

CONTRIBUTIONS TO THE KNOWLEDGE OF THE CALCAREOUS UNICAMERAL FORAMINIFERA FROM THE MIDDLE MIOCENE OF ROMANIA

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Abstract. This paper deals with a very diversified group of foraminifera, systematically considered to belong to more suprageneric taxa of the order Lagenida. They are revised according to the newly published nomenclature in the recent literature. We accept here the subdivision of the unilocular foraminifera into two families made by Loeblich & Tappan (1988): family Lagenidae, with the genera *Hyalinonettrion* Patt. & Rich., *Lagena* Walker & Jacob, *Obliquina* Seg., *Procerolagena* Puri, *Pymaeoseistron* Patt. & Rich., *Reussoolina* Colom, *Rimulinoides* Saidova and *Tetragonulina* Seg., and the family Ellipsolagenidae, with 4 subfamilies (Oolininae, Ellipsolageninae, Parafissurininae, Sipholageninae).

A new genus (*Fissurina*) is proposed, as well as five new species (*Fissurina buchneri*, *Cursina porocostata*, *Paliolatella grossecarinata*, *Parafissurina spinulata* and *Geminiella caudata*).

Keywords: Unicameral foraminifera, Middle Miocene, Romania

INTRODUCTION

The two families of foraminifera which make the subject of this paper include single chambered species (unicameral).

Most of the Badenian unicameral foraminifera come from pelitic deposits accumulated in sedimentary basins with depths greater than 200 m, in outer neritic or bathial facies. The richest samples in foraminifera from this group were collected from outcrops on the western border of the Pannonian Depression and Transylvania (for the Lower Badenian = Langhian) and from western Oltenia, Getic Depression and the Subcarpathians of Muntenia (for the Middle-Upper Badenian = Lower Serravallian).

THE GROUP OF THE UNICAMERAL FORAMINIFERA

Diagnosis. Test unilocular, wall calcareous, optically radial, sometimes two layered; aperture terminal or subterminal, circular, ovate or elongated, pseudoradial or trematophore with or without entosiphon; aboral opening circular, elliptical or slit-like.

Remarks. In a previous paper (Popescu, 1983), most of the unilocular foraminifera were grouped within the family Lagenidae. Two morphological features were considered: (1) the unilocular test and (2) the presence of the aboral opening. The last feature of the family Lagenidae was neglected by other authors. The aboral opening was considered there as an important morphological element at suprageneric or generic level.

Jones (1984) distinguished at least 9 evolutive lineages from which the unicameral foraminifera could have emerged, thus underlining the polyphyletic character of the group.

Loeblich & Tappan (1988) included this group into two families:

- Family **Lagenidae** with the genera *Hyalinonettrion* PATTERSON & RICHARDSON, 1987, *Lagena* WALKER & JACOB, 1798, *Obliquina* SEGUENZA, 1862, *Procerolagena* PURI 1954, *Pymaeoseistron* PATTERSON & RICHARDSON, 1987, *Reussoolina* COLOM, 1956, *Rimulinoides* SAIDOVA, 1975 and *Tetragonulina* SEGUENZA, 1862. Characteristic for these genera is the unilocular test and the circular terminal aperture, which can also be at the end of a neck.

- Family **Ellipsolagenidae** which includes monothalamous foraminifera whose aperture is prolonged with a tube in the interior of the chamber (entosolen).

The following subfamilies were separated here:

- **Oolininae**, with radially symmetric test, aperture circular or radial, with entosolen. Here were included the genera *Anturina* JONES, 1984, *Buchnerina* JONES, 1984, *Cushmanina* JONES, 1984, *Excultina* PATTERSON & RICHARDSON, 1987, *Favulina* PATTERSON & RICHARDSON, 1987, *Galwayella* PATTERSON & RICHARDSON, 1987, *Heteromorphina* JONES, 1984, *Homalohedra* PATTERSON & RICHARDSON, 1987, *Laculatina* PATTERSON & RICHARDSON, 1987, *Oolina* D'ORBIGNY, 1839, *Pristinosceptrela* PATTERSON & RICHARDSON, 1987, *Vasicostella* PATTERSON & RICHARDSON, 1987.

- **Ellipsolageninae**, with elongated slit-like aperture, bilaterally symmetric (*Duplella* PATTERSON & RICHARDSON, 1987, *Fissurina* REUSS, 1862, *Lagenosolenia* McCULLOCH, 1977, *Lagena* POPESCU, 1983, *Paliolatella* PATTERSON & RICHARDSON, 1987, *Pseudoolina* JONES, 1984).

- **Parafissurininae**, with subterminal asymmetric aperture and entosolenian tube (*Cursina* PATTERSON & RICHARDSON, 1987, *Irenita*

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JONES, 1984, *Parafissurina* PARR, 1947, *Pseudosolenina* JONES, 1984, *Ventrostoma* SCHNITKER, 1970, *Walterparria* JONES, 1984, *Wiesnerina* JONES, 1984).

- **Sipholageninae**, with two layered wall (*Bifarilamella* PATTERSON & RICHARDSON, 1987, Pytine MONCHARMONT ZEI & SGARELLA, 1978, *Sipholagena* MONCHARMONT ZEI & SGARELLA, 1978).

The previously mentioned classification will be also followed in the present paper.

The problem of the evolution of the monothalamous foraminifera was for the first time debated by Parr (1947) who suggested, being the successive appearance of the genera *Lagena*, *Oolina*, *Fissurina* and *Parafissurina*, the existence of some phyletic relationships (the genus *Lagena* at the basis of the evolution of the other three genera).

Other characters as the shape and position of the aperture, shape of the test, ornamentation, shape and position of the inner tube (entosolen/entosiphon) are considered as generic or specific, or rarely, suprageneric characters.

We will discuss next some of the morphological characters and their taxonomic importance.

The **aperture** of the unicameral foraminifera evolved from a circular or elliptical opening, with or without an apertural lip to an elongated opening, symmetric slit-like, in equatorial plan or asymmetric. The presence of the radial or trematophore apertures is an indication that those species could emerge from different phyletic lineages. Circular apertures with or without a lip are characteristic for the less evolved species (*Lagena*, "*Phialinea*", *Oolina*, *Cushmanina*). The aperture evolved to elliptical shape (as in *Lagena*), and then elongated or slit-like, in terminal position, in equatorial plane axe and symmetric reported to the axe (*Fissurina*, *Lagenosolenia*). The radial and cribrate types of aperture are rare. The species with this type of aperture cannot be included in the proposed taxonomical classifications due to their ancestry.

Entosiphon, or **inner tube**, or **entosolenian tube**, distinctive morphological element at the suprageneric, generic or specific level, appears in certain groups of monothalamous which could have different evolutionary lineages. The inner tubes are present in numerous foraminiferal families as buliminids, bolivinids, pleurostomellids, uvigerinids etc.

The fact that the inner tube was recorded at species with terminal, circular (e. g. *Favulina hexagona* [WILLIAMSON, 1848]), elliptical (*Lagena*, *Pseudosolenia*), slit-like (*Fissurina*) or subterminal (*Parafissurina*) aperture is an indication that the unicameral foraminifera are polyphyletic, therefore they cannot be grouped into a single family.

The shape of the inner tube can be straight and short (*Favulina*), rectilinear average sized (1/2 of the

height of the chamber) as in *Lagena*, long rectilinear (*Cribrilagena*), curved toward the dorsal wall (*Fissurina partim.*) or torsioned (*Fissurina pretiosa*).

The **aboral opening** varies from a circular aspect to elliptical to an elongated slit, and in the more evolved genera as a fissure, sometimes completely closed, its presence being noticeable only in optical sections as an opaque spot in the aboral-equatorial zone.

Sometimes, the aboral opening is at the end of a tube crossing the wall (in genus *Hyalinonetrium* or in the species *Lagena micans* BUCHNER, 1940). The function of this opening is not clear. Due to the fact that sometimes it is "knitted" to the test might lead to the assumption that it represents a part of the apertural neck of the "mother" specimen, which remained after the reproduction (budding type reproduction). In this case the presence of the aboral opening could be related only to the reproduction process.

Other important morphological features (genetic and specific) are the **test structure** and **surface**, the **shape of the latero-frontal projection** (circular, elliptical, ovate, elongated, fusiform, truncated), the **shape of the test** (spherical, lenticular, ellipsoidal), and finally **ornamentation**. This last character can vary sometimes within the same species according to the environmental conditions.

SISTEMATIC DESCRIPTIONS

Order LAGENINA

Superfamily **Nodosariacea** EHRENBERG, 1838

Family **Lagenidae** REUSS, 1862

Hyalinonetrium PATTERSON & RICHARDSON, 1987

Monothalamous test, elongated to fusiform; wall calcareous hyaline, surface smooth, unornamented; aperture circular, at the end of an elongated neck, bordered by a reverted phialine lip; aboral opening as a tube which can be continued inside the chamber.

Hyalinonetrium clavatum (D'ORBIGNY, 1846)

(Pl. 1, figs. 1-5)

Oolina clavata d'Orbigny, 1846, p. 24, pl. 1, fig. 2, 3.

Lagena clavata (d'Orbigny). Papp & Schmid, 1985, p. 21, pl. 1, figs. 6-9; Popescu, 1982, p. 262, pl. 1, figs. 13, 14.

Test fusiform, prolonged; surface smooth, unornamented; aperture terminal, at the end of a narrowing neck; aboral opening present.

Range: Badenian.

Lagena WALKER & JAKOB, 1798

Test unilocular, globular or subovate; wall calcareous, hyaline, ornamented with spines, costae or longitudinal striae; aperture circular, terminal, sometimes at the end of a coleret with or without a

phialine lip; circular aboral opening.

Remarks: The genus *Hyalinonetrion* differs from *Lagena* by its fusiform shape and the smooth unornamented surface of the wall, and by the presence of an reverted lip around the aperture; the previously shown characters can be considered as specific and not generic. In this case the genus *Hyalinonetrion* could be considered as a synonym of *Lagena*.

Although the genus is well defined according to the generally accepted description, the holotype of the type species *Serpula (Lagena) sulcata*, according to the figuration given by Walker & Jacob (see Patterson & Richardson, 1987, fide Loeblich & Tappan, 1988, pl. 455, figs. 15-17), seems to actually represent an initial chamber of *Nodosaria* or *Amphicoryna*.

Lagena amphora REUSS, 1862

(Pl. 1, fig. 6)

Lagena amphora Reuss, 1862, p. 330, pl. 4, fig. 57; Popescu, 1983, p. 262, pl. 7, fig. 6.

Lagena sulcata (W. & J.) *amphora* Reuss. Matthes, 1939, p. 55, pl. 3, fig. 4.

Test free, ovoidal, elongate; surface ornamented with 18-22 longitudinal costae prolonged on the apertural neck; aperture terminal rounded; circular aboral opening.

Range: Upper Badenian.

Lagena basitrunca POPESCU, 1983

(Pl. 1, fig. 7)

Lagena basitrunca Popescu, 1983, p. 262, pl. 9, fig. 1.

Test free, ovate, with truncate base; wall calcareous, hyaline; surface ornamented with 12-15 longitudinal costae, dividing towards the aboral half; aperture terminal, circular, at the end of a neck ornamented with helicoidal ribs; distinct aboral opening.

Range: Upper Badenian (Kossovian). This species was recorded from Valea Morilor section (Spirialis Marls), Colibași, Mehedinți district.

Lagena filicosta REUSS, 1862

(Pl. 1, fig. 8)

Lagena filicosta Reuss, 1862, p. 328, pl. 4, figs. 50, 51; Popescu, 1983, p. 263, pl. 2, figs. 5, 6.

Test spherical to ovate; surface ornamented with 14-20 longitudinal fine costae; aperture rounded, terminal, at the end of a neck bordered by a phialine lip; aboral opening.

Range: Badenian.

Lagena furcata MATTHES, 1939

(Pl. 1, fig. 9)

Lagena elegantissima (Bornemann) var. *furcata* Matthes, 1939, p. 58, pl. 3, fig. 15.

Lagena furcata Matthes, 1939. Popescu, 1983, p. 263, pl. 7, figs. 17, 19, 20.

Test spherical; surface ornamented with 14-20 fine longitudinal costae, bifurcated in the equatorial area; aperture circular, terminal, at the end of a neck; distinct aboral opening.

Range: Upper Badenian (Kossovian).

Lagena geminensis POPESCU, 1983

(Pl. 1, fig. 10)

Lagena geminensis Popescu, 1983, p. 263, pl. 1, figs. 1, 2, pl. 7, fig. 3.

Test subspherical to ovoidal; surface ornamented with 20-28 thin longitudinal costae, very elevated, some of them extending on the apertural neck; aperture circular, terminal; on the apertural neck appear transverse fine ribs between plate-like costae; aboral opening with distinct tube extending both inside and outside the test.

Range: Lower Badenian (Upper Langhian).

Lagena haidingeri (CZJZEK, 1847)

(Pl. 1, fig. 11)

Oolina haidingeri Czjzek, 1847, p. 138, pl. 9, figs. 1, 2.

Lagena haidingeri (Czjzek, 1847). Popescu, 1983, p. 263, pl. 1, figs. 3, 4, 8; pl. 7, fig. 4.

Test spherical to ovoidal, circular in transverse section; surface ornamented with fine longitudinal ribs (40-60); aboral half covered with spines or tubercles; aperture rounded at the end of a long, slender neck, ornamented with helicoidal and longitudinal striae, composing a hexagonal pattern, bordered by a phialine reverted lip; aboral opening.

Range: Badenian.

Lagena lacryma (BORNEMANN, 1855)

(Pl. 1, figs. 12, 13)

Ovulina lacryma Bornemann, 1855, Zeit. Deut. geol. Ges., 7, p. 12, fig. 1 (fide Ellis & Messina).

Lagena sulcata (W. & J.) var. *lacryma* Bornemann. Matthes, 1939, p. 57, pl. 3, fig. 12.

Lagena lacryma (Bornemann, 1855). Popescu, 1983, p. 264, pl. 1, figs. 9, 10.

Test ovoidal in shape; surface ornamented with longitudinal fine costae (24-30); aperture terminal, rounded at the end of a short neck, ornamented with helicoidal striae, bordered by a phialine lip; aboral opening.

Range: Upper Badenian.

Lagena semicostata (SEGUENZA, 1862)

(Pl. 1, figs. 14-16)

Phialina semicostata Seguenza 1862, For. Monot. mioc. Messina, p. 45, pl. 1, fig. 19 (fide Ellis & Messina).

Lagena sulcata (Walker & Jacob) var. *semicostata* Seguenza. Matthes, 1939, p. 57, pl. 3, fig. 11 (non fig. 10).

Lagena semicostata (Seguenza, 1862). Popescu, 1983, p. 264, pl. 1, figs. 15-22; pl. 7, fig. 21.

Test elongated, with truncate basis; wall calcareous, smooth; surface ornamented at the basal part of the test with 8-12 elevated costae, gradually disappearing towards upper half; aperture

circular, terminal, at the end of an elongated neck, thinning towards the upper part, ornamented with thin spiral ribs; aboral opening.

Remarks: This species has a large intraspecific variability in length, number and height of costae and height of the apertural neck. The length is usually twice as much as broadest diameter.

Range: Badenian.

Lagena setigera MILLETT, 1901
(Pl. 1, fig. 17)

Lagena clavata d'Orbigny var. *setigera* Millett, 1901, Rep. on the Recent Foram. Malay Arch. collected by Mr. Durrand, FRMS, J.R. Microsc. Soc. London, part 12, p. 491, pl. 8, fig. 9 a, b (fide Ellis & Messina); Wittaker & Hodgkinson, 1979, p. 43, text-figs. 29-37.

Lagena setigera Millett, 1901. Popescu, 1983, p. 265, pl. 1, figs. 11, 12.

Test pyriform-elongate; surface ornamented at the aboral end with 12-14 costae; aperture rounded at the end of an elongated neck; aboral opening.

Range: Common in Badenian deposits.

Lagena striata (D'ORBIGNY, 1839)
(Pl. 1, fig. 18)

Oolina striata d'Orbigny, 1839, Voy. Amer. Merid. 5(5), p. 21, pl. 5, fig. 12 (fide Ellis & Messina).

Lagena striata (d'Orbigny). Buchner, 1940, p. 424, pl. 4, figs. 54-59 (non figs. 60-61); Popescu, 1982, p. 265, pl. 2, figs. 7-9, pl. 7, fig. 5.

Test ellipsoidal; surface ornamented with numerous fine longitudinal costae (30-36), sometimes prolonged on the apertural neck (5-7 costae); aperture rounded at the end of an elongated neck with phialine lip; aboral opening.

Range: Badenian.

Lagena vestita POPESCU, 1983
(Pl. 1, figs. 19, 20)

Lagena vestita Popescu, 1983, p. 266, pl. 1, figs. 5-7.

Test spherical; surface ornamented with quasilongitudinal ribs in the lower (aboral) part of the test, anastomosed in the equatorial region, forming a reticular pattern, then becoming indistinct in the upper part; aperture rounded at the end of a high neck with phialine lip; aboral opening.

Occurrence: Badenian (Upper Langhian).

Procerolagena PURI, 1954

Procerolagena distoma (Parker & Jones, 1864)
(Pl. 1, figs. 28, 29)

Lagena distoma Parker & Jones, 1864 (in Brady, Trans. Linn. Soc. London, vol. 64, fide Ellis & Messina), p. 467, pl. 48, fig. 6; Brady, 1884, p. 461, pl. 58, figs. 11-15); Popescu, 1982, p. 263, pl. 7, figs. 11-15.

Test elongated with parallel margins; surface ornamented with 10-12 fine longitudinal striae; aperture circular, at the end of a short, conical neck; aboral opening.

Range: Upper Badenian.

Pygmaeoseistron PATTERSON & RICHARDSON,
1987

Pygmaeoseistron hispidum (Reuss, 1862)
(Pl. 1, figs. 21-24)

Lagena hispida Reuss, 1862, p. 335, pl. 6, figs. 77, 79.

Lagena tubospina Matthes, 1939, p. 59, pl. 3, fig. 16; Popescu, 1982, p. 265, pl. 2, figs. 1-3; pl. 7, fig. 1.

Test globular or ovoidal, sometimes assymetrical; wall calcareous, hyaline; surface hispid; aperture circular at the end of a coleret; no aboral opening.

Remarks: This is the only genus of *Lagenidae* without aboral opening. This is the simplest test building within the monothalamous foraminifera. A similar species was described by Cushman (1913, p. 14) as *Lagena hispidula*, which in our opinion can be included in the variability of the Reuss' species, and is a junior synonym.

Range: Miocene. Frequent in the Lower Badenian.

Family *Ellipsolagenidae*, A. SILVESTRI, 1923

Subfam. *Ellipsolageninae* SILVESTRI, 1923

Fissurina REUSS, 1862

Fissurina aequabilis (MATTHES, 1939)
(Pl. 1, fig. 25)

Lagena aequabilis Matthes, 1939, p. 89, pl. 8, fig. 148.

Lagena laevigata var. *labiata* Buchner, 1940, p. 476, pl. 12, fig. 203-207 (non fig. 201, 202).

Fissurina aequabilis (Matthes). Popescu, 1983, p. 268, pl. 9, fig. 11, 13.

Test ovate, elongated, slightly flattened, with rounded periphery; wall calcareous, smooth; aperture terminal, an elongated slit, with a rectilinear, free, short entosiphon, situated in a central position; the caudal margin with two or four spines situated in equatorial plane.

Remarks: The presence of the rectilinear entosiphon could be an argument for attributing this species to another genus (new); usually, in *Fissurina* the entosiphon has the tendency to get closer or is attached to the dorsal wall.

Range: Lower Badenian.

Fissurina bicaudata SEGUENZA
(Pl. 1, fig. 26)

Fissurina bicaudata Seguenza, 1862, Descr. Dei foraminiferi monot. (fide Ellis & Messina), p. 64, pl. 2, fig. 16.

Lagena modesta Matthes var. *bicaudata* (Seg.). Matthes, 1939, p. 86, pl. 7, figs. 129-131.

Lagena annectens Burrow Holland var. *pseudostaphyllearia* Buchner, 1940, p. 483, pl. 15, fig. 285-288 (non fig. 289, 290).

Fissurina bicaudata Seg. Popescu, 1983, p. 268, pl. 4, fig. 4; pl. 7, fig. 9; pl. 8, figs. 13, 14; pl. 10, figs. 4, 7, 8.

Taxon with a very large intraspecific variability, represented by the shape of the peripheral margin (carinal area); test ovoidal, flattened, narrowing towards the apertural zone, with or without caudal spine, with carina in the caudal area; wall smooth,

unornamented; aperture terminal, an elongated slit, with a short rectilinear, central entosiphon; the caudal opening an obturated slit, visible in the optical sections.

Range: Miocene (marine facies).

Fissurina BUCHNERI n. sp.

(Pl. 1, fig. 27; pl. 2, fig. 1)

Lagena fasciata Buchner (non Egger, 1857, p. 270, pl. 5, fig. 16-19), 1940, p. 479, pl. 14, fig. 162-165.

Fissurina fasciata (Egger). Popescu, 1983, p. 268, pl. 7, fig. 11; pl. 8, figs. 15, 17.

Test ovoidal, slightly compressed, with peripheral margins rounded, elliptical in transversal section; wall smooth, calcareous; on both sides, parallel with the peripheral margin two halfmoon patterns, slightly depressed, with rugose surface; aperture terminal, slit-like; entosiphon.

The specimens described by Buchner have nothing in common with the species described and figured by Egger. The morphological characters (among which the presence of the depressionary surfaces) are characteristic for the described species.

Type locality: Balta Sărată, south of Caransebeș.

Age: Upper Badenian (Kossovian).

Holotype: Collection I.G.R., nr. P-103926 (holder) figured by Popescu, 1983, pl. 7, fig. 11.

Fissurina corrosa (BUCHNER, 1940)

(Pl. 2, figs. 2, 3)

Lagena corrosa Buchner, 1940, p. 488, pl. 16, figs. 113-136.

Fissurina corrosa (Buchner). Popescu, 1983, p. 268, pl. 9, fig. 14.

Test elliptical, flattened, lenticular in transversal section; surface smooth, with a rough depressionary area disposed near the lateral margins; peripheral keel; aperture terminal, slit-like; entosiphon.

Range: Upper Langhian

Fissurina fimbriata (BRADY, 1884)

(Pl. 2, figs. 4-6)

Lagena fimbriata Brady, 1884, p. 486, pl. 60, figs. 26-28; Cushman, 1913, p. 30, pl. 14, fig. 8.

Lagena castanea Flint, 1899, Rep. U.S. Nat. Mus. 1897 (1899), p. 307, pl. 54, fig. 3 (fide Ellis & Messina); Cushman, 1923, p. 8, pl. 1, figs. 11-12; Buchner, 1940, p. 496, pl. 18, figs. 369-373.

Fissurina fimbriata (Brady). Popescu, 1983, p. 269, pl. 10, figs. 1, 2.

Test small, compressed, subtriangular; margins rounded, elliptical in transversal section; surface smooth; in the lower part of the test an elliptical fimbriate carina, surrounding the test occurs; aperture circular with an internal tube twisted near the aperture, then deviated towards the dorsal part.

Range: Badenian (Upper Langhian).

Fissurina foraminata (MATTHES, 1939)

(Pl. 2, figs. 6, 7)

Lagena foraminata Matthes, 1939, p. 81, pl. VI, fig. 110

Fissurina foraminata (Matthes). Popescu, 1983, p. 269, pl. 4, figs. 6-8; pl. 6, fig. 6.

Test oval in lateral view, lenticular in transversal section; wall calcareous, smooth, with average sized pores, better contoured on the lateral margins, attenuated or absent in the central part of the test, but better developed in the subapertural area where they have the tendency to become axially elongated; peripheral carina; aperture terminal, as an elliptical slit; short internal tube, slightly curved towards the dorsal wall; aboral opening.

Range: Badenian (Upper Langhian).

Fissurina marginata (WALKER & BOYS, 1784)

(Pl. 2, fig. 8)

Serpula (Lagena) marginata Walker & Boys, 1784, Test. Min., p. 2, pl. 1, fig. 7 (fide Ellis & Messina).

Fissurina marginata (Walker & Boys). Popescu, 1983, p. 269, pl. 5, figs. 10, 11.

Test compressed, lenticular, elliptical or circular in lateral view; surface smooth; carina simple, poorly developed, thick; aperture terminal, slit-like.

Range: Badenian (Upper Langhian).

Fissurina oblectans (BUCHNER, 1940)

(Pl. 2, figs. 9-13)

Lagena oblectans Buchner, 1940, p. 487, pl. 16, figs. 310-312.

Fissurina oblectans (Buchner). Popescu, 1983, p. 270, pl. 6, fig. 1.

Test subcircular, slightly oval in lateral view, lenticular in transversal section; surface smooth, ornamented with 2-3 costae, parallel to the equatorial carina; aperture an elongated slit, connected to an internal elongated exentric tube, close to the dorsal half; aboral opening, an almost obturated slit.

Range: Rare in the Middle Badenian.

Fissurina severantoni POPESCU, 1983

(Pl. 2, figs. 14, 15)

Fissurina severantoni Popescu, 1983, p. 271, pl. 8, figs. 11, 12.

Test circular in lateral view, lenticular in transversal section; simple marginal keel; surface ornamented with costae starting from a central smooth area, then recurved towards the apertural zone; above the smooth area there is a reticulate surface; aperture slit-like, bordered by a lip; elongated entosiphon, knited to the dorsal wall, in central position.

Range: Kossovian (Upper Badenian).

Fissurina toga POPESCU, 1983

(Pl. 2, figs. 18-20)

Fissurina toga Popescu, 1983, p. 273, pl. 4, fig. 5

Test compressed, ovate in lateral view, elliptical elongated in transversal section; surface smooth;

the aboral half of the test is covered with 9-12 high, sharp costae; peripheral keel double, present only in the aboral part; the slit-like, terminal aperture continues in the interior of the test with an elongated, curved tube, with a tendency to get closer to the dorsal wall.

Range: Upper Langhian.

Fissurina (?) tricaudata SILVESTRI, 1902
(Pl. 2, fig. 21)

Fissurina bicaudata Seg. var. *tricaudata* Silvestri, 1902, p. 144, fig. 17-19

Fissurina tricaudata Silv. Popescu, 1983, p. 273, pl. 10, figs. 5, 6.

Test ovate, compressed, carinate, lenticular in transversal section; the weakly developed marginal keel has lateral spines pointed towards the aboral area on each side, and a caudal spine; wall smooth, finely porulated. aperture terminal, an elongated slit-like.

Range: Upper Badenian (Kosovian).

Remarks. The short internal tube, *Lagena*-like, makes the assignement to the genus *Fissurina* uncertain. It could be a new genus.

Fissurina variocarinata (BUCHNER, 1940)
(Pl. 2, fig. 22)

Lagena annectens Burrow & Holland forma *variocarinata* Buchner, 1940, p. 482, pl. 15, fig. 279-283.

Fissurina variocarinata (Buchner). Popescu, 1983, p. 272, pl. 8, fig. 8.

Test compressed, ovate in frontal view; peripheral keel; aperture terminal, an elongated slit, at the end of a short, flattened neck; elongated inner tube, knited to the ventral wall.

Range: Kosovian.

Fissurinella n.g.

Test compressed, elliptical, lenticular; peripheral margin sharp, with a slightly fimbriated carina, interrupted in the aboral apex zone; marginal keel with double walls, V-shaped, knited at the margins, the inside with fine transverse walls which give at the surface the fimbriated aspect of the keel (radial striae); surface smooth; aperture an elongated slit, bordered by a phialine lip; entosiphon a short, laterally twisted tube; aboral opening.

Type species: *Lagena pretiosa* BUCHNER, 1940

Fissurinella pretiosa (BUCHNER, 1940)
(Pl. 2, figs. 23-30)

Lagena pretiosa Buchner, 1940, p. 502, pl. 19, figs. 398, 399.

Fissurina pretiosa (Buchner). Popescu, 1983, p. 270, pl. 4, figs. 15-20; pl. 6, fig. 16, pl. 7, fig. 10.

Test compressed, elliptical, lenticular in transversal section; peripheral margin sharp, with a slightly fimbriated carina, interrupted in the aboral apex zone; marginal keel with double walls, V-shaped, knited at the margins, the inside with fine

transverse walls which give at the surface the fimbriated aspect of the keel (radial striae); surface smooth, ornamented with an elliptical or slightly oval rib, disposed around the test, and with another (elliptical, oval, vermicular) in the central part of the test; aperture an elongated slit, bordered by a phialine lip; entosiphon a short, laterally twisted tube; aboral opening.

Range: Middle Badenian.

Lagena POPESCU, 1983

Lagena bellissima (MATTHES, 1939)
(Pl. 3, fig. 1)

Lagena bellissima Matthes, 1939, p. 72, pl. 5, fig. 65.

Lagena bellissima (Matthes). Popescu, 1983, p. 272, pl. 6, fig. 4.

Test compressed, ovate-elongated in lateral view; central part elliptical, ornamented with anastomosed costae; wall smooth; the double peripheral keel, connected by transversal walls, prolonged on the apertural neck, is bordered by an elliptical thickening; aperture circular to elliptical, bordered by a phialine everted lip, at the end of an elongated neck, covered by a reticulate structure; short inner tube, central, rectilinear; aboral opening.

Range: Upper Langhian.

Lagena calceolus POPESCU, 1983
(Pl. 3, figs. 2, 3)

Lagena calceolus Popescu, 1983, p. 272, pl. 4, fig. 1.

Lagena sagitata Popescu, 1983, p. 273, pl. 9, fig. 12.

Test elongated, pointed at both ends, lanceolated, flattened, lenticular in transversal section; the central body of the test is ovate, elongated, surrounded by a sharp, double keel, with thin transversal septae connecting its two walls; the apical part of the keel continues on the apertural neck; surface smooth, perforated by numerous pores, ornamented with fine, almost longitudinal ribs, bordered by an elliptical elevation; apical part ornamented with recurved ribs developed near the peripheral keel; aperture circular, at the end of a long, thin neck, with a phialine lip; entosiphon short, rectilinear, central; the interior of the double keel is empty; aboral opening.

Remarks. Younger specimens, less developed, were described as *L. sagitata* (Popescu, 1983).

Range: Upper Langhian.

Lagena radiata (SEGUENZA, 1862)
(Pl. 3, fig. 4)

Fissurina radiata Seguenza, 1862, Dei terreni Terziari del distretto di Messina. Parte II. Descrizione dei foram. monotal. delle marne Mioceniche del distretto di messina, p. 70, pl. 2, figs. 42, 43. (fide Ellis & Messina)

Lagena sublagenoides Cushman, 1913, p. 40, pl. 16, fig. 4. *Lagena radiata* (Seg.). Buchner, 1940, p. 450, pl. 7, fig. 122.

Lagena radiata (Seg.). Popescu, 1983, p. 273, pl. 5, fig. 16.

Test flattened, piriform in lateral view, lenticular in

transversal section; the central body elliptical-ovate, smooth, bordered by a double peripheral keel, fimbriated, V-shaped, knited on the margins, with fine transversal septae in the interior, corresponding to fine radial striae at the surface of the keel; aperture circular at the end of an elongated thin neck, with apertural phialine lip; inner tube short, rectilinear, central, free; aboral opening.

Range: Lower Badenian (Upper Langhian)

Lagnea tenuisiphonata POPESCU, 1983
(Pl. 3, fig. 5)

Lagnea tenuisiphonata Popescu, 1983, p. 274, pl. 5, fig. 7.

Test compressed, ovate in lateral view; the double peripheral keel, connected by fine transversal septae, continues on the apertural neck; surface ornamented with striae or thin, high, radial ribs, present only on the margin of the test, at the junction between the central corp and the peripheral keel; aperture circular to elliptical, at the end of a thin, elongated neck, with a phialine lip; entosiphon short, rectilinear, central, free; aboral opening.

Range: Lower Badenian (Upper Langhian).

Lagnea timmsensis (CUSHMAN & GRAY, 1946)
(Pl. 3, fig. 6-8)

Entosolenia sigmoidella (Cushman) var. *timmsensis*
Cushman & Gray, 1946, Lab. Foram. Res., sp. Publ.,
19, p. 30, pl. 5, fig. 34-36 (fide Ellis & Messina).

Lagnea timmsensis (Cushman & Gray). Popescu, 1983, p.
274, pl. 5, figs. 3-6; pl. 6, fig. 15.

Test compressed, ovate in lateral view, sigmoidal in aboral view, larger in the lower half, largely rounded at the base, pointed toward the upper part; peripheral keel double, with fine transversal septae, prolonged on the apertural neck; aperture circular, at the end of an elongated neck; entosiphon free, short, rectilinear; aboral opening.

Remarks. Differs from *L. tenuisiphonata* by its ovate-elongated form of the test and by the presence of the radial ribs at the junction of the central part with the keel and by the robust apertural neck.

Range: Upper Langhian.

Paliolatella PATTERSON &
RICHARDSON, 1987

Test compressed, ovate, elongated; surface smooth, without ornamentation; one or more marginal keels; aperture terminal, circular or ovate, at the end of a neck completely englobed by the marginal keel; entosiphon short, free; aboral opening.

Type species: *Paliolatella aviata* PATERSON & RICHARDSON, 1987.

Paliolatella nuda (MATTHES, 1940)
(Pl. 3, figs. 9, 10)

Lagena orbignyana (Seguenza) var. *nuda* Matthes, 1940,

p. 81, pl. 6, fig. 60

Fissurina nuda (Matthes). Popescu, 1983, p. 270, pl. 9, fig.
15-17

Test ovate, lenticular in transversal section; surface rough, covered with numerous pustules; peripheral carina simple, interrupted near the aboral opening; aperture circular, slit-like at the exterior, bordered by a phialine lip, knited to the equatorial carina; short entosiphon, rectilinear.

Range: Badenian.

Paliolatella grossecarinata n.sp.

(Pl. 3, fig. 12; pl. 4, figs. 26, 27; pl. 5, figs. 1, 2)

Test ovate, lenticular in transverse section, with acuminate apertural end; surface smooth; peripheral carina double, thick, almost completely knited, prolonged on the apertural neck; aperture slit-like; aboral opening.

Type locality: Lapugiu, Valea Cosului section.

Holotype: pl. 4, fig. 26 (personal collection)

Remarks. In teratic specimens occur an additional carina on one of lateral faces, giving a triangular transversal section.

Age: Middle Miocene

Paliolatella sp. 1
(Pl. 3, fig. 11)

Test ovate, lenticular; peripheral sharp carina, bordered by a circular ridge; surface smooth; aperture terminal, slit-like at the end of a short neck; aboral opening.

Porosolenia POPESCU, 1998

Test circular to elliptical in lateral view, compressed, lenticular in transversal section, with keeled margins; wall largely perforated; aperture terminal, a slit bordered by an everted lip; short entosiphon, free, rectilinear; aboral opening elongated in equatorial plan.

Type species: *Fissurina kossoviana* POPESCU, 1983.

Porosolenia kossoviana (POPESCU, 1983)
(Pl. 3, figs. 15, 16)

Fissurina kossoviana Popescu, 1983, p. 269, pl. 8, figs. 5,
6.

Porosolenia kossoviana (Popescu). Popescu et al., 1998,
p. 73.

Test elliptical, lenticular in transversal section, with parallel margins and rounded ends; surface perforated by numerous pores, excepting the subapertural area; a few (4-6) longitudinal ribs in the aboral half and near the keel, two short V-shaped ribs under the apertural opening; peripheral keel simple; aperture terminal, elliptical; short entosiphon, rectilinear; aboral opening.

Remarks. The species differs from *P. seguenzae* by its more elongated shape, with elliptic test and surface less costate.

Range: Upper Badenian (Kossovian).

Porosolenia SEGUENZAE (Buchner, 1940)
(Pl. 3, figs. 17-19)

Lagena seguenzae Buchner, 1940, p. 468, pl. 6, figs. 216-218.

Fissurina seguenzae (Buchner). Popescu, 1983, p. 270, pl. 4, figs. 9-14, pl. 6, fig. 10, 11, 17; pl. 8, fig. 16.

Test ovate, elongated, lenticular in transversal section; peripheral keel prolonged on the apertural neck, interrupted by the aboral opening; surface perforated by numerous pores, more evidenced on the margins of the test, ornamented with longitudinal arched ribs, better developed on the aboral area; aperture slit-like, terminal, bordered by a phialine everted lip.

Remarks. Matthes (1939) described and figured the species as *Lagena marginoperforata* var. (Pl. 6, figs. 102, 103).

Range: Lower Badenian (Langhian).

Porosolenia tibiscens POPESCU, 1983
(Pl. 3, fig. 20-24)

Fissurina tibiscens Popescu, 1983, p. 271, pl. 5, figs. 12-19; pl. 6, figs. 12, 14; pl. 7, fig. 8.

Test compressed, ovate in lateral view, lenticular in transversal section; peripheral keel acuminate, interrupted in the aboral zone; double peripheral keel with two acuminate carinae; wall with large pores, with an unpopulated surface in the subapertural area; aperture an elongated slit, continues in the interior with an elongated tube, knited to the dorsal surface; elliptical or slit-like aboral opening.

Remarks: Two types can be distinguished within this species with a high intraspecific variability: one type with rounded ribs, and a smooth area in the centre of the test, and another type with the keel interrupted in the aboral area, interrupted marginal ribs to which 2-4 ribs are added in the aboral zone.

Range: Kossovian (Upper Badenian).

Subfam **Oolininae** LOEBLICH & TAPPAN, 1961

Buchnerina R. W. JONES, 1984

Buchnerina milletti (MARGEREL, 1968)
(Pl. 4, figs. 1-4)

Lagena bicarinata Buchner (non Williamson), 1940, p. 499, pl. 1, figs. 86-92.

Fissurina milletti Margerel, 1968, p. 87, pl. 14, figs. 24-25.

Fissurina quadrata Poignant & Rouvillois (non Williamson), 1976, pl. 1, figs. 9, 10.

Lagena milletti (Margerel). Popescu, 1983, p. 273, pl. 3, figs. 13-16; pl. 6, figs. 9, 13.

Test compressed, elliptical to subquadratic in lateral view; surface granular, with fine pores; in marginal view 4 slightly elevated keels can be noticed; aperture circular to ovate, at the end of a short neck, ending with a phialine lip; inner tube 1/2 of the height of the test, central, almost rectilinear; very distinct aboral opening, with a tube which can extend outside or inside the test.

Range: Upper Langhian (Lower Badenian).

Cushmanina R. W. JONES, 1984

Cushmanina costeiana (POPESCU), 1983
(Pl. 4, figs. 5-8)

Oolina costeiana Popescu, 1983, p. 266, pl. 3, figs. 11, 12; pl. 9, figs. 8, 9.

Lagena striatopunctata Parker & Jones, 1865 var. *spirialis* Matthes, (non Brady), 1939, p. 63, pl. 4, fig. 26.

Test free, unilocular, pyriform, elongated; surface rough, ornamented with 6 helicoidal double costae; double costae have fine secondary walls between them; aperture rounded at the end of a slender, elongated neck, surrounded by a phialine lip; short entosiphon; aboral opening.

Remarks: *Oolina costeiana* differs from *O. spirialis* Brady (1884, p. 468, pl. 114, fig. 9) in elongated ellipsoidal chamber. In Kossovian deposits from Balta Sărată (Caransebeș area) occur some specimens with ovoidal, elongated test figured here (pl. 7, fig. 22) as *O. cf. O. costeiana*.

Range: Rare in Upper Langhian deposits from Valea Gemini, Coștei (Timiș district).

Favulina PATTERSON & RICHARDSON, 1987

Favulina hexagona (WILLIAMSON, 1848)
(Pl. 4, fig. 9)

Entosolenia squamosa (Montagu) var. γ *hexagona* Williamson, 1848, Ann. Mag. Nat. Hist., 2(1), p. 20, pl. II, fig. 23 (fide Ellis & Messina).

Oolina hexagona (Williamson). Popescu, 1983, p. 267, pl. 3, figs. 5-9; pl. 6, fig. 18.

Test spherical, slightly elongated axially, apically acuminate, circular in transversal section; largely rounded at the aboral end, pointed at the apertural end; surface ornamented with a hexagonal pattern (honeycomb), with hexagones arranged in horizontal, oblic or irregular rows; aperture circular at the end of a short pointed neck, with a short rectilinear entosiphon; no aboral opening was noticed.

Range: Middle and Upper Badenian.

Favulina mariae (KARRER, 1877)

(Pl. 4, fig. 10)

Lagena mariae Karrer, 1877, p. 378, pl. XVIb, fig. 16.

Oolina mariae (Karrer). Popescu, 1983, p. 267, pl. 7, figs. 10-15.

Test subspherical, with surface ornamented with dense hexagones (20-22 rows).

Range: Upper Badenian.

Favulina scalariformis (WILLIAMSON, 1848)

(Pl. 4, fig. 12)

Entosolenia squamosa (Montagu) var. β *scalariformis* Williamson, 1848, Ann. Mag. Nat. Hist., 2(1), p. 20, pl. II, fig. 21 (fide Ellis & Messina).

Oolina scalariformis (Williamson). Popescu, 1983, p. 267, pl. 3, fig. 10.

Test free, ovoidal, slightly elongated; surface

ornamented with longitudinally aligned hexagones (14-15 rows); aperture circular; entosiphon short, rectilinear.

Range; Upper Badenian.

Homalohedra PATTERSON &
RICHARDSON, 1987

Homalohedra axiformis (MATTHES, 1939)
(Pl. 4, figs. 11, 13)

Lagena axiformis Matthes, 1939, p. 64, pl. 4, figs. 32-34.

Oolina axiformis (Matthes). Popescu, 1983, p. 266, pl. 7, fig. 18.

Test spherical to fusiform, with the central part ovoidal; surface ornamented with 8 longitudinal ribs prolonged on the apertural neck; aperture circular at the end of an elongated neck; entosiphon short, rectilinear; aboral opening.

Range: Upper Badenian.

Solenina JONES, 1984

Solenina bestiola POPESCU, 1983
(Pl. 4, fig. 14)

Lagena bestiola Popescu, 1983, p. 272, pl. 4, fig. 1

Test flattened, slightly elongated, ovate in lateral view; surface smooth, with a reticulate area as a halfmoon situated immediately below the apertural neck; peripheral keel more developed in the aboral half; aperture ovate, with an reverted phialine lip, at the end of a short neck; entosiphon short, rectilinear.

Range: Upper Langhian.

Solenina sp.
(Pl. 4, fig. 15)

Test ovate, slightly elongated, lenticular in transverse section; double peripheral keel, knited from place to place, giving wavy aspect; surface smooth; aperture circular, slightly elliptical, bordered by a thick lip at the end of a long slender neck; aboral opening.

Vasicostella PATTERSON &
RICHARDSON, 1987

Test slightly flattened, bordered by a keel interrupted in the aboral zone; wall calcareous, hyaline, perforated; surface pustulated or costate; aperture circular to ovate, bordered by a phialine lip at the end of a neck; entosolenian tube short, rectilinear; obturated aboral opening.

Type species: *Lagena vulgaris* WILLIAMSON var. *helophoromarginata* F. W. O. JONES, 1872.

Vasicostella diaripata (POPESCU, 1983)
(Pl. 3, figs. 13, 14)

Fissurina diaripata Popescu, 1983, p. 268, pl. 9, figs. 10, 18.

Test elongated, ovate, lenticular in transversal section; surface smooth; peripheral carina developed in the aboral half, as two wings on both sides of the

aboral opening; aperture elliptical at the end of a short, acumined neck; entosiphon free, short, rectilinear.

Vasicostella fistulosa (MATTHES, 1939)
(Pl. 4, fig. 16)

Lagena limbata Matthes var. *fistulosa* Matthes, 1939, p. 82, pl. 6, fig. 114.

Lagena fistulosa (Matthes). Popescu, 1983, p. 273, pl. 8, fig. 7.

Test ovate in lateral view, lenticular in transverse section; surface smooth, ornamented with longitudinal, vermicular ribs; peripheral carina double, V-shaped in transversal section, extended on the apertural neck; aperture circular, at the end of a long, thin neck; inner tube short, rectilinear.

Range: Kossovian (Upper Badenian).

Vasicostella limbata MATTHES, 1939
(Pl. 4, figs. 17-19)

Lagena limbata Matthes, 1939, p. 82, pl. 6, fig. 113.

Test ovate, elongated, lenticular in transverse section, bordered by a tubular carina which continues on the apertural neck; surface smooth; aperture circular, at the end of an elongated slender neck; aboral opening.

Vasicostella neagui (POPESCU, 1983)
(Pl. 2, fig. 16, 17)

Fissurina neagui Popescu, 1983, p. 269, pl. 3, figs. 17-19.

Test ovate; surface ornamented with thick, radial ribs near the peripheral margin, two or three of them extending on the apertural neck; peripheral carina extended on the apertural neck; a circular rib, interrupted near the aperture, concentric with the periphery, surrounds the central ornamentation; aperture terminal, at the end of a truncated neck, slit-like; slit-like aboral opening.

Range: Upper Langhian

Subfam. **Parafissuriniinae** JONES, 1984
Cursina PATTERSON & RICHARDSON, 1987
Cursina bella (MATTHES, 1939)

(Pl. 4, fig. 25)

Lagena bella Matthes, 1939, p. 71, pl. 4, fig. 60.

Fissurina bella (Matthes). Popescu, 1983, p. 268, pl. 5, fig. 8; pl. 10, fig. 3.

Test circular, flattened, carinated in equatorial plane; wall smooth, ornamented with longitudinal ribs; aperture terminal, slit-like.

Range: Badenian.

Cursina porocostata n.sp.
(Pl. 4, figs. 20-24)

Diagnosis. Test circular in frontal view, slightly elongated axially, slightly flattened, lenticular in transversal section; wall calcareous, finely porulated; surface smooth, ornamented with well defined longitudinal ribs (5-8); peripheral carina interrupted

in the aboral area; aperture subterminal, circular, bordered by a spatulated lip in ecuatorial plan; entosiphon elongated, attached to the dorsal wall.

Col. G. Popescu, nr. 33 245.

Type locality: Valea Lupului section (Archis, Arad district - Zarand Basin).

Age: Upper Langhian - Lowermost Serravallian (Gloturborotalita druryi / Velapertina Zone).

Holotype: pl. 4, fig. 23.

Holotype size: height - 150 μ .m

***Parafissurina* PARR, 1947**

Test similar with *Fissurina*, from which differs by the subterminal position of the aperture.

Type species: *Lagena ventricosa* SILVESTRI, 1904.

Parafissurina carinata (BUCHNER, 1940)
(Pl. 5, figs. 3, 4)

Lagena lateralis Cushman forma *carinata* Buchner, 1940, p. 521, pl. 23, figs. 499, 500.

Parafissurina carinata (Buchner). Popescu, 1983, p. 274, pl. 10, figs. 14, 16.

Test subcircular in lateral view, bordered by a thin keel, lenticular in transversal section; surface smooth; aperture slit-like, subterminal; entosiphon long, torsioned, partly attached on the dorsal wall.

Range: Kossovian.

Parafissurina saturni (BUCHNER, 1940)
(Pl. 5, fig. 6)

Lagena saturni Buchner, 1940, p. 525, pl. 27, figs. 578-580.

Parafissurina saturni (Buchner). Popescu, 1983, p. 274, pl. 10, fig. 12

Test subspherical, slightly flattened, bordered by a very high thin peripheral keel; aperture slit-like, subterminal; surface smooth; entosiphon long, close to the dorsal face.

Range: Upper Badenian (Kossovian).

Parafissurina spinulata n.sp.
(Pl. 5, fig. 5)

Test ovate, elliptical in transverse section; peripheral margin rounded; surface smooth; three large spines in the basal area; aperture slit-like, subterminal.

Lagena fasciata Egger sp. var. nov. *spinosa* Sidebottom, (p. 402, pl. 17, figs. 16, 17) is very close to our species but with terminal aperture.

Type locality: Costei, Valea Gemini section.

Holotype, pl. 5, fig. 5.

Age: Middle Miocene.

Parafissurina subovata PARR, 1950
(Pl. 5, fig. 7)

Parafissurina subovata Parr, 1950, Foram. BANZ, Art. Res. Exp., Rpts. Ser. B, vol. 5, pt. 6, p. 319, pl. 10, figs. 12-14 (fide Ellis & Messina); Popescu, 1983, p. 275, pl. 10, fig. 15.

Test similar with *P. carinata*, but with subpentagonal aspect in lateral view.

Range: Upper Badenian (Kossovian).

Parafissurina wiesneri (BARKER, 1961)
(Pl. 5, figs. 11, 13)

Fissurina wiesneri Barker, 1961, pl. 59, fig. 23.

Parafissurina wiesneri (Barker). Popescu, 1983, p. 275, pl. 8, figs. 18, 19.

Test circular in lateral view, slightly flattened, lenticular in transversal section; peripheral keel high, interrupted in the caudal area; aperture subterminal, slit-like; entosiphon elongated, attached to the dorsal face; obturated aboral opening.

Remarks. The transfer of the species described by Barker to genus *Parafissurina* is motivated by the position of the aperture. Brady (1884) described the same specimen as *Lagena marginata*, and was transferred then by Barker to *L. marginata* var. *carinata* (see Barker, 1961).

Range: Upper Badenian (Kossovian).

Parafissurina sp. 1
(Pl. 5, fig. 8)

Test ovate, lenticular in transverse section; a thin, slightly developed carina; surface smooth; subterminal, slit-like aperture.

Parafissurina sp. 2
(Pl. 5, fig. 12)

Test ovate, slightly elongated, elliptical in transverse section; peripheral margin rounded; surface smooth; aperture subterminal, slit-like.

Parafissurina cf. *P. carinata* (BUCHNER, 1940)
(Pl. 5, figs. 9, 10)

Test almost circular, slightly compressed; peripheral margin acute, bordered by a thin carina; surface smooth; aperture subterminal, an elongated slit.

Subfam. **Sipholageninae** PATTERSON & RICHARDSON, 1987

***Geminiella* POPESCU, 1998**

Test free, unilocular, subcircular to ovate, slightly compressed in axial plan; wall two layered, the inner one smooth, and the outer one glomerular, with rough surface; aperture elliptical to slit-like, at the end of a neck, with or without a lip.

Type species: *Lagena gibbera* BUCHNER, 1940 (see Popescu, 1998).

Geminiella gibbera (BUCHNER, 1940)
(Pl. 5, figs. 14-17)

Lagena gibbera Buchner, 1940, p. 423, pl. 3, figs. 48-50.

Geminiella gibbera (Buchner). Popescu, 1998 (in Cicha et al., eds.), p. 73, pl. 27, figs. 7, 8.

Test circular to ovate, slightly compressed, elongated, in lateral view; wall calcareous, made of a glomerular outer layer, and an inner

microgranular layer; surface rough; aperture ovate sometimes flattened; entosiphon free, rectilinear, short; aboral opening.

Remarks. *Lagena gibbera* was designated as type species for the genus *Geminiella*. The species is based on the description of the species *Lagena aspera* Reuss described by Brady (1884, p. 457, pl. 57, figs. 8, 9) and of the species *Lagena* sp. aff. *laevis* Montagu (ibidem, p. 455, pl. 56, fig. 14). As a lectotype was selected the specimen described by Brady from pl. 57, fig. 8.

Range: Lower Badenian (Upper Langhian).

Geminiella labonea (POPESCU, 1983)

(Pl. 5, figs. 18, 19)

Lagena labonea Popescu, 1983, p. 264, pl. 9, fig. 2, 3.

Test spherical, slightly flattened, ovate in lateral view; surface rough, covered with small pustulae; aperture circular to ovate, bordered by a phialine lip at the end of an elongated neck; inner tube rectilinear; aboral opening.

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PLATES

PLATE I

- Figs. 1-5. *Hyalinonetrion clavatum* d'Orbigny. Figs. 1-3, lateral views; figs. 4, 5, broken specimen showing aboral opening.
- Fig. 6. *Lagena amphora* Reuss. Lateral view.
- Fig. 7. *Lagena basitrunca* Popescu. Lateral view.
- Fig. 8. *Lagena filicosta* Reuss. Lateral view.
- Fig. 9. *Lagena furcata* LeRoy. Lateral view.
- Fig. 10. *Lagena geminensis* Popescu. Lateral view.
- Fig. 11. *Lagena haidingeri* (Czjzek). Lateral view.
- Figs. 12, 13. *Lagena lacryma* (Bornemann). Lateral views.
- Figs. 14-16. *Lagena semicostata* (Seguenza). Fig. 14, lateral view; figs. 15, 16, details of the aboral area.
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- Fig. 27. *Fissurina buchneri* n.sp., holotype. Lateral view.
- Figs. 28, 29. *Procerolagena distoma* (Parker & Jones). Lateral view.

PLATE II

- Fig. 1. *Fissurina buchneri* n. sp, paratype. Lateral view.
- Figs. 2, 3. *Fissurina corrosa* (Buchner). Fig. 2, apertural view; fig. 3, lateral view.
- Figs. 4-6. *Fissurina fimbriata* (Brady). Lower Badenian. Valea Gemini section, Timiș district. Fig. 5, 6, lateral views; fig. 5, detail from fig. 4.
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- Fig. 8. *Fissurina marginta* (Walker & Jacob). Lateral view.
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- Figs. 14, 15. *Fissurina severantoni* Popescu. Lateral view.
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- Fig. 21. *Fissurina* (?) *tricaudata* Silvestri. Lateral view.
- Fig. 22. *Fissurina variocarinata* (Buchner). Lateral view.
- Figs. 23-30. *Fissurinella pretiosa* (Buchner). Lateral views. Fig. 31, photo of a specimen in transmitted light.

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- Fig. 1. *Lagnea bellissima* (Matthes). Lateral view.
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- Figs. 1-4. *Buchnerina milletti* (Margerel). Fig. 1, lateral view; fig. 2, detail of the caudal tube; fig. 3, edge-lateral view; fig. 4, broken specimen showing inner tube.
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- Fig. 1, 2. *Paliolatella grossecarinata* n. sp. Fig. 1 edge view; fig. 2 lateral view of teratic specimen.
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Most of the species described and figured come from section Valea Gemini, Costei, Timis district.
Scale bar - 100µm, when not shown of her sizes, 100.









