ACTA PALAEONTOLOGICA ROMANIAE V. 4 (2004), P. 217-231

THE JURASSIC BIVALVE FAUNA FROM THE WESTERN SIDE OF THE BUCEGI MOUNTAINS PART I. SUBCLASSES PALAEOTAXODONTA AND PTERIOMORPHIA (ORDERS ARCOIDA, PTERIOIDA, LIMOIDA)

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Abstract. 18 taxa, belonging to 12 genera and subgenera of the bivalve subclasses Palaeotaxodonta and Pteriomorphia (Orders Arcoida, Pterioida and Limoida) are described from the rich faunal assemblages of the Middle Jurassic (Bajocian - Bathonian), western side of the Bucegi Mountains. In the present paper, the majority of these taxa are mentioned and described the first time for studied area. The bivalves are found in sediments ranging from calcareous sandstones, argillaceous silts to biocalcarenites. For these taxa, stratigraphic occurrence and facies affinities are also recorded.

Keywords: bivalves, Palaeotaxodonta, Pteriomorphia, Middle Jurassic, Bucegi, Romania.

INTRODUCTION

The Middle Jurassic deposits that outcrop along the western slope of the Bucegi Mountains are distinguished by the richness of their bivalve fauna. Although the fossiliferous deposits of this area were studied since the nineteenth century, the majority of the papers published up to 1999 gave only species lists or illustrated only a few species. So far, 22 species from Subclass Anomalodesmata were described and figured by Lazăr (2000, 2002). An outline of the history of palaeontological researches in this area, a general account of the geology and stratigraphy, a list with localities of the samples and the numbers of the fossiliferous level mentioned for each species, are given in previous contributions (Stoica, 1997; Lazăr, 2000, 2002). Beginning with the present paper and continued with forthcoming ones, detailed description and illustration of the bivalve species from Subclasses: Palaeotaxodonta, Pteriomorphia, Isofilibranchia, Palaeoheterodonta and Heterodonta, will be given.

Pteriomorphia is very well represented in the studied assemblages, with a great specific diversity and large number of individuals. Within the Class Bivalvia, Subclass Pteriomorphia, 30 species belonging to the following families: Nuculidae, Isoarcidae, Arcidae, Parallelodontidae, Pteriidae, Isognomonidae, Pinnidae, Limidae, Oxytomidae, Entoliidae, Pectinidae, Terquemiidae, Ostreidae, were identified. Therefore only species from orders Arcoida, Pterioida and Limoida and two representative of subclass Palaeotaxodonta are presented in this paper. The studied bivalve faunas are found in sediments ranging from calcareous sandstones, argillaceous silts to biocalcarenites. These deposits were assigned to the Strungulita (Bajocian) and Strunga (Bathonian – Lower Callovian) formations by Patrulius (in Patrulius et al., 1980).

TAXONOMY

Class Bivalvia (BUONANNI, 1681) LINNÉ, 1758
Subclass Palaeotaxodonta KOROBKOV, 1954
Order Nuculoida DALL, 1889
Family Nuculidae GRAY, 1824
Genus *Palaeonucula* QUENSTEDT, 1930
? Palaeonucula
Pl. I, figs. 1 – 4

Material: four articulated internal moulds, only two of them with fragments of shell (LPBIIIL 1608-1611).

Measurements: L (Length) = 14,7 – 16mm; H (Height) = 12 – 14mm; I (Inflation) = 7-10mm; H / L = 0,816 – 0,875; I / L = 0,476 – 0,625.

Remarks: The very reduced degree of conservation of the mentioned specimens makes difficult the generic assigment. However, there are some characteristics that suggest a resemblance with the genus *Palaeonucula*. The specimens are subtrigonal to subtrapezoidal in outline, with moderate inflation, slightly opisthogyrate, gently enrolled umbones, placed in the posterior third of the dorsal margin. The posterodorsal area (escutcheon) is deeply impressed, cordiform and bordered by a rounded ridge. The dentition can not be observed. The ornament (observed on the few shell fragments) consist of fine, closely set regular commarginal ribs.

Occurence: Tatarul Peak - Obarsia Vaii Tatarului from calcareous sandstones levels (19 – 23) occuring in the upper part of the Strungulita Formation (Bajocian).

Family Isoarcidae KEEN, 1969
Genus *Isoarca* MÜNSTER, 1842
Isoarca cf. *bajociensis* d'ORBIGNY, 1850
Pl. I, figs. 5 – 7

cf. 1850 *Isoarca bajociensis* d'Orbigny, t.I, p. 280, nr. 342;
cf. 1903 – 1915 *Isoarca bajociensis* d'Orbigny; Cossman, p. 20, pl. 7, figs. 13-14.

Material: one poorly preserved right valve, composite mould with remains of shell, broken on the

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posteroventral margin (LPBIIIL 1651).

Approximate measurements: L= ?37mm; H = 35mm; Inflation of the single valve = 18mm.

Remarks: The general outline as preserved and the ornamentation agrees resonably well with the figure given by Cossman (1903 – 1915). Our specimen seems to be oval-subtrapezoidal in outline, inequilateral, with a strong inflation. The anterior and the ventral margins of the shell are pronouncedly rounded; although the posteroventral part of the shell is broken, it could be seen a rounded, strong posterior ridge that runs obliquely from the umbo to the posteroventral angle. The prosogyrate umbo is strogly developed and arcuated, situated near the anterior part of the shell. The hinge is slightly arched. Lengthwise the cardinal margin has preserved (only on 7mm of the length of hinge, posterior to the umbo) a few short, oblique teeth, that seem to be oriented convergently toward the central part of the valve. A delicate reticulate sculpture is represented by thiny concentric growth lines intersected by numerous delicate radial ribs. However, due to its poor preservation, the specimen is reffered to *I. bajociensis* only with reservation.

Occurrence: Grohotisul Mountain – bioclastic limestone with hardgroung in the upper part (level 25) on the top of Strunga Formation (Lower Bathonian –Middle Callovian).

Subclass Pteriomorphia BEURLEN, 1944
Order Arcoida STOLICZKA, 1871
Family Arcidae LAMARCK, 1809
Genus *Eonavicula* ARKELL, 1929
Eonavicula minuta (J. de C. SOWERBY, 1824)
Pl. I, figs. 8 - 11

1824 *Cucullaea minuta* J de C. Sowerby, p. 68, pl. CDXLVII, fig. 3;
1853 *Arca eudesii* Morris & Lycett, p. 46, pl. 5, fig. 6;
1853 *Arca aemula* (Phillips); Morris & Lycett, p. 47, pl. 5. fig. 17;
1853 *Arca aemula* (Phillips) var. *transversa*, Morris & Lycett, p. 47, pl. 5, fig. 8;
1930 *Navicula (Eonavicula) eudesii* (Morris & Lycett); Arkell, p. 384, pl. 16, only fig. 6;
1903-1915 *Parallelodon eudesii* (Morris & Lycett); Cossman, p. 14, pl. 5, figs. 1-5;
1948 *Eonavicula minuta* (J. de C. Sowerby); Cox & Arkell, p. 2;
1962 *Eonavicula minuta* (J. de C. Sowerby); Fischer, p. 326, figs. 1-14;
1964 *Eonavicula minuta* (J. de C. Sowerby); Fischer, p. 32;
1969 *Eonavicula minuta* (J. de C. Sowerby); Fischer, p. 80.

Material: one right valve (LPBIIIL 1633) and one left valve (LPBIIIL 1634), composite moulds with remains of shell; other numerous specimens (complet shells or dezarticulated valves) are strogly distorted.

Measurements: L = 17; 21 mm; H = 8.6; 9 mm; H/L = 0.42; 0.5

Remarks: Antero-posteriorly elongated valves, subtrapezoidal in outline, strongly inquilateral, with moderate inflation. Slightly prosogyrous umbo is well developed and situeted in the anterior third of the dorsal margin. The anterior margin is slightly arched and forms an acut angle with the dorsal margin. The posterior margin is obliquely truncated. The ventral margin is almost paralel with the dorsal one. In the median part of the ventral margin, a shallow sinus can be seen. The cardinal line is straight, parallel with the ventral margin. Although the ornament is not very well preserved, it can be seen with difficulty, being made up of numerous delicate radial riblets (disposed all over the surface of the shell), intersected with very faint growth lines, pronounced at irregular intervals. The posterior area well marked by a produced and obtuse carina, and bearing on the surface three sulci, two of them distinct and the third inconspicuous. The above mentioned characteristics agree reasonably with the descriptions and figures listed in the synonimy. However, our specimens are very similar in general form and dimensions with *A. (E.) bisulcata* Kanjilal, figured by Jaitly et al. (1995, p. 163, pl.2, fig. 26), but the number (2 or 3) of sulci on the posterior area is not very clear in our specimens.

Occurrence: Strungulita Pass (level 10) within an alternance of pelits with siltitic interlayers and limonitic concretions, Strungulita Formation (Bajocian).

Stratigraphic and geographic distribution: England: Inferior Oolite (Upper Aalenian – Bajocian), Great Oolite (Bathonian); France: Bathonian from Calvados, SW Ardennais Mountains.

Family Parallelodontidae DALL, 1898
Subfamily Grammatodontinae BRANSON, 1861
Genus *Grammatodon* MEEK & HAYDEN, 1861
Subgenus *Grammatodon*
MEEK & HAYDEN, 1861
Grammatodon (Grammatodon) concinnus
(PHILLIPS, 1829)
Pl. I, figs. 12 - 17

1829 *Cucullaea concinna* sp. nov., Phillips, pl. 5, figs. 9, 31;
1853 non *Cucullaea concinna* Phillips; Morris & Lycett, p. 50, pl. 5, fig. 7 *(= Grammatodon bathonicus*, Cox & Arkell, 1948);
1899 *Cucullaea concinna* Phillips; Greppin, p. 101-102, pl. 9, fig. 3;
1930 *Parallelodon (Grammatodon) concinnum* (Phillips); Arkell, p. 341, pl. 15, figs. 2, 3, 4;
1973 *Cucullaea concinna* (Phillips); Romanov, p. 4, pl. 3, figs. 1, 2, 3;
1978 *Grammatodon (Grammatodon) concinnus* (Phillips); Duff, p. 36, pl. 2, figs. 7, 11-17, 19;
1986 *Grammatodon (Grammatodon) concinnus* (Phillips); Pugaczewska, p. 52, pl. 33, figs.1a, b.

Material: two valves (LPBIIIL 1604, 1605) within limonitic concretions; five specimens, internal moulds with remains of shell (LPBIIIL1606:1-5).

Measurements: L = 11-18mm; H =7-11mm; I =10mm; Length of the straight hinge line = 9-15mm.

Remarks: The shell is subtrapezoidal in outline,

equivalve, inequilateral, with the umbones placed in the anterior half, near to the midpoint of the dorsal part. The umbones are clearly salient above the hinge line. The hinge line is straight and only 2-3 mm shorter that that total length (L) of the shell. The dorsal margin, truncated anteriorly, forms with the anterior margin an almost right angle. The ventral margin is largely convex. The posterior margin is almost straight forming an obtuse angle with the dorsal margin and an acute angle with the ventral margin. A faint umbonal carina runs posteriorly from the umbo, obliquely to the posteroventral angle, meeting the ventral margin in an acute angle. Jaitly at al (1995, p. 165) shows that these distinctly sharper umbonal carinae describe a more pronouncedly sigmoidal curve in *G. G. concinnus*, character that can be observed on our specimens. The anterodorsal area exhibits 3 - 5 distinct radial ribs with several faint radial riblets between them. On the slightly concave posterodorsal area, several faint radial ribs can be observed. The surface of the flank is ornamented with very faint radial striae that cross numerous narrow growth lines. Cardinal area well-defined, ornamented with chevron-shaped grooves radiating from beneath the umbones. Taxodont dentition, clearly visible, with 5-6 anterior short and oblique teeth; the first 2-3 posterior teeth are also short and oblique and the following posterior teeth are elongated, gently curved over and run subparallel to the hinge margin.

Occurrence: Strungulita Pass, within calcareous sandstones (level 9) and within an alternance of pelits with siltitic interlayers and limonitic concretions (level 10), Strungulita Formation (Bajocian).

Stratigraphic and geographic distribution: Romania: Codlea -Bathonian; Anina: Aalenian – Middle Bathonian; Switzerland: Upper Bajocian; Poland: Upper Bajocian – Lower Bathonian; Central and southern England: Callovian-Lower Oxfordian; France, Germany, Switzerland, Poland: Callovian-Oxfordian.

Order Pterioida NEWELL, 1965
Superfamily Pteriacea GRAY, 1847
Family Pteriidae GRAY, 1847
Genus *Pteria* SCOPOLI, 1777
Pteria plana (MORRIS & LYCETT, 1854)
Pl. II, fig. 1

1854 *Pteroperna plana* sp. nov. Morris & Lycett, p. 128, pl. 14, fig. 4;
1969 *Pteroperna plana* Morris & Lycett; in Moore p. N304, fig. C39 – 4b.

Material: one poorly preserved left valve (LPBIIIL 1504) and numerous other shell fragments from the same level.

Measurements: H = 59mm; L = 35mm; Length of the anterior auricle = 8mm; Length of the posterior wing = 38,5mm.

Remarks: Strongly inflated left valve, inequilateral, oblique, bialate; umbo small, acute, slightly curved anteriorly, distinctly salient to hinge line; anterior auricle subtriangular, short, pointed; posterior wing larger, subtriangular, sharply pointed posteriorly and bears four elongate grooves, subparallel to the hinge margin (only two of them clear visible); the maximum inflation of the left valve is situated in the dorsal half of the shell; the ventral part is more enlarged with a reduced inflation and the ventral margin is regularly rounded; just beneath the anterior auricle, the anterior margin exhibits a shallow excavation. The surface of the shell isn't very well preserved but it seems to be smooth, only with growth lines. Although we can't observ the hinge features, in the above mentioned characteristics, our material correspond with the specimens figured and described by Morris & Lycett (1854).

Occurence: Strungulita Pass (level 8) within calcareous sandstone with limonitic concretions, Strungulita Formation (Bajocian).

Stratigraphic and geographic distribution: England: Bajocian.

Pteria sp.
Pl. II, fig. 2

Material: one incomplet external mould of right valve (LPBIIIL 1778), broken in the anterior part.

Approximate measurements: H = 11,6mm; L = 15mm.

Remarks: Altought our material is poorly preserved, there are some characteristics that suggest a resemblance with genus *Pteria*. The valve is inequilateral, oblique, with elongated pointed posterior wing that shows a well delineated concavity under the hinge line; hinge line long and straight; the umbo and anterior auricle are broken; the ventral part is more enlarged with a reduced inflation and the ventral margin is largely convex; the surface of the shell preserved only very fines growth lines. The general shape is close to that of the species *Pteroperna burensis* (Loriol, 1893) described and figurated by Dikani and Makarenko (1990, p. 31, pl. 3, figs. 26-29) from the Callovian of Rusia, but the very reduced degree of conservation makes difficult the specific assigment.

Occurrence: Strunga Pass – bioclastic limestone with hardgroung in the upper part (level 25) on the top of Strunga Formation (Lower Bathonian – MiddleCallovian).

Genus *Gervillella* WAAGEN 1907
Gervillella acuta (J. de C. SOWERBY, 1826)
Pl. II, figs. 3, 4

1826 *Gervillia acuta* sp. nov. J. de C. Sowerby, t. 510, fig. 5;
1853 *Gervillia acuta* J. de C. Sowerby; Morris & Lycett, p. 20, pl. 3, figs. 12, 12a;
1853 *Gervillia subcylindrica* Morris & Lycett, p. 21, pl. 3, fig. 13;

1854 *Gervillia acuta* J. de C. Sowerby; Morris & Lycett, pl. 14, figs. 1, 1a;
1948 *Gervillella acuta* (J. de C. Sowerby); Cox & Arkell, p. 9.

Material: one incomplet internal mould of the shell (LPBIIIL 1503), the anterior third of the specimen is missing.

Remarks: There are some features that suggest resemblance with the species *G. acuta*: elogated, lanceolate slightly curved shell; in the median part, the shell seems to have maximum inflation (I = 15mm); posteroventral side is compressed and attenuated; althought incomplet, the posterior wing is large, triangular, obtuse; a few remains of the shell (on the posterior wing of the left valve) show delicate growth lines.

Occurrence: Tatarul Peak within calcareous sandstones (levels 19 and 21), Strungulita Formation (Bajocian).

Stratigraphic and geographic distribution: Romania: Anina: Bajocian – Middle Bathonian; England: Upper Aalenian – Bajocian – Lower Bathonian (Inferior Oolite), Bathonian (Great Oolite, Stonesfield Slate, Fuller's Earth Rock, Forest Marble).

Gervillella aff. orientalis (DOUVILLE, 1916)
Pl. II, fig. 5

aff. 1916 *Gervillia orientalis sp. nov.* Douville, p. 59, pl. 4, figs. 14-17;
aff. 1965 *Gervillia orientalis* Douville; L. R. Cox, p. 43, pl. 4, figs. 7, 8.

Material: two internal moulds (LPBIIIL 1505, 1506) with a moderate degree of preservation. **Approximate measurements:** H (measured vertically from the umbo to the maximum convexity of the anteroventral margin) = 16,6mm; I (inflation of the shell) = 6, 4mm; L (the diagonal shell length) = ?23mm.

Remarks: The specimens is characterized by a medium size, subequivalve, oblique; the length of the straight hinge line is about two thirds of the length of the shell; the anterior auricle is very small and seems to be pointed; the posterior wing is larger and obtusely triangular in general shape; the umbones projects only slightly above the hinge margin; the body of the shell is evenly and moderately inflated, its degree of inflation diminishing gradually from the anterior margin to the posteroventral end of the shell; the anterior margin forms a very large convex curve and the ventral margin forms a strongly convex curve. Most of these features are found in *Gervillia orientalis* Douville as described by L. R. Cox (1965). Our specimens seems also to resemble *Gervillia ovata* (Sowerby, 1826) decribed and figured by Morris & Lycett (1853, p. 22, pl. 2, figs. 12, 12a) from the Bathonian of England, differing mainly by the larger posteroventral extermity. On the other hand Morris & Lycett (1853) specify that the right valve of *G. ovata* is more flattened, character that is not observed in our specimens.

Occurrence: Strunga Pass – bioclastic limestone with hardgroung in the upper part (level 25) on the top of Strunga Formation (Lower Bathonian – MiddleCallovian).

Family Isognomonidae WOODRING, 1925
Genus *Isognomon*
SOLANDER in LIGHTFOOT, 1786
Sugenus *Isognomon* SOLANDER in LIGHTFOOT, 1786
Isognomon (Isognomon) isognomoides
(STAHL, 1824)
Pl. II, figs. 6, 7; Pl. III, figs. 1 – 3

1824 *Ostracites isognomoides* sp. nov. Stahl, p. 66, fig. 25;
1836 *Perna crassitesta* Goldfuss, p. 104, pl. 107, fig. 13;
1854 *Perna rugosa* Goldfuss, var. Morris & Lycett, p. 128, pl. 14, fig. 16;
1863 *Perna mytiloides* Lamarck; Lycett, p. 112, pl. 32, fig. 3;
1899 *Perna isognomoides* Stahl; Greppin, p. 107-108;
1916 *Perna isognomoides* Stahl; Jekelius, p. 227;
1937 *Perna isognomoides* Stahl; Wetzel, p. 139, pl. 15, figs. 2, 3;
1948 *Isognomon isognomoides* Stahl; Cox & Arkell, p. 10;
1969 *Isognomon isognomoides* Stahl; Fischer, p. 87, text-fig. 16;
1969 *Isognomon isognomoides* Stahl; in Morre, p. N322, fig. C50 -2f, g.

Material: 14 specimens (LPBIIIL 1635 – 1648), complet shells with both valves or specimens partially broken along the ventral margin.

Measurements: H (dorso-ventral length) = 66 - 108mm; L (antero-posterior length) = 47 – 88mm; Lh (hinge margin length) = 40 – 73mm; H / L = 1,16 – 1,59; Lh / L = 0,48 – 0,86.

Remarks: Large sized shell, subequivalve, subtrapezoidal or subrhomboidal in outline. Strongly acute, prosogyrus umbo, situated at the anterior end of the hinge margin. Under the umbo the anterior part of the shell exhibits a concavity corresponding to the byssal gape. The lower part of the anterior margin is strongly convex, rounded and slightly extented in the front of the umbones. The ventral margin describes a large, elliptical curve. The posterior wing is obtuse, narrow, long and not very well differentiated. The ligamental area is fairly high (approx. 1- 2 cm in very large individuals) with 10-12 ligamental grooves (Pl. III, fig. 3) disposed perpendicular to the dorsal margin, with narrow intervals between them. The surface of the both valves is ornamented with pronouced, lamellose comarginal growth lines at irregular intervals.

Morris & Lycett (1854) mentioned that the gerontic individuals exhibit a considerable growth of shell height concurrent with a reduced growth of the hinge margin length. Our large sample confirms this remark. Hereby, in the large individuals, i.e. in adults or gerontic stage, Lh / H ratio is 0.48 – 0.57 and in the juveniles the same ratio is 0.70 – 0.80. Our specimens are

distinguished from *Perna crassitesta* Goldfuss, figured and described by Cossman (1903-1915, p. 7, Pl. III, fig. 1-4) by the absence of the pronounced lobe from te median posterior part.

Occurrence : Strunga Pass, Strungulita Pass, Tatarul Peak, Obarsia Vaii Tatarului, within calcarenites (level 12), Strungulita Formation (Bajocian);

Stratigraphic and geographic distribution: France: SW Ardennais Mountains - Bathonian; England: Upper Aalenian – Bajocian – Lower Bathonian (Inferior Oolite), Bathonian (Great Oolite, Stonesfield Slate, Forest Marble); Switzerland: Bale, Bajocian.

Family Pinnidae LAECH, 1819
Genus *Pinna* LINNÉ, 1858
Pinna ampla (J. SOWERBY, 1812)
Pl. III, figs. 4 – 7

1812 *Mytilus amplus* sp. nov. J. Sowerby, t. I, p. 27, pl. 7;
1853 *Pinna ampla* (J. Sowerby); Morris & Lycett, p. 31, pl. 4, fig. 14;
1923 *Pinna ampla* (J. Sowerby); Lissajous, p. 181, fig.-text 26;
1948 *Pinna (Stegoconcha) ampla* (J. Sowerby); Cox & Arkell, p. 11.

Material: 13 fragmented articulated specimens (LPBIIIL 1653-1665), internal moulds with shell remains.

Approximate measurements: L (measured from the umbo to the postero-ventral margin) = 156 -194mm; H (measured perpendicular on length, near the posterior extremity) = 123 - 174mm.

Remarks: large species with moderate inflation, subtriangular in outline, with te psteroventral margin largely splayed. The straight, oblique dorsal margin forms with the anterior margin an angle with values between 30^0-45^0. Median carina clearly visible. Although the shell fragments are fairly eroded one can observe the ornamentation represented by numerous waved, knobbed longitudinal ribs, crossed by concentric growth lines produced at irregular intervals. Lissajous (1923, p. 181) showed that pronounced erosion of the shell lead to the disappearence of the longitudinal ribs and bring a reticulate appearance of the ornament, remark that can be observed on our specimens.

Occurence: La Politzie Saddle, Grohotisul Mountain, Strunga Pass, Tatarul Peak, Obarsia Vaii Tatarului within calcareus sandstones from upper part of Strungulita Formation (Bajocian).

Stratigraphic and geographic distribution: England: Upper Bajocian – Lower Bathonian (Upper Inferior Oolite), Middle Bathonian (Great Oolite, Stonesfield Slate, Fuller's Earth Rock), Lower Callovian (Cornbrash); France: Bathonian.

Order Limoida RAFINESQUE, 1815
Family Limidae RAFINESQUE, 1815
Genus *Ctenostreon* EICHWALD, 1862
Ctenostreon cf. proboscideum
(J. SOWERBY, 1820)
Pl. IV, figs. 14 – 15

cf. 1820 Lima proboscidea *sp. nov. J. Sowerby, p. 115, pl. 164;*
cf. 1862 – 1863 *Lima proboscidea* (J. Sowerby); Goldfuss, p. 88, pl. 103, fig. 2;
cf. 1853 *Lima pectiniformis* Schlotheim; Morris & Lycett, p. 26, pl. 6, fig. 9;
cf. 1957 Ctenostreon proboscideum *(J. Sowerby); Himşiaşvili, p. 137, pl. 27, figs. 1, 2;*
cf. 1974 *Ctenostreon cf. proboscideum* (J. Sowerby); Barbulescu, p. 115, pl. 24, fig.1; pl. 25, fig. 1;
cf. 1991 *Ctenostreon proboscideum* (J. Sowerby); Romanov & Kasum –Zade, p. 75, pl. 25, fig. 6;
cf. 1995 *Ctenostreon proboscideum* (J. Sowerby); Jaitly at al, p. 178, pl.10, figs. 2-3, 7; pl. 11, figs. 2, 5;
cf. 2000 *Ctenostreon proboscideum* (J. Sowerby); Barbulescu, pl. 2, fig. 1.

Material: two specimens: LPBIIIL 748 – articulated shell broken along to the dorsal margin; LPBIIIL 749 – left valve internal mould with remains of shell.

Approximate measurements: LPBIIIL 748: L = 112mm, H = 116mm; H/L = 1.03; LPBIIIL 749: L = 129mm, H = 135mm; H/L = 1.04.

Remarks: Large, moderately convex, suborbicular shell, nearly equilateral; the auricles are broken; ornamentation represented by 9-10 very strong radial ribs; the nodose and fistulous plications are strongly eroded; width of radial ribs reach 16-17mm near the ventral margin. Our specimens have a fairly well resemblance with *Ctenostreon rugosum* (Smith, 1817) in the reduced number of radial ribs and dimensions.

Occurrence: Strunga Pass – Obarsia Vaii Tatarului, within calcareous sandstones, Strungulita Formation (Bajocian).

Stratigraphic and geographic distribution: this species is frequently mentioned in Bajocian – Callovian deposits from Europe.

Genus *Limatula* WOOD, 1839
Limatula cerealis ARKELL, 1932
Pl. IV, figs. 1 – 7

1932 *Limatula cerealis* sp. nov. Arkell, p. 158, pl.2, figs. 7, 8;
1853 *Lima gibbosa* Sowerby; Morris & Lycett, p. 28, pl. 3, figs. 7, 7a;
1948 *Limatula cerealis* Arkell; Cox & Arkell, p. 18;
1951 *Limatula gibbosa* Sowerby; Krach, pl. 12, fig. 10;
1964 *Limatula cerealis* Arkell; Fischer, p. 41;
1969 *Limatula cerealis* Arkell; Fischer, p. 93, pl. 10, figs. 6a, b;
1973 *Limatula gibbosa* (Sowerby); Romanov, p. 89, pl. 7, fig. 7;
1991 *Limatula cerealis* Arkell; Romanov et al., p. 48, pl. 29, figs. 1, 2;

1998 *Limatula gibbosa* (Sowerby); Bărbulescu in Dragastan et al., p. 137, pl. 3, figs. 17, 18.

Material: one articulated composite mould (LPBIIIL 1715).

Mesurements: H (dorso-ventral length) = 22mm; L (antero-posterior length) = 15mm; I = 14mm; H / L = 1,46; I / L = 0,93.

Remarks: Equilateral, subequivalve shell, dorso-ventrally elongated, oval in outline, strongly convex; umbones large and contiguous; small, suequal, smooth auricles; oblique dorsal margin and short, convex, largely curved posterior margin; the anterodorsal margin is slightly concave and forms with the anterior margin an angle of around 90º; the flanks of both valves are ornamented with 12 radial ribs, triangular in transversal section; the anterior and posterior extremities of both valves are smooth; delicate closely packed growth lines. *Limatula helvetica* Oppel is similar in outline, but shows 23 – 25 radial ribs and delicate radial riblets between them. *Limatula gibbosa* (Sowerby) has similar dimensions and general outline, but the number of radial ribs is between 15-18.

Occurrence: Strunga Pass – Tatarul Peak, within calcareous sandstones from the upper part of Strungulita Formation (Bajocian).

Stratigraphic and geographic distribution: Romania: Central Dobrogea – Lower Callovian; Haghimas (Piatra Liciului): Bajocian – Bathonian; Rarau (Campulung – Pojorata): Bajocian; France: SW Ardennais Mountains – Bathonian; England, Poland: Bathonian – Callovian; Uzbekistan, Turkmenia: Callovian; Gruzia, Azerbagian: Upper Bajocian – Bathonian.

Genus *Pseudolimea* ARKELL, 1932
Pseudolimea duplicata
(J. de C. SOWERBY, 1827)
Pl. IV, figs. 8 -10

1827 *Plagiostoma duplicata* sp. nov. J. de C. Sowerby, p. 114, pl. 559, fig. 3;
1853 *Lima duplicata* (J. de C. Sowerby); Morris & Lycett, p. 26, pl. 3, figs. 6, 6a;
1867 *Lima duplicata* (J. de C. Sowerby); Laube, p. 13;
1871-1873 *Lima duplicata* (J. de C. Sowerby); Terquem et Jourdy, p. 118;
1923 *Limea duplicata* Münster; Lissajous, p. 156;
1948 *Pseudolimea duplicata* (J. de C. Sowerby); Cox & Arkell, p. 17;
1951 *Radula duplicata* (J. de C. Sowerby); Krach, p. 371, pl. 12, fig. 1;
1957 *Lima (Radula) duplicata* (J. de C. Sowerby); Himşiaşvili, p. 130, pl. 28, figs. 5-7;
1964 *Pseudolimea duplicata* (J. de C. Sowerby); Fischer, p. 41;
1965 *Pseudolimea duplicata* (J. de C. Sowerby); Cox, p. 64, pl. 8, fig. 8b;
1969 *Pseudolimea duplicata* (J. de C. Sowerby); Fischer, p. 93;
1973 *Lima (Limea) duplicata* (Münster); Romanov, p. 88, pl. 7, figs. 8-13;
1974 *Pseudolimea duplicata* (J. de C. Sowerby); Bărbulescu, p. 112, pl. 25, fig. 7;
1986 *Lima (Lima) duplicata* (J. de C. Sowerby); Pugaczewska, p. 57, pl. 22, figs. 4-6; pl. 26, figs. 1a, b; pl. 17, fig. 1;
1986 *Pseudolimea duplicata* (Münster); Pugaczewska, p. 58, pl. 22, fig. 1; pl. 18, fig. 9; pl. 24, figs. 4, 5; pl. 27, figs. 5, 6;
1989-1990 *Pseudolimea cf. duplicata* (J. de C. Sowerby); Dikani & Makarenko, p. 73, pl. 12, fig. 3;
1991 *Pseudolimea duplicata* (J. de C. Sowerby); Romanov & Kasum-Zade, p. 57, pl. 30, figs. 7, 8;
1995 *Pseudolimea duplicata* (J. de C. Sowerby); Jaitly et al., p. 183, pl. 13, figs. 3-5;
1998 *Pseudolimea duplicata* (J. de C. Sowerby); Bărbulescu in Dragastan et al., p. 137, pl. 3, fig. 15.

Material: one specimen – left valve (LPBIIIL 1716).

Measurements: H (dorso-ventral length) = 33, 6mm; L (antero-posterior length) = 29mm; H / L = 1,15.

Remarks: convex, obliquely ovate left valve, postero-dorsal margin slightly convex; ventral margin rounded, obliquely elongated to the antero-dorsal angle; dorsal margin oblique and straight; small, triangular auricles, the anterior auricle bears very delicate radial riblets; ornament represented by 28-30 prominent radial ribs, triangular in transversal section; interspaces wide, each having a very fine riblet (Pl. IV, fig. 10).

Occurrence: Strunga Pass – Tatarul Peak, within calcareous sandstone from the upper part of Strungulita Formation (Bajocian).

Stratigraphic and geographic distribution: Romania: Central Dobrogea: Bathonian – Callovian; Germany - Bajocian; France, England, Poland: Bajocian, Bathonian, Callovian; Rusia, Uzbekistan, Turkmenia, Caucaz, Crimea: Bajocian – Callovian.

Genus *Plagiostoma* J. SOWERBY, 1814
Plagiostoma bellula MORRIS & LYCETT, 1853
Pl. IV, fig. 11 - 13

1853 *Lima bellula* sp. nov. Morris & Lycett, p. 30, pl. 3, figs. 9, 9a;
1871-1873 *Lima bellula* Morris & Lycett; Terquem et Jourdy, p. 117;
1951 *Plagiostoma cf. bellula* Morris & Lycett; Krach, p. 371.

Material: one specimen (LPBIIIL 1717) right valve.

Measurements: H = 27mm; L = 29mm; H / L = 0,93.

Remarks: Obliquely ovate shell, moderately convex, inequilateral; small orthogyrous umbo; the umbonal crest well defined; moderately large, deeply excavated lunula; anterior margin obliquely truncated, posterior margin rounded and largely convex ventral margin; the surface of the valve is ornamented with very delicate, densely dotted radial striations intersected by very fine growth lines (Pl. IV, fig. 13).

Occurrence: Grohotisul Mountain – bioclastic

limestones with hardground in the upper part (level 25) on the top of Strunga Formation (Lower Bathonian –Middle Callovian).

Stratigraphic and geographic distribution: England: Upper Aalenian - Bathonian (Inferior Oolite, Great Oolite); Poland: Callovian.

Plagiostoma bynei COX & ARKELL, 1948
Pl. V, figs. 1 - 4

1853 *Lima semicircularis* Goldfuss; Morris & Lycett, p. 29, pl. 3, figs. 3, 3a (non Goldfuss)
1967 *Lima semicircularis* Goldfuss; Laube, p. 14;
1948 *Lima (Plagiostoma) bynei* nov. sp. Cox & Arkell, p. 17;
1951 *Plagiostoma semicirculare* Goldfuss; Krach, p. 336, pl. 11, figs. 1, 2;
1964 *Lima (Plagiostoma) bynei* Cox & Arkell; Fischer, p. 40, pl. 1, fig. 20;
1969 *Lima (Plagiostoma) bynei* Cox & Arkell; Fischer, p. 92, pl. 10, figs. 1a, b;
?1974 *Lima (Plagiostoma) semicirculare* Goldfuss; Bărbulescu, p. 113, pl. 25, fig. 3;
?1986 *Plagiostoma cf. semicircularis* Goldfuss; Pugaczewska, p. 58, pl. 26, figs. 2a, b;
1998 *Plagiostoma bynei* Cox & Arkell; Bărbulescu in Dragastan et al., p. 136, pl. 3, fig. 16.

Material: one articulated specimen (LPBIIIL 1718) with moderate degree of preservation.

Measurements: H = 30mm; L = 27mm; I = 18mm.

Remarks: Subtrapezoidal, moderately convex shell with obliquely truncated anterior margin and rounded ventral one; small, acute, ortogyrous umbo; the posterior auricle of the left valve is triangular, with moderate size and slightly concave, oblique posterior margin; on the surface of the posterior auricle a few, delicate radial ribs can hardly be observed; ornamentation represented by approximately 36 rounded radial ribs; interspaces are densely dotted on the dorsal third of the shell, and became transversely striated close to the ventral margin (Pl. V, figs. 2, 4).

Occurrence: Obarsia Vaii Tatarului (level 21) within calcareous sandstone, Strungulita Formation (Bajocian).

Stratigraphic and geographic distribution: Romania: Central Dobrogea: Bathonian-Callovian; Bathonian from Franco-Suab basin; Poland - Callovian; France: Bajocian – Bathonian.

Plagiostoma cf. hellica
COSSMAN 1907 (ex D'ORBIGNY)
Pl. V, figs. 5 - 7

cf. 1907 *Lima Hellica* Cossman ex d'Orbigny, p. 278, pl. 2, figs. 1, 2;
cf. 1964 *Lima (Plagiostoma) hellica* Cossman ex d'Orbigny; Fischer, p. 40, pl. 1, fig. 21.
cf. 1969 *Lima (Plagiostoma) hellica* Cossman ex d'Orbigny; Fischer, p. 92, pl. 10, fig. 4.

Material: one articulated specimen (LPBIIIL 1723) with moderate degree of preservation.

Approximate measurements: H = 22-25mm; L = 23-24mm.

Remarks: subtriangular, oval shell, moderately convex with obliquely truncated anterior part and fairly large rounded posterior part; the surface of the valves are ornamented with numerous (around 50) flattened, distinct radial ribs; the radial ribs are slightly sinuate in the ventral half of the shell; narrow interspaces densely dotted. In the ventral half of the shell, a few growth lines are more pronounced, giving an imbricate aspect.

Occurrence: Obarsia Vaii Tatarului, within calcareous sandstone, Strungulita Formation (Bajocian).

Stratigraphic and geographic distribution: Romania: Central Dobrogea: Bathonian – Callovian;
France: SW Ardennes Mountains - Bathonian.

Plagiostoma sp. 1
Pl. V, figs. 8, 9

Material: five disarticulated specimens (LPBIIIL 1722: 1-5) with a reduced degree of preservation.

Measurements: H = 69mm, L = 75mm.

Remarks: convex suborbicular shell, oval – elongated along a line that connects the umbo with the antero-ventral extremity; straight or gently convex anterior margin, forms a largely rounded angle with the antero-ventral extremity; the ventral margin is regularly rounded; the posterior margin is shorter and pronouncedly oblique; the strong, well developed umbo is slightly anteriorly recurved; the maximum inflation is situated in the dorsal half of the shell; ornamented with numerous flattened radial ribs, more wide to the ventral part and separated by narrow striated interspaces. Considering the dimensions, general shape and the aspects of ornamentation, our specimens have a general resemblance with *Plagiostoma subgiganteum* (Repman) described and figured by Romanov & Kasum - Zade (1991, p. 36, pl. 17, fig. 2), however the reduced degree of preservation doesn't allow a specific identification.

Occurrence: Gutanu Glade, Grohotisul Mountain, Strunga Pass,Tatarul Peak, within calcareous sandstone from the upper part of Strungulita Formation (Bajocian).

Plagiostoma sp. 2
Pl. V, figs. 10 - 11

Material: two specimens (LPBIIIL 1720, 1721) internal moulds with remains of the shell.

Approximate measurements: H = 39-48,5mm, L = 45-52mm.

Remarks: convex shell, subtriangular in outline, abruptly truncated in the anterior and posterior part; the anterior margin is elongated, nearly straight and oblique, making with the antero-ventral extremity a large rounded angle; the ventral margin is largely

convex; the orthogyrous umbo is well developed; ornamented with numerous (around 50) rounded radial ribs, separated by very narrow, transversally striated interspaces. The auricles are not preserved. The state of preservation of our specimens is too poor to allow a specific identification.

Occurrence: within hardground surface from Gaura Valley (? Bathonian)

Acknowledgements

I wish to express my gratitude to Professor Aurelia Bărbulescu for critical remarks with regard to this paper and for permanent supervision. Special thanks to my colleagues Associate Professor Dr. Marius Stoica for photographing the described specimens and Victor Barbu for his help during fieldwork.

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PLATES

PLATE I

Figs. 1 – 4 *? Palaeonucula*: 1 - Internal mould of articulated specimen, dorsal view, Strungulita Formation, Bajocian, LPBIIIL 1610; 2 - Internal mould of articulated specimen, left valve view, Strungulita Formation, Bajocian, LPBIIIL 1610; 3 - Internal mould of articulated specimen, right valve view, Strungulita Formation, Bajocian, LPBIIIL 1610; 4 - Internal mould of articulated specimen, left valve view, Strungulita Formation, Bajocian, LPBIIIL 1608.

Figs. 5 – 7 *Isoarca* cf. *bajociensis* d'ORBIGNY, 1850: 5 – enlarged fragment of shell with details of ornamentation, LPBIIIL 1651; 6 – left valve, Strunga Formation, Bathonian, LPBIIIL 1651; 7 – anterior view of left valve, Strunga Formation, Bathonian, LPBIIIL 1651;

Figs. 8 – 11 *Eonavicula minuta* (J. de C. SOWERBY, 1824): 8 – Internal mould of left valve, Strungulita Formation, Bajocian, LPBIIIL 1634; 9 – dorsal view of the same specimen; 10 - Internal mould of right valve, Strungulita Formation, Bajocian, LPBIIIL 1633; 11 – enlarged view of the same specimen;

Figs. 12 – 17 *Grammatodon (Grammatodon) concinnus* (PHILLIPS, 1829): 12 - Internal mould of left valve, with remains of the shell, Strungulita Formation, Bajocian, LPBIIIL 1606-1; 13 – same specimen; 14 – Articulated specimen with valves open, dorsal view, Strungulita Formation, Bajocian, LPBIIIL 1606-2; 15 – Fragment of left valve (internal view) within limonitic concretion, LPBIIIL 1604; 16 – right valve (dorsal view) within limonitic concretion, LPBIIIL 1605; 17 – same specimen – enlarged view of hinge margin.

PLATE II

Fig. 1 *Pteria plana* (MORRIS & LYCETT, 1854) – left valve, Strungulita Formation, Bajocian, LPBIIIL 1504;

Fig. 2 *Pteria sp.* – external mould of right valve, Strunga Formation, Bathonian, LPBIIIL 1778;

Figs. 3, 4 *Gervillella acuta* (J. de C. SOWERBY, 1826): 3 – incomplet internal mould of articulated specimen, left valve view, Strungulita Formation, Bajocian, LPBIIIL 1503; 4 – same specimen, right valve view;

Fig. 5 *Gervillella aff. orientalis* (DOUVILLE, 1916) – internal mould of articulated specimen, left valve view, Strunga Formation, Bathonian, LPBIIIL 1506;

Figs. 6, 7 *Isognomon (Isognomon) isognomoides* (STAHL, 1824): 6 – articulated specimen, left valve view, Strungulita Formation, Bajocian, LPBIIIL 1635; 7 - articulated specimen, right valve view, Strungulita Formation, Bajocian, LPBIIIL 1645.

PLATE III

Figs. 1 – 3 *Isognomon (Isognomon) isognomoides* (STAHL, 1824): 1 - articulated specimen, left valve view, Strungulita Formation, Bajocian, LPBIIIL 1644; 2 – right valve, Strungulita Formation, Bajocian, LPBIIIL 1647; 3 – fragment of left valve, internal view, Strungulita Formation, Bajocian, LPBIIIL 1636;

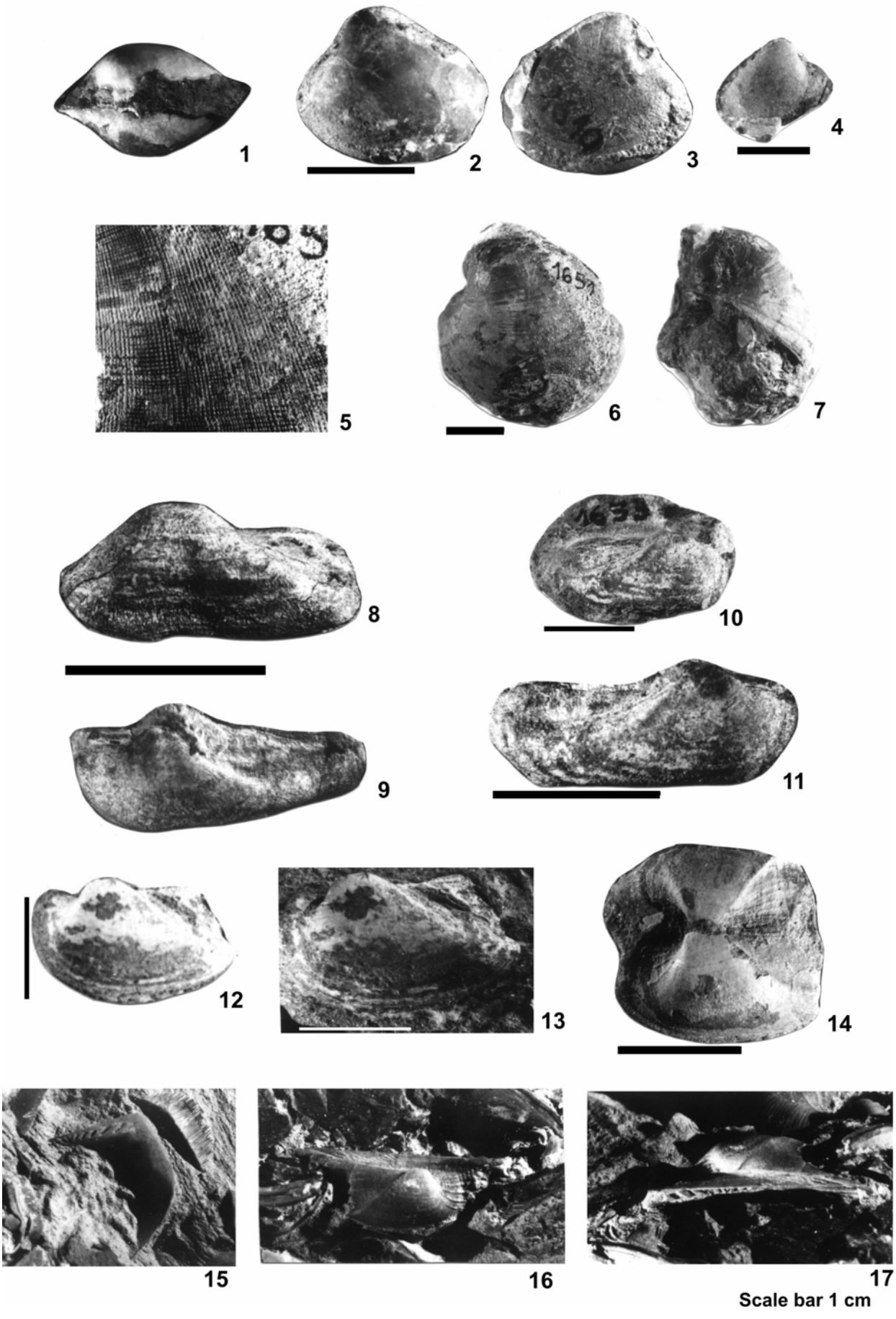
Figs. 4 – 7 *Pinna ampla* (SOWERBY, 1812): 4 – internal mould of articulated specimen, left valve view, Strungulita Formation, Bajocian, LPBIIIL 1660; 5 - enlarged fragment of shell with details of ornamentation, LPBIIIL 1656; 6 – incomplet internal mould of articulated specimen, right valve view, Strungulita Formation, Bajocian, LPBIIIL 1654; 7 - incomplet internal mould of articulated specimen with remains of the shell, right valve view, Strungulita Formation, Bajocian, LPBIIIL 1656.

PLATE IV

Figs. 1- 7 *Limatula cerealis* ARKELL, 1932: 1 – 7 - internal view of articulated specimen, Strunga Formation, Bathonian, LPBIIIL 1715: 1 – dorsal view; 2 – posterior view; 3 – anterior view; 4 – left valve view; 5 – right valve view; 6 – left valve view; 7 – ventral view;
Figs. 8 – 10 *Pseudolimea duplicata* (J. de C. SOWERBY, 1827): 8 – left valve, antero-lateral view, Strungulita Formation, Bajocian, LPBIIIL 1716; 9 - left valve, lateral view, Strungulita Formation, Bajocian, LPBIIIL 1716; 10 – same specimen - enlarged fragment of shell with details of ornamentation;
Figs. 11 – 13 *Plagiostoma bellula* MORRIS & LYCETT, 1853 - right valve, Strunga Formation, Bathonian, LPBIIIL 1717: 11 – lateral view; 12 – dorsal view; 13 - enlarged fragment of shell with details of ornamentation;
Figs. 14, 15 *Ctenostreon cf. proboscideum* (J. SOWERBY, 1820): 14 – internal mould with (?) left valve with fragments of shell, Strungulita Formation, Bajocian, LPBIIIL 749; 15 – articulated specimen, (?) right valve view, Strungulita Formation, Bajocian, LPBIIIL 748.

PLATE V

Figs. 1 – 4 *Plagiostoma bynei* COX & ARKELL, 1948: 1 – articulated specimen, right valve view, Strungulita Formation, Bajocian, LPBIIIL 1718; 2 – same specimen, enlarged fragment of shell with details of ornamentation; 3 - articulated specimen, left valve view, Strungulita Formation, Bajocian, LPBIIIL 1718; 4 - same specimen, enlarged fragment of shell with details of ornamentation;
Figs. 5 – 7 *Plagiostoma cf. hellica* COSSMAN 1907 (ex D'ORBIGNY): 5 - articulated specimen, left valve view, Strungulita Formation, Bajocian, LPBIIIL 1723; 6 – same specimen, enlarged fragment of shell with details of ornamentation in the dorsal half of the left valve; 7 - same specimen, enlarged fragment of shell with details of ornamentation in the ventral half of the left valve;
Figs. 8, 9 *Plagiostoma sp. 1*: 8 – internal mould of left valve with remains of shell, Strungulita Formation, Bajocian, LPBIIIL 1722-1; 9 - same specimen, enlarged fragment of shell with details of ornamentation;
Figs. 10, 11 *Plagiostoma sp. 2:* 10 – internal mould of articulated specimen, left valve view, Gaura Valley, Bathonian, LPBIIIL 1721; 11 - same specimen, enlarged fragment of shell with details of ornamentation.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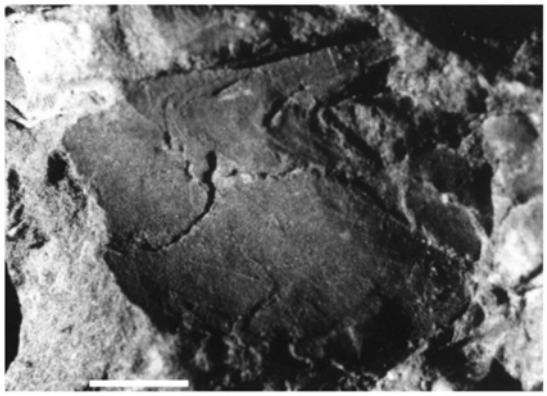

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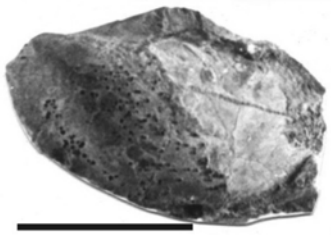

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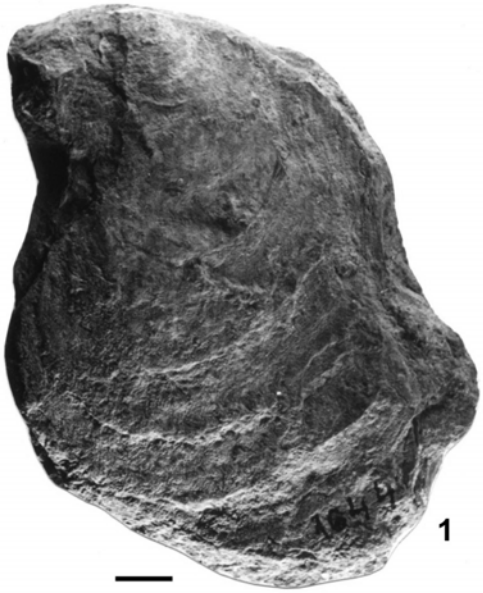
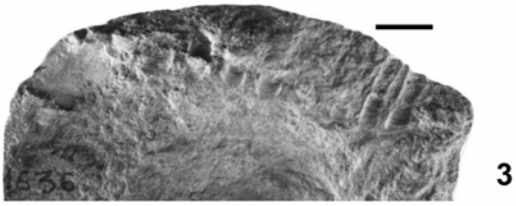
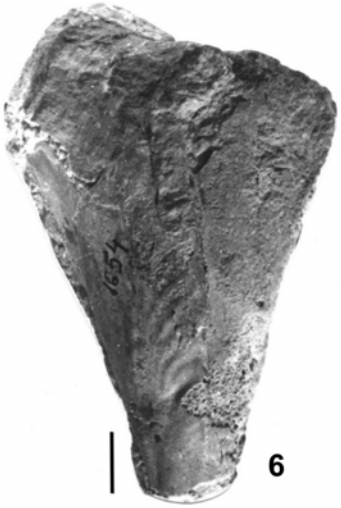
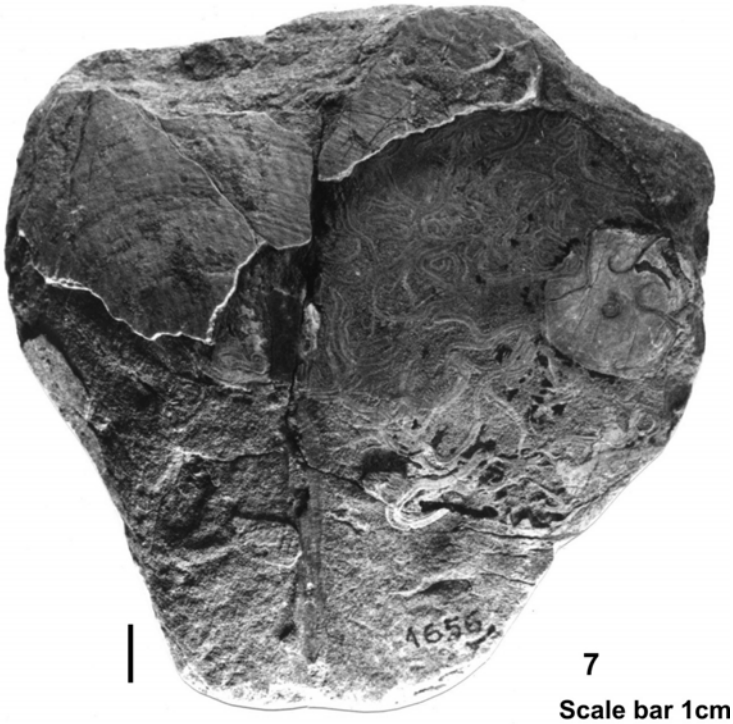
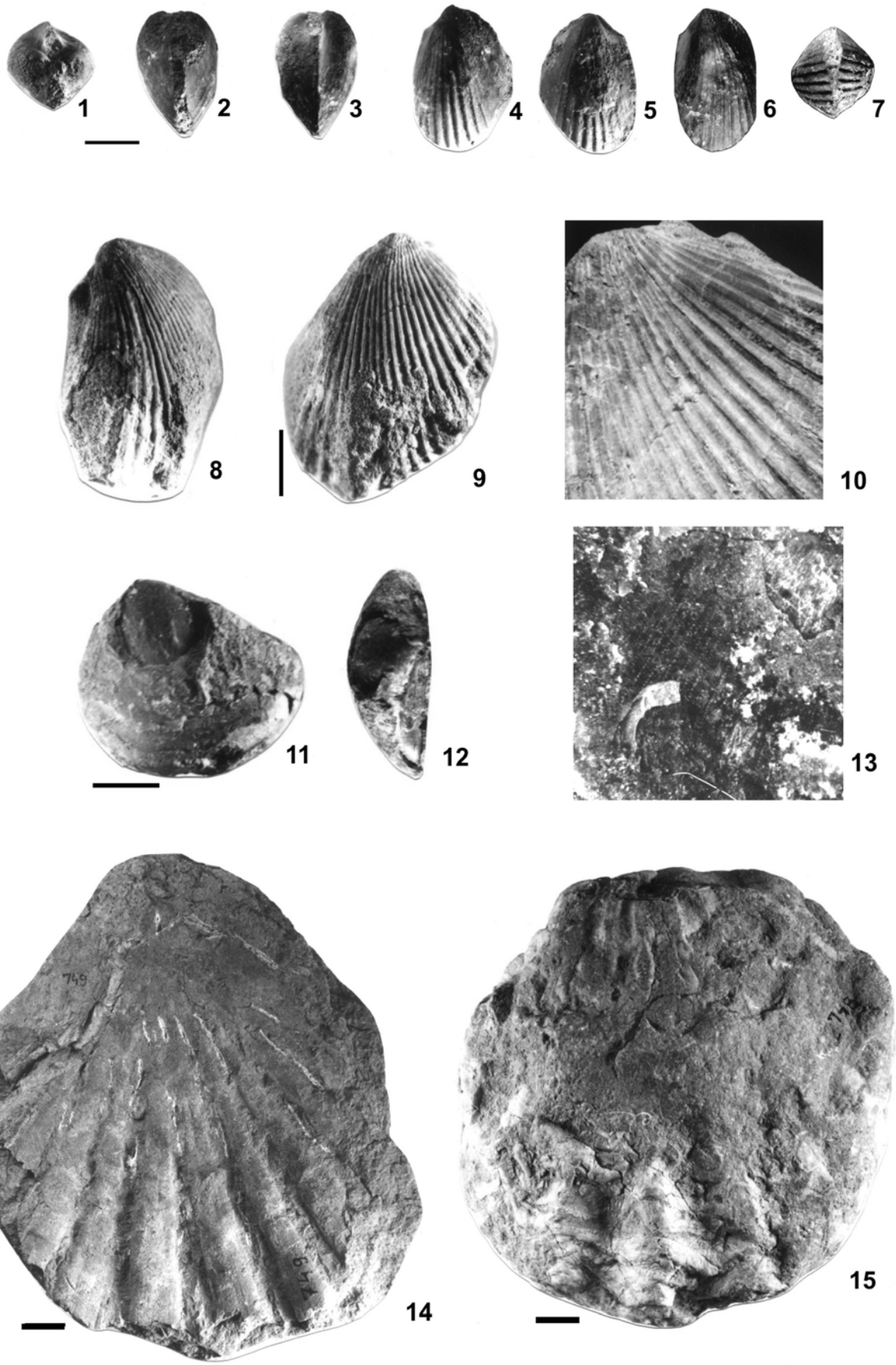








Scale bar 1cm


1
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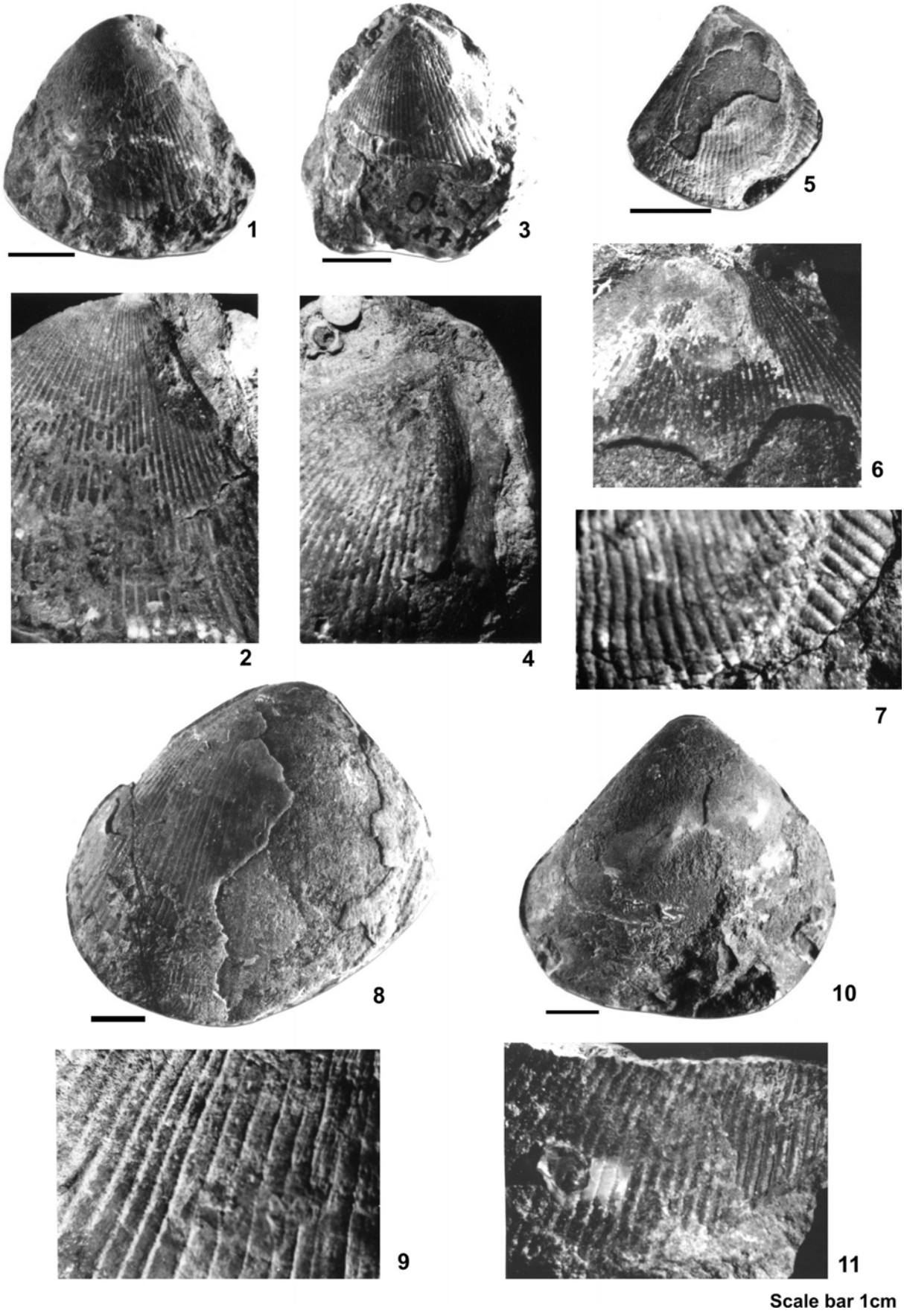
13
749
749
14
15
Scale bar 1cm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