Lower Devonian Lingulata from the well Ursynów 1 (E Poland)

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New data are presented for the poorly known Devonian lingulate fauna. Late Lochkovian members of the lingulate genera: ?Lingularia, "Trigonoglossa", Lingulodiscina, Orbiculoidea and Schizotreta are described. The material is from a depth 2858.1–2979.1 m of the well Ursynów 1, situated in the NW part of the Radom-Lublin area (E Poland), together with a simplified lithological section of the Lower Devonian.

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Key words: Early Devonian, Brachiopoda, Lingulata, taxonomy, Radom-Lublin area.

INTRODUCTION

Taxonomic knowledge of Early Devonian lingulates is still inadequate. The available data are very scanty especially on shell morphology, mainly the shell interiors (anatomy). One of the main reasons for this situation is that available records, although not rare, often have only few complete specimens and preserve few, if any, elements of internal structure (L. R. M. Cocks, 1978). These problems are noted by e.g. M. G. Bassett (1986) mainly in the context of the unsatisfactory knowledge of "inarticulates" of Silurian/Devonian age and the consequences for their taxonomy and evolution. Early Devonian "inarticulates" in Poland have not been, up to now, described in detail and illustrated. This preliminary note is the first documentation of this group. It is expected that this study will be continued in the future on the basis of complementary collections in preparation.

MATERIAL

The Lochkovian phosphatic brachiopods were found in a section where only little information was as yet been recorded (M. Rubel, L. Teller, 1978; L. Teller, 1997). The collection although unsatisfactory in terms of the number and poor state of preservation of specimens (generally incomplete) is relatively diverse. It includes, among others, a few conical discinids (one almost complete), several lingulids, trigonoglossids, lingulodiscinids, schizotretids. These all, with some exceptions of rare juveniles within for example Orbiculoidea and the Lingulidae, represent adult individuals and, for the most part, are small. In addition, there is also a comparatively high content of unidentified shell fragments. The collection contains about 50 specimens of separate dorsal and ventral valves. Most are preserved as mainly damaged, external and internal moulds. These all, although in
various degrees of completeness and exfoliation, generally preserve useful characteristics like for example shell outline, some details of the beak area and also surface ornamentation, occasionally sufficiently impressed on internal moulds and on the external shell, where preserved. In some cases the concentric lines are unusually thickened all over shell surface, along the midline and/or on the posterior portion. Few specimens bear sporadic traces of some anomalies in the pattern of ornamentation expressed as breaks and/or gashes of filar drapes like those in A. Williams and L. E. Holmer (1992) and a number of variously deformed and repaired pattern of concentric lines observed for example in bivalves (L. Liljedahl, 1984). Common are traces of post-mortem, pre- and/or after burial mechanical damage and fractures.

The collection is deposited in the archives of the Institute of Palaeobiology of the Polish Academy of Sciences, for which abbreviation ZPAL.Bp.U1 is used.

SYSTEMATIC PALAEONTOLOGY

Family Lingulidae Menke, 1828
Genus ?Lingularia Biernat et Emig, 1993
Type species: Lingularia similis Biernat et Emig, 1993, p. 11, figs. 3–6


Remarks. — A few lingulide morphotypes are recognized here based on some of the only available external shell morphology including shell shape and outline, size of the adult shell and/or nature of the surface ornamentation. In general, these types seem to fit sufficiently well with some of the well known Silurian species, like e.g.: Lingula squamiformis Phillips, 1836, "L." lewisi Sowerby, 1839, "L." minima Sowerby, 1839, "L." cornea Sowerby, 1839, as repeating, although in a somewhat varying degree, some of the above morphological features characteristic of particular genera and/or species. The small differences observed may require new taxonomic names on specific level.

The lingulide species studied are, for the present, attributed (tentatively) to the genus Lingularia Biernat et Emig, 1993. It is probable that they represent a new genus but this
can not be sufficiently documented here because of the poor material currently available.

Undoubtedly, they show more external similarity to *Lingulara similis* Biernat et Emig, 1993, type species of the genus and to its members discussed by G. Biernat and Ch. Emig (1993), rather than to the recent *Lingula*. As is known, presence of the *Lingula* *s.s.* in the Palaeozoic strata is controversial (M. G. Bassett, 1979, 1986; G. Biernat, Ch. Emig, 1993; A. J. Rowell, 1970) and new generic names are probably needed. All "L." in brackets in the present text correspond to Silurian/Early Devonian lingulide species discussed and figured by M. G. Bassett (1986) whose generic status, according to him, should be changed on the basis of available material.

*Lingularia* sp. cf. "*Lingula*" *lewisii* Sowerby, 1839 type (Pl. 1, Figs. 1, 2, 4)

**Material:** Six external or internal moulds of dorsal and ventral (2) valves, all, to a varying degree, decorticated, many indeterminate fragments of valves.

**Type locality:** Ursynów 1 well; depth: U1/4 — 2973.0—2979.0 m, U1/137 — 2862.1—2866.1 m, U1/23 — 2858.1—2862.1 m.

**Diagnosis:** Like "L." *lewisii* Sowerby figured by M. G. Bassett (1986, pl. 10A) but is less spatulate and much more narrowly elongate, anterior margin more truncate, growth lines densely spaced and of more varied prominence.

**Dimensions (mm):**

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<td>9.1</td>
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<td>ZPAL.Bp U1/11</td>
<td>2</td>
<td>4.1</td>
<td>5</td>
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<tr>
<td>ZPAL.Bp U1/137</td>
<td>3</td>
<td>6</td>
<td>4.1</td>
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<tr>
<td>ZPAL.Bp U1/138</td>
<td>2.5</td>
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**Description.** — Shell medium sized, almost equi-valve, about two times as long as wide; convexity of ventral valve moderate, that of the dorsal valve more marked on the umbosal part and somewhat flattened anterolaterally. Posterior margin evenly arcuate and, often, forming structure somewhat like a "shoulder" meeting parallel or almost so lateral margins; anterolateral angles broadly rounded, anterior margin truncate to very weakly rounded; ventral beak with pointed apex. Surface ornamentation consists of dense, subconcentric ridges; these are variable in thickness and are arranged in bundles (3 to 4 ridges per bundle) separated by distinct and narrow interspaces. Very fine radial fila are discernible.

General outline of concentric ridges varies, particularly along the midlength of valve, from more elongately oval on the posterior half of shell to much less oval on the anterior one in correspondence to the nearly truncate anterior margin (Pl. 1, Fig. 4) like for example *Pseudolinguula spatula* Williams (1974, pl. 5, fig. 1).

**Interior not preserved.**

**Remarks.** — The species is very similar to "*Lingula*" *lewisii* Sowerby, from the Silurian (Ludlow, Aymestry Limestone) species from England, figured in R. I. Murchison (1839, pl. 6, fig. 9) and, in turn refigured by M. G. Bassett (1986, Text-fig. 1B-1:A). It has a similar outline, distinctly parallel lateral margins and truncate to weakly subtruncate anterior margin. It differs, in being more narrowly elongate (about two times longer than wide) and in having postero-and anterolateral angles varying from more marked to less angular. The species seems to be intermediate between "*L.*" *lewisii* (see M. G. Bassett, 1986, fig. 1B-1:A) and *L.squamosiformis* Phillips, illustrated by K. Graham (1970, pl. 16, figs. 6, 9) from the Scottish Carboniferous.

*Lingularia* sp. cf. "*Lingula*" *cornea* Sowerby, 1839 (Pl. 1, Figs. 3, 6, 7)

**Material:** Five more or less complete external moulds of the dorsal and ventral valves; few fragments of particular valve.

**Type locality:** Ursynów 1 well; depth: U1/2 — 2913.5—2919.5 m, U1/31 — 2973.0—2979.5 m, U1/157 — 2973.0—2979.5 m.

**Dimensions (mm):**

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<td>Dorsal valve ZPAL.Bp U1/92</td>
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<td>3</td>
<td>4</td>
<td>4.4</td>
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<tr>
<td>Ventral valve ZPAL.Bp U1/31</td>
<td>3.8</td>
<td>2.4</td>
<td>3</td>
<td>2.4</td>
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**Description.** — The main characteristic of this species is its somewhat bulgy appearance, widely ovoid outline and blunt apex; shell is the widest at midlength and slightly more narrowed posteriorly than anteriorly; postero-and anterolateral angles widely rounded; lateral margins distinctly subarculate, and the anterior moderately subarcuate to almost arcuate. Umbonal region (juvenile valve) is well marked constituting ca. 1/10 of the whole valve length (to about 0.1 mm long and 0.8 mm wide) of subtransversally — oval outline, bearing a few poor subconcentric and evenly subarcuate ridges, bordered by a thickened ridge and followed by a rather deeply marked furrow suggesting a short period of growth cessation. Further concentric ridges are, generally, of uneven thickness, coarsely thickened along midlength of valve, often irregularly arranged on different parts of valve steeply changing their outline from more elongately oval to subarcuate.

**Interior not preserved.**

**Remarks.** — This lingulid shows some general similarity to the lectotype of "*Lingula*" *cornea* Sowerby, the Silurian species from England (Downton Castle Sandstone Formation) figured by M. G. Bassett (1986, Text-fig. 18-1D) mostly in the shell outline and, to some extent, to the poor latex cast of "*Lingula*" sp. from Méricourt Beds (Méricourt).
described by C. Barrois et al. (1922) as "Lingula" lewisii and refigured by M. G. Bassett (op. cit., pl. 8, fig. 9).

Lingularia sp. A
(Pl. I, Fig. 5)

Material: Three specimens of ventral and/or dorsal valves, a few fragments of each valve.
Type locality: Ursynów 1 well; depth: U1/123, U1/125 — 2973.0 - 2979.5 m.
Dimensions: ZPAL.Bp.U11123: L — 7.1 mm, Wp — 3 mm, Wm — 4.1 mm, Wa — 3.1 mm.

Description. — Characteristic is the elongately oval outline with a slight median furrow on the ventral valve like for example "Lingula" sp. A, refigured from C. Barrois et al. (1922) by M. G. Bassett (1986, fig. 8, fig. 4). It extends along the anterior 3/4 of the valve midlength and weakly incises the truncate and slightly narrowed anterior margin; antero- and posterolateral angles rounded, lateral margins almost parallel to evenly arcuate. Markedly exposed is the posterior 1/5 of the shell length (= young post-larval shell) well delineated by the elevated and thickened concentric ridge. Concentric lines are differentiated into 6 to 9 ridges, with markedly thickened edges and two to four thinner ones in interspaces.

Interior unknown.

Remarks. — The species, in its very elongately oval shell, is similar to "Lingula" sp. A, refigured from C. Barrois et al. collection from the Angres Limestone — exact locality and horizon unknown — figured by M. G. Bassett (1986, pl. 8, figs. 7, 8) but differs in the more truncate anterior margin and in the almost parallel lateral margins. "Lingula" sp. A (in M. G. Bassett, 1986, pl. 8, figs. 1-4) is wider and more subquadrate, moreover, it has a shorter median furrow and is wider anteriorly in contrast to our species. There is also a great similarity to Lingula mytilloides Sowerby from the ?Plean Limestone Carboniferous of Scotland, figured by K. Graham (1970, pl. 14, figs. 8, 11, 12) from Scotland.

Genus Trigonoglossa Dunbar et Conddra, 1932
Type species: Lingula nebraseensis Meek, 1872

Remarks. — Broadly trigonal to subtrigonal in outline, coarse and, in places, regularly arranged concentric lines are suggestive of the genus Trigonoglossa; these specimens are, tentatively, included here.

?Trigonoglossa sp.
(Pl. I, Figs. 12, 13; Pl. II, Figs. 1, 2)

Material: Scarce and poorly preserved. It comprises one shell preserving both valves of which the dorsal is crushed in its anterior part and the umbo partly squeezed; four incomplete moulds and a few fragments of valves.
Type locality: Ursynów 1 well; depth: U1/171, U1/172, U1/173 — 2858.1–2862.8 m; U1/135 — 2858.1–2862.8 m; U1/165 — 2858.1–2862.8 m.
Dimensions (mm) (data are approximate because of some deformation and damage to specimens):

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<tr>
<td>ZPAL.Bp.U1/171</td>
<td>11</td>
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<tr>
<td>ZPAL.Bp.U1/173</td>
<td>10</td>
<td>ca. 4.5</td>
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Description. — Shell comparatively thick, gently convex and broadly trigonal, maximum width close to the
Genus *Schizotreta* Kutorga, 1848

*S. rugata* sp. 1

(PI. II, Fig. 8)

**Material.** One ventral valve, partly deformed, exfoliated with a damaged apical part.

**Type locality:** Ursynów 1 well; depth: U1/143 — 2913.5—2919.5 m.

**Dimensions:** ZPAL.Bp.UI1/143: L — ca. 10 mm; W — ca. 13 mm; Aa — 7 mm, Ap — 3 mm.

**Description.** — Valve very low almost subconical, subcircular in outline, steeply narrowing anteriorly; posterolateral angles and lateral margins evenly rounded, the posterior margin feebly convex; bead low, subcentral (submarginal) lying some distance posterior of the valve mid-length; valve evenly flattened peripherally in posterior, lateral and anterior directions.

Surface concentric ridges relatively coarse and widely spaced, with 2 to finer lines in interspaces; radial fila are present.

**Remarks.** — Although only one isolated valve is available, its general morphology suggests the genus *Schizotreta*. It is similar to *Schizotreta petita* Bassett, the Lochkovian species from the Méricourt borehole, France, described and figured by M. G. Bassett (1986, p. 91, pl. 9, fig. 6), differing, in being less oval in outline and, less narrow anteriorly. There is more similarity, mostly in the general appearance of the dorsal valve and of its beak to the Lochkovian *Schizotreta* sp. from the Grand-Vaast borehole figured by M. G. Bassett (1986, pl. 9, figs. 9, 10) but that species differs somewhat from form in having narrower interspaces.

**Family Discinidae** Gray, 1840

Subfamily *Orbiculinae* Schuchert et Levene, 1929

Genus *Orcibuioidea* d’Orbigny, 1848

*Orcibuioidea* sp. cf. *Orbiculioidea siegenensis* Kayser, 1890

(PI. II, Figs. 3–6)

**Material.** Three exteriors of the ventral (juvenile) and dorsal valves, partly exfoliated and deformed, a few very fragmentary valves.

**Type locality:** Ursynów 1 well; depth: U1/159, U1/161 — 2862.1—2865.1 m.

**Dimensions (mm):**

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<tr>
<td>ZPAL.Bp.UI1/161</td>
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<td>3.3</td>
<td>ca. 3</td>
<td>ca. 1</td>
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<tr>
<td>ZPAL.Bp.UI1/159</td>
<td>7.5</td>
<td>7</td>
<td>5.5</td>
<td>2</td>
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**Description.** — Valves low, nearly circular, evenly flattened in the posterior part, and slowly depressed towards the anterolateral margins; both apices are eccentric (the dorsal one tending to be submarginal) defined by a thickened ridge and situated ca. 1/7 the distance from the posterior to the anterior margins; ventral liristhum short, only slightly longer than wide.

Surface concentric ridges are strongly developed like those of the Silurian *Schizotreta* sp. (G. Biernat, 1984, pl. 25, fig. 2) and coarsely lamellose, evenly widely spaced (1 or 2 per ca. 0.8 mm) with 2—3 mm, sometimes discontinuous, fila in interspaces.

**Remarks.** — Circular (or almost so) outline with widely arranged and sharp concentric ridges distinguish this species from the other orbiculoids in the collection. It seems comparable, mostly in the appearance of concentric ridges, with a group of species displaying relatively thick and regularly spaced ridges like, for example *Orbiculioidea siegenensis* (E. Kayser, 1890) sensu C. Barrois et al. (1922) the Lochkovian form from the Grand-Vaast borehole figured by M. G. Bassett (1986, pl. 10, fig. 3–5) but differing from the latter in having a more eccentric beak and also a more circular outline, less densely spaced concentric ridges and probably in being of smaller size. *O. devillei* Barrois, Pruvost et Dubois, 1922, figured by M. G. Bassett (1986, pl. 10, fig. 1a–d holotype), has similarly arranged concentric ridges but a more convex apical part and the beak is slightly less eccentric. *O. rugata* Sowerby, 1839 figured by M. G. Bassett (1986, Text-
fig. 18-1F, G, H, I) from the Ludlow series (Ludfordian Stage) of England seems to have less regularly spaced concentric ridges and a less eccentric beak.

?Orbiculoides sp.  
(Pl. II, Fig. 7)

Material: One ventral valve greatly exfoliated, almost complete.  
Type locality: Ursynów well; depth: U1173 — 2865.1 m.  
Dimensions: ZPAL.Bp.U1173: L — 7.9 mm, Wm — 6.2 mm.  

Description. — Valve with elongate outline, highest centraly, bilaterally compressed, flattened in lateral view with beak nearly central, posterolateral slopes moderately concave, and the anterior slope gently convex; few concentric ridges (L. E. Holmer, 1987; M. Mergl, 1994).

Genus ?Lingulodiscina Whitfield, 1890  
Type species: Lingula exilis Hall, 1860  

Remarks. — This is a poorly known and rare, till now, genus of uncertain taxonomic status. A. J. Rowell (1955b: H285) suggested it is synonymous with Orbiculoidea. The original description of the taxon (R. P. Whitfield, 1890, p. 122) and the diagnosis (A. J. Rowell, op. cit.) noted the linguloid (elongately oval) appearance of the dorsal valve associated with a submarginal dorsal apex which defined the genus. G. Dahmer (1946, fig. 6; 1951, pl. 6, fig. 11) mentioned this morphological feature in connection with his Lingulodiscina mamma, the Devonian (Lochkovian) form from Westphalia, Germany.

The studied specimens from Ursynów 1 preserve an accentuated elongately oval dorsal valve and submarginal dorsal apex. These characters appear to be quite stable as generic criteria (anyway often one of a few available) particularly in the lack of (due to the state preservation) details of shell morphology, both internal and external.

?Lingulodiscina cf. L. mamma Dahmer, 1946  
(Pl. II, Figs. 11-15)

Material: One specimen, with two valves preserved (ZPAL.Bp. U1173), greatly decorticated with fragments of the surface ornament; few very fragmentary valves, undetermined.  
Type locality: Ursynów well; depth: U1173 — 2873.0-2979.0 m.  
Diagnosis: Like Lingulodiscina mamma Dahmer, 1946 in the general shell appearance like: size and elongately oval outline about one third longer than wide, in lateral view gently convex posteriorly; dorsal valve of linguloid outline with submarginal apex.  
Dimensions: Figured complete specimen (L — 15 mm, W — 11 mm).

Description. — Specimen thick-shelled, longer than wide (85% as long as wide), elongately oval to subcircular in outline; dorsal valve evenly convex in lateral view with submarginal apex and internally preserving a trace of something like a median septum; ventral valve thickest in the posterior third, steeply sloping anteriorly and laterally (Pl. II, Fig. 13). Surface ornamentation generally badly preserved shows on some fragmentary shell patches sufficiently well thickened marginally concentric lines of nearly equal arrangement, encircling the posterior parts of shell.

Remarks. — This species is poorly preserved; the only shell, articulated (with both valves closed) is similar to Lingulodiscina Dahmer, 1946 or R. P. Whitfield (1890). However, no detailed comparison is possible based only on the illustrations given by the above authors. The species is similar to L. mamma (G. Dahmer, 1946, figs. 1, 2, 5) in general shell shape and outline differing somewhat in being of slightly larger size.

CONCLUSIONS

The Ursynów collection shows how poor detailed knowledge on the Devonian phosphatic brachiopods is and how much general taxonomic study is needed throughout the world, based on adequate records.

1. Any information on Devonian taxa is necessary, particularly on the degree of intraspecific variability and also on the anatomy of the species and their generic assignments.

2. The soft-bottom endofauna is relatively poorly documented, and is dominated by lingulide "species" and much less by the discinide.

3. A few "species" seem to merit separation as new taxa but this cannot be sufficiently supported by the material at hand.

4. The lingulide species seem to be more comparable with the genus Lingularia Biernat et Enig, 1993 than with the younger recent Lingula; a new generic status may be expected with more complete material.

5. Diversification of phosphatic brachiopods and of the associated fauna (see p. 452) indicate favourable environments for the development of the soft bottom benthos.

6. These fossils constitute life assemblages; juvenile common and adult shells occur together; transportation, if at all, occurred on a very limited scale.

Acknowledgements. The authors wishes to thank Prof. David A. T. Harper from the University of Copenhagen for reviewing a draft of this paper and discussion on its subject and to the Wolomin Oil Prospecting Enterprise for making available the core material.
REFERENCES


EXPLANATIONS OF PLATES

PLATE I

Figs. 1, 2, 4. Lingularia sp. cf. “Lingula” lewisi Sowerby, 1839 type

Fig. 1 — exterior of the ventral valve (zentruma skorupka brunzawa), (ZPAL.Bp.U1/137), x 12; Fig. 2 — exterior of the exfoliated dorsal valve (zentruma skorupka grzbietowa czterciowo zhuszczona) (ZPAL.Bp.U1/4), ca. x 9; Fig. 4 — anterior fragment of valve, arrangement and outline of concentric lines in agreement with anterolateral margin (fragment przedniej czesci skorupki z widocznym zarysem i ujednaczeniem linii koncentrycznych przebiegajacych zgodnie z przednio- boczecnymi brzegami) (ZPAL.Bp.U1/28), ca. x 10; Ursynów 1, Lochkovian.

Figs. 3, 6, 7. Lingularia sp. cf. “Lingula” cornea Sowerby, 1839

Fig. 3 — dorsal valve exterior elevation along midline marked (skorupka grzbietowa od strony zawartnej z zaznaczonym sie srodkiem wyznieniem) (ZPAL.Bp.U1/157), ca. x 3; Fig. 6 — exterior of the ventral valve (skorupka brzuszna od strony zawartnej) (ZPAL.Bp.U1/31), ca. x 7; Fig. 7 — exterior of the dorsal valve: some irregularity in the appearance of concentric lines shown (skorupka grzbietowa od strony zawartnej: zaznaczona jej niezregularnosc w przebiegu linii koncentrycznych) (ZPAL.Bp.U1/92), ca. x 9; Ursynów 1, Lochkovian.

Fig. 5. Lingulatia sp. A

Dorsal valve slightly furrowed mediially concentric lines greatly thickened (skorupka brzuszna z lekko zaznaczajaca sie brzuzdka, linie koncentryczne pogrubione w czesci srodowej) (ZPAL.Bp.U1/125), ca. x 6; Ursynów 1, Lochkovian.
Fig. 9. *Lingularia* sp. B
Exterior of a partly deformed and greatly exfoliated dorsal valve, concentric and radial striation traced (zewnętrzna częściowo zdeformowana i silnie zasuszona skorupka grzbietowa; słab podkreślone koncentryczne i radialne prążkowanie) (ZPAL.Bp.U1/150), ca. x 15; Ursynów 1, Lochkovian.

Figs. 8, 10, 11. *Lingularia* sp. cf. "Lingula" mytiloides Sowerby, 1812
Figs. 8, 10 — exterior of the ventral valve, greatly damaged, with preserved patches of the shell (skorupka brzuszna od strony zewnętrznej, bardzo zniszczona z zachowanymi niewielkimi fragmentami skorupki) (ZPAL.Bp.U1/123), ca. x 12; Fig. 11 — highly fossiliferous slab with lingulides species and traces of bivalves (fragment z licznymi zachowanymi lingulidami i śladowi małżów) (ZPAL.Bp.U1/69), ca. x 12; Ursynów 1, Lochkovian.

Figs. 12, 13. *Trigonaglossa* sp.
Fig. 12 — fragmentary valve with a trace of the repaired local life injury (fragment skorupki ze śladami założonego uszkodzenia) (ZPAL.Bp.U1/155), ca. x 6; Fig. 13 — dorsal valve exterior (skorupka grzbietowa od strony zewnętrznej) (ZPAL.Bp.U1/166), ca. x 5; Ursynów 1, Lochkovian.

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**PLATE II**

Figs. 1, 2. *Trigonaglossa* sp.
Fig. 1 — interior view of a ventral valve, relatively deep umbonal cavity shown (skorupka brzuszna od strony zewnętrznej z widoczną głęboką jamą umbaloną) (ZPAL.Bp.U1/172), ca. x 4; Fig. 2 — dorsal valve view of an almost complete (articulated) shell, anterior of the dorsal valve damaged (widok od strony grzbietowej kompletnej muszli z uszkodzoną częścią przednią skorupki grzbietowej) (ZPAL.Bp.U1/171), ca. x 3.5; Ursynów 1, Lochkovian.

Figs. 3–6. *Orbiculoides* sp. cf. *Orriculoides siegenensis* Kayser, 1890
Figs. 3, 6 — two different dorsal valves (dwie różne skorupki grzbietowe); 3 — ZPAL.Bp.U1/159, ca. x 10, 6 — ZPAL.Bp.U1/169, ca. x 10; Fig. 4 — dorsal valve exterior (skorupka grzbietowa od strony zewnętrznej) (ZPAL.Bp.U1/94), ca. x 4; Fig. 5 — ventral valve (skorupka brzuszna) (ZPAL.Bp.U1/161), ca. x 10; Ursynów 1, Lochkovian.

Fig. 7. *Orbiculoides* sp.
Dorsal valve view (skorupka grzbietowa) (ZPAL.Bp.U1/173), ca. x 5; Ursynów 1, Lochkovian.

Figs. 8, 10, 11.
Ventral valve view (skorupka brzuszna) (ZPAL.Bp.U1/143), ca. x 6; Ursynów 1, Lochkovian.

Fig. 9. Juvenile valves of unidentified orbiculoid and linguloid (mlodociane skorupki niezidentyfikowanych orbiculoida i lingulida) (ZPAL.Bp.U1/128), ca. x 12.

Figs. 10, 15. *Lingularia* sp. B
Fig. 10 — dorsal valve, concentric lines well visible (skorupka grzbietowa z widocznymi liniami koncentrycznymi) (ZPAL.Bp.U1/157), ca. x 6; Fig. 16 — adult ventral valve (skorupka brzuszna dorosłego osobnika) (ZPAL.Bp.U1/29), ca. x 9; Ursynów 1, Lochkovian.

Articulated shell in four views (kompletna muszla widziana z czterech stron): ventral (brzuszna) (Fig. 12), dorsal (grzbietowa) (Fig. 15), lateral (z boką) (Fig. 13), posterior (z tyłu) (Fig. 11), ca. x 3; Fig. 14 — enlarged posterior part of Fig. 15 with fragment of median septum (powiększona część tylna z fig. 15 z fragmentarnym septum środkowym) (ZPAL.Bp.U1/118), ca. x 6; Ursynów 1, Lochkovian.