CONTRIBUTIONS TO THE KNOWLEDGE OF THE MARINE MIDDLE MIOCENE MILIOLIDA FROM ROMANIA

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Abstract. 53 species of Miliolida coming from marine Middle Miocene from Romania were described and illustrated. Amongst them, a new genus (Dervieuxina) and two new species (Triloculina dentata and Borelis roegli).

Keywords: Miliolida, New taxa, Middle Miocene, Romania.

The miliolids make up a special group of benthic foraminifera. Their characteristics are the wall porcelaneous structure and the chambers arrangement, which are considered as the main characters for classification.

They can be good stratigraphic markers, as well as good indicators for the reconstruction of the paleoenvironmental and sedimentation conditions. Miliolids are generally shallow water dwellers, but some species are known to adapt to deep-water conditions.

As shown by Murray (1991), the living miliolids exceed 20% of the benthic foraminiferal assemblages only in normal marine to hypersaline lagoons and marshes and is normally <20% in shelf areas. Generally, they can stand salinities between 32‰ and more than 60‰.

Most miliolids are epifaunal, either sessile or free, and many of them are known as epiphytic.

As diagnostic features at generic level, Luczewska (1972, 1974) took into consideration the form of the aperture and of the apertural modifications, the inner structure and the coiling type of the chambers.

The present study was thought as an exhaustive approach on the Badenian miliolids collected from the famous fossiliferous localities Coști (Valea Gemini, Valea Popii), Lâpugiu de Sus (Valea Coșului) and Buituri (Valea lui Ion), as well as from many other sites: Valea Satului section (Panc, Hunedoara distr.), the Popești Quarry section (north of Cluj), Valea Hășmașului (NE from Retegu on the Someșul Mare Valley), some drillings and outcrops from the Caransebeș Basin (Valea Zlagna drilling, Buchin drilling, Balta Sărată section, Delinești section), as well as the drillings Coșevita and Marginea (Bega Basin), Vânatori, Pria and Ponița in the southern extremity of the Șimleu basin, Curtuiș (Baia Mare Basin), western Oltenia (Colibași, Valea Morilor section), Lower Strei Basin (Țeiușul Superior, surroundings of the Hunedoara town, Călan Quarry, surroundings of the Nădăști village and short sections on the Silivaș Valley), the right flank of the Mureș River (Vârmaga village, Hunedoara distr.), the surroundings of the Brad town, the left flank of the Crișul Alb Valley, Valea Pute Râu (Predaell – Sărări, Prahova District), Valea Muscelului section (Pătârlagele, Buzău District) and others.

Order Miliolida Lankester, 1885
Superfamily Cornuspiraceae Schultze, 1854
Family Cornuspiridae Schultze, 1854
Subfam. Cornuspirininae Schultze, 1854
Cornuspira Schultze, 1854
Cornuspira foliacea (Philippi), 1844

Orbis foliaceus Philippi, 1844, Enum. Mol. Sicil. 2, p. 147, Plate 24, Figure 26 (fide Ellis & Messina).
Cornuspiroides foliaceus (Philippi), Barker, 1961, Plate 11, Figures 5, 6.
Test large, discoidal, strongly flattened, consisting of a globular proloculus and a long planispiral undivided evolute second chamber which in the adult has a high rate of growing; wall calcareous, porcelaneous; surface smooth, with fine arched or sinuous transverse growing striae; aperture at the end of strongly flattened tube.

Range. In Paratethys this species is common in marine Middle Miocene (= Badenian).

Cornuspira plicata (Cziczek), 1847
(Plate 1, Figure 1)

Opeculina plicata Cziczek, 1847, p. 146, Plate 13, Figures 12, 13
Test free, planispiral evolut, flattened;

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globular proloculus followed by a long undivided evolute tube; cross-section of tube elongated, more flattened on marginal part, pseudocarinate; surface with fine transverse striae.

Remarks. This species is closely related to Operculina carinata Costa, 1856 (Atti Accad. Pontaniana, Napoli, 7/2, p. 209, Plate 17, Figure 1 A, B - see also Barker, 1961, Plate 11, Figure 4) suspected to be a junior synonym.

Range. In Paratethys is rare in Lower Serravallian (= Wilcian).

Cornuspira striata (Czjzek), 1847
(Plate 1, Figure 2)
Operculina striata Czjzek, 1847, p. 146, Plate 13, Figures 10, 11
Operculina angigrya Reuss, 1850, p. 370, Plate 46, Figure 21.
Operculina involvens Reuss, 1850, p. 370, Plate 46, Figure 21.

Remarks. Species with a large variability during its ontogeny. Initial chamber spherical, followed by a long undivided tube; the first 10-15 whorls have oval to circular section, the next 10 whorls subcircular to quadrangular section, more broad than high (this stage was named by Reuss Operculina angigrya); in the next stage become slightly involute with subquadruangular section and the surface of the test ornamented with longitudinal, concentric, interrupted striae; the mature stage is involute, the section of the tube is semicircular or semilunar and surface with concentric striae (this stage was named by Reuss Operculina involvens).

The holotypes of these synonym species are coming from the "Badener Tegel"; they were mentioned by Karrer (1866, p. 130-131) from Coștei.


Subfam. Cornuspiroidinae Saidova, 1981
Cornuspiroidea Cushman, 1928
Cornuspiroidea striolatus (Brady), 1882

Cornuspira striolata Brady, 1882 (in Tizard & Murray); Brady, 1884, p. 202, Plate 113, Figures 18, 19.
Cornuspiroidea striolatus (Brady). Cushman, 1928, p. 3; Barker, 1960, Plate 113, Figures 18, 19; Hornibrook, 1961, Plate 3, Figure 43.

Test free, large (2-4 mm), flabelliform; proloculus globular, followed by an undivided, second chamber, planispiral, gradually enlarging at the beginning, later more rapidly becoming flattened and flabelliform; wall aragonitic, porcelaneous, yellowish white in color; surface with numerous longitudinal concentric striae; aperture an elongated slit at the open end of the last chamber.

Remarks. There was found only one specimen in the upper part of Valea Gemini section; unfortunately the test turned into powder by desiccation of the rock.

Family Nubeculariidae Jones, 1875
Subfam. Nodophalminae Cushman, 1978
Stellartculina Papp & Schmid, 1978
Stellartculina mutabilis (d' Orbigny), 1846
(Plate 1, Figure 3)
Linguina mutabilis d' Orbigny, 1846, p. 61, Plate 2, Figures 52-54

Remarks. This species with a large intraspecific variability was studied by Papp & Schmid; they included in the synonym of Linguina mutabilis the species Nodosaria quadra (d' Orbigny, 1846, p. 36, Plate 1, Figures 28, 29) and N. boueana (d' Orbigny, 1846, p. 37, Plate 1, Figures 30, 31). The taxon is rare in our material coming from Coștei and Lăpușiu de Sus. There is a large variability: there were recorded specimens with discoidal second chamber or flattened with two carinas (as in Adelosina) then uniseriate chambers, slightly elongated, tr-, tetra- or multicoastate. The species described by Karrer (1867) from Lăpușiu de Sus as Triloculina nodosaroides (p. 360, Plate 2, Figure 9) is suspected to be a microspheric specimen of the same species with a more developed mioloid initial stage (see also Luczkowska, 1974, p. 70, Plate 16, Figures 15, 16). Another suspected synonym - Vertebralina elongata Karrer (1865, p. 155, Plate 3, Figure 10).

Range (in Paratethys) - Upper Langhian, Upper Lagenid Zone.

Family Ophthalmidiidae Wiesner, 1920
Edenostomina Collins, 1958
Edenostomina bujurensis Popescu, 1979
Edenostomina bujurensis Popescu, 1979, p. 17, Plate 6, Figures 1, 2

Test elongated to oval, triangular or lenticular in cross-section with acute margins; aperture triangular, elongated, surrounded by distinct lip.

Remarks. Some specimens assigned to Edenostomina bujurensis differ in pseudoquinqueloculind arrangement of the chambers (microspheric forms?).

Range. Species mentioned only in Romania in Badenian (Langhian and Kossovan).
Superfamily Miliolacea Ehrenberg, 1839
Family Spiroloculinidae Wesner, 1920
Adelosina d’Orbigny, 1826
Adelosina longirostra (d’Orbigny), 1846
(Plate 1, Figure 5)
Quinqueloculina longirostra d’Orbigny, 1846, p. 291,
Plate 18, Figures 25-27
Quinqueloculina mariae d’Orbigny, 1846, p. 300,
Plate 20, Figures 13-15
Adelosina laevigata d’Orbigny, 1846, p. 302,
Plate 20, Figures 22-24

Remarks. The three species described by d’Orbigny were considered as synonyms by Papp & Schmid (1985). In their opinion, A. laevigata represents juvenile specimens of A. longirostra, and Quinqueloculina mariae are megalospheric young specimens of A. longirostra. See also Luczkowska (1972).

Range. Badenian.

Adelosina schrebersii (d’Orbigny), 1846
(Plate 1, Figures 8, 10, 11)
Quinqueloculina schrebersii d’Orbigny, 1846, p.
296, Plate 19, Figures 22-24.
Quinqueloculina josephina d’Orbigny, 1846, p. 297,
Plate 19, Figures 25-27.
Adelosina pulchella d’Orbigny, 1846, p. 303, Plate
20, Figures 25-29.

Remarks. Papp & Schmid (1985) regard Adelosina pulchella as juvenile stage of A. schrebersii. The specimens described by d’Orbigny as Quinqueloculina schrebersii represent microspheric generation and Q. josephina are young A-generation (megalospheric) of the same species.

Inaequalina Luczkowska, 1971
Inaequalina jadwigae Luczkowska, 1971
(Plate 1, Figures 12, 13)
Inaequalina jadwigae Luczkowska, 1971, p. 441,
Plate 25, Figures 1-11; Popescu, 1979, p. 15,
Plate 4, Figure 5, Plate 5, Figure 1-5, Plate 31,
Figure 1, 2.

Remarks. This species is similar with Spiroloculina acutimargo Brady (1884, Plate 10, Figure 12, non 13), transferred by Thalmann to S. affixa Terquem and to Spiroloculina elevata Wesner (1923, p. 36) by Barker (1960). The species I. jadwigae should be considered as a junior synonym of Inaequalina elevata. Jones (1994) regarded Inaequalina as a junior synonym of Spiroloculina. The two genera differ in their symmetry: Inaequalina have a concave-convexe transverse - axial section instead of biconvex one as in Spiroloculina.

Range. Species rare. It was mentioned by Luczkowska (1971) from "Lower Tortonian" in Poland. In Romania, the described species was recorded, rarely, from Lăpușiu and Costei (Lower Badenian) and frequent from Kossovan (e.g. in Valea Morilor Section).

Subfam. Spiroloculininae Wesner, 1920
Spiroloculina d’Orbigny
Spiroloculina canaliculata d’Orbigny, 1846
(Plate 2, Figures 1, 2)
Spiroloculina canaliculata d’Orbigny, 1846, p. 259,
Plate 16, Figures 10-12; Papp & Schmid, 1985,
p. 90, Plate 84, Figures 5, 6.

Remarks. Differs from S. badenensis and S. excavata by its elongated apertural neck, small, oval aperture and very thin inner cavity.

Range. Species common in the Lower and Middle Miocene.

Spiroloculina excavata d’Orbigny, 1846
(Plate 1, Figure 14, Plate 13, Figure 2)
Spiroloculina excavata d’Orbigny, 1846, p. 271,
Plate 16, Figures 19-21; Papp & Schmid, 1985, p.
91, Plate 85, Figures 5, 6.

Test flattened, elliptical in outline, biconcave;
surface smooth; sutures distinct; external margin of the chambers higher than inner one, and sharp.

Remarks. There were separated micro- and megalospheric specimens, the differences consisting in the dimensions of the initial chamber and in the arrangement of the chambers following the proloculum.

Range. Middle Miocene (in Paralethys).

Spiroloculina rostrata Reuss, 1850
Spiroloculina rostrata Reuss, 1850, p. 382, Plate 49,
Figure 7.

Remarks. Species small, very rare, described from Lăpușiu de Sus. Our specimen is coming from Valea Costului section, Lăpușiu de Sus, from deposits assigned, biostratigraphically, to Upper Lagenid Zone.

Range. Middle Miocene (Lower Badenian).

Spiroloculina lapugyensis Karrer, 1867
(Plate 1, Figure 4)
Spiroloculina lapugyensis Karrer, 1867, p. 357, Plate
2, Figure 2.

Remarks. The two synonym species were described from Lăpușiu de Sus. The differences between them consist in less compressed test in the holotype of S.cavernosa. There are specimens with intermediate features.

Range. Lower Badenian (Upper Lagenid Zone).

Family Haueriniidae Schwager, 1876
Subfam. Siphonapertinae Saidova, 1975
Siphonaperta Vella, 1957
Siphonaperta cf. S. agglutinans (Cushman), 1917
(Plate 2, Figures 5, 8)
Test quinqueloculin, five chambers visible from the exterior with acute edges; wall calcareous with an agglutinated outer coating; sutures distinct; aperture rounded at the end of a distinct neck, bordered by a hyaline rim, provided with a narrow, simple or sometimes bifid tooth.

Remarks. This species differs from specimens from Kossovan deposits in having a distinct apertural neck and more angled edges (see Popescu, 1979).

Subfamily Hauerininae Schwager, 1876
Cycloforina Luchzkowska, 1972
Cycloforina Iachesis Karrer, 1868
(Plate 3, Figure 1)
Quinqueloculina Iachesis Karrer, 1868, p. 146, Plate 2, Figure 4.
Test subelliptical, elongated, irregular in outline, lenticular to triangular in section; chambers with angular margins, somewhat concave faces, irregular in shape; sutures deep, distinct; surface rough; aperture rounded, at the end of a distinct neck, surrounded by a hyaline lip, provided with a narrow, simple or bifid tooth.

Range: Badenian, Marine Middle Miocene in Paratethys.

Cycloforina reticulata (Karrer), 1862
(Plate 3, Figures 2-5)
Quinqueloculina reticulata Karrer, 1862, p. 449, Plate 2, Figure 5.
Cycloforina zigzag Papp & Schmid, 1985 (non d'Orbigny, 1846), p. 102, Plate 97, Figure 9 (non Figure 8)

Remarks. Luchzkowska (1974, p. 84) have done a complete description of this species, pointing out the differences between C. reticulata (Karrer) and C. zigzag (d'Orbigny); slender shape, depressed sutures, fewer and more prominent costae; in addition a distinct apertural neck and rounded aperture surrounded by a distinct hyaline lip are the most important features of C. reticulata compared with C. zigzag.

C. reticulata is suspected to be a junior synonym with Quinqueloculina signata Reuss (1850, p. 385, Plate 50, Figure 11).

Range. C. reticulata (and the type for Q. signata) were recorded only in Lower Badenian. In this stratigraphical interval C. zigzag doesn't occur; its range is restricted to Uppermost Badenian (Upper Kossovan, =Konkian). Topotypic material for C. zigzag was illustrated by Popescu, 1979.

Cycloforina sclerotica (Karrer), 1868
(Plate 3, Figure 6)
Quinqueloculina sclerotica Karrer, 1868, p. 152, Plate 3, Figure 5.

Remarks. The figured specimen represents a toptype. Rare in Cos-tei and Lâpugiu de Sus in Lower Badenian deposits.

Cycloforina vermicularis (Karrer), 1868
(Plate 3, Figure 7)
Quinqueloculina vermicularis Karrer, 1868, p. 150, Plate III, Figure 1.
Cycloforina vermicularis (Karrer). Luchzkowska, 1974, p. 88, Plate XIII, Figure 10, text-Figure 32; Popescu, 1979, p. 17, Plate 7, Figure 4.
Test compact, triangular to polygonal in cross-section; chambers narrow, uniform width, fifth visible from the exterior; surface ornamented with deep longitudinal, sometimes sinuous or interrupted irregular distributed costae; aperture circular, at the end of a short neck with short tooth widening at the end sometimes T or Y shaped.

Range. (In Paratethys). This species was described from Cos-tei (Valea Gemini section) from Upper Langhian (=Upper Lagenide Zone). Occurs in Upper Langhian and in Upper Kossovan. Luchzkowska (1975, p. 90) mentioned it only in Lower Badenian (=Langhian) deposits from Poland and Slovakia.

Hauerina d'Orbigny, 1846
Hauerina compressa d'Orbigny, 1846
(Plate 4, Figure 1)
Test medium sized, subcircular, flattened; periphery subacute; 3-4 chambers on the last whorl; early chambers quinqueloculare, later planispiral; surface with slightly concentric striae; wall calcareous; aperture terminal, elliptical, narrow, elongate, multiple, of numerous pores in an tretaphorelike plate.

Range. Middle Miocene in Paratethys. Occurs especially in the Upper part of the Langhian and in the Upper part of the Kossovan.

Lachlanella Vella, 1957 emend.
Luchzkowska, 1972
Lachlanella incrassata Karrer, 1868
(Plate 6, Figure 5, Plate 13, Figure 4)
Quinqueloculina incrassata Karrer, 1868, p. 148, Plate II, Figure 10.
non Lachlanella incrassata Luchzkowska, 1974, p. 93, text Figure 33/1,2; Plate 10, Figure 2, 3.
Remarks. The specimens described by Luchzkowska (1974, p. 93, Plate 10, Figures 2-3, text-Figure 33/1,2) as Lachlanella incrassata
(Karrer) are not conspecific with Karrer’s material. The aperture is quadrangular with T-shaped tooth; chambers with quinqueloculinitid arrangement, with floor; surface ornamented with fine longitudinal striae.

*Lachlanella Schroekingeri* (Karrer), 1868
(Plate 4, Figures 2, 3)
*Quinqueloculina Schroekingeri* Karrer, 1868, p. 149, Plate 2, Figure 12
Test subquadrangular with angled margins; chambers subquadrate in section with slightly concave surfaces; sutures distinct; surface with irregular short strips; aperture terminal, narrow, high, provided with a long slender tooth.

Range: Langhian (Upper Lagenid Zone = Upper Moravian). This species described from Costei was also recorded from Lăpușiu (Valea Cogului) and generally in Langhian deposits (Lower Badenian) from the eastern border of the Pannonian basin. Described also from Poland (Luczkowska, 1974, p. 95) at Korytnica and Grabki Duze from deposits of the same age.

*Lachlanella undosa* (Karrer), 1867
(Plate 4, Figures 4–6)
*Quinqueloculina undosa* Karrer, 1867, Plate 361, Plate 3, Figure 3
Test subquadrangular in outline, with angled and carinate margins, five chambers visible from the exterior; sutures distinct; surface with regular short strings; aperture terminal, narrow, high, with a long slender tooth.

Range: This species differs from *L. Schroekingeri* in having thick sinuous carinas. See also the remarks made by Luczkowska (1974, p. 95).

*Podolia* Serova, 1961
*Podolia lyra* (Serova), 1955
(Plate 13, Figures 5, 6)
*Hauerina lyra* Serova, 1955, p. 329, Plate 13, Figures 5-12.
Test subovate in outline, quinqueloculine, five chambers visible from the exterior; margins acute but not carinate; sutures deep, distinct; surface smooth, with interrupted longitudinal striae; wall calcareous pierced by fine, irregularly distributed pores; aperture terminal, bordered by a hyaline lip, evolving from rounded in the young stage, to rounded or high arculated, with a simple tooth, and finally to lyra-shaped and complex one with trematoporelike plate in the adult.

Remarks: The perforation in the test, which appear at the surface like small pores were well observed in ultrastructure as well as the longitudinal interrupted striae. In the adult specimens the lyra-shape given by the lateral projection of the marginal hyaline border evolved to a complex aperture.

Range: Rare in the Middle Miocene (from the Central Paratethys).

*Quinqueloculina d’Orbigny, 1826, emend. Luczkowska, 1972

Remarks: In the synonymy of this genus Luczkowska included among others the genus *Massilina* Schlumberger, 1893. This point of view is in agreement with our concept about the genus Quinqueloculina: a “massilinid” stage may occur in some species belonging to *Quinqueloculina*. The emendation made by Luczkowska (1972, 1974) is based on a study of a large amount of well preserved meliloids from the Middle Miocene.

*Quinqueloculina anagalis* Luczkowska, 1974
(Plate 4, Figures 7–9; Plate 5, Figure 1, 2–6)
*Quinqueloculina anagalis* Luczkowska, 1974, p. 40, Plate 1, Figures 1–3; text-Figures 7–9.
*Quinqueloculina ungeriana* Papp & Schmid (non d’ Orbigny), p. 100, Plate 95, Figure 81 (non Figures 6,7).
Test large, flattened, oval in outline, (in massiline stage), with sharply keeled periphery; wall ornamented with dense and fine arcuate longitudinal ribs; aperture oval, elongate, with well developed simple or bifid tooth.

Remarks. Luczkowska (1974) studied a large amount of specimens (massiline and quinqueloculine stages, micro and megalospheric generations) making valuable remarks concerning variability and ontogeny of this species. Quinqueloculine stage, ornamented with fine and dense, longitudinal striae is somewhat near *Q. alexandri* Lucz. (1974), but differs by its angled (acute) margins and distinct sutures.

*Quinqueloculina buchiana* d’Orbigny, 1846
(Plate 5, Figures 7–11)
*Quinqueloculina buchiana* d’Orbigny, 1846, p. 289, Plate 18, Figures 10–12; Luczkowska, 1971, p. 46, Plate 4, Figures 1–4; Papp & Schmid, 1985, p. 99, Plate 93, Figures 1–7, text-Plate 14, Figure 4, text-Plate 15, Figures 1–3.
Test large ovate in outline with high keeled margins.

Range: This species is common in the Central Paratethys in the Lower Badenian (Langhian) deposits. It was mentioned also from the Kossovon in West Ukraine.

*Quinqueloculina heidingerii* d’Orbigny, 1846
Range: In Central Paratethys was mentioned in the lower part of the Middle Miocene.

Quinqueloculina parkeri (Brady), 1881
(Plate 5, Figures 12, 13; Plate 6, Figures 3-4)
Millotina parkeri Brady, 1881, Plate7, Figure 14 (fide Barker, 1960); Jones, p.23, Plate 7, Figure 14.
Test ovate, flattened, lenticular in section, with acute margins, triloculine in arrangement of chambers, three or sometimes four visible from the exterior; wall calcareae; surface ornamented by slight waves and longitudinal short, interrupted striae; aperture high, with parallel margins, provided with a long slender tooth.
Remarks. Differs from Q. falcifera (Karrer, 1868, p. 151, Plate 3, Figure 3), by its more elongated shape and lenticular to subtriangular cross-section.

Subfamily Milliolinellinae Vella, 1957
Dervieuxina n.g., 1900
Type species: Penerolis rovassendae Dervieux, 1900
Test free, involute to evolute, flabelliform, flattened or lenticular; chambers inflate, somewhat overlapping, quinqueloculine in early stage; initial aperture arched, simple, then becoming more complicated, finishing in the adult with a multiple aperture in trematophore-like plate at the end of the final chamber; surface with slightly concentric striae, sometimes corresponding in the interior of the chamber to inner fine ridges.

Dervieuxina aspergilla (Karrer), 1868
(Plate 6, Figures 6, 7)
Penerolis aspergilla Karrer, 1868, p. 154, Plate 4, Figure 9.
Hauerina aspergilla (Karrer). Luczkowska, 1974, p. 90, Plate 18, Figure 5.
Test subcircular, slightly flattened, involute, periphery rounded, slightly lobate in outline; chambers inflate, 3-5 in the last whorl; sutures slightly depressed; surface smooth or with fine concentric striae; aperture a very high arch, multiple of numerous rounded pores in a trematophore-like plate.
Remarks. This species was assigned to the genus Involvolaterina Loeblich & Tappan (1955) because of the involute mature stage and multiple aperture. The difference consists in the aperture which in Involvolaterina is an areal cribrate one while in D. aspergilla all the irregularly shaped pores are on a trematophore-like plate.
The species described by Serova (1955) as Hauerina tumida and H. composita are suspected to be junior synonyms of D. aspergilla. This assumption is based on the great intraspecific variability observed in our material.

Range: Middle Miocene in Paratethys. Common in the upper part of the Langhian (in Upper Lagenidie Zone) from the eastern border of the Pannonian basin.

Dervieuxina rovassendae (Dervieux), 1900
(Plate 6, Figures 8-10)
Penerolis rovassendae Dervieux, 1900 (fide Ellis & Messina).
Test large, very fragile, flattened; chambers inflate, quinqueloculine in the initial part, evolving through triloculine, planispiral evolute, flabelliform in the adult; wall thin, calcareae, with longitudinal concentric striae corresponding inside to short, thin partitions which do not divide the lumen; aperture evolves during the ontogenetic development from circular, arched to podolinitid (in the triloculine stage), semicircular or strongly elongated multiple openings in a trematophore-like plate (see also Popescu, 1979, Plate 15, Figures 1-7).
Remarks. The thin, fragile test makes the species to be destroyed during the preparation of samples.

Range: In Paratethys is mentioned only in Romania in Badenian deposits.

Miliolinella Wiesner, 1931
Miliolinella selene (Karrer), 1868
(Plate 6, Figures 11-13)
Triloculina selene Karrer, 1868, p. 138, Plate 1, Figure 12.
Range: The species is common in Badenian deposits from Central Paratethys. It was mentioned in Poland (Luczkowska, 1974) and Ukraine (Didkovski & Satanovskay, 1970). In Romania M. selene was recorded from the Upper Langhian (Upper part of the Lower Badenian) and Upper Kossowan.

Pseudotriloculina Cherif, 1970
Remarks. Cherif's genus is a senior synonym of the genus Sinuloculina Luczkowska, 1972 (see Loeblich & Tappan, 1988).

Pseudotriloculina inflata (d' Orbigny), 1826
(Plate 7, Figure 5)
Triloculina inflata d' Orbigny, 1846, p. 278, Plate 17, Figures 13-15; Papp & Schmid, 1985, p. 95, Plate 89, Figures 1-3.
Sinuloculina inflata (d' Orbigny). Luczkowska, 1974, p. 126, Plate 14, Figure 6.
Test ovoidal; chambers broad, more inflated at the base; two or three chambers visible from the exterior; surface smooth; wall calcareae, thick; aperture circular with a robust bifid tooth;
Range: In Central Paratethys in marine Middle Miocene (Badenian).

Ptychomiliola Eimer & Hickert, 1899
Ptychomiliola costifera (Cushman), 1917
(Plate 12, Figure 8)
Spiroloculina costifera Cushman, 1917, p. 34.

Remarks. Initial part of our specimens are clearly adelosinid. The aperture, at the end of a distinct neck bordered by an everted hyaline lip is provided with a bifid tooth. The assignment of this species to the genus Ptychomiliola is questionable because of the adelosinoid early stage.

Range: Very rare in Upper Langhian from Romania (eastern border of the Pannonian Basin); in Hungary (Laky, 1968) is mentioned from Kossoviun deposits (Upper Badenian).

Ptychomiliola separans (Brady), 1884
(Plate 1, Figures 6, 7, 9)
Milolina separans Brady, 1884, Plate 7, Figures 1-4
(transferred by Cushman to Ptychomiliola-fide Barker, 1960).
Test adelosinid, later planispiral, evolute; aperture rounded at the end of a produced neck, bordered by an everted lip, with a bifid tooth.

Remarks. Genus Ptychomiliola differs of Adelosina in its tendency to become planispiral and evolute; our specimens cannot be separated from Adelosina.

Range: Rare in Uppermost Langhian in eastern Pannonian Realm. This taxon was mentioned in Kossoviun from Hungary (Laky, 1968, p. 154).

Pyrgo Defrance, 1824
Pyrgo inornata (d' Orbigny), 1846
(Plate 7, Figures 1-3)
Biloculina inornata d' Orbigny, 1846, p. 266, Plate 16, Figures 7-9.
Pyrgo inornata (d' Orbigny), Papp & Schmid, 1985, p. 50, Plate 84, Figures 1-3.

Range. In Central Paratethys is mentioned in Lower Badenian (Langhian).

Tortonella Didkovski, 1957
Tortonella bondartschuki Didkovski, 1957
(Plate 7, Figure 4)

Tortonella bondartschuki Didkovski, 1957, p. 1139,
Plate 3, text-Figures 1-3; Didkovski & Satanovsky, 1970, p. 49, Plate 28, Figure 4;
Popescu, 1979, p. 26, Plate 16, Figures 1, 2.
Test oval to subcircular in outline, flattened, with rounded peripheral margins; initial stage triloculine, later planispiral, two chambers on each whorl; sutures deep; wall calcareous, smooth; aperture terminal, circular, bordered by a well developed translucent lip provided with a simple tooth in initial part which evolves to a cross shape with central rounded opening.

Remarks. In Central Paratethys in Badenian (marine Middle Miocene, in Upper Langhian and Upper Kossoviun).

Triloculina d' Orbigny, 1826
Triloculina gibba d' Orbigny, 1826
(Plate 7, Figure 6)
Triloculina gibba d' Orbigny, 1826, p. 274, Plate 16, Figures 22-24 (fide Ellis & Massenia); Didkovski & Satanovsky, 1970, p. 56, Plate 33, Figure 3;
Luczewska, 1974, p. 134, Plate 23, Figure 2, text-Figure 46/2; Papp & Schmid, 1985, p. 93, Plate 86, Figures 1-4.

Range: Marine Middle Miocene in Central Paratethys.

Triloculina marginodentata n. sp.
(Plate 7, Figures 7-9; Plate 8, Figure 1)
Test subcircular in outline, triangular to polygonal in cross-section, with angular, crenulate margins; initial chambers quinqueloculine, later triloculine; wall calcareous, smooth; aperture rounded, large, with bifid tooth, bordered by an everted hyaline lip.

Type section: Valea Gemini section, Costeii.
Age: Upper Langhian (upper part of the Lower Badenian)- from Upper Lagenide Zone.

Remarks. Diffs from Triloculina intermedia Karrer by its strongly acute, sometimes keeledentate margins. T. marginodentata is similar also to Milolina clavulensis Vengelski (1958, p. 85, Plate 16, Figure 4) described from Upper Badenian (= Kossoviun) from which differs in shape of the aperture and apertural tooth.

Subfamily Sigmoilinellinae Luczkowska, 1974
Sigmoidinella Zheng, 1979
Sigmoidinella aniceps (Reuss), 1850
(Plate 8, Figures 2, 3)
Triloculina aniceps Reuss, 1850, p. 383, Plate 49, Figure 11.

Test oval, flattened, lenticular-elongated in section; chambers with sigmoidine arrangement, strongly overlapping, five visible from the exterior; wall calcareous; surface smooth with interrupted longitudinal striae; aperture small, rounded or elliptical, at the end of a distinct neck, with a thin slightly everted rim.

Remarks. The assignment of this species to the Sigmoidinella is somewhat questionable because of the flattened test and lenticular-elongate section. There are some differences from the type of Triloculina aniceps, which has only three chambers visible from the exterior. More similar seems to be Spiroloculina tenuirostra described by Karrer from Lápugi and suspected to be a junior synonym of S. aniceps. Differs from Milolina micro Serova (1955) in lacking the apertural simple tooth.
*Sigmoilinella mucro* (Serova), 1955  
(Plate 12, Figures 4, 5)  
*Sinuiloculina mucro* (Serova). Popescu, 1979, p. 20, Plate 7, Figure 7.

**Remarks.** It is difficult to make a difference concerning the shape or inner structure between *S. mucro* and *S. anceps* Reuss (1850). The two mentioned species differ in larger apertural end, and the presence of a short, thin tooth in *S. mucro*. See also Popescu (1979).

**Range:** In Central Paratethys – Badenian. The type was described from Kossovan deposits from Ukraine.

*Sigmoilinita* Siegel, 1965  
*Sigmoilinita tenuis* (Czjzek), 1848

*Quinqueloculina tenuis* Czjzek, 1847, p. 149, Plate 13, Figures 31-34.  
*Spiriloculina berchtoldsdorfensis* Karrer, 1877, p. 375, Plate 16 a, Figure 10.

**Remarks.** There are some similar species described from deposits of the same age, in which the differences consist in shape or thickness of the test. They are suspected as synonyms: *Spiriloculina tenuissima* Reuss and *Spiriloculina tschokrakensis* Gerke.

**Range:** Marine Middle Miocene (Badenian) in Central Paratethys.

*Spirosigmoilina* Parr, 1942  
*Spirosigmoilina crenata* (Karrer), 1868  
(Plate 8, Figure 5)  
*Spiriloculina crenata* Karrer, 1868, p. 135, Plate 1, Figure 9.  
*Spirosigmoilina speciosa* Luczkowska (non Karrer), 1974, p. 151, Plate 17, Figures 17, 18.

**Test ovate, flattened, with truncate sinusous periphery; initial chambers strongly sigmoid, later planispiral; wall calcareous, smooth, thin, surface with large protuberances, giving a corrugate pattern of the periphery; aperture elongate, narrow, with a long, simple tooth.**

**Range:** Marine Middle Miocene in Paratethys (in Langhian and Kossovan).

*Spirosigmoilina speciosa* (Karrer), 1868  
(Plate 8, Figure 6)  
*Spiriloculina speciosa* Karrer, 1868, p. 135, Plate 1, Figure 8.

**Remarks.** *S. speciosa* differs of *S. crenata* in a greater number of spires, and more dense constrictions (protuberances) on each chamber, and more flattened test.

Cushman (1946) includes *S. speciosa* in the synonymy of *S. crenata*. This is possible because in some specimens of *S. crenata* initial part is exactly as in *S. speciosa*; so, the two species which appear in the same stratigraphical level could represent different generations (dimorphism).

Subfamily *Sigmoilopsinae* Vella, 1957  
*Sigmoilopsis* Finlay, 1947  
*Sigmoilopsis foeda* (Reuss), 1850  
(Plate 8, Figure 4)  
*Quinqueloculina foeda* Reuss, 1850, p. 384, Plate 40, Figures 5, 6.  
*Spiriloculina plana* Smigielska, 1957, p. 260, Plate 16, Figure 5.  
*Spiriloculina foeda* (Reuss). Luczkowska, 1974, p. 99, Plate 15, Figures 1-4, text-Figure 34/5-9; Popescu, 1979, p. 19, Plate 9, Figure 2.

**Test flattened, oval, with rounded periphery; wall agglutinated; sutures indistinct in the centre of the test, slightly depressed in the last part; aperture circular, with a short tooth at the end of a narrow neck, surrounded by a hyaline lip.**

**Remarks.** Papp & Schmid (1985) described and illustrated as *Sigmoilopsis bronniана* some specimens taken from d’ Orbigny’s vial nr. 206 “which correspond (l) to the description of d’ Orbigny”. The figured and described specimens belong to another genus – *Ammomassilia* (A. alveoliniformis Millett, 1898). The “small denticles” of the aperture observed by these authors are nothing else but remnants of a broken off trisetopore. The third error consists in including in the synonymy of the so-called “*Sigmoilopsis bronniана*” the species *Sigmoilopsis foeda* (Reuss), which has nothing in common with the species described and illustrated by Papp & Schmid.

Subfamily *Tubinellinae* Rhumbler, 1906  
*Articulina d’ Orbigny, 1826*  
*Articulina gibbosula* d’ Orbigny, 1846  
(Plate 6, Figures 1, 2; Plate 8, Figures 7-9; Plate 9, Figures 1-3)  

**Remarks.** The type material is coming from Tarnopol (A. gibbosula) and from Lăpușul de Sus (A. sulcata). In our material coming from Lăpușul de Sus and Coștei there were recorded specimens with one or two rectilinear chambers. This species was assigned to *Nodobaculariella* and *Articulina*. So, Didkovski & Satanovskaya (1970) described “gibbosula” as *Articulina* and “sulcata” as *Nodobaculariella*. Early mioline, later rectilinear arrangement of the chambers is
an argument for assigning this species to Articulina.

Range: In Central Paratethys this species was recorded from Badenian. No records from Sarmatian.

Family Miliolidae Ehrenberg, 1839
Subfamily Miliolinae Ehrenberg, 1839
Miliola Lamarck, 1804
Miliola fabularoides (Karrer), 1865
(Plate 2, Figure 3, 4, 6, 7)
Quinqueloculina fabularoides Karrer, 1865, p. 704, Plate 1, Figure 3.
Quinqueloculina transsilvanica Karrer, 1865, p. 704, Plate 1, Figure 4.
Schlumbergerina bogdanovi Serova, 1952 (in Bogdanowich), p. 171, Plate 26, Figure 3; Serova, 1955, p. 324, Plate 11, Figures 1-3.

Test compact, quinqueloculine, ovate in outline, five chambers visible from the exterior with chambers in quinqueloculine arrangement; periphery rounded; sutures depressed; wall calcareous, pseudooperculated with an agglutinated outer coating with fine sandy grains; aperture circular with trematophore plate.

Remarks. Q. transsilvanicae represents mature specimens in which the trematophore was broken.

M. fabularoides is suspected to be a senior synonym of Quinqueloculina atropos Karrer (1868, p. 152, Plate 3, Figure 6) from which differs only in lacking the trematophore (which we assumed to be probably destroyed to the specimens figured by the same author in 1868).

Miliola kostejana (Karrer), 1868
(Plate 9, Figures 4-8)
Quinqueloculina kostejana Karrer, 1868, p. 152, Plate 3, Figure 4.
Test compact, ovate, fusiform; tubular chambers (with floor) subtriangular in cross-section, with quinqueloculine arrangement; wall calcareous, porcelaneous, fragile; sutures distinct; surface pustulated or covered with rounded pseudopores; aperture terminal, with a trematophore plate which is very fragile.

Remarks. This species was described by Karrer from Costei. It is common in Upper Lagenid Zone in Bega Basin (Costei and Lapugi). Similar specimens were figured by Poignant (1981) as P. striiglata (d’Orbigny) (Plate 2, Figures 9, 11).

Family Riveroindae Saidova, 1981
Pseudohauerina Ponder, 1972
Pseudohauerina ornatisima (Karrer), 1868
(Plate 9, Figure 9; Plate 10, Figures 1-3)
Quinqueloculina ornatisima Karrer, 1868, p. 151, Plate 3, Figure 2.

Pseudohauerina ornatisima (Karrer). Luczkowska, 1974, p. 98, Plate 18, Figures 8, 9; Poignant, 1983, p. 21, Plate 1, Figure 4.

Remarks. Species with a large intraspecific variability consisting in the number of chambers on the last whorl: 2, 3 or 4.

Range: In Central Paratethys the species is restricted to the Middle Miocene with high frequency in Lower Badenian. It is mentioned from Oligocene to Recent in Indo-Pacific bioprovince.

Superfam. ALVEOLINACEA Ehrenberg, 1839
Family Alveolinidae Ehrenberg, 1839
Borelis de Montfort, 1808
Borelis melo (Fichtel & Moll), 1798
(Plate 10, Figures 4-7)
Nautilus melo Fichtel & Moll var α, 1798, p. 118, Plate 24, Figures a-f.

Remarks. The type (neotype) was described by Reichel (1937) from Buittur (near Hunedoara) in the Lower Strei Basin, a gulf of the Transylvania Basin; the deposits containing Borelis in this area belong to the Uppermost Badenian (Upper Kossovian=Konkian). The second designation of a neotype (by Rogl & Hansen, 1984) is invalid (see also Loeblich & Tappan, 1988, p. 362).

During the marine Paratethysian Middle Miocene, the genus Borelis occurs at two stratigraphic levels: in the Upper Langhian (in Upper Lagenid Zone) and, the second level, in the Upper Kossovian.

In these two stratigraphic intervals there were recorded sphenical, ellipsoidal and oval – lenticular specimens assigned by authors to B. melo, B. haueri (d’Orbigny) (figured in Plate 13, Figure1) and, respectively, to B. roettella. Morphologically, there are no notable differences between specimens coming from the two levels, except for “roettella” – type which has subacute margins and slightly lobulate peripheral outline, in the Upper Langhian specimens (more “mansarded” centrally), while the specimens coming from the Upper Kossovian have rounded margins and rounded peripheral outline.

As there were noted no transitions between the three types mentioned above, they are treated by authors as different species.

The lenticular specimens from the Upper Langhian can be separated under a new name (Borelis roegli n.sp.).
Borelis roegli n.sp.

(Plate 10, Figures 8, 9; Plate 13, Figure 3)
Test free, rounded in axial view, lenticular, subacute in edge view; early whorls streptospirally enrolled, then planispiral, involute, 9 chambers on the last whorl, divided by septulae into elongated oval chamberlets, higher in the peripheral area, sometimes storeyed in two rows; umbilical area slightly depressed; margin subacute, peripheral outline lobated; multiple apertures, in a single row on lateral sides, two or three centrally.
Diameter: 2-2.5mm.
Etymology: in honor of micropaleontologist Fred Rögl for his contribution to the knowledge of the Foraminifera.
Locality: Valea Coșului section, Lăpugiu de Sus, Hunedoara district.
Age: Lower Badenian (Upper Lagenid Zone).
Holotype: Authors’ collection (holder Nr. 8).
Range: Lower Badenian (Moravian).
Common in our material from marginal facies.

Superfam. SORITACEA Ehrenberg, 1839
Family Peneroplidae Schultz, 1854
Laevipeneroplis Sulc, 1936
Laevipeneroplis laevigatus (Karrer), 1868
(Plate 11, Figures 1, 3)
Peneroplis planatus (Fichtel & Moll) var. laevigata Karrer, 1868, p. 153, Plate 3, Figure 7.
Peneroplis laevigatus Karrer. Bogdanowicz, 1952, p. 327, Plate 1, Figures 7, 8; Popescu, 1979, p. 27, Plate 17, Figures 1, 2.
Test large, flattened, biumbilicate, involute in early stage, later uncoiling, flabeliforme; sutures slightly depressed; wall calcareous, with small dense pores; aperture consisting in the early stage of a row of pores near the base of the apertural face, later areal, made up by two rows of elliptical to rounded openings.
Remarks. There are some differences between specimens coming from lower and upper Badenian. Upper Badenian specimens have a lenticular involute stage (in cross section) instead of parallel faces.
Range: Badenian. This species is rare in both Lower (Langhian) and Upper (Kossovian) Badenian.

Dendritina d’Orbigny, 1826
Dendritina haueri d’Orbigny, 1846
(Plate 11, Figures 4, 5)
Dendritina haueri d’Orbigny, 1846, p. 134, Plate 7.

Figures 1, 2.
Test large, planispirally coiled, involute, biumbilicate, 10-12 chambers per whorl; wall calcareous; surface smooth, with concentric pseudoostriae made up by small, alligned pores; aperture in the adult areal, dendritic, bordered by a distinct small lip.
Range: in Paratethys: Upper Langhian; rare in Valea Coșului section (Lăpugiu de Sus) and Valea Gemini (Coștei).

Spirolinea Lamarck, 1804

Remarks. There are close relations between genera Spirolinea and Dendritina. The differences consist in uniserially arranged chambers in the adult stage in Spirolinea and in more complicated apertural opening in Dendritina (“dendritic type”). In the coiled portion, the shape of the aperture and the structure of the test are similar.

Spirolinea austriae d’Orbigny, 1846
(Plate 11, Figures 6-9; Plate 12, Figures 6, 7)
Spirolinea austriae d’Orbigny, 1846, p. 137, Plate 7, Figures 7-9; Papp & Schmid, 1985, p. 54, Plate 45, Figures 1-5.
Test large, compressed, biumbilicate, symmetrical in the initial part, rectilinear and uncoiling in the adult; surface with fine longitudinal striae, containing a row of small pores; wall calcareous; aperture terminal, dendritic.
Range: Lower Badenian (Upper Langhian) in Paratethys.

Spirolinea laubei (Karrer), 1868
(Plate 11, Figure 2)
Peneroplis laubei Karrer, 1868, p. 154, Plate 3, Figure 8.
Test large, compressed, early chambers planispirally enrolled, biumbilicate, later uncoiling, rectilinear; wall calcareous, with numerous low costae, separated by depressionary thin areas each of them containing a row of small dense pores; aperture terminal, dendritic.
Remarks. Differs from Spirolinea austriae in smaller diameter of the enrolled part and longer uniserial, rectilinear stage.
Range: Lower Badenian (Langhian / Moravian) in Paratethys.

REFERENCES
PLATES

Plate I
Figure 1, Cornuspira plicata (Czjzek). Lower Badenian. Valea Gemini section, Coștei, Hunedoara distr. Bar, 100μm. Lateral view.

Figure 2, Cornuspira striata (Czjzek). Lower Badenian. Valea Gemini section, Coștei, Hunedoara distr. Bar, 300μm. Lateral view.

Figure 3, Stellatriculina mutabilis (d'Orbigny). Middle Badenian. Borehole 12-Balta Sărată, south of Caransebeș. Bar, 100μm. Lateral view.

Figure 4, Spiroloculina lapugensis Karrer. Lower Badenian. Valea Gemini section, Coștei, Hunedoara distr. Bar, 300μm. Lateral view.

Figure 5, Adelesina longirostrata (d'Orbigny). Middle Badenian. Borehole 12-Balta Sărată, south of Caransebeș. Bar, 300μm. Lateral view.

Figures 6, 7, 9, Pleychomiliola separans (Brady). Middle Badenian. Borehole 12-Balta Sărată, south of Caransebeș. Bars, 1mm. Lateral views.

Figures 8, 10, 11, Adelesina schreiberi (d'Orbigny). Middle Badenian. Borehole 12-Balta Sărată, south of Caransebeș. Bars, 1mm. Lateral views.

Figures 12, 13, Inaequalina jadwigaæ Lyczkowska. Upper Badenian. Valea Morilor section, Colibaș, Mehedinti distr. Bar, 300μm. Lateral views of the concave (Figure 12) and flat (convex) face (Figure 13).

Figure 14, Spiroloculina excavata d'Orbigny. Lower Badenian. Valea Coșului section, Lăpușiu de Sus. Bar, 300μm. Lateral view.

Plate II
Figures 1, 2, Spiroloculina canaliculata d'Orbigny. Lower Badenian. Valea Coșului section, Lăpușiu de Sus. Figure 1, bar, 300μm. Figure 2, bar, 100μm. detail of Figure 1.

Figures 3, 4, 6, 7, Milliola fabularoides (Karrer). Lower-Middle Badenian. Valea Gemini section, Coștei. Topotypes. Figure 3, bar, 300μm, lateral view; Figures 4, bar, 100μm, apertural detail of Figure 3; Figure 6, bar, 100μm, lateral view; Figure 7, bar, 100μm, edge view.


Figure 9, Cycloforina lachensis (Karrer). Lower Badenian. Valea Gemini section, Coștei. Bar, 300μm. Lateral view.

Plate III
Figure 1, Cycloforina lachesis (Karrer). Topotype. Badenian inferior. Valea Gemini section, Coștei. Bar, 100μm. Lateral view.

Figures 2-5, Cycloforina reticulata (Karrer). Lower Badenian. Valea Gemini section, Coștei. Bars, 100μm. Lateral views.

Figure 6, Cycloforina sclerotica (Karrer). Topotype. Lower Badenian. Valea Gemini section, Coștei. Bar, 100μm. Lateral view.
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Figure 7, Cyloloforina vermicularis (Karrer). Topotype. Lower Badenian. Valea Gemini section, Coștei. Bar, 100μm. Lateral view.

Figures 8, 9, Hauerina compressa d’Orbigny. Lower Badenian. Valea Gemini section, Coștei. Figure 9, edge (apertural) view, bar, 100μm; Figure 8, apertural detail of Figure 9, bar, 30μm.

Plate IV
Figure 1, Hauerina compressa d’Orbigny. Lower Badenian. Valea Gemini section, Coștei. Bar, 100μm. Lateral view.

Figures 2, 3, Lachlanella schroeckingeri (Karrer). Lower Badenian. Valea Gemini section, Coștei. Bars, 100μm. Lateral views.

Figures 4-6, Lachlanella undosa (Karrer). Topotype. Lower Badenian. Valea Gemini section, Coștei. Bars, 100μm. Lateral views.

Figures 7-9, Quinqueloculina anagalis Luczkowska. Lower Badenian. Mega I generation. Quinqueloculine stage (QS). Valea Gemini section, Coștei. Bars, 100μm. Figure 7, lateral view; Figure 9, opposite side view; Figure 8, apertural view.

Plate V
Figure 1, Quinqueloculina anagalis Luczkowska. Lower Badenian. QS, mega I generation. Valea Coșului section, Lăpușul de Sus. Bar, 1mm. Lateral / apertural view.

Figures 2-6, Quinqueloculina anagalis Luczkowska. Lower Badenian. Massiline stage (MS). Figures 2, 3, 6, mega II generation; Figures 4, 5, microsphaeric generation. Valea Coșului section, Lăpușul de Sus. Bars, 1mm. Lateral views.

Figures 7-11, Quinqueloculina buchiana d’Orbigny. Lower Badenian. QS, Bars, 1mm. Figures 7-9, 11, lateral views; Figure 10, apertural view. Valea Coșului section, Lăpușul de Sus.

Figures 12, 13, Quinqueloculina parkeri (Brady). Lower Badenian. Valea Gemini section, Coștei. Bar, 100μm. Lateral view.

Plate VI
Figures 1, 2, Articulina gibbosula d’Orbigny. Lower Badenian. Valea Gemini section, Coștei, lateral view; bars, 100μm. Figure 1, lateral view; Figure 2, surface detail.


Figure 5, Lachlanella incrassata (Karrer). Topotype. Lower Badenian. Valea Gemini section, Coștei. Bar, 300μm. Lateral view.

Figures 6, 7, Dervieuxina aspergilla (Karrer). Lower Badenian, topotype. Valea Gemini section, Coștei; Figure 6, bar, 100μm. Lateral view; Figure 7, bar, 300μm, lateral/apertural view.

Figures 8-10, Dervieuxina rovasendae (Dervieux). Lower Badenian. Valea Gemini section, Coștei. Figure 8, bar, 300μm, lateral view; Figure 9, bar, 300μm, edge view; Figure 10, bar, 300μm, apertural detail from Figure 9.

Figures 11-13, Miliolinella selene (Karrer). Topotype. Valea Gemini section, Coștei. Bars, 100μm. Figure 11, edge/apertural view; Figures 12, 13, lateral view.

Plate VII
Figures 1-3, Pyrgo inornata d’Orbigny. Lower Badenian. Valea Coșului, Lăpușul de Sus. Bars, 300μm. Figures 1, 3, ventral views; Figure 2, edge/ventral view.

Figure 4, Tortonella bondartschuki Didkovsky. Upper Badenian. Valea Morilor section, Colibași, Mehedinți distr. Bar, 100μm. Edge view.

Figure 5, Pseudotriloculina inflata (d’Orbigny). Valea Gemini section, Coștei. Bar, 300μm. Apertural/lateral view.

Figure 6, Triloculina gibba d’Orbigny. Upper Badenian. Valea Morilor section, Colibași, Mehedinți distr. Bar, 300μm. Apertural view.

Figures 7-9, Triloculina marginodentata n. sp. Lower Badenian. Valea Gemini section, Coștei. Bars, 100μm. Figure 7, apertural view; Figure 8, holotype, edge view; Figure 9, lateral view, broken specimen.

Plate VIII
Figure 1, Triloculina marginodentata n.sp. Lower Badenian. Valea Gemini section, Coștei. Bar, 100μm. Lateral view.

Figures 2, 3, Sigmololinella anceps (Reuss). Lower Badenian. Valea Coșului, Lăpușul de Sus. Bars, 300μm. Figure 2, lateral view, Figure 3, opposite side.

Figure 4, Sigmolopolis foeda (Reuss). Lower Badenian. Valea Coșului, Lăpușul de Sus. Bar, 100μm. Lateral / edge view.
Figure 5, Spirosligmolina crenata (Karrer). Topotype. Lower Badenian. Lateral view. Valea Gemini section, Coștei. Bar, 300μ. Lateral view.

Figure 6, Spiroslgmolina speciosa (Karrer). Upper Badenian. Valea lui Ion section, Bûltur, Hunedoara distr. Bar, 300μ. Lateral view.

Figures 7-9, Articulina gibbosula d'Orbigny. Lower Badenian. Valea Gemini section, Coștei. Bars, 100μ. Lateral views.

Plate IX

Figures 4-8, Miliola kustjana (Karrer). Topotypes. Lower Badenian. Valea Gemini section, Coștei, Timiș distr. Bars, 100μ. Figures 4-6, lateral views; Figure 7, apertural view; Figure 8, detail from Figure 7.

Figure 9, Pseudohauerina ornatissima (Karrer). Topotype. Lower Badenian. Valea Gemini section, Coștei, Timiș district. Bar, 300μ. Edge view.

Plate X

Figures 4-7, Borelis melo (Fichtel & Moll). Lower Badenian. Valea Coșului section, Lăpușni de Sus. Bars, 100μ. Figure 4, detail of the initial chamber of Figure 5, natural equatorial section; Figure 6, natural axial section; Figure 7, side, equatorial view.

Figures 8, 9, Borelis roegli n.sp. Lower Badenian. Valea Coșului section, Lăpușni de Sus. Bars, 100μ. Figure 8, holotype, lateral view; Figure 9, inner side of an apertural face.

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Figures 1, 3, Laevipeneroplis laevigatus (Karrer). Lower Badenian. Valea Gemini section, Coștei, Timiș distr. Bars, 100μ. Lateral views. Figure 3, surface detail from Figure 1.

Figure 2, Spirolina laubei Karrer. Lower Badenian. Valea Gemini section, Coștei, Timiș distr. Bar, 600μ. Lateral view.

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Figure 1-3, Miliolina setana (Karrer). Topotype. Valea Gemini section, Coștei. Bars, 100μ. Figure 1, 2, lateral views; Figure 3, edge view.

Figures 4, 5, Sigmolinella mucro (Serova). Upper Badenian. Valea lui Ion section, Bûltur, Hunedoara distr. Figure 4, lateral view, bar, 300μ; Figure 5, apertural detail, bar, 100μ.

Figure 6, 7, Spirolina austriaca d'Orbigny. Lower Badenian. Valea Gemini section, Coștei. Figure 6, lateral view, bar, 300μ; Figure 7, surface detail, bar 50μ.

Figure 8, Psychomioliola costifera (Cushman). Middle Badenian, Balta Sărătă borehole, Caransebeș, Timiș distr. Bar, 300μ. Lateral view.

Plate XIII
Figure 1, Borelis melo (Ficht. & Moll) forma haueri (d'Orb.). Lower Badenian. Valea Coșului section, Lăpușni de Sus. Bar, 300μ. Frontal view.

Figure 2, Spiriloculina excavata d'Orb. Lower Badenian. Valea Coșului section, Lăpușni de Sus. Bar, 30μ. Detail in natural transverse section.

Figure 3, Borelis roegli n. sp. Lower Badenian. Valea Coșului section, Lăpușni de Sus. Bar, 300μ. Edge view.

Figure 4, Lachlanellina incrassata (Karrer). Lower Badenian. Valea Coșului section, Lăpușni de Sus. Bar, 300μ. Lateral view.

Figures 5, 6, Podolia lyra (Serova). Lower Badenian, Valea Gemini section, Coștei. Figure 5, apertural detail of Figure 6, bar, 30μ; Figure 6, laterav view, bar, 100μ