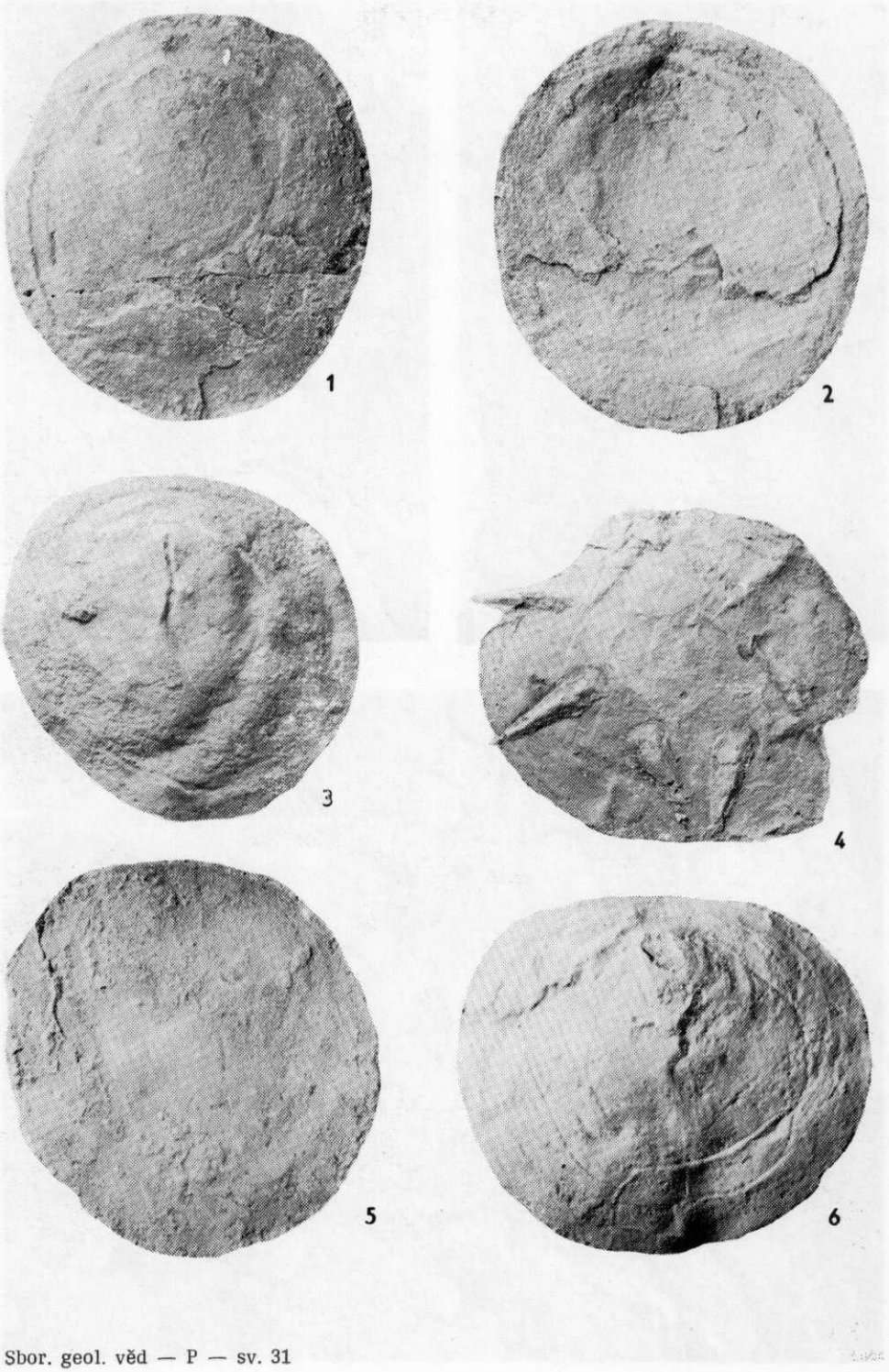

1
2
3
4
5
6
7
8
9
10
11
12
13


1
2
3
4
5
6
7
8


1
2
3
4
5
6
7
8
10
11
9
12
13
15
14
16


1
2
3
4
5
6
7
8
9


1
4
5
2
3
6
8
7
10
9
11
14
12
17
15
18
13
16


1
2
3
4
5
6

Westonia ? fatkai sp. n.

Pl. VI, figs. 9—13; text-fig. 8

Holotype: Brachial valve figured on pl. VI, figs. 9, 13, deposited in the District Museum at Rokycany (OMR 20464).

Type horizon: Jince Formation, the layer below horizon with *Alueva — Conocoryphe ovata.*

Type locality: Jince, southern part of Vinice slope.

Name: After Dr. O. Fatka.

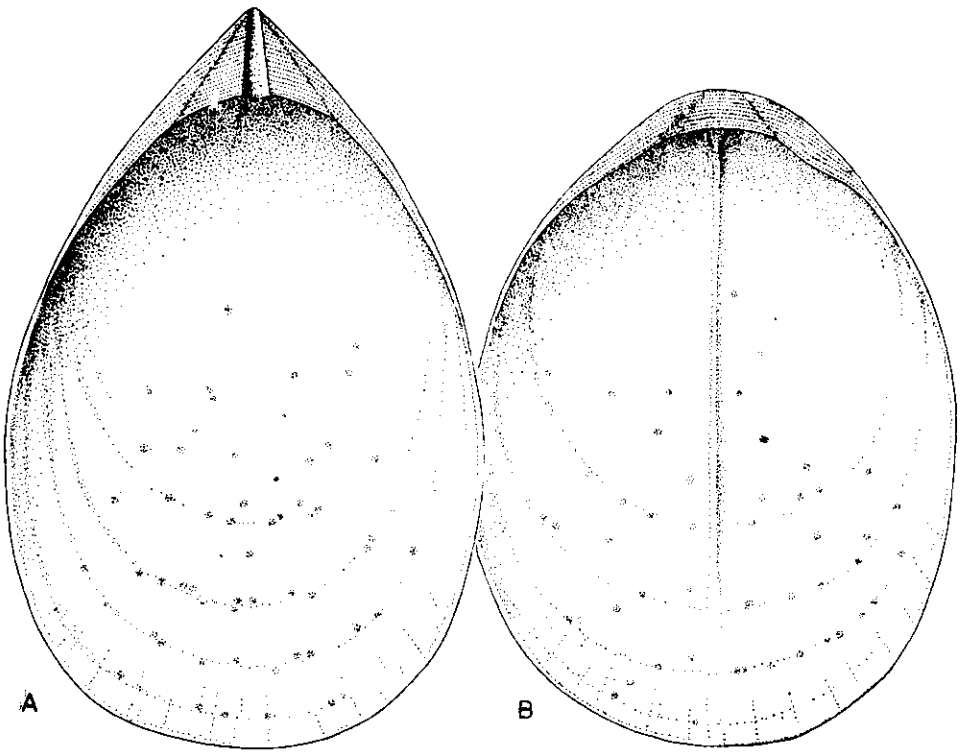
Material: 4 pedicle and 6 brachial valves, many fragments.

Description: Shell large, equally biconvex, thick-walled, 10 mm wide at adults. Pedicle valve oval in outline, with pointed beak, 130—140 % as long as wide, widest at midlength. Anterior margin semicircular, lateral margins gently curved; posterolateral margins subtend 80°. The valve is strongly convex in transverse profile, and evenly and gently convex in lateral profile. Ventral pseudointerarea large, gently raised above valve floor, anteriorly undercut. Pedicle groove U-shaped in transverse profile, deep, about twice as long as wide, weakly widening anteriorly. Propareas narrowly triangular, with distinct flexure lines and densely crowded coarse growth lines. Anterior edges of propareas subtend 90°—100°. Imprints of visceral field and muscle scars not preserved. Gently diverging, wide paired trunks of vascula lateralia feebly impressed in posterolateral sectors of valve.

Brachial valve oval to subpentagonal in outline, 115—120 % as long as wide, widest at midlength. The valve is moderately convex in transverse profile and gently convex in lateral profile, with deep, narrow sulcus originating near umbo. Posterior margin rounded. Dorsal pseudointerarea is wide, anteriorly undercut shelf, weakly elevated above valve floor. Median depression weakly bounded, slightly concave, with front edge concave anteriorly; propareas widely triangular. Surface of pseudointerarea covered by coarse growth lines. Median ridge originates at umbo and extends over midlength of the valve. Ridge low, coarse, and anteriorly gradually passes into flat elevation. Inner surfaces of both valves bear fine radial striating; minute, circular pits are uncommon.

Ornamentation consists of coarse, elevated growth lines, arranged in regular interval on the entire shell surface; growth lines very fine, of uniform size. Oblique terrace lines not developed.

Comparison: The size, shape, and interiors of both valves of *W. ? fatkai* resemble those of *W. bohemica,* but the former lacks oblique terrace lines; nevertheless, we consider *W. bohemica* to be a descendant of *W. ? fatkai.* In the diagnosis of *Westonia* [Walcott, 1901; Rowell, 1965], the network-like or zig-zag patterns of ornamentation, formed by oblique terrace lines have been considered as a main generic



8. *Westonia ? fatkai* sp. n.
A — interior of pedicle valve; B — interior of brachial valve

feature of *Westonia*. Terrace lines are an ecologic adaptation of lingulids for burrowing life style in sandy substrate (Savazzi, 1986). Thus, appearance of terrace lines is only an evolutionary convergence inside inarticulate brachiopods and need not reflect the taxonomic affinity.

Occurrence: Type locality only.

Lingulella Salter, 1866

Lingulella matthewi Koliha, 1921

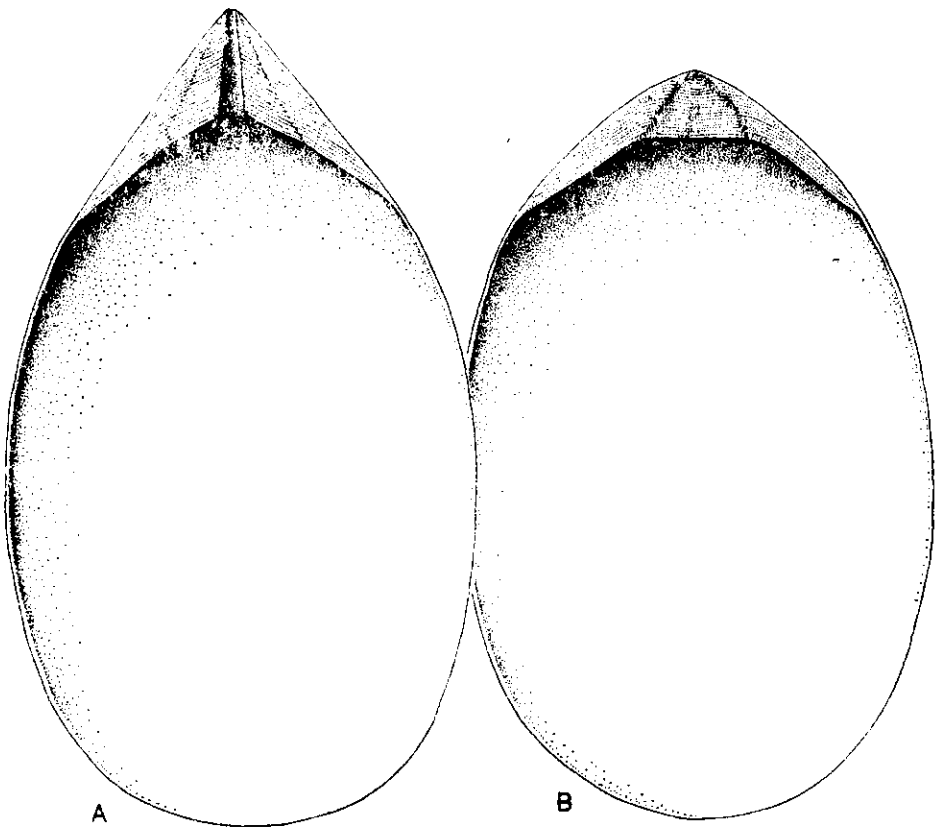
Pl. IV, figs. 1—10; text-figs. 9, 10

1921 *Lingulella Matthewi* n. sp.; Koliha, p. 30
1980 *Lingulella matthewi* Koliha, 1921; Šlehoferová, p. 18, pl. 1, figs. 1—6.

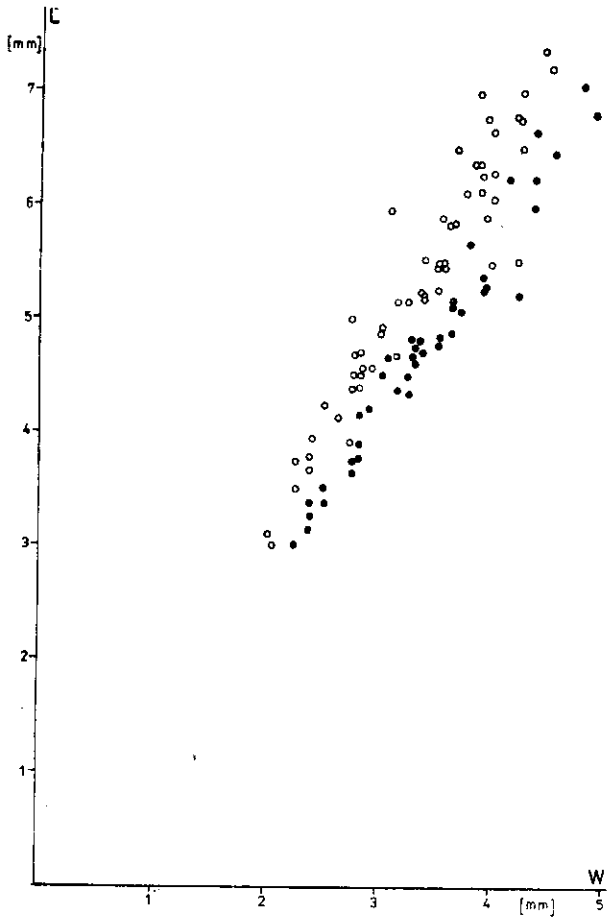
Lectotype: Pedicle valve selected from the original Koliha's material, figured herein on pl. IV, fig. 9, deposited in the National Museum, Prague (NM-L 26034).
Type horizon: Jince Formation, Rejkocephalus lyelli—Lingulella Zone (upper part).
Type locality: Medový Újezd, quarry.
Material: 65 pedicle and 50 brachial valves.

Description: Shell of medium size, biconvex, 6—7 mm long in adults, thin-walled. Pedicle valve elliptical, 140—185 % as long as wide, widest at midlength, nearly parallel-sided. Anterior margin evenly rounded, sides gently curved. Beak pointed, posterolateral margins subtend 80—85°. The valve is gently and evenly convex in lateral profile, and moderately convex in transverse profile. Ventral pseudointerarea long, slightly elevated above valve floor, 15—20 % as long as the valve. Pedicle groove narrow, gently widening anteriorly, 25 % as wide as long, its anterior width is about double as posterior width. Propareas large, widely triangular. Flexure lines coarse, straight, dividing propareas into two uneven parts. Surface of pseudointerarea covered by coarse growth lines.

Brachial valve oval, 125—150 % as long as wide, widest at midlength. Anterior and lateral margins evenly rounded, beak angle 90—100°. Dorsal



9. *Lingulella matthewi* Koliha, 1921
A — interior of pedicle valve; B — interior of brachial valve



10. Relationship between length versus width in *Lingulella matthewi* Kotiha, 1921
L — length, W — width, *empty circles* — pedicle valve, *full circles* — brachial valve

pseudointerarea large, anteriorly probably undercut, gently raised above valve floor. Median depression widely triangular, defined by deflection of growth lines, and extends forward into short tongue. The surface of pseudointerarea covered by coarse growth lines. Neither muscle scars nor pallial markings are preserved.

Ornamentation: The surface of both valves is covered by fine, regularly spaced growth lines of uniform size. A pair of flat, indistinct, anteriorly widening radial plications are preserved in any specimens.

Comparison: *L. sufi* is close to *L. matthewi,* but the former is distinct in nearly smooth valve surface, smaller width/length ratio of the pedicle valve, and by absence of radial plications.

Occurrence: Brdy area; Rejkocephalus lyelli—Lingulella Zone (upper part); Medový Újezd (quarry; borehole Mý-XII, depth 10.00—32.00 m).

Lingulella havliceki sp. n.

Pl. V, figs. 1—10; text-fig. 11, 12

Holotype: Pedicle valve figured herein on pl. V, fig. 1, deposited in the National Museum, Prague (NM-L 26031a).

Type horizon: Jince Formation, Rejkocephalus lyelli—Lingulella Zone (lower part).

Type locality: Jince, the top of Vystrkov Hill.

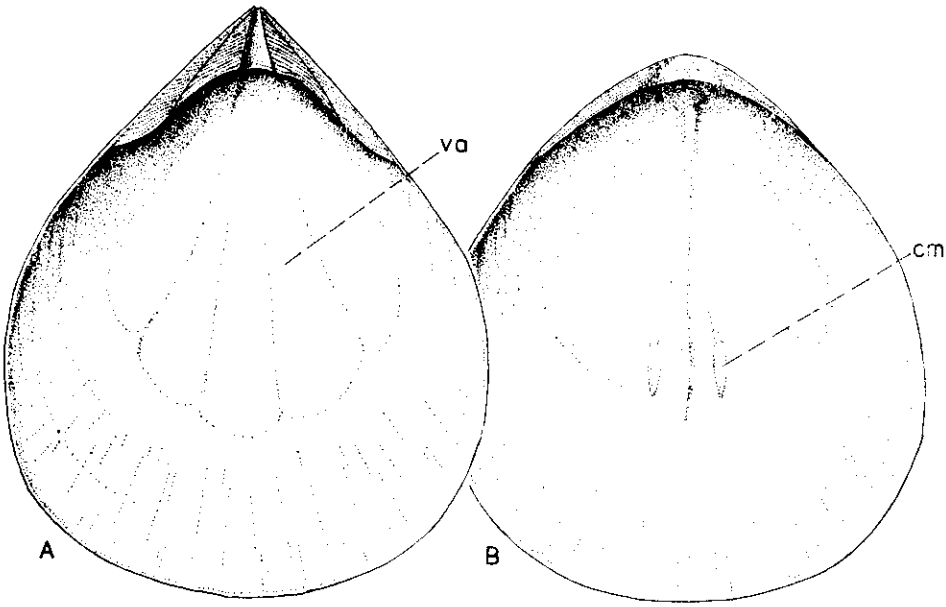
Name: After Dr. V. Havlíček.

Material: 15 pedicle and 15 brachial valves.

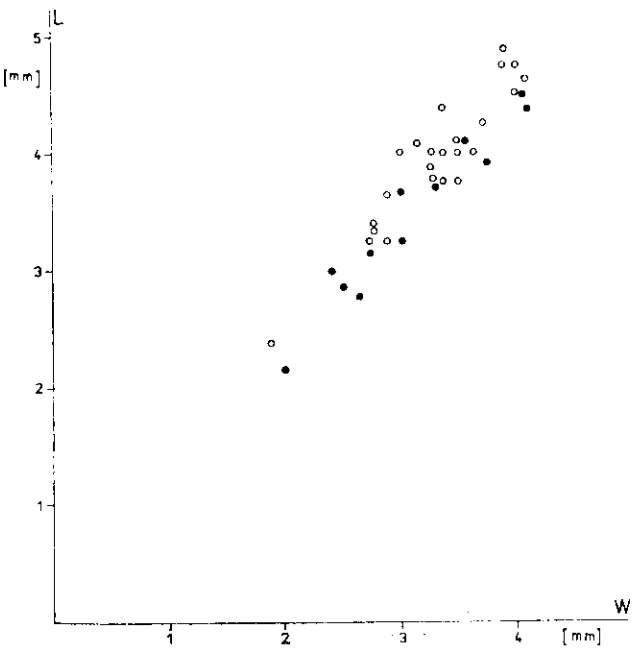
Description: Shell of minute size, biconvex, 4.5—6 mm long in adults, thin-walled. Pedicle valve broadly subpentagonal in outline, 105—130 % as long as wide, widest at anterior third. Anterior half semicircular in outline, posterolateral margins nearly straight. The valve is evenly and moderately convex in beak region in transverse profile, the convexity decreases anteriorly; the valve is slightly convex in lateral profile. Beak pointed, with posterolateral margins subtending 82—85°. Ventral pseudointerarea catacline, anteriorly undercut, 70 % as wide as valve. Pseudointerarea divided by a long, deep, moderately widening pedicle groove about twice as long as wide. Anterior of pedicle groove rests on the shelf elevated and undercut above valve floor. Propareas long, large, each is divided by a weak flexure line into two parts. Surface of propareas covered by slightly inclined fine growth lines. Visceral area very large, occupying 70 % of the valve length and 50—60 % of valve width, divided by fine radially arranged ridges into several (five to seven) narrowly triangular lobes. Muscle scars poorly impressed, with two pairs of them located in the umbonal region. Terminal vascular canals densely crowded along periphery of the valve.

Brachial valve oval to subpentagonal in outline, 105—120 % as long as wide, with evenly rounded anterior and lateral margins. Posterior margin rounded, with tumid beak, posterolateral margins subtend 100—120°. The valves is as deep as or slightly deeper as the pedicle valve, and it is moderately convex in both profiles. Dorsal pseudointerarea short, slightly elevated above valve floor, anteriorly undercut. Widely triangular median depression poorly defined, with anteriorly concave front edge. Surface of pseudointerarea is densely covered by fine growth lines. Interior of brachial valve bears large, flabellate visceral area, which is divided by low, incipient median ridge. A pair of central muscle scars rather small, narrowly elliptical, poorly impressed at the centre of the valve. Vascula media gently divergent; the arrangement of terminal vascular canals is the same as in pedicle valve.

Ornamentation consists of low, prominent growth lines of uneven size. Radial striation of the inner shell layers well-preserved in partly exfoliated specimens.



11. *Lingulella havliceki* sp. n.
A — interior of pedicle valve; va — visceral area; B — interior of brachial valve; cm — central muscle scars



12. Relationship between length and width in *Lingulella havliceki* sp. n.
L — length, W — width, *empty circles* — pedicle valve, *full circles* — brachial valve

Comparison: The broadly subpentagonal shell and the shape of ventral pseudointerarea distinguish *L. havlíceki* from other Bohemian lingulids of Cambrian age. *L. hayesi* (Walcott), and *L. oweni* (Walcott), although similar in size and shape, differ by deeper impression of muscles and by different shape of dorsal pseudointerareas.

Occurrence: Brdy area; Rejkocephalus lyelli—Lingulella Zone (lower part); Jince (Vinice slope, the top of Vystrkov Hill), Čihadlo near Kváň, Medový Újezd (borehole Mý-XII, depth 84.30—88.50 m).

Lingulella šufi sp. n.

Pl. VI, figs. 5—7; text-figs. 13, 14

Holotype: Pedicle valve figured on pl. VI, fig. 5, deposited in the Geological Survey, Prague (MM 259).
Type horizon: Jince Formation, horizon with *Alueva — Conocoryphe ovata.*
Type locality: Jince, southern part of Vinice slope.
Name: After the late Professor J. Šuf.
Material: 20 pedicle and 18 brachial valves.

Description: Shell minute, equally biconvex, 3.7 mm long in the largest specimens, rather thick-walled. Pedicle valve elliptical in outline, widest at midlength, 140—180 % as long as wide. Anterior margin evenly rounded, lateral and posterolateral margins gently curved. The valve is moderately and evenly convex in transverse profile and gently convex in lateral profile. Beak pointed, posterolateral margins subtend 80—85°. Ventral pseudointerarea large, 70 % as wide as the valve, anteriorly undercut, weakly raised above valve floor. Pseudointerarea is medianly divided by a narrow, deep pedicle groove into two large propareas. Pedicle groove U-shaped in transverse profile, 30 % as wide as long anteriorly, slightly tapering posteriorly. Flexure lines subtend 60°, and divide propareas into inner, shorter parts, which are steeply inclined toward pedicle groove, and longer and less inclined outer parts. Surface of pseudointerarea is covered by fine growth lines. Interior of pedicle valve is devoid of muscle scars, large rhomboidal visceral field is feebly impressed.

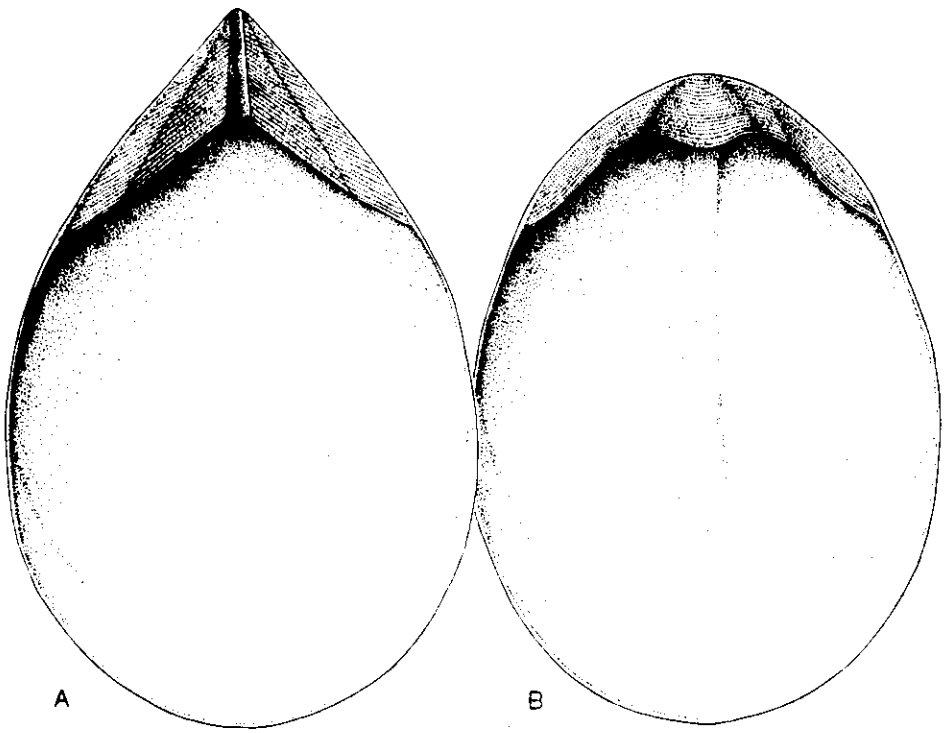
Brachial valve elliptical in outline, widest at midlength 135—155 % as long as wide, with rounded beak. The valve is as deep as or slightly deeper than the pedicle valve. Dorsal pseudointerarea short, anteriorly inclined, weakly raised above valve floor. Pseudointerarea is medianly divided by weakly concave, poorly defined and widely triangular median depression, which extends forward as a short tongue. Surface of pseudointerarea covered by fine growth lines. Very fine, wide, flat median ridge extends from median depression and extends over midlength of

the valve. Visceral area large, poorly defined, subrectangular in outline. Other features not preserved.

Ornamentation: Surface of the shell covered by very fine growth lines and devoid of radial ornamentation. Growth lamellae poorly defined externally, but internally they are marked by the thickening of the wall.

Comparison: See *L. matthewi* (p. 0000).

Occurrence: Type locality only.



13. *Lingulella sufi* sp. n.
A — interior of pedicle valve; B — interior of brachial valve

Lingulella sp.

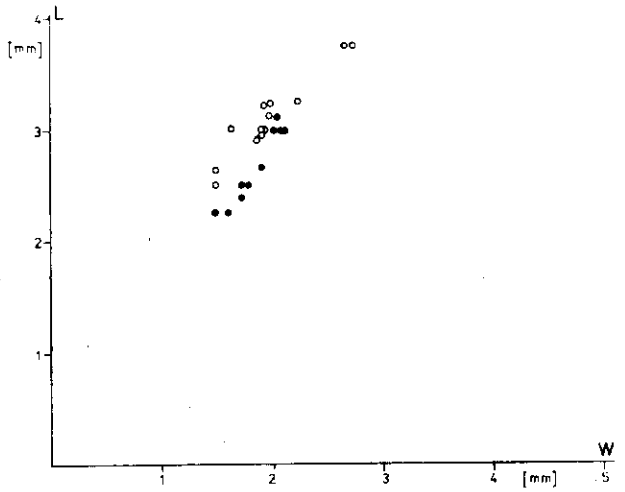
Pl. VI, figs. 1—4

1896 *Lingulella* (?) sp.; Pompeckj, p. 509, pl. 14, figs. 16a—b.
1912 *Lingulella* cf. *ferruginea* Salter; Walcott, p. 500, pl. 30, fig. 4.
1980 *Lingulella jahni* sp. n.; Šlehoferová (MS), p. 22, pl. 2, figs. 1—5.

Material: Several dozens of specimens.

Remarks: Minute lingulids are very difficult for taxonomic study, because the amount of diagnostic features is limited. Many tiny lingulids of Cambrian to Ordovician age have been assigned to the genus *Lingulella* (Biernat-Tomczykova, 1968; Rowell-Krause, 1975; Rowell, 1977; Laurie, 1986). However, lingulids preserved in shales are strongly deformed and are not suitable for description and comparison. Therefore, we consider to be better assigned minute Bohemian lingulids from the shales in generic level only.

Occurrence: Skryje-Týřovice area, Bohemiella romingeri Zone: Skryje (Luh, Dlouhá hora, Hradiště, "Pod hruškou"). Brdy area; Onymagnostus hybridus Zone: Jince (Vinice slope).



14. Relationship between length versus width in *Lingulella sufi* sp. n. L — length, W — width, *empty circles* — pedicle valve, *full circles* — brachial valve

Acrotretacea Schuchert, 1893

Acrothelidae Walcott-Schuchert, 1903

Acrothelinae Walcott-Schuchert, 1903

Acrothele Linnarsson, 1876

Acrothele quadrilineata Pompeckj, 1896

1896 *Acrothele quadrilineata* nov. spec.; Pompeckj, p. 511, pl. 14, fig. 6.
1912 *Acrothele quadrilineata* Pompeckj; Walcott, p. 655, pl. 62, fig. 5.
1980 *Acrothele quadrilinata* Pompeckj; Šlehoferová, p. 45, pl. 6, figs. 1—9.

Holotype (by monotypy): Pedicle valve figured by Pompeckj (1896) on pl. XIV, fig. 6, refigured herein on pl. VI, fig. 8, deposited in the Geologische Bundesanstalt, Wien.

Type horizon: Jince Formation, Bohemiella romingeri Zone.
Type locality: Skryje, Buchava quarry.
Material: 8 pedicle and 2 brachial valves.

Description: Shell large for the genus, 8 mm wide in adults, thin-walled. Pedicle valve is a very low, eccentric cone, with beak situated in posterior third of the valve. Pedicle valve nearly circular in outline, with evenly rounded anterior and lateral margins, and less curved to nearly straight posterior margin. In lateral profile, commissure straight with ventrally deflected posterior part. Pseudointerarea procline, widely triangular, about 40 % as wide as valve, well-defined by the deflection of the growth lines. Pedicle opening minute, circular in outline, located immediately posteriorly from the beak. Interior of pedicle valve with narrow, anteriorly converging vascula lateralia; muscle scars not preserved.

Brachial valve has the same outline as pedicle valve with marginal beak. The valve is flat in tranverse and lateral profiles, with ventrally deflected umbonal region. Protegulum of brachial valve minute, circular, with a pair of divergent, low, elliptical protegular nodes. Interior of brachial valve unknown.

Ornamentation: Surface of shell covered by coarse, elevated growth lines increasing in size anteriorly. Growth lines may be weakly undulating; growth lamellae not developed. Additional ornamentation of fine granules is less distinct on the growth lines than on the bottom of interspaces. Wide, flat rays radiate from the umbo of pedicle valve, increase in a size anteriorly and reach front margin; additional rays originate by implantation between older ones. There ar 4 to 6 rays in front margins of large valves. All rays of the pedicle valve are confined to the median sector; rays of the same shape in the brachial valve are located on flanks, median sector is devoid of radial ornamentation.

Comparison: *A. quadrilineata* is close to *A. coriacea* Linnarsson the latter differs by more posteriorly located ventral beak, more transverse shell and by narrower ventral pseudointerarea. Specimens assigned by Termier - Termier (1974) to *A. coriacea* from the Montagne Noire, France, are poorly preserved but they probably lack radial rays.

Occurrence: Brdy area: Onymagnostus hybridus Zone: Jince (Vinice slope). Skryje-Týřovice area; Bohemiella romingeri Zone: Skryje (Buchava, "Pod třešní").

Glyptacrothele Termier - Termier, 1974

Remarks: *Glyptacrothele* Termier - Termier is characterized by lamello-granulose ornamentation and slightly elliptical outer pedicle

opening (Termier - Termier, 1974). Apart from *G. courtessolei* Termier - Termier, the species *Acrothele granulata* Linnarsson has been assigned to this genus by Termier - Termier (1974). However, *A. granulata* is the type species of *Redlichella* Walcott (Walcott, 1912; Rowell, 1965) and has deeply impressed cardinal muscle scars, whereas cardinal scars of *Glyptacrothele* seem to be weakly impressed. The additional investigation on better preserved material of *Glyptacrothele* is necessary to determine whether *Glyptacrothele* is a valid genus or a younger subjective synonym of *Redlichella.*

Glyptacrothele bohemica (Barrande, 1879)

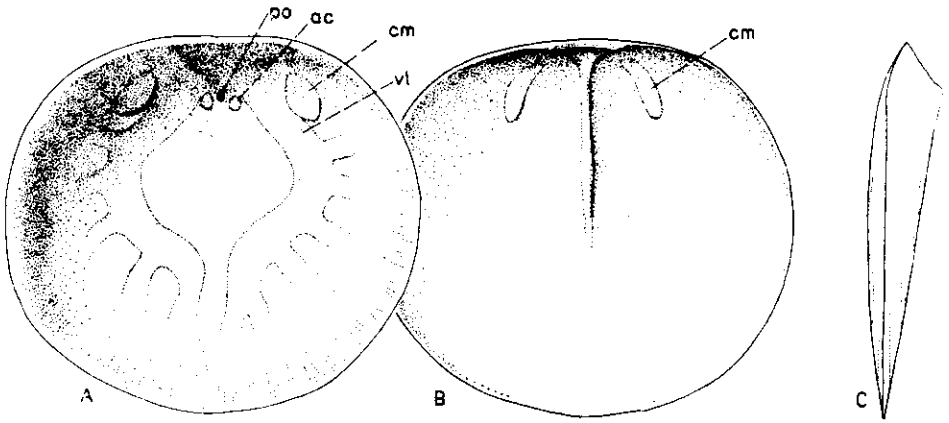
Pl. VIII, figs. 10—16, pl. IX, figs. 1—9; text-fig. 15

1879 *Obolus ? bohemicus* Barrande; Barrande, pl. 102, fig. 7:1—3.
1896 *Acrothele bohemica* Barr.; Pompeckj, p. 509, pl. 14, figs. 7—15.
1912 *Acrothele bohemica* (Barrande); Walcott, p. 639, pl. 56, fig. 1.
1921 *Acrothele bohemica,* Barr. sp.; Koliha, p. 30.
1980 *Acrothele bohemica* (Barrande, 1879); Šlehoferová, p. 40, pl. 4, figs. 1—7, pl. 5, figs. 1—8.

Lectotype: Selected here, pedicle valve figured by Barrande (1879) on pl. 102, fig. 7:1, re-figured herein on pl. IX, fig. 7, deposited in the National Museum, Prague (NM-L 26028).
Type horizon: Jince Formation, Bohemiella romingeri Zone.
Type locality: Mlečice.
Material: 40 pedicle and brachial valves, many fragments.

Description: Shell of medium size, 6—7 mm wide in adults, thin-walled (less than 0.2 mm in adults). Pedicle valve is a low, assymmetric cone, subcircular in outline, 70—90 % as long as wide, and less than 20 % as high as wide. Apex situated at posterior sixth of the valve, surface of the valve weakly sloping anteriorly and laterally from the apex. Anterior and lateral margins evenly rounded, posterior margin slightly less curved. Commissure straight in anterior and lateral positions, posterior part is deflected ventrally. Ventral pseudointerarea widely triangular, short, moderately to steeply procline, in lateral profile straight to gently concave, about 25 % as wide as the valve. Borders of pseudointerarea marked by deflections of valve surface and growth lines. Pedicle opening elliptical, minute, located immediately posteriorly from the apex. Interior of pedicle valve with a pair of large, weakly impressed cardinal muscle scars, located laterally from the apex, and further with smaller paired muscle scars, laterally bounding inner pedicle opening. Vascular canals gently impressed, running parallel with valve margins; each main canal branches anterolaterally into several secondary canals, which terminate by fine canals along valve periphery.

Brachial valve has the same outline as pedicle valve. Beak marginal, with raised protegulum, which bears a pair of spinose, elliptical protegular nodes. The valve is weakly and evenly convex in transverse profile, and flat in lateral profile, except for ventrally deflected dorsal beak. Dorsal pseudointerarea is a tiny, very short plate bordering posterior margin of valve, and is supported by a strong, low median ridge reaching 30 % of the valve length. Cardinal muscle scars large, feebly impressed, narrowly elliptical, located in posterolateral parts of valve floor. Other muscle scars and pallial markings not preserved.



15. *Glyptacrothele bohemica* (Barrande, 1879)
A — interior of pedicle valve; ac — anterocentral muscle scars, cm — cardinal muscle scars, po — inner pedicle opening, vl — vascula lateralia; B — interior of brachial valve; cm — cardinal muscle scars; C — lateral profile of complete shell

Ornamentation consists of minute granules, irregularly spaced or forming discontinuous, undulating concentric lines. The size of granules increases anteriorly. Growth lines indistinct in median sector, but coarse in flanks. The surface of central pseudointerarea bears finer granules than the adjacent shell surface, but growth lines are better developed there. Growth lamellae poorly developed, marked by an absence of granulose ornamentation. The dominance of granulose or concentric ornamentation varies. Overally, the specimens from the Skryje-Týřovice area have better developed granules, whereas specimens from the Brdy area have more distinct growth lines; nevertheless, these differences may be explained by an intraspecific variability. Radial ornamentation weak and usually more distinct on the brachial valve; rays originate at umbo and increase in size anteriorly; there are 26—30 rays in adults.

Comparison: *G. bohemica* is close to *Redlichella granulata* (Linnarsson), but the latter differs by stronger muscle impressions and by absence of radial rays. *G. courtessolei* Termier-Termier has a more centrally located ventral beak and coarser growth lines in comparison with *G. bohemica.*

Occurrence: Brdy area; Eccaparadoxides pusillus Zone, Onymagnostus hybridus Zone, and interval between Eccaparadoxides pusillus and Paradoxides gracilis Zones: Jince (Vinice slope), Rejkovice (W part of the village). Skryje-Týřovice area; Bohemiella romingeri Zone: Skryje (Luh, Čihátko, Dlouhá hora, Hradiště, Buchava), Mlečice, Biskoupky.

Botsfordiidae Schindewolf, 1955

Botsfordiinae Schindewolf, 1955

Botsfordia Matthew, 1892

Botsfordia snajdri sp. n.

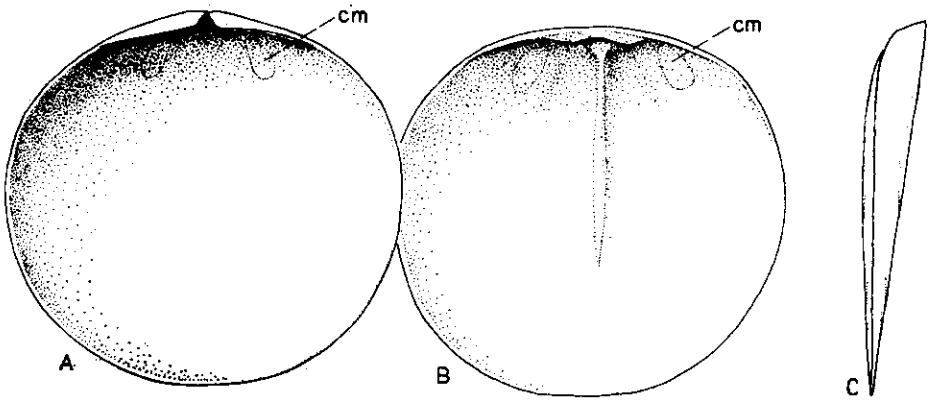
Pl. VIII, figs. 1—9; text-figs. 16, 17

Holotype: Brachial valve, figured on pl. VIII, figs. 3, 4, 9, deposited in the Geological Survey, Prague (MM 258).
Type horizon: Jince Formation, horizon with *Alueva — Conocoryphe ovata.*
Type locality: Jince, southern part of Vinice slope.
Name: After the late Dr. M. Šnajdr.
Material: 5 pedicle and 12 brachial valves.

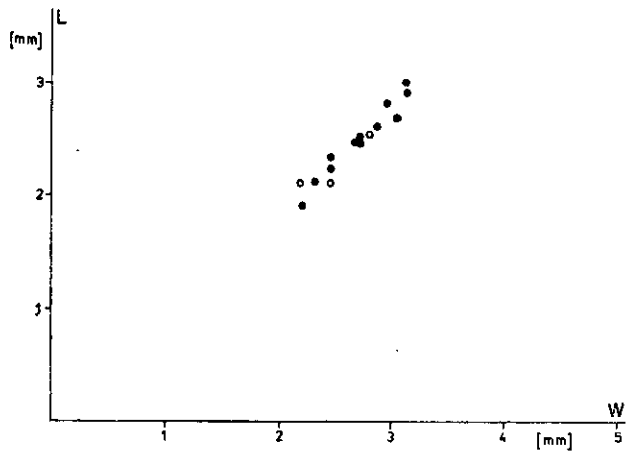
Description: Shell minute, 3 mm wide in adults, thin-walled. Pedicle valve subcircular in outline, 88—92 % as long as wide, with anterior and lateral margins evenly rounded. Posterior margin nearly straight, deflected ventrally in median part. Ventral beak marginal, forming the top of the valve; surface evenly sloping anteriorly and laterally from the beak. Ventral pseudointerarea steeply apsacline, very low, divided by a minute, deep, narrowly triangular delthyrium into two tiny propareas. A pair of deeply impressed, minute, oval muscle scars located between apex and lateral margins.

Brachial valve circular in outline, 83—90 % as long as wide, with posterior margin deflected ventrally. In anterior view, the valve is nearly flat, but in lateral profile, the valve is gently convex posteriorly and becomes nearly flat in anterior half. Dorsal pseudointerarea short, high, with inclined propareas which laterally pass into valve floor without distinct boundaries. Median plate strongly elevated, well defined, anteriorly supported by a fine median buttress, which expands forward as a low, narrow median ridge. Median ridge extends anteriorly over midlength. Posterolaterally located cardinal muscle scars large, elongate, deeply impressed. Pallial markings not preserved.

Ornamentation consists of minute, densely and irregularly spaced granules of uniform size. Growth lines and radial ornamentation not developed.



16. *Botsfordia snajdri* sp. n.
A — interior of pedicle valve; B — interior of brachial valve; C — lateral profile of complete shell; cm — cardinal muscle scars



17. Relationship between length versus width in *Botsfordia snajdri* sp. n. L — length, W — width, *empty circles* — pedicle valve, *full circles* — brachial valve

Comparison: *B. snajdri* is most similar to *B. epigona* Mergl from the early Middle Cambrian of Morocco (Mergl, 1988), but the latter differs by much shorter and anteriorly deflected ventral pseudointerarea. *B. caelata* (Hall) (Walcott, 1912; Pelman, 1977) differs by more rounded posterior margin, less distinct median ridge, and better developed growth lines. *B. poletaevae* Aksarina (Aksarina - Pelman, 1978) differs from *B. snajdri* by more distinct growth lines and by longer median ridge in brachial valve interior.

Occurrence: Type locality only.

Acrotretidae Schuchert, 1893

Acrotretinae Schuchert, 1893

Luhotreta gen. n.

Type species: *Luhotreta pompeckji* (Šlehoferová)

Diagnosis: Large acrotretid with a moderately high, widely conical pedicle valve. Ventral pseudointerarea catacline to steeply procline, intertrough deeply cut. Brachial valve weakly convex, with an orthocline pseudointerarea divided by a widely triangular median plate. Median plate supported anteriorly by a strong median buttress, median ridge absent. Cardinal muscle scars large, laterally spaced. Coarse, scarse lamellae and fine growth lines cover shell surface.

Remarks: *Luhotreta* is close to *Vandalotreta* Mergl (Mergl, 1988); the latter differs by an absence of growth lamellae, and by a pair of large central muscle scars centrally located in brachial valve interior. *Hadrotreta* Rowell (Rowell, 1966) differs from *Luhotreta* by a weakly sulcate brachial valve and by presence of a coarse median ridge in brachial valve interior.

Species assigned: *L. pompeckji* (Šlehoferová); Jince Formation, Brdy and Skryje-Týřovice areas.

Luhotreta pompeckji (MS Šlehoferová, 1980), emend.

Pl. X, figs. 1—16; text-fig. 18

1896 *Acrotreta* nov. spec.; Pompeckj, p. 512, pl. 14, fig. 17.
1980 *Acrotreta pompeckji* sp. nov.; Šlehoferová, p. 34, pl. 3, figs. 1—13.

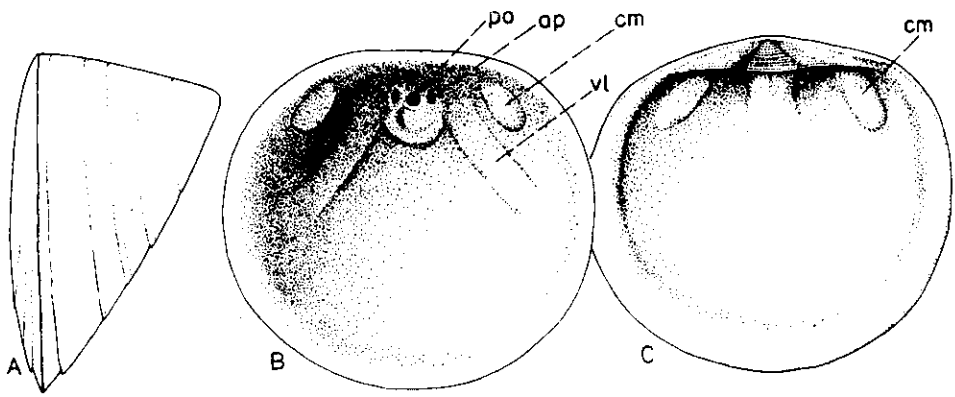
Holotype: Brachial valve figured on pl. X, fig. 11, deposited in the Academy of Sciences, Prague (PEŠ 42).
Type horizon: Jince Formation, Bohemiella romingeri Zone.
Type locality: Skryje, Hradiště hill.
Material: 15 pedicle and 8 brachial valves.

Description: Shell large for *Acrotretinae,* thin-walled, 2.5 mm wide in large specimens. Pedicle valve conical, nearly circular in outline, about 60—70 % as high as wide. Apical angle 80—90° in posterior view, and 60—80° in lateral view. Ventral pseudointerarea catacline to steeply procline, defined by the flattening of the valve; intertrough narrow and deep. Outer pedicle opening minute, circular, located immediately posteriorly from the apex. Interior of valve with minute, but well-developed apical process, and slightly elliptical inner pedicle opening, which extends into short pedicle tube internally. Apical pits minute, situated laterally to the pedicle tube. Cardinal muscle scars large, deeply impressed,

located posterolaterally. Vascula lateralia deeply impressed in umbonal area, shallowing and diverging anteriorly.

Brachial valve nearly circular, weakly convex in transverse profile, and weakly convex apically but flat anteriorly in lateral profile. Dorsal pseudointerarea short, orthocline, with weakly concave, widely triangular median plate. Propareas narrowly triangular, as wide as median plate. Median buttress strong, nearly as wide as the median plate, and not extending anteriorly as median ridge. Cardinal muscle scars large, poorly impressed, located posterolaterally. Except for posterior margin, the periphery of the brachial valve interior forms narrow, flat brim.

Ornamentation consists of fine, regularly spaced growth lines slightly finer on the surface of ventral pseudointerarea. Growth lamellae scarce, several in number, very strong and overlapping near periphery of large shells.



18. *Luhotreta pompeckji* (Šlehoferová, 1980)
A — lateral profile of complete shell; B — interior of pedicle valve; ap — apical pits, cm — cardinal muscle scars, po — inner pedicle opening, vl — vascula lateralia; C — interior of brachial valve; cm — cardinal muscle scars

Occurrence: Brdy area; horizon with *Alueva — Conocoryphe ovata* to Onymagnostus hybridus Zone: Jince (southern part of Vinice slope, Vinice slope). Skryje-Týřovice area; Bohemiella romingeri Zone: Skryje (Luh, Dlouhá hora, Hradiště, Buchava a. o.), Biskoupky.

Hadrotreta Rowell, 1966

Hadrotreta sp.

Pl. X, figs. 17, 18

Remarks: A single, gently convex brachial valve with a minute, distinct median ridge is available only. Overall shape of the valve with

shallow sulcus and presence of median ridge recall *Hadrotreta* Rowell, but generic assignment without knowledge of dorsal pseudointerarea and pedicle valve is only tentative,

Occurrence: Skryje-Týřovice area; Bohemiella romingeri Zone: Skryje (Buchava).

Superfamily, family and genus unknown

"Acrothele" gigantea Želízko, 1911

Pl. XI, figs. 1—6

1896 *Acrothele* nov. spec.; Pompeckj, p. 566.
1911 *Acrothele gigantea* Žel.; Želízko, p. 4.
1989 *Acrothele* (?) *gigantea* Želízko, 1911; Šlehoferová, p. 48, pl. 7, figs. 1—4.

Lectotype: Selected here, pedicle (?) valve figured herein on pl. XI, figs. 1, 2, deposited in the National Museum, Prague (NM-L 26032).
Type horizon: Jince Formation, Ellipsocephalus hoffi—Rejkocephalus lyelli Zone.
Type locality: Jince, Koníček Hill.
Material: 13 pedicle and 2 brachial valves.

Description: Shell large, planoconvex, thin-walled, maximally 30 mm long. Pedicle (?) valve subcircular in outline, with flattened posterior margin, 100—120 % as long as wide. Beak gently pointed, located nearly at posterior margin. Posterior part of the valve steeply sloping toward posterior margin. Ventral pseudointerarea poorly defined, widely triangular. A pair of minute, triangular impressions are developed anterolaterally from the beak. Several fine, radially arranged ridges are situated at the centre of the valve; they may correspond to vascular canals.

Opposite valve (? brachial) flat, with fine ridge near marginal beak, and paired, poorly divergent ridges at the centre of the valve. Shell devoid of the ornamentation except for coarse 4—5 in number, concentric lamellae.

Remarks: All available specimens are poorly preserved; valves are strongly flattened, wrinkled, and original shell substance is dissolved. Large-size and probably only fine ornamentation, and ? absence of pedicle opening distinguish *"Acrothele" gigantea* from other acrothelid genera (*Acrothele* Linnarsson, *Eothele* Rowell, *Glyptacrothele* Termier - Termier, *Redlichella* Walcott, *Spinulothele* Rowell), but recall the Lower Ordovician genus *Oxlosia* Ulrich - Cooper, 1936. In addition, it is not excluded, that *"A." gigantea* may be rejected from the brachiopods.

Dimensions (in mm):	length	width
pedicle valve NM-L 26032	27.0	25.0
pedicle valve GS-YA 1305	24.0	24.0
pedicle valve GS-YA 1324	25.0	25.0
brachial valve MM 284	25.5	25.5

Occurrence: Brdy area; interval between Eccaparadoxides pusillus and Paradoxides gracilis Zones to Ellipsocephalus hoffi—Rejkocephalus lyelli Zone: Jince (Vystrkov Hill, Vinice slope, Koníček Hill, Ovčín), Rejkovice (railway cutting near Zelený mlýn).

K tisku doporučil V. Havlíček.

Přeložil M. Mergl

References

Aksarina, N. A. - Pelman, J. L. (1978): Kembrijskie brachiopody i dvuchstvorčatye molljuski Sibiri. — Izdat. Nauka. Moskva.

Barrande, J. (1879): Système silurien du centre de la Bohême, V. — Prag, Paris.

Biernat, G. - Tomczykova, E. (1968): On the Upper Cambrian Lingulella Salter (Brachiopoda) from the Holy Cross Mountains, Poland. — Acta paleont. pol., 13, 2, *159—185.* Warszawa.

Fatka, O. (1986): Biostratigrafie jineckého souvrství. — MS Geofond. Praha.

Fatka, O. - Kordule, V. - Mergl, M. - Šarič, R. (in press): Early Middle Cambrian fauna in Jince area (Central Bohemia). — Věst. Ústř. Úst. geol. Praha.

Havlíček, V. (1960): Jinecké vrstvy a jejich nadloží na Strašicku. — Zpr. geol. Výzk. v Roce 1958, *55—58.* Praha.

— (1971): Stratigraphy of the Cambrian of Central Bohemia. — Sbor. geol. Věd, Geol., 20, *7—52.* Praha.

Koliha, J. (1921): Ramenonožci z řádu Atremat v českém středním kambriu. — Čas. Mus. Král. čes., 95, *29—31.* Praha.

Kukal, Z. (1971): Sedimentology of Cambrian deposits of the Barrandian area (Central Bohemia). — Sbor. geol. Věd, Geol., 20, *53—100,* Praha.

Laurie, J. R. (1986): Phosphatic fauna of the Early Cambrian Todd River Dolomite, Amadeus Basin, central Australia. — Alcheringa, 10, *431—454.* Sydney.

Mergl, M. (1988): Inarticulate brachiopods of early Middle Cambrian age from the High Atlas, Morocco. — Věst. Ústř. Úst. geol., 63, 5, *291—295.* Praha.

Pelman, J. L. (1977): Ranne- i srednekembrijskie bezzamkovye brachiopody Sibirskoj platformy. — Trudy Inst. Geol. Geofiz., 316, *1—167.* Novosibirsk.

Pompeckj, J. F. (1896): Die Fauna des Cambrium von Tejřovic und Skrej in Böhmen. — Jb. K.-Kön. geol. Staatsanst., 45, *495—614.* Wien.

Rowell, A. J. (1965): Inarticulata. *In:* Treatise on invertebrate paleontology, part H, Brachiopoda (edit. Moore, R. C.). — Univ. Kansas Press.

— (1966): Revision of some Cambrian and Ordovician inarticulate brachiopods. — Palaeont. Contr., 7, *1—88.* Lawrence.

— (1977): Early Cambrian brachiopods from the southwestern Great Basin of California and Nevada. — J. Paleont., 51, 1, *68—85.* Menasha.

Rowell, A. J. - Krause, F. F. (1975): Distribution and systematics of the inarticulate brachiopods of the Ordovician carbonate mud mound of Meikjlejohn Peak, Nevada. — Palaeont. Contr., 61, *1—74.* Lawrence.

Savazzi, E. (1986): Burrowing sculptures and life habits in Paleozoic lingulacean brachiopods. — Paleobiology, 12, 1, *46—64*. Chicago.
Šlehoferová, P. (1980): Inartikulátní ramenonožci středního kambria Čech. — MS přírodověd. fak. Univ. Karl. Praha.
Šnajdr, M. (1975): Additional notes on the stratigraphy of the Jince Formation. — Věst. Ústř. Úst. geol., 50, *157—161*. Praha.
Šuf, J. (1926): Předběžná zpráva o faunistických obzorech jineckých vrstev středního kambria na Vystrkově u Jince. — Věst. St. geol. Úst., Čs. Republ., 2, *129—135*. Praha.
— (1927): Předběžná zpráva o faunistických obzorech jineckých vrstev středního kambria u Rejkovic. — Věst. St. geol. Úst. Čs. Republ., 3, *120—124*. Praha.
Termier, G. - Termier, H. (1974): Les brachiopodes cambriens de la Montagne Noire (Sud de la France). — Géol. méditerr., 1, *35—52*. Marseille.
Ulrich, E. O. - Cooper, G. A. (1938): Ozarkian and Canadian Brachiopoda. — Bull. Geol. Soc. Amer., 13, *1—323*. Baltimore.
Walcott, C. D. (1901): Cambrian Brachiopoda: Obolella, subgenus Glyptias; Bicia; Obolus, subgenus Westonia; with descriptions on new species. — Proc. US nat. Mus., 23, *669—695*. Washington.
— (1912): Cambrian Brachiopoda. — Monogr. US geol. Surv., 51, *1—872*. Washington.
Želízko, J. V. (1911): Nové příspěvky ke studiu jineckého kambria. — Rozpr. Čes. Akad. Vědy Slovesn. Umění, Tř. II, 20, 10, *1—7*. Praha.

Explanation of plates

All photos by M. Mergl

Pl. I

Lindinella kordulei sp. n.; Ellipsocephalus hoffi—Rejkocephalus lyelli Zone; locality: Rejkovice (Zelený mlýn) (1—5).
1, 4 — holotype, composite mould and latex cast of exterior of pedicle valve, ×3.8, ×10.0, GS-YA 1290; 2 — composite mould of pedicle valve, ×3.8, GS-YA 1285; 3 — composite mould of brachial valve, ×3.8, GS-YA 1290; 5 — latex cast of exterior of brachial valve, ×10.0, GS-YA 1292.

Pl. II

Lindinella kordulei sp. n.; Ellipsocephalus hoffi—Rejkocephalus lyelli Zone; locality: Rejkovice (Zelený mlýn) (1, 2).
1 — internal mould of ventral pseudointerarea, ×10.0, GS-YA 1283; 2 — internal mould of dorsal pseudointerarea, ×10.0, MM 251.
Westonia bohemica (Koliha, 1921); interval between Eccaparadoxides pusillus and Paradoxides Zones; locality: Jince (Vystrkov Hill) (3—6).
3 — lectotype, internal an external moulds of complete shell, ×5.0, NM-L 18202; 4—6 — internal mould of brachial valve, latex cast and external mould of exterior, ×5.0, ×10.0, ×16.0, NM-L 26030.

Pl. III

Westonia bohemica (Koliha, 1921); Eccaparadoxides pusillus Zone; localities: Strašice (Kamenná Hill, "V Andělkách" Forest) (1—3), Rejkovice (Hejdův dvůr) (4).
1 — internal mould of pedicle valve, ×5.2, VH 3406; 2, 3 — internal moulds of bra-

chial valves, ×5.2, ×5.2, VH 3406, VH 3406; 4 — internal mould of brachial valve, ×4.5, VH 5416.
Lindinella sp.; Pompeckium kuthani Zone; locality: Lohovice (5—8).
5, 6 — internal mould and latex cast of exterior of incomplete brachial valve, ×5.0, PEŠ 40; 7, 8 — internal mould and latex cast of exterior of brachial valve, ×5.0, PEŠ 41.

Pl. IV

Lingulella matthewi Koliha, 1921; Rejkocephalus lyelli—Lingulella Zone; locality: Medový Újezd (quarry) (1—10).
1, 4, 6—8 — composite moulds of brachial valves, all ×9.0, OMR 4542, VH 5418b, VH 5417c, VH 5420a, MŠ 1223d; 2, 3, 5 — composite moulds of pedicle valves, all ×9.0, OMR 5863, VH 5418a, VH 5417d; 9 — lectotype, composite mould of pedicle valve, ×12.0, NM-L 26034; 10 — composite mould of pedicle valve, ×12.0, NM-L 26035.

Pl. V

Lingulella havliceki sp. n.; Rejkocephalus lyelli—Lingulella Zone; localities: Jince (Vystrkov Hill) (1—10).
1 — holotype, internal mould of pedicle valve, ×12.0, NM-L 26031a; 2 — internal mould of ventral pseudointerarea, ×12.0, NM-L 26031c; 3, 4, 10 — internal moulds of pedicle valves, ×12.0, NM-L 26031b, d, MM 288b; 5, 7, 9 — internal moulds of brachial valves, ×12.0, NM-L 26031e, f, MM 288a; 6, 8 — exterior of pedicle and brachial valves, ×12.0, NM-L 26031g, h.

Pl. VI

Lingulella sp.; Bohemiella romingeri Zone; localities: Skryje (Dlouhá hora) (1,2), Skryje ("Pod hruškou") (3), Skryje (old brickyard) (4).
1, 2 — internal mould and latex cast of exterior of brachial valve, ×12.0, PEŠ 05; 3 — composite mould of pedicle valve, ×12.0, OMR 8081; 4 — internal mould of pedicle valve, ×12.0, PEŠ 45.
Lingulella sufi sp. n.; horizon with *Alueva — Conocoryphe ovata*; locality: Jince (southern part of Vinice slope) (5—7).
5 — holotype, interior of pedicle valve, ×12.0, MM 259; 6 — interior of brachial valve, ×12.0, MM 253; 7 — internal mould of pedicle valve with partly preserved shell, ×12.0, MM 261.
Acrothele quadrilineata Pompeckj, 1896; Bohemiella romingeri Zone; Skryje (Buchava) (8).
8 — holotype, composite mould of pedicle valve, ×6.5, without number.
Westonia ? fatkai sp. n.; layers below horizon with *Alueva — Conocoryphe ovata*; locality: Jince (southern part of Vinice slope) (9—13).
9, 13 — latex cast and external mould of brachial valve, ×5.0, ×10.0, OMR 20464; 10 — internal mould of dorsal pseudointerarea, ×10.0, MM 399; 11 — internal mould of ventral pseudointearea, ×10.0, MM 398; 12 — holotype, internal mould of pedicle valve, ×5.0, OMR 20465.

Pl. VII

Acrothele quadrilineata Pompeckj, 1896; Bohemiella romingeri Zone (1, 2, 4—8), and Onymagnostus hybridus Zone (3); localities: Skryje ("Pod třešní") (1, 2, 4—8), Jince (Vinice slope) (3).
1, 2 — composite moulds of pedicle valves, ×7.0, PEŠ 35, PEŠ 44; 3 — latex cast of

pedicle valve exterior, ×9.0, VH 5415; 4 — external mould with partly preserved shell of pedicle valve, ×7.0, PEŠ 33; 5, 6 — latex cast of pedicle valve exterior and external mould of brachial valve of the same specimen, ×7.0, PEŠ 38, 7, 8 — latex casts of brachial and pedicle valves of the same specimen, ×7.0, PEŠ 39.

Pl. VIII

Botsfordia snajdri sp. n.; horizon with *Alueva — Conocoryphe ovata*; locality: Jince (southern part of Vinice slope) (1—9).
1 — internal mould of pedicle valve, ×9.0, MM 253; 2 — internal mould of brachial valve, ×9.0, MM 257; 3, 4, 9 — holotype, internal mould with partly preserved shell, its external mould, and detail of ornamentation, ×9.0, ×9.0, ×15.0, MM 258; 5 — interior of pedicle valve, ×9.0. MM 292; 6 — interiors of brachial valves, all ×9.0, MM 256, MM 255, MM 254.
Glyptacrothele bohemica (Barrande, 1879); Eccaparadoxides pusillus Zone (11—14), Bohemiella romingeri Zone (10, 15, 16); localities: Rejkovice (W part of the village) (11—13), Jince (Vinice slope) (14), Skryje (Čihátko) (15, 16), Skryje (Hradiště) (10).
10, 11 — internal moulds of minute pedicle valves, ×11.0, PEŠ 24, MM 291; 12, 13 — internal moulds of minute brachial valves, ×11.0, MM 289, MM 290; 14 — internal mould of brachial valve with partly preserved shell, ×8.0, VH 5419; 15, 16 — latex cast of exterior and internal mould of incomplete brachial valve, ×11.0, PEŠ 27.

Pl. IX

Glyptacrothele bohemica (Barrande, 1879); Eccaparadoxides pusillus Zone (1), Bohemiella romingeri Zone (2—9); localities: Jince (Vinice slope) (1), Biskoupky (2—6,9), Mořice (7, 8).
1 — composite mould of pedicle valve, ×7.5, MM 266; 2 — incomplete internal mould of pedicle valve showing scars and pallial markings, ×10.0, MM 264; 3 — latex cast of pedicle valve exterior, ×10.0, MM 263; 4—6 — internal mould of pedicle valve, lateral, posterior, and ventral views, all ×8.0, VH 5421; 7 — lectotype, internal mould of pedicle valve, ×9.5, NM-L 26028a; 8 — internal mould of brachial valve, specimen figured by Barrande (1879), ×9.5, NM-L 26028b; 9 — exterior of brachial valve showing protegulum and ornamentation, ×15.0, MM 265.

Pl. X

Luhotreta pompeckji (Šlehoferová, 1980); Bohemiella romingeri Zone (1—3, 7—13), Onymagnostus hybridus Zone (4—6), horizon with *Alueva — Conocoryphe ovata* (14—16); localities: Skryje (Dlouhá hora) (1—3), Skryje (Hradiště) (11), Skryje (Buchava) (12), Skryje (Luh) (13), Biskoupky (7—10), Jince (Vinice slope) (4—6) Jince (southern part of Vinice slope) (14—16).
1—3 — pedicle valve exterior, ventral, anterior, and lateral views, ×17.0, MM 278; 4—6 — internal mould of pedicle valve, ventral, posterior, and lateral views, ×17.0, MM 278; 7—9 — internal mould of pedicle valve, ventral, posterior, and lateral views, ×17.0, MM 275; 10 — internal mould of large pedicle valve, ×14.0, PEŠ 43; 11 — holotype, interior of incomplete brachial valve, ×17, PEŠ 42; 12 — internal mould of brachial valve with partly preserved shell, ×17.0, VH 5424; 13 — composite mould of pedicle valve, ×17.0, MM 272; 14, 15 — internal mould of pedicle valve, anterior and ventral views, ×14.0, MM 286; 16 — interior of brachial valve, ×14.0, MM 270.
Hadrotreta sp.; Bohemiella romingeri Zone; locality: Skryje (Buchava) (17,18).
17, 18 — interior of brachial valve, ventral and oblique views, ×17.0, VH 5423.

Pl. XI

"Acrothele" gigantea Želízko, 1912; Paradoxides gracilis Zone (3, 6), Ellipsocephalus hoffi—Rejkocephalus lyelli Zone (1, 2, 4, 5); localities: Jince (Koníček Hill) (1, 2), Jince (Vinice slope) (3), Rejkovice (Zelený mlýn) (4, 5), Ovčín (6).
1, 2 — lectotype, internal and external moulds of pedicle valve, ×2.5, NM-L 26032; 3, 4, 6 — deformed composite moulds of pedicle valves, all ×2.5, GS-YA 1324, GS-YA 1305, PEŠ 36; 5 — composite mould of brachial valve, ×2.5, MM 284.

Pl. XII

1 — slab with valves of *Lingulella matthewi* Koliha, 1921; Rejkocephalus lyelli—Lingulella Zone (upper part); Medový Újezd (quarry), ×3.0, OMR 15533.
2, 3 — slabs with valves of *Lingulella havliceki* sp. n.; Rejkocephalus lyelli—Lingulella Zone (lower part); Medový Újezd (borehole Mý-XII), (2), Jince (Vystrkov Hill) (3), all ×3.0, MŠ 990, NM-L 26031.

Středokambričtí inartikulátní ramenonožci ze středních Čech

(Résumé anglického textu)

Michal Mergl - Petra Šlehoferová

Předloženo 12. září 1988

Inartikulátní ramenonožci jsou důležitou, avšak nehojnou složkou bentických marinních společenstev českého středního kambria. Celkem zde bylo zjištěno 14 druhů, z toho jsou dva rody (*Lindinella, Luhotreta*) popsány jako nové.

Rozšíření brachiopodových faun je v těsné závislosti na litologickém vývoji a stratigrafické úrovni. V brdské oblasti byla písčitá dna osídlena několika lingulovými asociacemi: asociací s *Westonia ? fatkai, Westonia bohemica, Lingulella havliceki* a *Lingulella matthewi*. V těchto asociacích je nebrachiopodová fauna nehojná. Bahnitá dna ve větších hloubkách byla osídlena asociacemi s *Acrothele* a *Botsfordia*, ve vyšší části jineckého souvrství s nehojným lingulidním druhem *Lindinella kordulei*. Tyto asociace jsou doprovázeny hojnými a druhově rozmanitými faunami trilobitů, ostnokožců a dalších skupin (hyolitů, gastropodů, ostrakodů aj.). Podobně jako trilobiti a ostnokožci (Fatka, 1986) i sled brachiopodových asociací v brdském kambriu dokládá symetrický vývoj pánve: lingulová společenstva jsou vázána na spodní a svrchní část jineckého souvrství, zatímco ve střední části souvrství jsou potlačena. V souvislosti s prohloubením pánve ve střední části souvrství (Fatka, 1986) se místo nich objevují asociace s *Acrothele* a *Botsfordia*.

Ve skryjsko-týřovické oblasti je s výjimkou hrubozrnných klastik ve spodní části jineckého souvrství zastoupena pouze asociace s *Acrothele*, která je i zde doprovázena hojnou a druhově početnou faunou trilobitů, ostnokožců, hyolitů i dalších skupin.

Беззамковые брахиоподы среднего кембрия из средней Чехии

Монографическая обработка беззамковых брахиолодов из среднего кембрия содержит 14 видов, относящихся к 9 родам; определены новые роды Lindinella и Luhotreta Распространение отдельных видов обусловлено литологическим составом и стратигра

фическим уровнем: мелководные районы с песчаным дном обитало несколько лингулидных сообществ, тогда как более глубокие части бассейна с болотистым дном обитали сообщества с Acrothele и Botsfordia.

Přeložil A. Kříž