MIDDLE JURASSIC ANOMALODESMATAN BIVALVES FROM STRUNGA - TÂTARU, BUCEGI MOUNTAINS

IULIANA V. LAZĂR

Abstract. This paper presents 20 bivalve species from Strunga-Tâtăr (western slope of Bucegi Mountains). These taxa are represented exclusively by anomalodesmatan bivalves, including deep infaunal suspension feeders. Only 10 of these species are described and figured, the other taxa follow to be described in a future paper. A high number of collected specimens belonging to these taxa permitted the use of biometric methods for species identification and for comparison with the same species described from other Middle Jurassic occurrences. For the mentioned bivalve species, stratigraphic occurrence, facies affinities and a few other paleoecological types of data were recorded.

Keywords: Anomalodesma, bivalves, biometry, paleoecology, Middle Jurassic, Strunga, Romania.

The western slope of the Bucegi Mountains is one of the best known areas in paleontological literature. This area has several outcrops of Middle Jurassic deposits that have been studied from a paleontological point of view since the second half of the last century by Suess (1867), Herich (1885), Redlich (1896), Popović-Hatzeg (1898) and Patrullus (since 1954 until 1959) and Neagu (1982, 1995). All these studies were completed by an exceptional synthesis with regard to the stratigraphy and to the tectonic evolution of this zone, that is the work of Patrullus (1969) "Geologia Masivului Bucegi și a Culoarului Dămbovița".

The complete succession of Middle and Late Jurassic deposits occur in the area of Strunga-Strunghu-Tatare, confined northwards by the Strungh Pass and southwards by the Tatareului Valley. The succession of Middle and Late Jurassic deposits is synthetically presented in Figure 1.

Paleocommunities of these deposits were associated to depositional environments that correspond to proximal shelf environments with sandy and fine sediments and to proximal middle shelf environments (Stoica, 1997). These paleocommunities are characterised by a large variety of marine organisms such as solitary corals, ammonites, belemnites, brachiopods, gastropods, bivalves and crinoids, with a low diversity (excepting the bivalves) but with a rather high density.

In this area, the bivalve fauna is very rich, all previous papers on this subject presenting only lists of species and only few of them having short descriptions or figures for just a few of the bivalve species.

This paper will focus only on Anomalodesmata bivalves, a group that had numerous and diverse representatives and was characterized by high density populations. Until now I could identify 20 species of Anomalodesmatan bivalves:

- **Subclass Anomalodesmata DALL, 1889**
  - Order Pholadomyoida NEWELL, 1985
  - Superfamily Pholadomyacea GRAY, 1847
  - Family Pholadomidae GRAY, 1847

To this family the following species were recorded from Strunga - Tataru Pholadomya murchisoni SOWERBY, 1827, P. deltoidea (SOWERBY, 1827), P. ambiguus (SOWERBY, 1819), P. ovulis (SOWERBY, 1819), P. angustata SOWERBY, 1827, Goniomya intersectans (SMITH, 1817), Goniomya (G.) cf. marginata AGASSIZ, 1842, Homomya gibbosa (SOWERBY), Pachymya (Arcoyma) calceiformis (PHILLIPS).

- **Family Ceratomyidae ARKELL, 1934**
  - It has the following representatives: Ceratomya striata (SOWERBY), Gressaica peregrina (PHILLIPS, 1819), G. rostrata AGASSIZ, 1842, G. abducta intermedia WETZEL, 1957, G. gregaria (ZIETEN, 1830).

- **Family Pleurothyridae DALL, 1900**
  - With the following species: Pleurothyria uniformis (SOWERBY, 1813), P. tenuistriga (MUNSTER) AGASSIZ, 1842, P. subelongata (d'ORBIGNY), P. caudata TERQUEM et JOURDY, 1871, P. alduni (BRONGNIART, 1821), Pleurothyra sp.

- **Superfamily Padoracea RAFFINESQUE, 1815**
  - Family Laternulidae HEDLEY
  - With the species Cercomya cf. undulata (SOWERBY).

Due to advanced diageneisis processes, the preservation degree of macrofauna is generally low or moderate. The original aragonite shells of anomalodesmatan bivalves are preserved as internal casts or composite casts. Almost all recorded individuals have both valves and the ornamentation is quite well preserved.

For the species of gener Ples urineo, Pholadomya, Gressaica, Ceratomya and Homomya, the majority of the collected individuals were found in growth position, with the anterior-posterior axis almost in vertical position, with the anterior side to the base of the sediment and the posterior-ventral side upwards oriented. This facts confirms once more that the life position of these deep infaunal suspension feeder bivalves was vertical. The same life position was described by Fursich (1980) for various representatives of Order Pholadomyida, collected from Middle Jurassic deposits of central England and Poland. Stoica (1997) shows as well P. murchisoni and G. gregaria in life position from Strunga-Tataru.

On the synthetic log established for the researched area (Figure 1), the marker levels were indicated: "Isognomoids level", "Brachiopods level", "Montlivaltia" and Neireids level" and the provenance levels of the above mentioned species.

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Figure 1 - Synthetic log of Strunga-Tataru sector and provenance levels of the mentioned species. Legend: 1 - Leaota cristaline; 2 - white quartzitic microconglomerate; 3 - sandy clay with coal intercalation; 4 - silty marls; 5 - grey sandstone; 6 - sandy clay; 7, 9-21 - grey calcareous sandstone; 8 - pellets alternating with silt bearing siderit concretions; 22 - grey sandstone; 23 - "Tataru Sandstone" calcarenites, quartzitic sandstone, quartzitic microconglomerate levels; 24 - limestone with rich fauna of ammonites; 25 - hard-ground; 26 - green or red marly levels; 27 - chart limestone; 28 - jasper; 29 - massive limestone.
It can be observed that the species *Pholadomya murchisoni* occurs in almost all levels, where it is associated with sandstone levels of sandstone-clay levels of genera *Pleuromya*, *Cercomya* and *Grassiya*. *Pleuromya uniformis* generally occurred in large colonies and it shows a wide tolerance with regard to the type of substratum in which it is half buried. This species is present in lower pelitic levels as well as in sandstone levels, almost like all other deep infaunal suspension feeders, excepting *P. tenulastria* and *P. subelongata*, and it preferred coarser levels of calcareous sandstone.

Species separation in these anomalodesmatan bivalves was possible by means of biometrical methods, very useful for the study of species to which the ornamentation is weakly preserved or for specimens preserved as internal casts.

The first paper in which biometrical methods were applied for bivalve studies was written by Bărăulescu (1963) for Bathonian - Callovian bivalve faunas of Central Dobrogea.

The large enough number of specimens permitted us to apply biometrical methods, based on the use of a large number of measurements on entire shells. The measured dimensions are: Length (L), Height (H), Inflation (I). On the basis of these measurements the ratios H/L and I/L were calculated. Their charts emphasise the variation of height reported to length and the variation of inflation reported to length, respectively.

In this paper the results obtained by biometrical analysis for the species of genus *Pholadomya* and for *Homomya gibbosa* are presented. The charts of Figure 2 permit the clear separation of *P. murchisoni* of the other 3 species of this genus, referred as ratios between height and respectively inflation reported to length and as ratios H/L and I/L reported to L. Although the number of specimens of *P. deltoidea*, *P. ambiguus* and *P. angustata* is low and the dispersal polygons of the four species are relatively close, separation of species can be clearly done when referring to the ornamentation characters: shape of ribs, number of ribs, ways of distribution and development degree of knobs per radial rib.

For the species *H. gibbosa* (Figure 3), I could compare the specimens collected from the Bucegi Mountains to those described by Bărăulescu (1963) from Bathonian deposits of Central Dobrogea. It can be seen that the specimens from Bucegi fit perfectly within the dispersal polygons defined by the species of Central Dobrogea.
The dispersal polygons obtained (Figures 2, 3) show again that the results of biometrical analysis are representative only if the measurements are accomplished on a large number of specimens that have to belong to ontogenetic stages at least related, if not the same. The species differentiation of the same genus must be done with caution, due to the fact that clear, non measurable morphological characters of shells occur frequently, this being the case of the posterior-ventral rib’s shape, the posterior-ventral angle and the ornamentation characters.

**SYSTEMATIC DESCRIPTIONS**

The classification of the bivalves used here is that of Newell (1969, N205).

Class Bivalvia (BONNANI, 1681) LINNE, 1758
Subclass Anomalodesmata DALL, 1889
Order Pholadomyoida NEUWELL, 1965
Superfamily Pholadomyacea GRAY, 1847
Family Pholadomyidae GRAY, 1847
Genus Pholadomya SOWERBY, 1823
Pholadomya murchisoni SOWERBY, 1827
Pl. 1, Figs 1a, 1b, 2a, 2b, 3a, 3b.

1829 Pholadomya murchisoni Sowerby, vol.6, p. 87, pl. 545, fig. 1-3
1862 Pholadomya murchisoni Sowerby; Goldfuss, p. 253-254, pl. 155, fig. 2
1871-1873 Pholadomya murchisoni Sowerby; Terquem et Jourdy, p. 72-73, pl. V, fig. 1-6
1875 Pholadomya murchisoni Sowerby; Moesch, p. 44, pl. XVII, fig. 6-9
1888 Pholadomya murchisoni Sowerby; Herlich, p. 319, pl. XXVI, fig. 2-4
1916 Pholadomya Murchisoni Sowerby; Jekelius, p. 234
1957 Pholadomya murchisoni Sowerby; Himjiayil, P. 159, Tab. XX, fig. 1
1973 Pholadomya murchisoni Sowerby; Romanov, p. 137, pl. 14, fig. 6
1986 Pholadomya murchisoni Sowerby; Pugaczewska, p. 63, pl. 30, fig. 1a-c
1989 Pholadomya murchisoni Sowerby; Dikani, p. 8
1990 Pholadomya murchisoni Sowerby; Dikani & Makarenko, pl. 29, fig. 5-6

**Figure 3 - Scatter diagram showing the Inflation / Length ratio and Height / Length ratio of Homomya gibbosa from Bucegi and Dobrogea**

Material: 92 specimens (LPIII: 1507-1598) represented by internal casts with a high degree of preservation; 34 specimens (1507-1540) were collected from the lower pelitic interval; 58 specimens were sampled from calcareous-sandstone upper levels (levels 17-21).

Dimensions: L=38-71mm, l=27.5-63.9mm, H=32.8-65mm, H/L=0.74-1.11, I/L=0.59-0.95.

Description: oval shell, globular, cordiform and convex anterior part: posterior part more or less elongated. Umbo is prominent and it occurs in the anterior third part of the shell. Ventral margin is slightly convex in the case of elongated specimens, or strongly convex in the case of short specimens. The ornamentation is represented by 7-9 radial, strong ribs developed under the umbo, reaching the ventral margin with one exception: that of the posterior rib that can disappear before reaching this margin. The radial ribs are crossed by concentric growth lines, well outlined at almost regular intervals, fact that makes possible the occurrence of clear knots disposed in a regular manner. This regular, reticular ornamentation represents a typical character of the species. The first anterior rib occurs on the anterior part of the shell. The second rib occurs on the anterior part of the margin and is separated by the following ribs by a larger interval, sometimes even twice in size when compared to the intervals between the following ribs. The second or the third rib occurs in the area of maximal convexity, descending straight towards the ventral margin. The following 3 ribs descend straight as well to the ventral margin and the last 3-4 ribs show in the ventral area a slight strike towards the posterior end.

Occurrence: Strunga-Tataru, Bajocian; Moselle Region, England, Germany, Poland, Russia, Moldavia, with ranges between Bajocian to Callovian.

**Pholadomya ambiguа (SOWERBY, 1819)**

Pl. 2, Figs. 1; 3
1821 Lutaria ambiguа Sowerby, p. 48, pl. 227, fig. 1-2
1862 Pholadomya ambiguа (Sowerby); Goldfuss, p. 255, pl. 156, fig. 1a-c
1875 Pholadomya ambiguа (Sowerby); Moesch, p. 23, pl. VI, fig. 1; pl. VII, fig. 1

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1986 Pholadomya (P.) ambigu (Sowerby); Pugaczewska, p. 66, pl. 32, fig. 6
Material: two internal casts (LPBIIIL 1602-1603).
Dimensions:

<table>
<thead>
<tr>
<th>Nr. LPB</th>
<th>L (mm)</th>
<th>H (mm)</th>
<th>I (mm)</th>
<th>H/L</th>
<th>I/L</th>
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<td>72,7</td>
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<td>98,5</td>
<td>59,3</td>
<td>56,2</td>
<td>0,60</td>
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Description: Shells elongated longitudinally, with sub-triangular or oval outline. Umbo is placed in the anterior third section of the shell. The dorsal margin is straight and the ventral one is almost straight or slightly convex. The ornamentation is represented by 7 radial ribs; the first of which occurs in the anterior part, is largely bent and reaches the anterior-ventral margin. The following 2 ribs occur in the central part, descending almost perpendicularly to the ventral margin, the following 2 descend obliquely towards the ventral, posterior part. The radial ribs are strong enough (especially ribs 2-5) and they gain a slightly pustular aspect due to the concentric lines crossings which are prominent enough.

Remarks: the collected specimens fit in description, figures and dimensions in the limits of Sowerby (1821), Goldfuss (1862) and Moesch (1875) but they are larger than those of Pugaczewska (1898) from Poland.

Occurrence: Tatarul Valley's upper stream, from calcareous sandstone upper levels (levels 17-21): Poland, Polish Lowlands, North of Central Uplands, Middle Batsianon - Early Callonian; Germany and England, Early-Middle Jurassic.

Pholadomya (Pholadomya) deltaidea (SOWERBY, 1827)
Pl. 2, Figs: 1-2
1853 Pholadomya solitaria, Morris and Lycett, p. 124, pl. XI, fig. 1; pl. XII, fig. 2
1863 Pholadomya deltaidea Sowerby; Lycett, p. 86, pl. XLI, fig. 4, 4a
1875 Pholadomya deltaidea Sowerby; Moesch, p. 39, pl. XII, fig. 2, 3; pl. XIII, fig. 1, 2; pl. XIV, fig. 1-4
1898 Pholadomya deltaidea (Sowerby); Cox and Arkell, p. 43
1896 Pholadomya (P.) deltaidea Sowerby; Pugaczewska, p. 64, pl. 32, fig. 7
Material: 3 specimens (LPBIIIL 1599-1601) internal casts with a moderate degree of preservation.
Dimensions:

<table>
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<tr>
<th>Nr. LPB</th>
<th>L (mm)</th>
<th>H (mm)</th>
<th>I (mm)</th>
<th>H/L</th>
<th>I/L</th>
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<td>73</td>
<td>79</td>
<td>57</td>
<td>1,08</td>
<td>0,76</td>
</tr>
<tr>
<td>1600</td>
<td>79</td>
<td>82</td>
<td>68</td>
<td>1,03</td>
<td>0,86</td>
</tr>
<tr>
<td>1601</td>
<td>69</td>
<td>75</td>
<td>59</td>
<td>1,08</td>
<td>0,85</td>
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</tbody>
</table>

Description: Shells with sub-triangular outline and prominent, orthogyrumbo. Ventral margin is rounded and bent. The posterior-ventral area is narrow. The anterior surface has a cordiform aspect. Ornamentation is represented by 7 radial ribs of which the first two are largely arched and they occur in the anterior part. The following 5 ribs are well prominent and they occur on the flanks, excepting the last two ribs which disappear gradually without reaching the ventral margin. The concentric lines are prominent, separated by regular, almost equal intervals, generating within the crossing with the radial ribs a slight pearly ornamentation.

Remarks: Lycett (1863) and Pugaczewska (1896) showed that the variability of this species is wide, from the following points of view: dimensional (depending of the faces type), of number of ribs (between 7 and 8 ribs) and of ribs' interval dimensions. When analysing the specimens with these criteria, the individuals collected from the Bucegi Mountains fit well in the dimensional boundaries described by Lycett and Moesch but they are larger than those described by Pugaczewska. They resemble in dimension and occurrence of intervals the material of the above mentioned authors, P. deltaidea and P. protei described by Arkell (1935, p. 334, Pl. XVI, Fig. 9, Pl. XVII, Fig. 1) have more numerous ribs (7) and they cover the most part of the shell. P. protei has 3-4 ribs occurring in the middle part of the valves. On the other hand, the specimens of P. protei described by Arkell were collected from Oxfordian - Kimeridgian deposits. This is why Arkell (1935) showed that "some species of P. deltaidea from the Combrash, closely resemble some of P. protei from Malton, but in the Combrash species, the ribs are always more numerous, covering more of the posterior part of the shell".

Occurrence: Tatarul Valley upstream, from the calcareous sandstone upper levels; Poland, Polish Lowlands, North of Central Uplands, Middle Batsianon; England, abundant in Great Oolite and Combrash, Late Bajocian - Batsianon-Early Callonian.

Pholadomya (Pholadomya) ovalis (SOWERBY, 1819)
Pl. 1, Figs: 4a, 4b
1842 Pholadomya ovulum Agassiz, p. 119, Tab. 3, fig. 7-8; Tab. 3b, fig. 1-6
1842 Pholadomya fabacea Agassiz, p. 120, Tab. 3b, fig. 10-12
1854 Pholadomya ovulum Agassiz; Morris and Lycett, p. 122, Tab. XIII, fig. 12
1854 Pholadomya ovulum Sow; Morris and Lycett, p. 141, Tab. XV, fig. 14
1863 Pholadomya ovulum Agassiz; Lycett, p. 84, Pl. XXXV, fig. 18, 18a
1867 Pholadomya ovulum Agassiz; Laube, p. 50, Tab. V, fig. 2
1875 Pholadomya ovulum Agassiz; Moesch, p. 48, Tab. XX, fig. 6-8, 11
1916 Pholadomya ovulum Agassiz; Jekelius, p. 236
1948 Pholadomya ovulum (Sowerby); Cox and Arkell, p. 44
1989-1990 Pholadomya (P.) ovalis (Sowerby); Dikani & Makarenko, p. 12 (1989), Tab. 30, fig. 10-12; 16-17
1998 Pholadomya (P.) ovalis (Sowerby); Bărbulescu in Dragastan et al., p. 142, Pl. VI, fig. 3
Material: 1 specimen (LPBIIIL 1489), internal cast with both valves still preserving shell fragments.
Dimensions:

<table>
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<th>H (mm)</th>
<th>I (mm)</th>
<th>H/L</th>
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<td>24</td>
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<td>18,5</td>
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<td>21,6</td>
<td>0,57</td>
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<tr>
<td>28,4</td>
<td>16,9</td>
<td>27,8</td>
<td>0,66</td>
<td>0,50</td>
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<tr>
<td>45</td>
<td>28,7</td>
<td>22</td>
<td>0,63</td>
<td>0,48</td>
</tr>
</tbody>
</table>

Description: Oval-elongated shell, with a short anterior part rounded, closed margins, slightly rostrate.
posterior part of shell attenuate and elongated with a small or moderate opening; prosogyrr umbo, high, slightly flattened; dorsal margin of shell almost horizontal and slightly concave on both parts of the umbo; ventral margin largely and elliptically curved, almost horizontal in its middle part. Both valves present longitudinal foldings and fine radial ribs, very narrow and far from each other. The preservation degree is not so good and it permits the observation of only 3 radial, fine ribs of the right valve, immediately back of the umbo.

These ribs seem to descend obliquely towards the ventral margin. All other ribs can only be intuited as they begin to disappear in the middle area of the valve and they vanish before reaching the ventral margin.

Remarks: The collected specimen, weakly preserved, could be assigned to P. (P.) ovalis (SOW) taking into consideration the general characters of the shell and H/L and I/L ratios that fit those shown by previous authors. With regard to the ornamentation, Morris and Lycett (1854) and Lycett (1863) show that in many specimens the fine, radial ribs are weakly marked, sometimes visible only in the part of umbo, as it is the case of the collected specimen.

Occurrence: Strunlita, lower pelitic level (8th level), Bajocian; Central Dobrogea, Mireasa, Upper Bithanian; England, Inferior Oolite, Cottewolds Hills, Great Oolite, North England, Combrash, Yorkshire; Rusia, Donetz Basin, Bithanian.

Pholadomya sp. aff. Pholadomya angustata SOWERBY, 1827
Pl. 1, Figs. 5a, 5b

Material: 2 specimens (LBPIII 1477-1488), internal casts with moderate preservation degree, without preserving the ornamentation characters.

Dimensions:

<table>
<thead>
<tr>
<th>N°. LRBP</th>
<th>L (mm)</th>
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<th>I (mm)</th>
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<td>13.6</td>
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<td>1488</td>
<td>50</td>
<td>27.4</td>
<td>21</td>
<td>0.54</td>
<td>0.42</td>
</tr>
</tbody>
</table>

Description: Oval shell, almost rectangular, strongly elongated longitudinally; anterior part very short and slightly convex; posterior part very elongated and slightly bent upwards. Posterior opening very narrow, like a slit (specimen LBP III 1487) or reduced (LBP III 1488). Umbro is slightly erected over the dorsal margin and it occurs very close to the anterior end. Anterior margin rounded, ventral margin largely arched (largely convex), posterior-ventral margin rounded and bent slightly upwards. Dorsal margin almost straight and horizontal. Immediately back of the umbo occur the ligament nymphs, slightly depressed, straight and elongated. The maximal convexity zone occurs in the anterior half of the shell, the posterior end being laterally compressed. Only on specimen LBP III 1487 concentric, strongly enough grown folds can be seen, developed on the entire surface of the shell.

Remarks: 14-15 fine, radial ribs represent one of the typical characters of P. angustata. Although these ribs are not seen in the collected material, the specimens are compared to this species on the grounds of similarities in general shell shape and in H/L and I/L ratios. The specimens show an identical shape with the specimen figured by Labé (1967, p. 51, Taf. V, Fig. 3). In general shape and dimensions (including the ratios H/L and I/L) the collected specimens are close to those described and figured by Moesch (1875, p. 33, Tab. X, fig. 2-4, H/L=0.54, I/L=0.43), by Bărbulescu (1974, p.

123, Pl. XXVII, Fig. 6), by Pugaczewska (1986, p. 65, Pl. 31, Fig. 6), by Dikani & Makarenko (1989-1990, p. 18, Tab. 30, Figs. 1, 2). As Bărbulescu showed (1974), the difference between P. angustata and P. ovalis is represented by the more elongated longitudinally, inequilateral, less convex shapes in anterior part and more compressed shapes in posterior part. The collected specimens resemble in general shape and in H/L (0.54) ratio P. canaliculata ROEMER, for which I could review the collection of University Claude-Bernard, Lyon 2 (specimens 59045a and b). Although this resemblance occurs, the ratio I/L for P. canaliculata (I/L=0.51) is much higher than P. angustata (I/L=0.36-0.42). P. angustata has generally 12-14 radial ribs and P. canaliculata only 10 ribs, while in the Carpathian material these ribs are not preserved.

Occurrence: Strunlita, calcareous sandstone upper levels (levels 17, 18), Bajocian, Central Dobrogea, very rare in the Bithanian deposits of Tichilesti Valley, Poland; North of Central Uplands (Rudniki), Bithanian, England, Switzerland, Hungary, Turkmenea: Early-Middle Jurassic (Callovian).

Genus Goniomya AGASSIZ 1842
Goniomya (Goniomya) intersectans (SMITH, 1847)
Pl. 4, Figs. 4 - 7

1821 Mya anguilfera; Sowerby, p. 46, Pl. 224, fig. 6, 7
1854 Goniomya letterata (Sowerby); Morris & Lycett, p. 119, Pl. XI, fig. 3
1862 Lyssianassa letterata; Golofuss, Pl. 154, fig. 8
1948 Goniomya intersectans Cox; Cox & Arkell, p. 45
1969 Goniomya (Goniomya) intersectans (Smith); in R. C. Moore, p. N832, fig. 11: 4a, 4b
1998 Goniomya (Goniomya) intersectans (Smith); A. Bărbulescu în Dragasani et al., p. 142, Pl. VI, fig. 13-15

Material: 10 specimens (LBP III 1470-1479), internal casts presenting a moderate degree of preservation.

Dimensions:

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</tbody>
</table>

Description: Shell oval with moderate size and convexity, strongly elongated longitudinally, umbo occurring in the anterior third part of the shell. Umbo is small, rounded and slightly flattened, erected very low over the dorsal margin. Dorsal margin is long and almost straight, concave immediately back of umbo. In front of umbo, the dorsal margin descends slightly oblique towards the anterior end which is rounded. The anterior part is very short, having a rounded margin, the posterior part is very elongated and has a rounded end as well. Ventral margin is straight or very largely arched. The majority of specimens are opened in posterior and ventral parts. As Dikani & Makarenko (1989) showed, the species G. (G.) doubois AGASSIZ has a rounded, low hull from umbo to the inferior-posterior angle from which, the valve surface is concave towards the cardinal margin. This character is shared with the Romanian specimens. To the opposite part, this hull bounds the valve surface covered by usual ribs. The corresponding hull of the posterior part can not be observed in the collected specimens. The valve surface is covered by "V" shaped ribs, with the apex oriented towards the ventral margin. These ribs are gradually developed from
umbo towards the ventral margin. The central line that connects the anterior and posterior ribs descends obliquely fromumbo to the ventral margin. The acute angle formed by the two branches of ribs is variable (around 45°) in the collected specimens. The anterior branches of ribs are narrower, sharper, and the intervals between them are wider than the ribs. The first 2-3 ribs running from the anterior part towards the centre of the shell never form the "V" shape and they descend obliquely towards the ventral margin. They are slightly sinuous. Sometimes, the first anterior rib is concentric with the anterior margin. The posterior branches of ribs are slightly wider and the intervals between ribs are almost as wide as the latter. The last posterior branches of ribs do not generate the "V" shape. In almost all specimens, the ribs attenuate close to the ventral margin, that is covered only with concentric growth lines.

Remarks: Goniomya (Goniomya) intersectans (Smith) is different from G. luteata (Sow.), synonym of G. (V.) scripta SOW., according to Cox and Arkell, 1948) by its larger dimensions. G. (G.) intersectans is strongly inequilateral, with the posterior part very elongated and the anterior part very short. In G. luteata, the central line connecting the apex of "V" shape is almost perpendicular to the ventral margin, while in G. (G.) intersectans this line makes an acute angle with the ventral margin. G. (G.) intersectans is different from G. (G.) dubois AG. and G. (G.) hemisctosa by its lack of horizontal segments that connects the anterior branches with the posterior ones.

Occurrence: Strunga, Strungulitia, Tataru Peak, from the calcareous sandstone upper levels (levels 17-21), Bajocian; Central Dobrogea: Casian, Lower Callovian; England: Fuller’s Earth Rock of North Dorset, Somerset, Dyham, Glos.

Goniomya sp., cf. Goniomya (Goniomya) marginata AGASSIZ, 1842

Pl. 4, Fig. 8

Material: 1 specimen (LPBIII L 1469). Left valve internal cast.

Dimensions: L = 740mm, H = 322mm.

Description: Shell oval, longitudinally elongated, with the posterior part shorter than the anterior part. Umbo is small, rounded, curved towards the opposed valve and low over the dorsal margin. It occurs close to the centre of the dorsal margin. Right ventral margin straight or largely curved. The characteristic ornamentation of the species is represented by ribs in "V" shape, concentric from umbo to the ventral margin. The line that connects anterior and posterior branches of ribs descends almost perpendicularly from the umbo to the ventral margin. The last ribs from the posterior part are gradually disappearing, when they become concentric with the growth lines.

Remarks: In dimensions, general shape, position of umbo and ornamentation, the Carpathian specimen is closest of G. marginata AGASSIZ (1842, Tab. 1, Figs. 12-14). It is different from G. (G.) intersectans by its length of posterior part, which is much longer in the latter and has an umbo that occurs in the anterior third part.

Occurrence: Strunga - Tataru Peak, from calcareous sandstone upper levels, Bajocian.

Genus Homomya AGASSIZ, 1843

Homomya gibbosa (SOWERBY)

Pl. 4, Figs. 1, 2a, 2b, 3a, 3b

1855 Myacites gibbosus (Sowerby); Morris & Lycett, p. 138, Pl. XII, fig. 14

1863 Homomya gibbosa (Sowerby); Lycett, p. 88, Pl. XLIll, fig. 2, 2a

1948 Homomya gibbosa (Sowerby); Cox & Arkell, p. 44

1963 Homomya gibbosa (Sowerby); Bárbspescu, p. 54, Pl. VII, fig. 55; Pl. VIII, fig. 62; Pl. IX, fig. 64

1963 Homomya vezelayi (d’Arch.); Bárbspescu, p. 56, Pl. VII, fig. 50, 61; Pl. IX, fig. 65

1974 Homomya gibbosa (Sowerby); Bárbspescu, p. 121, Pl. XXIX, fig. 1-3

Material: 8 specimens (LPBIII 1440-1447), internal, complete casts. 1 specimen (LPBIII 1445) is juvenile, with a moderate degree of preservation.

Dimensions: L = 1059.6 (96 - 1200mm); H = 64.1 (55 - 73.8mm); I = 56.2 (50 - 62mm); H / L = 0.59 (0.53 - 0.64); I / L = 0.52 (0.51 - 0.56); Juvenile specimen LPBIII 1445: L = 64mm; H = 33mm; I = 24mm; H / L = 0.52; I / L = 0.37.

Description: Shell oval, longitudinally elongated in shape, slightly inequivalve, accentuated inequilateral, opened in posterior part. The anterior part is short and rounded, the posterior one is more elongated and rounded. Umbo is large and flattened and it occurs in the anterior third part, very close to the anterior end. The dorsal margin is straight and largely concave in the middle part. The ventral margin is straight or largely convex in the middle part. The external surface of the shell is covered by concentric growth lines, situated at irregular intervals. The only juvenile specimen preserves shell remains in an exceptional way (Pl. 4, Fig. 3a). On these remains it was possible to observe the characteristic ornamentation for juvenile stages (Pl. 4, Fig. 3b), represented by radial, extremely fine ribs, slightly arched with respect to the previous shell margins. The direction of ribs is marked by a fine granulation that occurs regularly. The specimen figured by Morris & Lycett (1855, Pl. XV, Fig. 11a, b) is attributed to species Myacites beani. But Cox & Arkell (1944, p. 44) consider this species as a juvenile stage of H. gibbosa.

Occurrence: “La Politie” Pass, Gaura Valley, Strunga, Tataru Peak, from the calcareous sandstone upper levels, Bajocian; Central Dobrogea: Tichilesti Valley, Casian, Bathonian; England: Great Oolite, Upper Fuller’s Earth, Lower Cornbrash, Lower Oolite, Parkinson zone, Corellians, Lower Calcareous Grit.

Genus Pachymya SOWERBY, 1826

Subgenus Arcomya ROEMER, 1839

Pachymya (Arcomya) calceiformis (PHILLIPS)

Pl. 1, Figs. 6a, 6b, 7a, 7b, 8

1854 Myacites calceiformis (Phillips); Morris & Lycett, p. 113, Pl. XI, fig. 2

1854 Anatina undulata, Morris & Lycett, p. 188, Pl. XI, fig. 4

1863 Myacites calceiformis (Phillips); Lycett, p. 80, Pl. 42, fig. 1

1965 Pleuromya calceiformis (Phillips); Cox, p. 132, Pl. 20, fig. 9

1989 Pleuromya calceiformis (Phillips); Fischer, p. 115, fig. 24

1986 Pleuromya calceiformis (Phillips); Pugaczewska, p. 69, Pl. 34, fig. 3a - b

1998 Pachymya (Arcomya) calceiformis (Phillips); Bárbspescu în Dragana et al., p. 144, Pl. VII, fig. 1, 2

Material: 4 specimens (LPBIII 1480-1483; 1843-juvenile specimens), internal casts with moderate degree of preservation.
shape is sub-rectangular to sub-trapezoidal. High, compressed, strongly prosylyr umbo. Ornamentation is represented by longitudinal ribs, oblique, that develop concentrically from the anterior to the posterior parts. The first anterior ribs are slightly undulated and they develop almost parallel or concentric with the valve margins in the middle part. Seen from anterior part, the ribs seem to divide before reaching the flanks (PI. 3, Fig. 2). The ribs of the valve flanks are obliquely developed, running from the upper to the lower margins. These longitudinal ribs are thick enough, very clear and they form in the posterior part a sharp, very clear angle, observed very well at juvenile specimens (PI. 3, Figs. 3a, 3b, 3c). As Lissajous (1923) and Morris & Lyckett (1855) showed, in adult stages these sharp angles of the ribs are often flattened, eroded or they simply disappear. By contrary, in the posterior and middle parts of the valves, very fine ribs are developed radial, from umbo towards the lower margin. These radial lines are extremely fine and they can be clearly seen in the collected specimens, as M. Clerc noticed (1904, after Bărbulescu, 1974). A very well preserved adult specimen (PI. 2, Fig. 6) shows clear "V"-shaped ribs on the posterior part. The zone of maximal inflation of the shell occurs in the anterior and superior third part of the valves. With regard to the dimensions of the small sized collected specimens (juvenile stages), these are very close to the dimensions given by Fischer (1969, p. 144, for the Bathonian deposits of SW Ardennes Massif) and the large sized specimens (adult stages) are close enough to those described by Morris & Lyckett (1854, p. 108, for the upper sequence of the Lower Oolite in England) and by Bărbulescu (1974, 1999, for the Bathonian deposits of Central Dobrogea).

Occurrence: Strunga, Tataru Peak, from grey, calcareous sandstone upper levels, Bajocian; Central Dobrogea: Tichilesti Valley, Miresa, Upper Bathonian; France: SW Ardennes Massif, the zone with Hecticoceras retrocostatum (Dayave locality), marly-limestones with Pholadomyidae (Fusseis, Hurigny localities); England: Upper Inferior Oolite, Great Oolite, Paris Basin, Swiss Jura, Bathonian.

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PLATES

Plate I

Figs. 1a, b; 2a, b; 3a, b. - Pholadomya murchisoni SOWERBY; 1a, 2a, 3a - left valve, x1; 1b - anterior view, x1; 2b, 3b - dorsal view, x1. 1a, b, 2a, b - Strungra-Tataru sector, Bajocian, lower pelitic levels; 3a, b - Bajocian, Strungra-Tataru sector, calcareous-sandstone upper levels.

Figs. 4a, b - Pholadomya (Pholadomya) ovalis (SOWERBY); 4a - right valve, x1; 4b - dorsal view, x1; Strungra-Tataru sector, Bajocian, lower pelitic level.

Figs. 5a, b - Pholadomya sp. aff. Pholadomya angustata SOWERBY; 5a - right valve, x1; 5b - dorsal view, x1; Strungra-Tataru sector, Bajocian, calcareous-sandstone upper levels.

Figs. 6a, b; 7a, b; 8 - Pachymyia (Arconyma) calceiformis (PHILLIPS); 6a - left valve, x1; 6b, 7b - dorsal view, x1; 7a, 8 - right valve, x1; Strungra-Tataru sector, Bajocian, calcareous-sandstone upper levels.

Figs. 9, 10, 11a, b - Ceratomya cf. C. undulata SOWERBY; 9, 10, 11a - left valve, x1; 11b - dorsal view, x1; Strungra-Tataru sector, Bajocian, calcareous-sandstone (5th level).

Plate II

Figs. 1, 3 - Pholadomya ambiguа (SOWERBY); 1 - left valve, x1; 3 - right valve, x1; Strungra-Tataru sector, Bajocian, calcareous-sandstone upper levels.

Figs. 2, 4 - Pholadomya (Pholadomya) deltoidea (SOWERBY); left valves, x1; Strungra Tataru sector, Bajocian, calcareous-sandstone upper levels.

Figs. 5, 6 - Ceratomya striata (SOWERBY); 5 - left valve, x1; 6 - characteristic ornamentation with "V" shaped ribs in the posterior part of the shell, x 2,5; Strungra-Tataru sector, Bajocian, calcareous-sandstone upper levels.

Plate III

Figs. 1a, b, c, d; 2 - Ceratomya striata (SOWERBY); 1a - right valve, x1; 1b left valve, x1; 1c - anterior view, x1; 1d - dorsal view, x1; 2 - anterior view - the ribs seem to divide before reaching the flanks, x1; Strungra-Tataru sector, Bajocian, calcareous-sandstone upper levels.

Figs. 3a, b, c - Ceratomya striata (SOWERBY) - juvenile specimen; 3a - posterior view, x1; 3b - left valve, x1; 3c - anterior view, x1; Strungra-Tataru sector, Bajocian, calcareous-sandstone upper levels.

Plate IV

Figs. 1, 2a, b - Homomyia gibbosa (SOWERBY); 1 - right valve, x 0,90; 2a - left valve, x 0,90; 2b - dorsal view, x 0,90; Strungra-Tataru sector, Bajocian, calcareous-sandstone upper levels.

Figs. 3a, b - Homomyia gibbosa (SOWERBY), juvenile specimen; 3a - right valve, x 1; 3b - characteristic ornamentation, represented by radial, extremely fine ribs, slightly arched with respect to the previous shell margins. The direction of ribs is marked by a fine granulation that occurs regularly, x 3; Strungra-Tataru sector, Bajocian, calcareous-sandstone upper levels.

Figs. 4 - 7 - Goniomyia (Goniomyia) intersectans (SMITH); 4, 6 - right valve, x 1; 5, 7 - left valve, x 1; Strungra-Tataru sector, Bajocian, calcareous-sandstone upper levels.

Fig. 8 - Goniomyia sp., cf. Goniomyia (Goniomyia) marginata AGASSIZ, left valve, x 1; Strungra-Tataru sector, Bajocian, calcareous-sandstone upper levels.