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CONTRIBUTIONS TO THE MIDDLE JURASSIC OF THE ANINA AREA – THE BIVALVE FAUNA (PART I)

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Abstract. The Middle Jurassic deposits from Anina area bear rich bivalve assemblages belonging to the Aalenian – Lower Callovian interval. Fourteen bivalve species described and illustrated in this paper were collected from the Ponor and Colonia Ceha quarry, within the Dealul Zanei Marls Formation (Toarcian – Lower Callovian). Facies affinities and paleoecological aspects were recorded for the studied species. The bivalves are found in sediments ranging from marls, silt-marls and calcareous sandstones.

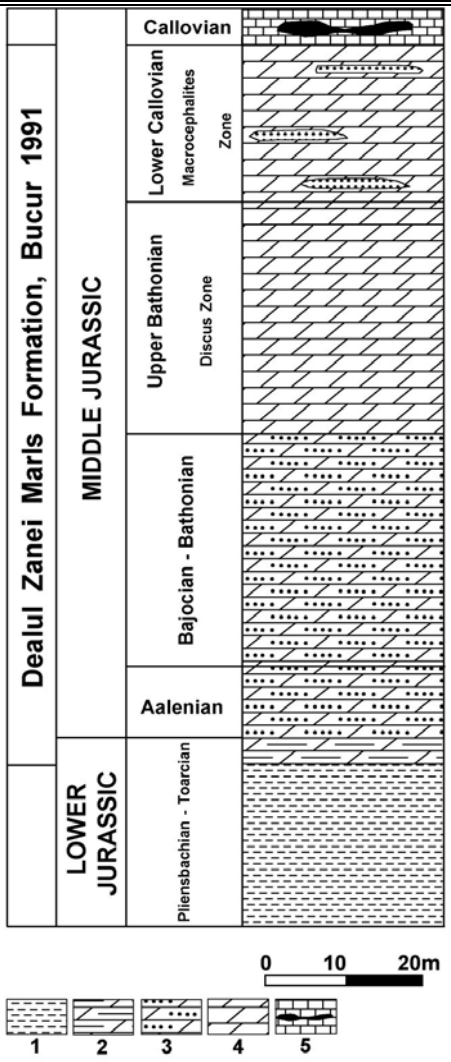
Keywords: Bivalves, Jurassic, Anina, Romania.

INTRODUCTION

Middle Jurassic deposits from Resita - Moldova Noua Zone (Resita Basin) have been studied since the nineteenth century starting with Kudernatsch' papers (1855, 1857) and continuing with many other authors. A complete history on the research activity done in the Resita Basin was given by Bucur (1997). Many of the previous papers dealing with the Jurassic fauna from this area, present only species list or illustrate only a few species of bivalves (Badaluta, 1975, 1976; Badaluta et al., 1969; Boldur & Mihalache, 1964; Boldur et al., 1964a; Bucur and Strusievicz, 1988; Bucur 1997, Nastaseanu, 1963). Badaluta – Nastaseanu (1965) presents an impressive list of bivalve species from this area, species that was described in her Ph.D. theses, that unfortunately remained unpublished.

The studied bivalve fauna was collected from Ponor and Colonia Ceha quarries (Anina area), occurring in the central part of the Resita – Moldova Noua Zone (Text-fig. 1). The Middle Jurassic deposits from Anina area bear rich assemblages of bivalves belonging to the Toarcian – Lower Callovian interval, Dealul Zanei Marls Formation, Bucur, 1991 (Bucur, 1991, 1997). The studied bivalves occur in the Aalenian – Lower Callovian interval and they are found in sediments such as marls, silty-marls and calcareous siltstones.

A moderate specific diversity and a large number of individuals represent the bivalves' assemblages from the lower part of the succession (Aalenian – Bathonian). So far we have identified 26 taxa belonging to the following genera: *Corbula, Grammatodon (Grammatodon)* and *Protocardia* from Aalenian; *Grammatodon (G.), Gervillella, Ctenostreon, Liostrea, Gryphaea, Gryphaea (Bilobisa), Praeexogyra, Entolium, Cingentolim (Cingentolium), Camptonectes (Camptonectes), Camptonectes (Camptochlamys), Pinna, Modiolus, Pholadomya, Pleuromya* from Bajocian – Bathonian interval; *Bositra, Entolium, Cingentolium (C.), Pinna, Goniomya* from Lower Callovian. Only fourteen of these (mainly from Pteriomorphia Subclass) are described and figured, other taxa remaining to be described in a future paper.



1 – shale, 2 – silt marls, 3 – calcareous siltstone, 4 – marl, 5 – limestone with siliceous concretions

Text-fig. 1. Synthetic litostratigraphic log of central part of Resita– Moldova Noua Basin. (compilation from Nastaseanu, 1963 and Bucur , 1997)

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TAXONOMY

Class Bivalvia (BUONANNI, 1681) LINNÉ, 1758
Subclass Pteriomorphia BEURLEN, 1944
Order Arcoida STOLICZKA, 1871
Family Parallelodontidae DALL, 1898
Subfamily Grammatodontinae BRANSON, 1861
Genus *Grammatodon* MEEK & HAYDEN, 1861
Subgenus *Grammatodon*
MEEK & HAYDEN, 1861
Grammatodon (Grammatodon) cf. concinnus
(PHILLIPS, 1829)
Pl. I, figs. 1, 2

cf. 1829 *Cucullaea concinna* sp. nov., Phillips, pl. 5, figs. 9, 31;
cf. 1973 *Cucullaea concinna* (Phillips); Romanov, p. 43, pl. 3, figs. 1, 2, 3;
cf. 1978 *Grammatodon (Grammatodon) concinnus* (Phillips); Duff, p. 36, pl. 2, figs. 7, 11-17, 19;

Material: one right valve (LPBIIIL1818-1), two left valves (LPBIIIL1818-2) and six fragmented valves with a low degree of preservation.

Measurements: L = 17-18,5mm; H =9-11,4mm; Length of the straight hinge line = 14,4 - 6mm.

Remarks: The shell is medium sized, obliquely subrectangular in outline, with long, straight hinge line. The posterior margin meets the dorsal margin in a slightly obtuse angle, and the ventral margin in a fairly sharp curve. The ventral margin is very large, convex, meeting the anterior margin in a broad curve. The umbo is slightly prosogyrous, rounded, not very prominent with well-defined umbonal carina. The posteroventral area is slightly concave. On the flank of the shell can be seen only the concentric ornamentation of fine concentric, rounded comarginal riblets. Due to the poor deegre of preservation of our specimens, we can not observe the radial ornamentation. Taxodont dentition, well 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 runs subparalel to hinge margin. Althought specimens from Anina are not very well preserved (when compared with those from Bucegi Mountains that are described in the same volume), it can be referred only with reservation to *Grammaton (G.) concinnus.*

Occurrence Anina – Ponor Quarry: Bajocian – Middle Bathonian, within calcareous sandstones.

Stratigraphic and geographic distribution: Romania: Codlea - Bathonian; Bucegi Mountains – Strungulita Pass - Bajocian; 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
Family Bakevellidae KING, 1850
Genus *Gervillella* WAAGEN 1907

Gervillella aff. aviculoides (J. SOWERBY, 1814)
Pl. I, fig. 9

aff. 1814 *Perna aviculoides* sp.nov. J. Sowerby, p.147, pl. 66, figs. 1-4;
aff. 1973 *Gervillella aviculoides* (J. Sowerby); Romanov, p. 68, pl. 5, figs. 6, 7;
aff. 1990 *Gervillella aviculoides* (J. Sowerby); Dikani & Makarenko, p. 33, pl. 4, figs. 4-12;
aff. 1995 *Gervillella aviculoides* (J. Sowerby); Jaitly et al., p. 172, pl. 7, fig1.

Material: one specimen (LPBIIIL1819) broken to the posterior end, with the right valve slightly disjointed from the articulation of the shell.

Approximate measurements: Right valve: H (measured vertically from the umbo to the maximum convexity of the anteroventral margin) = 13,1mm; L (the diagonal shell length) = ? 59,3mm; length of the posterior wing = 43mm; Left valve: H = 15mm; L = ? 56mm; length of the anterior wing = 17,3mm; I (inflation of the shell) = ? 15mm;

Remarks: Large, oval – elongated, shell, slightly curved, with the left valve slightly more convex than the right valve. The diagonal length of the right valve reaches up to four times the maximum width. The boundary between the main body of the shell and the posterior wing is marked by a distinct concavity. Surface of the shell is ornamented with regularly spaced, delicate growth lines. The anterior wing is well developed, triangular in shape, acute. Although the foregoing descriptions are close to *G. aviculoides*, our specimen shows few other different characteristics comparatively with the specimens described and figured by the authors listed in the synonimy. For example, the posterior wing is very long, forming a ratio 1:1,3 with the measured right valve length. The posterior wing seems to form a large concavity in the posterior part and it is ornamented with numerous, delicate growth lines, strongly vaulted, comarginal with the posterior wing margin. This specimen may belong to a new species. As the avaible morphological information is, however, too poor (we have only one specimen) we cannot create a new species, until more material becomes avaible. For the moment, we place this specimen close to *G. aviculoides.*

Occurrence Anina – Colonia Ceha Quarry: Lower Callovian, within calcareous sandstones.

Stratigraphic and geographic distribution: Rusia: Bathonian – Callovian; England, Germany: Callovian – Oxfordian; western India (Kachchh) – Jurassic / Cretacic boundary.

Gervillella lanceolata (MÜNSTER, 1826)
Pl. I, Figs. 3 – 8

1826 *Gervillia lanceolata* sp. nov. Münster in Goldfuss, p. 123, pl. 115, fig. 9;
1995 *Gervillella lanceolata* (Münster); Jaitly et al., p. 172, pl. 7, fig. 2.

Material: one specimen with disjointed valves (LPBIIIL 724) and 10 mainly disarticulated and

fragmentary shells (LPBIIIL 1820)

Measurements: LPBIIIL 724: H = 19,2mm, L = 62,4mm; LPBIIIL 1820-1, 2: I (inflation) = 13,2 – 13, 6mm.

Remarks: Medium sized, thick-shelled, lanceolate, slightly curved upwards posteriorly, posterior end compressed and attenuated. Hinge margin straight, very oblique, with three subquadrate hinge pits and three elongated, oblique anterior teeth. Umbo very small, acute and slightly bent over the hinge line. The left valve is slightly more convex than the right valve. The growth lines are strongly marked at irregular intervals.

Occurrence: Anina – Ponor Quarry: Bajocian – Middle Bathonian, within calcareous siltstone.

Stratigraphic and geographic distribution: Germany - Callovian; western India (Kachchh): Callovian – Oxfordian.

Family Posidoniidae FRECH, 1909
Genus *Bositra* DE GREGORIO, 1886
Bositra buchii (ROEMER, 1836)
Pl. II, figs. 1, 2

1836 *Posidonia Buchi* sp. nov. Roemer, p. 81, pl. 4, fig. 8;
1965 *Bositra buchi* (Roemer); Cox, p. 50, pl. 6, fig.1;
1973 *Posidonia buchi* Roemer; Romanov, p.71, pl. 5, figs. 10-18;
1974 *Posidonia buchi* Roemer; Barbulescu, p. 104, pl. 22, figs. 4, 7;
1978 *Bositra buchi* (Roemer); Duff, p. 52, pl. 4, figs. 3-6, 8, 10, 14;
1986 *Bositra buchi* (Roemer); Pugaczewska, p. 54, pl. 15, fig. 11; pl. 26, fig. 4;
1995 *Bositra buchi* (Roemer); Jaitly et al., p. 175, pl. 8, figs. 6-9;
1995 *Bositra buchi* (Roemer); Szente, p. 102, pl. 2, fig. 8.

Material: 15 specimens (LPBIIIL 1821:1-15)

Measurements: L = 6,7 - 11,7mm; H = 6 – 11,5

Remarks: According to Badaluta et al. (1969) this species is very abundant within Aalenian – Lower Callovian deposits from studied area. They occur in calcareous siltstones and limestones, being preserved mainly like composite moulds. Our specimens show a general suborbicular to ovate outline, with short and straight hinge line. The ornamentation is represented by pronounced concentric growth lines, sometimes developed like lamellae.

Occurrence: our specimens were found in Lower Callovian deposits from Colonia Ceha Quarry.

Family Pinnidae LAECH, 1819
Genus *Pinna* LINNÉ, 1858
Pinna (Pinna) mitis PHILIPS, 1829
Pl. II, figs. 3 – 5

1829 *Pinna mitis* sp. nov., Phillips, pl. 5, fig. 7;
1940 *Pinna cf. mitis* Phillips, Cox, p. 132, pl. 10, fig.11;
1978 *Pinna (Pinna) mitis* Phillips, Duff, p. 43, text-fig. 12b, pl.3, figs. 6-11, 13, 15;
1995 *Pinna (Pinna) mitis* Phillips, Jaitly et al., p. 175, pl. 8, figs. 10-12.

Material: 4 fragmentary articulated specimens (LPBIIIL 1822: 1-4)

Approximate measurements: L = 40 – 45mm; H = ? 90 – 110mm.

Remarks: Also our specimens have a relatively poor preservation, the characters of ornamentation correspond closely to the specimens described and figurated by the authors listed in the synonimy. The shell of our specimens shows a low inflation; the median carina is clearly visible; region dorsal to the carina bears numerous (19 - 24) fine, densely packed radial riblets crossed by delicate concentric growth lines, resulting a fine reticulate aspect of the ornamentation in this portion of the shell; the ventral region with 15 -17 radial riblets, crossed by concentric growth welts strongest on the ventral margin. The concentric growth welts are attenuated nearly to the median carina and they don't reach the median carina.

Occcurence: Anina – Ponor Quarry, Colonia Ceha Quarry, Lower Callovian.

Stratigraphic and geographic distribution: England – Callovian Oxford Clay; Kachchh (India) – Upper Callovian.

Order Limoida RAFINESQUE, 1815
Family Limidae RAFINESQUE, 1815
Genus *Ctenostreon* EICHWALD, 1862
Ctenostreon cf. proboscideum (J. SOWERBY, 1820)
Pl. II, fig. 6

cf. 1820 *Lima proboscidea* sp. nov. J. Sowerby, p. 115, pl. 164;
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 rugosum* (J. Sowerby); Romanov & Kasum –Zade, p. 73, pl. 22, fig. 3

Material: one articulated specimen (LPBIIIL 1823), internal mould, with fragments of the shell preserved only on the dorsal half. The dorsal margin of the shell is broken.

Approximate measurements: H = 107,8 mm; L = 138 mm; I (inflation) = 55,6 mm.

Remarks: Our specimen has a large, suborbicular, moderate convex shell. Dimensions of the shell are close to the values specified by the authors listed in the synonimy. However, on the surface of both valves only 7 prominent radial ribs represent the ornamentation. These radial ribs have nodose and elevated prominent fistulous plications.

Occurrence: Anina – Ponor Quarry: Bajocian – Bathonian.

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

Order Pectinoida RAFINESQUE, 1815
Family entoliidae KOROBKOV, 1960
Genus *Entolium* MEEK, 1865

Subgenus *Entolium* MEEK, 1865

Entolium (Entolium) corneolum (YOUNG and BIRD, 1828)

Pl. III, figs. 1 – 4

1828 *Pecten corneolus* sp. nov. Young & Bird, p. 234, pl. 9, fig.5;
1888 *Pecten disciformis* Zieten; Herbich, p. 324, pl. 28, fig. 7;
1899 *Pecten (Entolium) demissum* Phillips; Simionescu, p. 27, pl. 2, fig.6;
1957 *Entolium demissum* Phillps; Himşiaşvili, p. 126, pl. 3, fig. 3;
1957 *Entolium cingulatum* Goldfuss; Himşiaşvili, p. 128, pl. 23, figs. 5, 6;
1961 *Entolium demissum* (Phillips); Bărbulescu, p. 701, 702;
1961 *Entolium cf. cingulatum* (Goldfuss); Bărbulescu, p. 702;
1963 *Entolium demissus* Phillips; Bărbulescu, p. 49, pl. 5, figs. 38-40;
1973 *Entolium demissum* (Phillips); Romanov, p. 43, pl. 5, figs. 1-12;
1974 *Entolium demissus* Phillips; Bărbulescu, p. 111, pl. 23, figs. 7, 9;
1974 *Entolium cingulatum* Phillips; Bărbulescu, p. 111, pl. 23, fig. 8;
1976 *Entolium cingulatum* Goldfuss; Preda, p. 32, pl. 2, fig. 18;
1976 *Entolium demissus* Phillips; Preda, p. 31, pl. 2, figs. 19; pl. 6, fig. 1;
1978 *Entolium (Entolium) corneolum* (Young and Bird); Duff, p. 62, pl. 4, figs. 25, 29, 30; pl. 5, figs. 3-5, text-fig. 20;
1984 *Entolium (Entolium) corneolum* (Young and Bird); Johnson, p. 45, pl. 1, figs. 24-26 (here synonymie);
1989-1990 *Entolium (Entolium) demissus* (Phillips); Dikani & Makarenko, p. 43, pl. 6, figs. 1-6
1995 *Entolium (Entolium) corneolum* (Young and Bird); Szente, p. 99, pl. 2, fig. 2;
1997 *Entolium (Entolium) corneolum* (Young and Bird); Radulovič et al., p. 147-148, pl. 1, fig. 7;
1995 *Entolium (Entolium) corneolum* (Young and Bird); Jaitly et al., p. 193, pl. 18, figs. 8-9;
1998 *Entolium demissus* (Phillips); Bărbulescu in Dragastan et al., p. 138, pl. 4, fig. 1.

Material: 16 single valves (LPBIIIL1824) represented by internal or external moulds with remains of the shell.

Measurements: H = 18,4 – 48,2mm; L = 17,2 – 40,6mm; H/L = 0,94 – 1,29.

Remarks: Equilateral, equivalve shell, suborbicular to suboval in outline. The length of the valves is variable, but at the majority of our specimens, the length is smaller than the height, generating a suboval outline. The auricles are small, subequal with external angles rounded. Umboes are small, median, pointed, orthogyrate. The anterior, posterior and ventral margins describe a large curved line. Ornamentation represented by closely packed, concentric growth lines, sometimes with very fine radial striae that can be observed only on the surface of internal moulds (Pl. III, fig. 3).

Occurrence: Anina – Ponor Quarry and Colonia Ceha Quarry: Bathonian - Lower Callovian.

Stratigraphic and geographic distribution: Romania: Central Dobrogea: Bathonian – Callovian; Rosia (Padurea Craiului): Liasic and Bajocian; Haghimas Mountains (Piatra Liciului): Bajocian-Bathonian; Codlea: Bathonian; Campulung – Pojorata (Rarau): Bajocian; Bucegi Mountains: Bajocian – Bathonian. England: Aalenian – Kimmeridgian; Luxembourg, France, Germany, Poland, Russia, India: Toarcian - Bajocian, Bathonian, Callovian, Oxfordian.

Genus *Cingentolium* YAMANI, 1983

Subgenus *Cingentolium* YAMANI, 1983

Cingentolium (Cingentolium) cingulatum (GOLGFUSS, 1835)

Pl. III, figs. 5 – 7

1835 *Pecten cingulatus* Phillips; Goldfuss, p. 74,pl. 99, figs. 3a, b;
1871-1873 *Pecten cingulatus* Phillips; Terquem et Jourdy, p. 127;
1926 *Entolium ciungulatum* Goldfuss; Staesche, p. 93, pl. 4, figs. 3 - 4;
1957 *Entolium cingulatum* Goldfuss; Himsiasvili, p. 128, pl. 23, figs. 5, 6;
1965 *Entolium ciungulatum* Goldfuss; Cox; p. 52, pl. 6, fig. 5;
1974 *Entolium cingulatum* Phillips; Barbulescu, p. 111, pl. 23, fig. 8;
1983 *Cingentolium (Cingentolium) cingulatum* (Goldfuss); Yamani, p. 7, pl. 1, figs. 1 - 5;
1985 *Neoentolim cingulatum* (Goldfuss); Romanov, p. 38, pl. 4, figs. 12, 14, 15, 17, 18, 19.
1998 *Cingentolium cingulatum* (Goldfuss); Turculet, p. 95, pl. 4, fig. 7; pl. 5, fig. 1-7.

Material: 10 single valves (LPBIIIL1825), preserved like internal moulds with remains of the shell.

Measurements: H = 10,8 – 26,7mm; L = 8,6 – 23,1mm; H/L = 1,02 – 1,33.

Remarks: Considering the general outline of the valves, dimensions and the presence of two internal laminae diverging from the umbones and forming a very acute angle with the dorsal margin and connected with palial line, our specimens closely agree with Cox (1965) and Yamani (1983) descriptions. On the internal moulds these internal laminae appear like grooves. The valves are thin, with low convexity or planoconvex. The auricles are small, nearly equal with the external angles rounded. Ornamentation with closely - packed concentric growth lines on the entire surface of the shell and numerous very fine radial striae well observed on the internal moulds or on the internal surface of the valves.

Occurrence: Anina – Colonia Ceha Quarry: Lower Callovian.

Stratigraphic and geographic distribution: Romania: Central Dobrogea – Callovian; Germany: Liasic – Kimmeridgian; Tanganyika and Kenya – Upper Jurassic; France – Lower – Upper Jurassic;

Poland – Liasic; India: Callovian – Lower Oxfordian; Caucaz: Upper Liasic - Malm; Pamir: Toarcian-Oxfordian; Central Asia: Bajocian-Callovian.

Family Pectinidae RAFINESQUE, 1815
Genus *Camptonectes* AGASSIZ in MEEK, 1864
Subgenus *Camptonectes* AGASSIZ in MEEK, 1864
Camptonectes (Camptonectes) laminatus (J. SOWERBY, 1818)
Pl. III, figs. 8, 9

1818 *Pecten laminata* sp. nov. J. Sowerby, p. 4, pl. 205, fig. 4;
1984 *Camptonectes (Camptonectes) laminatus* (Sowerby); Johnson, p. 124, pl. 4, figs. 10, 12-16, ? figs. 11(here synonymy);
1985 *Camptonectes (Camptonectes) laminatus* (Sowerby); Romanov, p. 83, pl. 13, figs. 9 - 11.
1995 Camptonectes (Camptonectes) laminatus (Sowerby); Jaitly et al., p. 195, pl. 19, fig. 6.

Material: 2 poorly preserved articulated specimens (LPBIIIL 1826)

Approximate measurements: LPBIIIL 1826-1: L ~ 33mm, H ~ 33,4mm; LPBIIIL 1826-2: L ~21,3mm, H ~ 25,4mm.

Remarks: Specimens with large to moderate dimensions, inequilateral, thin shell, with low convexity or planoconvex shell. Although, very close to *C (C.) auritus* (Schlotheim, 1813), our specimens are narrower with a more suboval general outline. Ornamentation is represented by coarse, radiar, divaricate striae on the all surfaces of the valves. These coarse striae are gently curved towards the anterior and posterior margin. Auricles are small, unequal, anterior auricle is larger than the posterior one. The anterior auricle of the right valve is elongated with dorsal margin straight, the anterior one truncate and more convex, rounded, ventral margin. A concave, rounded, byssal fasciole underlines the anterior auricle. On the surface of the right anterior auricle, the ornamentation is represented by numerous commarginal lamellae crossed by delicate radial striae.

Occurrence: Anina – Ponor Quarry: Bathonian.

Stratigraphic and geographic distribution: Romania: Bucegi Mountians – Bajocian; England: Bajocian, Bathonian, Oxfordian; New Zeeland, Afganistan: Callovian; Japan: Lower Liasic; India (Kachchh): Bathonian.

Camptonectes (Camptonectes) auritus (SCHLOTHEIM, 1813)
Pl. III, fig. 10

1813 *Chamites auritus* sp. nov., Schlotheim, p. 103;
1978 *Camptonectes (Camptonectes) auritus* (Schlotheim); Duff, p. 66, text-fig. 22, pl. 5, figs. 22, 25;
1984 *Camptonectes (Camptonectes) auritus* (Schlotheim); Johnson, p. 113, pl. 3, figs. 25-40, text-figs. 98-107 (here synonymy);
1985 *Camptonectes (Camptonectes) lens* (Sowerby); Romanov, p. 80, pl. 13, figs. 4-8;
1986 *Camptonectes (Camptonectes) lens* (Sowerby); Pugaczewska, p. 57, pl. 24, figs. 2, 3a, b; pl. 25, fig. 3;
1989-1990 *Camptonectes (Camptonectes) lens* (Sowerby); Dikani & Makarenko, p. 50, pl. 7, fig.3;1995 *Camptonectes (Camptonectes) auritus* (Schlotheim); Jaitly et al., p.195, pl. 21, figs. 1-4;
1998 *Camptonectes (Camptonectes) lens* Sowerby; Bărbulescu in Dragastan et al., p.138, pl.4, fig.5.

Material: one external mould slightly distorted of left valve (LPBIIIL1827)

Measurements: L = 18,4mm; H = ? 24,4mm.

Remarks: Although our material is poorly preserved, we could observe the characteristic ornamentation represented by fine, divaricate, densely punctate striae, divergent to the anterior and posterior margins. The general outline is subovate, with the height greater than length (maybe due to the distortion of the sample). Auricles are small, unequal, anterior auricle larger than posterior ones. The anterior left auricle has the dorsal margin straight and anterior margin gently convex.

Occurrence: Anina: Ponor Quarry: Bajocian.

Stratigraphic and geographic distribution: Romania: Central Dobrogea: Upper Bathonian - Lower Callovian; Haghimas Mountains: Bajocian; Codlea (Southern Carphatians): Lower Bathonian; Hungary (Bakony Mountians: Bajocian; Poland: Bajocian – Callovian; Southern Germany: Hettangian – Toarcian; France: Bjocian – Bathonian; England: Callovian – Oxfordian.

Subgenus *Camptochlamys* ARKELL, 1930
Camptonectes (Camptochlamys) obscurus (J. SOWERBY, 1818)
Pl. III, figs. 11, 12

1818 *Pecten obscura* sp. nov., J. Sowerby, p. 3, pl. 205, fig. 1;
1984 *Camptonectes (Camptochlamys) obscurus* (Sowerby); Johnson, p. 134, pl. 4, figs. 17-22, 24, 25 (here synonymy);
1985 *Camptonectes (Annulinectes) annulatus* (Sowerby); Romanov, p. 90, pl. 14, figs. 5, 6;
1986 *Camptonectes (Camptonectes) richei* Dechaseaux; Pugaczewska, p. 56, pl.23, figs.4a, 4b.
1995 *Camptonectes (Camptochlamys) obscurus* (Sowerby); Jaitly et al., p. 196, pl. 19, figs. 7-8.

Material: 2 single valves (LPBIIIL1828:1-2) and 3 fragmentary single valves (LPBIIIL1828:3-5).

Measurements: H = 29,4 – 41mm; L = 22.1 – 34,5mm; UA (umbonal angle) = 82^0 - 95^0

Remarks: Suborbicular to subovate, moderate convex shell, nearly equilateral, with height greater than length. Auricles well developed with moderate size, unequal, anterior auricle greater than posterior one. The characteristic pattern of ornamentation is represented by distinct commarginal lamellae spaced at 2-3 mm and diverging striae that cover most of the surface shell. In specimen LPBIIIL1828-1 (Pl. III, fig. 11) we could observe that the commarginal lamellae keep going from the surface of the shell to the auricles surface.

Occurrence: Anina – Ponor Quarry: Bajocian –

Bathonian.

Stratigraphic and geographic distribution: Romania: Bucegi Mountains: Bajocian; Germany, France, England, Poland, Russia, Turkmenia : Bajocian – Bathonian; India (Kachchh): Bajocian – Oxfordian.

Subclass Isofilibranchia IREDALE, 1939
Order Mytiloida FÉRUSSAC, 1822
Family Mytilidae RAFINESQUE, 1815
Genus *Modiolus* LAMARCK, 1799
Modiolus imbricatus J. SOWERBY, 1818
Pl. IV, figs. 1, 2

1818 *Modiola imbricata* sp. nov., J. Sowerby, p. 21, pl. 112, figs. 1, 3;
1837 *Mytilus compresus* Goldfuss, p. 178, pl. 131, fig. 11;
1853 *Mytilus imbricatus* Sowerby; Morris & Lycett, p. 41, pl. 4, fig. 2;
1853 *Mytilus compresus* Goldfuss; Morris & Lycett, p. 40, pl. 4, fig. 7;
1867 *Modiola imbricata* Sowerby; Laube, p.29, pl. 2, figs. 3, 3b;
1940 *Modiolus imbricatus* Soweby; Cox, p. 64, pl. 5, figs. 1-7;
1948 *Modiolus imbricatus* Soweby; Cox & Arkell, p. 3;
1964 *Modiolus imbricatus* Soweby; Fischer, p. 33;
1965 *Modiolus imbricatus* Soweby; Cox, p. 36, Pl. 3, figs. 5,6;
1969 *Modiolus imbricatus* Soweby; Fischer, p. 83;1969 *Modiolus imbricatus* Soweby; Bărbulescu şi Grădinaru, p. 85, pl. 1, fig. 3;
1995 *Modiolus (M.) imbricatus* J. Soweby; Jaitly et al., p. 203, pl. 22, figs. 4-11.

Material: 2 articulated specimens (LPBIIIL 1829: 1-2) strongly distorted due to the compaction.

Remarks: Although our specimens are strongly distorted, some distinct patterns occur, allowing the specific identification. The umbonal ridge is slightly curved, rounded, and fading before it reaches the ventral margin, the maximum inflation seems to be located on the umbonal rigde. The anteroventral area is narrow and slightly depresses. Ornamentation is represented by fine concentric threads and pronounced growth lamellae, imbricate at irregular intervals.

Occurrence: Anina – Ponor Quarry: Bajocian – Bathonian.

Stratigraphic and geographic distribution: Romania: Central Dobrogea: Bathonian-Callovian; Codlea: Bathonian; Bucegi Mountains – Bajocian; England: Bajocian-Callovian; France: Bathonian; Switzerland: Bajocian.

Subclass Heterodonta NEUMAYR, 1884
Order Veneroida ADAMS & ADAMS, 1856
Family Astartidae d'ORBIGNY, 1844
Genus *Nicaniella* CHAVAN, 1945
Subgenus *Trautscholdia* COX & ARKELL, 1948
Nicaniella (Trautscholdia) carinata PHILLIPS, 1829
Pl. IV, figs. 3 – 9

1829 *Astarte carinata* sp. nov., Phillips, pl.5, fig.31978 *Nicaniella (Trautscholdia) carinata* (Phillips); Duff, p.97, pl. 11, figs. 12-17, 23, 24

Material: 15 single valves (LPBIIIL 1830: 1-15) internal moulds.

Measurements: H = 4,8 – 12,1mm; L = 6,5 – 12,2mm; H / L = 0,72 – 1,11.

Remarks: Our specimens correspond closely with the description given by Duff (1978): small specimens, globular, subtrigonal in outline. The umbo is prominent, inflated, prosogyrate. Anterodorsal and posterodorsal margins are slightly concave. Ventral margin is large convex, crenulate over its entire length. Ornament represented by 8 regularly spaced sharp commarginal ribs. The umbonal carina, moderate developed runs diagonally from the umbo to the posteroventral margin.

Occurrence: Anina – Lower Callovian.

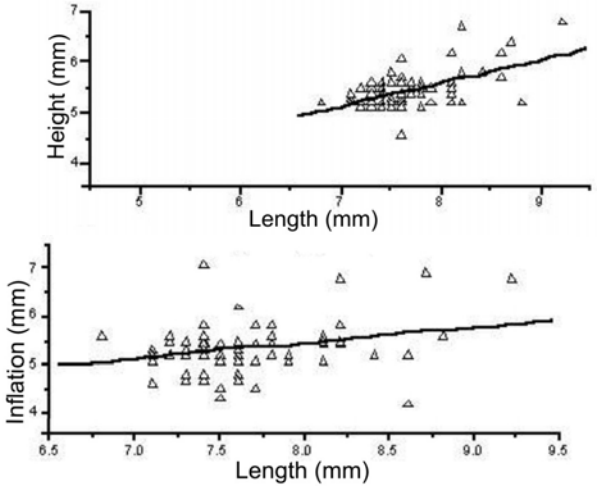
Stratigraphic and geographic distribution: Romania: Codlea – Bathonian; England – Oxford Clay.

Order Myoida STOLICZKA, 1870
Family Corbulidae LAMARCK, 1818
Genus *Corbula* BRUGUIERE, 1797
Corbula sp.
Pl. IV, figs 10 -18.

Material: 76 articulated specimens (LPBIIIL 1831).

Meassurements: L = 6,8 – 9,2 mm (length average = 7,64); H = 4,6 – 6,8 mm (height average = 5,4); I = 4,2 – 7,1 mm (inflation average = 5,34); H / L = 0,59 – 0,81 (average = 0,70); I / L = 0,48 – 0,82 (average = 0,69).

Description: Small species, subtrigonal in outline, strongly inflated (height almost equal with inflation), with maximum inflation in median part of the shell. Almost specimens are longer than high, with height / length ration constantly between 0,64 – 0,75 (Text-fig. 2).



Text - figure 2. Length / Height ratios and Length / Inflation ratios of *Corbula sp.*

The anterodorsal margin is slightly concave and posterodorsal margin straight, sloping obliquely downwards. Ventral margin narrow, strongly rounded to the anterior part, then becoming less curved to the posterior part. Posterior part of the shell is rostrate. Inequivalve right valve slightly larger than left valve, overhanging along ventral and posteroventral margins. Umbones mesial, are well developed, slightly prominent and prosogyrous. Lunula small, suboval or heart-shaped, depressed. A distinct acute or gently rounded carina runs posteriorly from the umbo, obliquely to the posteroventral angle. Escutcheon lanceolate, smooth (only with delicate growth lines) flattened or gently depressed on the right valve and more depressed (concave) on the left valve. Ornamentation represented by 18-20 commarginal ribs that are very thin and attenuated in the umbonal region, becoming more pronounced, sharp on the flanks. The spaces between ribs are two – three times larger than the ribs. Hinge not observed as yet.

Remarks: Our specimens resemble closely in general outline with *Corbula attenuata* Lycett (1863, p. 62, pl. 37, figs. 6, 6a), but this species has the ornamentation represented by numerous delicate striations (no commarginal sharp ribs) and the H/L and I/L ratios are different from our specimens. Lycett shows that in *C. attenuata*, "height, equal to two thirds of the length, and a third greater than the diameter through both the valves". In our specimens the height is approximate equal with two thirds of the length, but the inflation is nearly equal with the height. *Corbula bukmani* Lycett is less elongated (length is one third greater than height and inflation), anterior margin is pronounced rounded, ventral margin is evenly curved from the anterior to the posterior part and the concentric striae seem to be narrower comparatively with our material. *Corbula sp*. from Anina differs, however, sufficiently from other species of *Corbula* from Jurassic and considering these, specimens from Anina could be a new species. But as long as the characters of hinge are not observed yet and our literature concerning jurassic corbulids is very poor, we forbear for the moment to create a new species.

Occurrence: Anina – Ponor Quarry: Aalenian.

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PLATES

PLATE I

Figs. 1, 2 *Grammatodon (Grammatodon) cf. concinnus* (PHILLIPS, 1829): 1 – Composite mould of right valve, external view, Ponor Quarry, Bajocian – Middle Bathonian, LPBIIIL1818-1; 2 – left valve internal view Ponor Quarry, Bajocian – Middle Bathonian, LPBIIIL1818-2;
Figs. 3 – 8 *Gervillella lanceolata* (MÜNSTER, 1826): 3 – articulated specimen, the anterior part is missing, right valve view, LPBIIIL 1820-1; 4 – articulated specimen, the posterior part is missing, dorsal view, LPBIIIL 1820-2; 5 - specimen with disjointed valves (LPBIIIL 724); 6 - left valve, fragmented, internal view, LPBIIIL1920-3; 7- left valve, fragmented, internal view, LPBIIIL1920-4, 8 - left valve, fragmented, internal view, LPBIIIL1920-5; all specimens are from Ponor Quarry, Bajocian – Middle Bathonian;
Fig. 9 *Gervillella aff. aviculoides* (J. SOWERBY, 1814) – right valve view, Colonia Ceha Quarry, Lower Callovian, LPBIIIL1819.

PLATE II

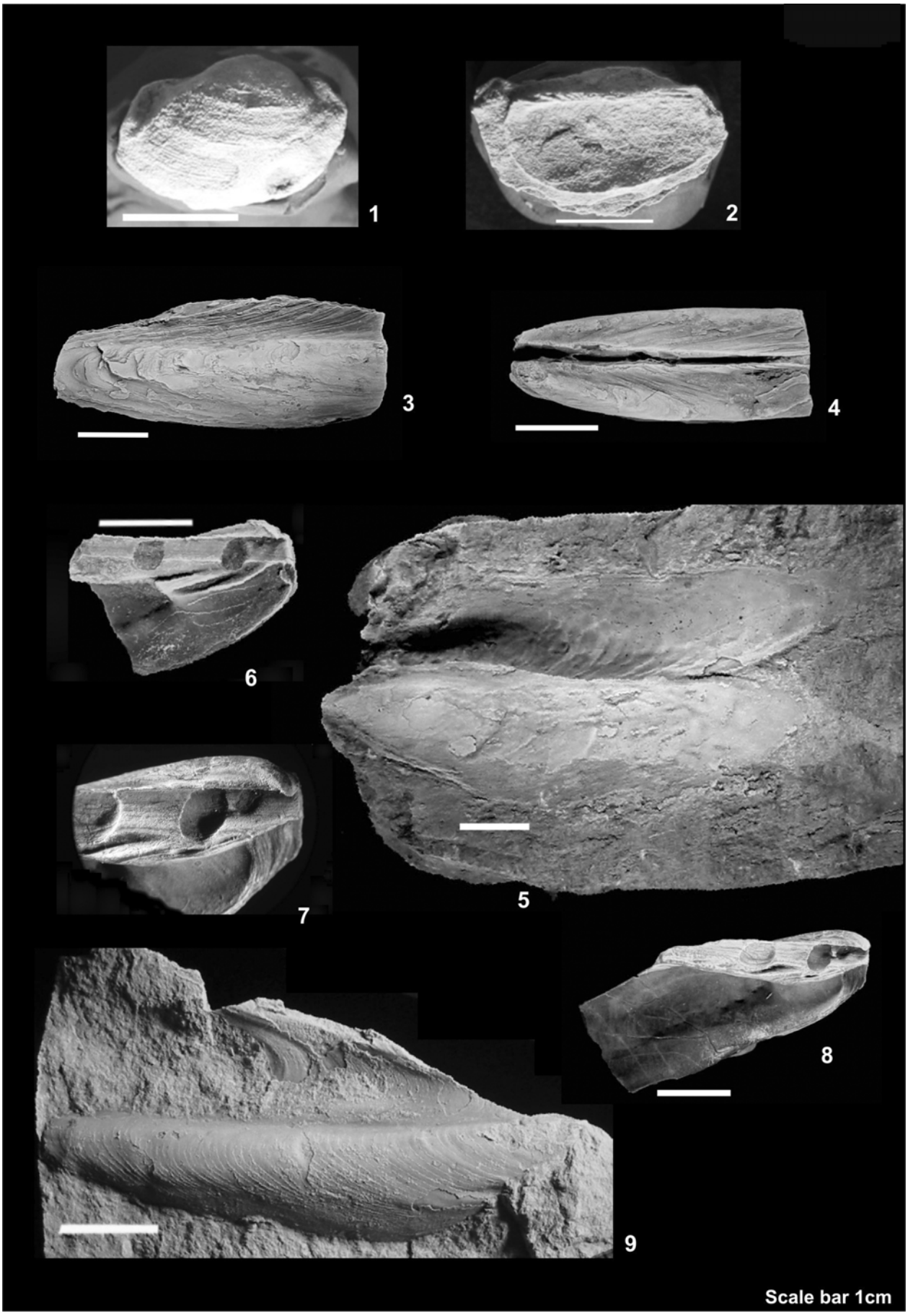
Figs. 1, 2 *Bositra buchii* (ROEMER, 1836): 1 – internal mould of left valve, Colonia Ceha Qarry, Lower Callovian, LPBIIIL1821-1; 2 – sample with internal moulds, Colonia Ceha Qarry, Lower Callovian, LPBIIIL1821;
Figs. 3 - 5 *Pinna (Pinna) mitis* PHILIPS, 1829: 3 – Fragment of articulated specimen, right valve view, LPBIIIL1822-1, Ponor Quarry, Lower Callovian; 4 - Fragment of articulated specimen, left valve view, LPBIIIL1822-2, Ponor Quarry, Lower Callovian; 5 - Fragment of articulated specimen, ?right valve view, LPBIIIL1822-3, Colonia Ceha Quarry, Lower Callovian.
Fig. 6 *Ctenostreon cf. proboscideum* (J. SOWERBY, 1820) - Internal mould, with fragments of shell, ?right valve view, LPBIIIL1823, Ponor Quarry, Bajocian – Bathonian.

PLATE III

Figs. 1 – 4 *Entolium (Entolium) corneolum* (YOUNG and BIRD, 1828): 1- internal mould of right valve, LPBIIIL1824-1; 2- 1- internal mould of ?left valve, LPBIIIL1824-2; 3 - internal mould of ?left valve, LPBIIIL1824 – 3; 4 - internal mould of right valve, LPBIIIL1824-4; all specimens are from Ponor Quarry, Bathonian - Lower Callovian;
Figs. 5 – 7 *Cingentolium (Cingentolium) cingulatum* (GOLGFUSS, 1835): 5 – Single valve, internal view, LPBIIIL1825-1; 6 - Single valve, internal view, LPBIIIL1825-2; 7 – internal mould of ?left valve, LPBIIIL1825-3; all specimens are from Colonia Ceha Quarry, Lower Callovian;
Figs. 8, 9 *Camptonectes (Camptonectes) laminatus* (J. SOWERBY, 1818): 8 – fragmented articulated specimen, ?left valve view, LPBIIIL1826-1; 9 - fragmented articulated specimen, right valve view, LPBIIIL1826-2; both specimens are from Ponor Quarry, Bathonian;
Fig. 10 *Camptonectes (Camptonectes) auritus* (SCHLOTHEIM, 1813) - external mould of right valve, LPBIIIL 1827, Ponor Quarry, Bajocian;
Figs. 11, 12 *Camptonectes (Camptochlamys) obscurus* (J. SOWERBY, 1818): 11- Left valve, LPBIIIL1828-1; 12 – fragmented left valve, LPBIIIL1828-2; both specimens are from Ponor Quarry, Bajocian – Bathonian.

PLATE IV

Figs. 1, 2 *Modiolus imbricatus* J. SOWERBY, 1818: 1 – distorted articulated specimen, right valve view, LPBIIIL1829-1; 2 – internal mould of an distorted articulated specimen, LPBIIIL1829-2; both specimens are from Ponor Quarry, Bajocian – Bathonian;
Figs. 3 – 9 *Nicaniella (Trautscholdia) carinata* PHILLIPS, 1829: 3 - internal mould of right valve, LPBIIIL1830-1; 4 - internal mould of right valve, LPBIIIL1830-2; 5 - internal mould of right valve, LPBIIIL1830-3; 6 - internal mould of right valve, LPBIIIL1830-4; 7 - internal mould of right valve, LPBIIIL1830-5; 8 - internal mould of left valve, LPBIIIL1830-6; 9 - internal mould of right valve, LPBIIIL1830-7; all specimens are from Colonia Ceha Quarry, Lower Callovian;
Figs. 10 – 18 *Corbula sp.*: 10 - left valve view, LPBIIIL1831-1; 11 – right valve view, LPBIIIL1831-2; 12 – dorsal view, LPBIIIL1831-3; 13 – left valve view, LPBIIIL1831-4; 14 – dorsal view, LPBIIIL1831-5; 15 left valve view, LPBIIIL1831-6; 16 – right valve view, LPBIIIL1831-7; 17 - right valve view, LPBIIIL1831-8; 18 - right valve view, LPBIIIL1831-9; all articulated specimens are from Ponor Quarry, Aalenian.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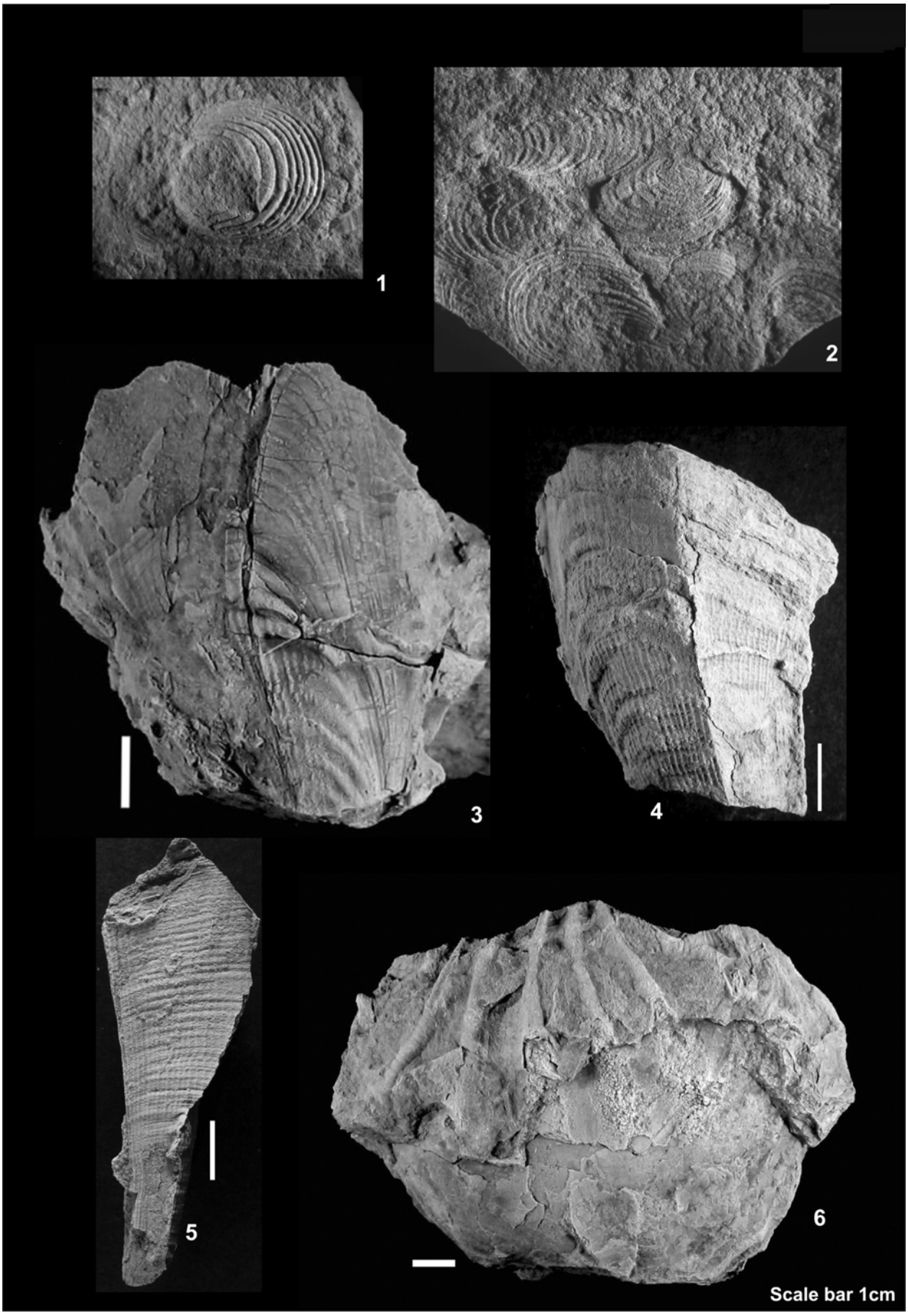
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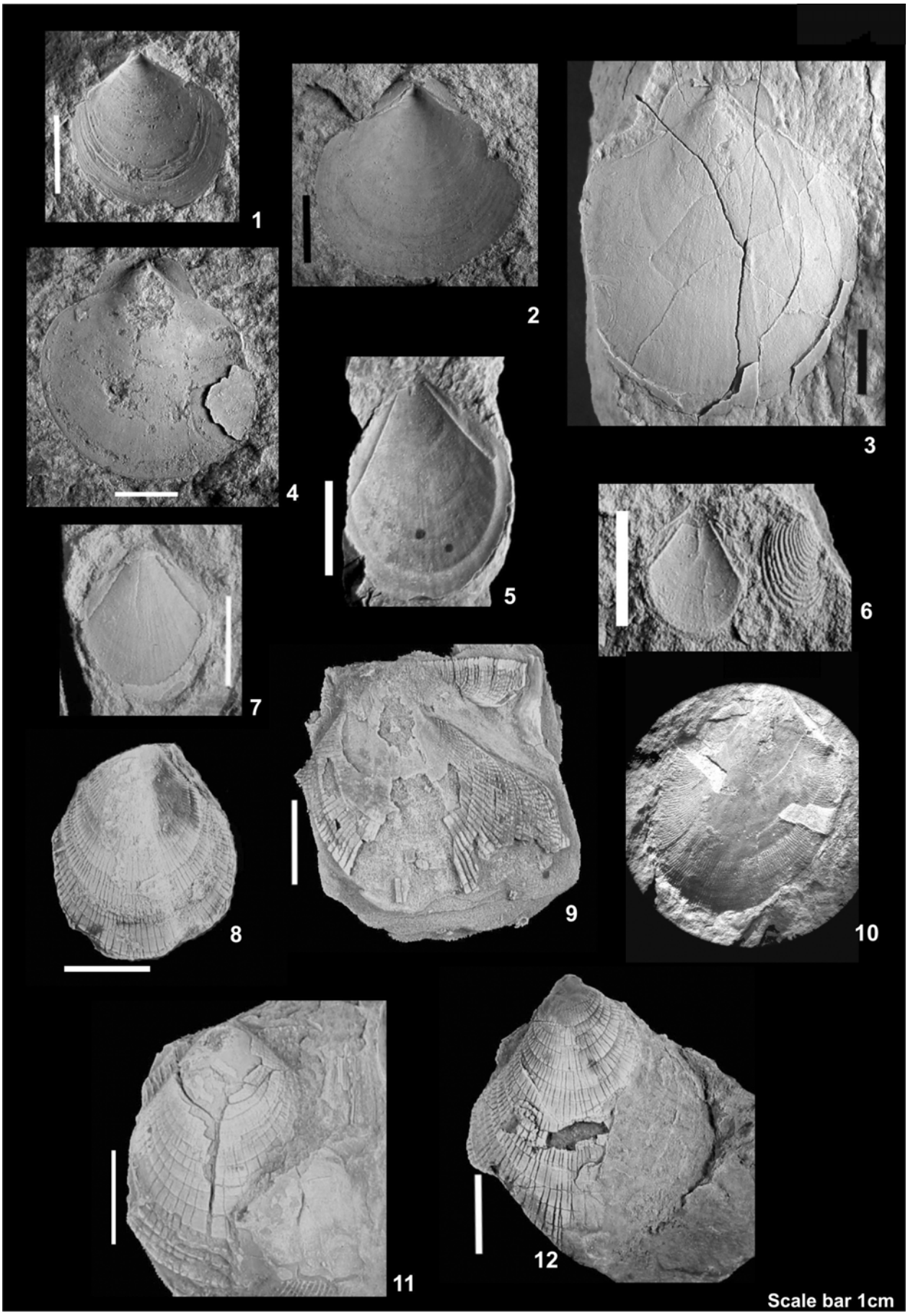
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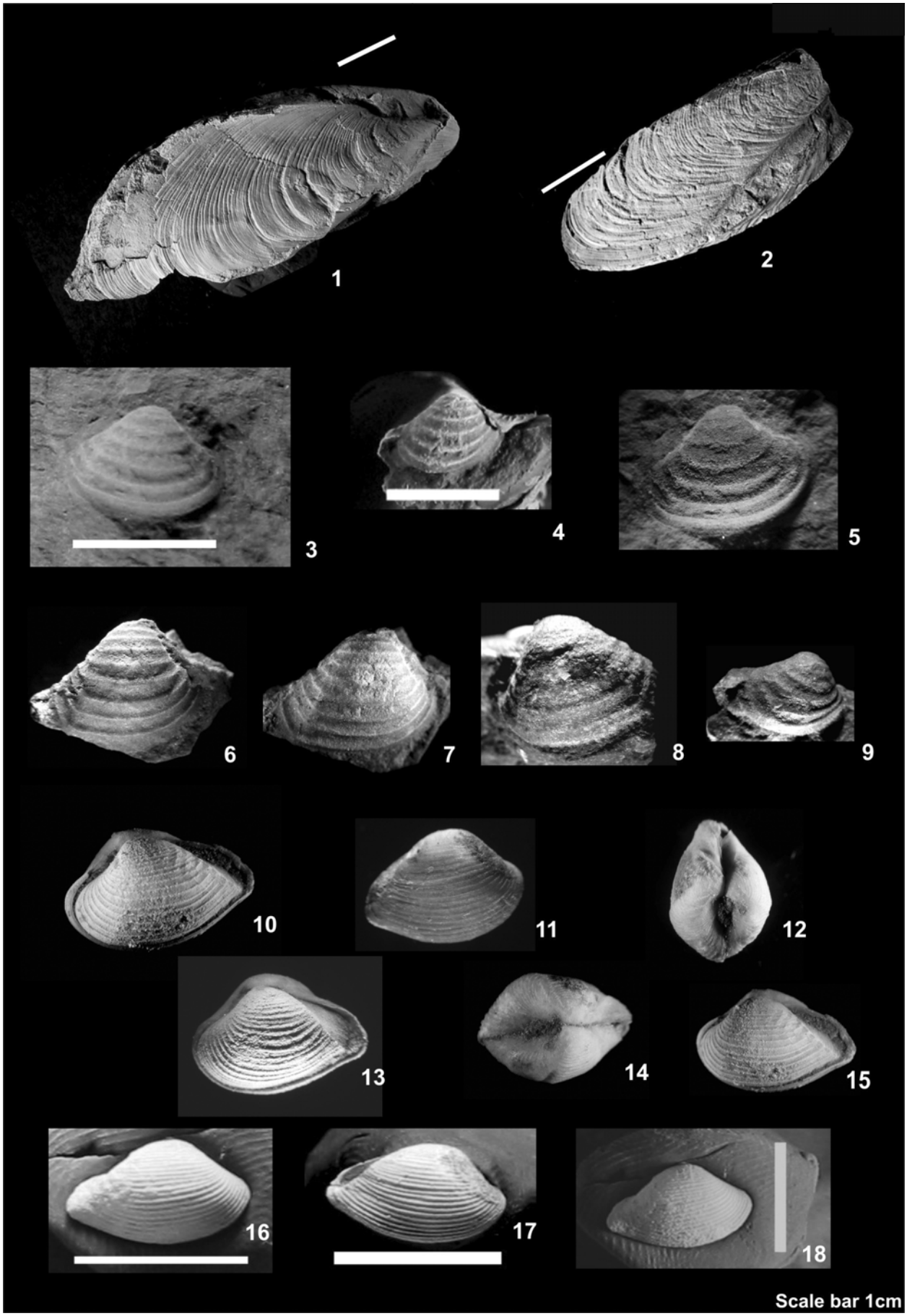
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