Smaller agglutinated foraminifera from the *acanthicum* Limestone  
(Upper Jurassic), Eastern Carpathians, Romania

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ABSTRACT  

INTRODUCTION  
In the inner central part of the Eastern Carpathians deposits belonging to the Middle and Upper Jurassic stages are widely developed in the Hașhimasheila Mountains (Lacul Rosu lake, Bicaz) in the north and in the Bucegi Mountains (Vama Strunga, Tataru, Rasnov) in the south. These deposits are also represented in the marls and marly limestones rich in macrofossils. The Kimmeridgian deposits from the Hașhimasheila Mountains (Vama Strunga - Tataru area) are represented by marls and marly limestones rich in macrofossils (solitary hexacorals - *Montilvilia*; bivalves - *Pholadomya murcihisoni*; and gastropods). Microfossil assemblages from these deposits are represented by Foraminifera such as: *Spirophilaldium infracarolicum*, *S. clarum*, *Citharina proxima*, *C. citharinella*, *Lenticulina muensteri*, *L. quenstedti*, *Planuludia contracta*, *P. aniceps*, *Epistomina regularis*, *E. coronata*, *E. nuda*; ostracods such as: *Cytherella perennis*, *Lophocythere scabra*, *Pleurocythere fatosa*, *Echyphocythere dierallenis*, *Presculideridae subtrigonia intermedia*, and otoliths such as: *Otolithus* (*Lycocoidarudarium* or natus*), and *Otolithus tenuicostatus* (Neagu et al., 1983).

The upper part of the Middle Jurassic and Upper Jurassic deposits are represented by sandstones, marly limestones, polycolour jaspers, and massive limestones. Using a very weak acid (10% solution of formic acid) it has been possible to recover from all kinds of calcareous sediments (different types of limestones) rich smaller agglutinated foraminiferal assemblages that display excellent preservation. The presence of numerous genera of great importance and significance for the Lower Cretaceous flysch deposits in all these assemblages (starting with Lower Kimmeridgian *acanthicum* beds, urged us to undertake a special study of this material. In the course of this study, we found in these assemblages all the important genera that have been among the only markers for biostratigraphical correlation of the Cretaceous flysch facies, which are more or less devoid of macrofossils. At the same time the Upper Jurassic smaller agglutinated foraminifera are very important from an evolutionary point of view. They offer us the possibility to select presumed ancestors and note evolutionary trends of certain taxa. In some cases, the evolutionary trends of post-Jurassic flysch genera can be established up to Recent time.

STRATIGRAPHIC CONSIDERATIONS  
The Kimmeridgian deposits from the Hașhimasheila - Lacul Rosu area start with cherry-coloured nodular limestones, followed by nodular clastic grey limestones corresponding to the uppermost part of the lower Kimmeridgian and the basal part of the upper Kimmeridgian (*Ortaspidoceras uhlandi* and *Aspidoceras acanthicum* zones). The smaller agglutinated foraminiferal assemblage from the nodular cherry-limestones is represented by *Tolypamminina vagans*, *Placopilina cenomana*, *P. argoviensis* (attached specimens), *Ammodiscus silicicoleus*, *Glomospira variabilis*, *G. pusilla*, *Thurammina papillata*, *T. tuberosa*, *Reophax multilocularis*, *R. chrysalis*, *Ammobaculites incertus*, *Haplophilagmoides globigerinoides*, *Recurvoides" univerrsus*, *R" pygmaeus*, *Thalmanammina atanasiui* n.sp., *Haghimashella arcuata*, *Verneulinoides favus*, *Uvigerinammina uvigeriniformis*, *Trochammina concava*, *T. jogłowski Foundation Special Publication no. 3, pp. 211-225.
neoparva, T. rotundata, T. pulchra, T. carpathica, Tritaxis lobata, Textularia jurassica, Pseudomorulaeplecta franconica, and Bicazammina jurassica. Calcareous benthic foraminifera include: Spirillina tenuissima, Patellina feifeli feifeli, Neotrocholina conica. In addition there are sclerites of holothurians and teeth of Squaloidea.

They grey nodular limestones representing the next sedimentary sequence contain a quite similar assemblage of smaller foraminifera to those from the cherty limestones, but differ in having several unique elements as follows:
- the presence of the genus Thalmannammina with a very rough wall;
- the dominant feature of the assemblage is the large frequency of Trochammina neoparva.

Kimmeridgian limestones are also exposed in some localities of the Bucegi Mountains. The following localities deserve mention (Fig. 1):

1. Rasnov village (along the Rasnov-Poiana Brasov road). This locality is also very rich in ammonites. The agglutinated foraminiferal assemblage is comprised of Tolyppammina vagans (rare), Ammodiscus siliceous, Glomospira variabilis, G. pusilla, Reophax multilocularis, R. chrysalis, R. helvetica, Ammobaculites inconstans, A. supr Jurassicum, "Recurvoides" universus, "R", pygmaeus, Haghimashella arcuata, Verneulinoides favus, Verneulinella carpathica n.sp., Rashnovammina carpathica n.sp. (frequent), Trochammina neoparva, T. pulchra (rare), Textularia jurassica, and Pseudomorulaeplecta franconica. In this assemblage it is worth underlining the frequent presence of the species Verneulinoides favus and Verneulinella carpathica n.sp.

2. Galma Ialomitzei (a large olistolith within the Aiptan flysch deposits). Here, the lithology is similar to that in Rasnov, but ammonites are less common. Patrulius (1968) considered, based on macrofaunal assemblage, that the Kimmeridgian deposits start here with the uppermost part of the acanthicum biozone, continuing then until the hybonotum biozone of the Tithonian. Cherry-coloured compact limestones rich in smaller foraminiferal assemblages occur in the lowermost part of the outcrop. From the taxonomic point of view these are similar to the assemblages from the Rasnov. Nevertheless, they additionally contain numerous calcareous species such as Patellina feifeli feifeli, P. feifeli, and Neotrocholina conica, which suggests a more distal character of the environment. The upper part of this outcrop is represented by grey and white limestones. According to Patrulius (1968), these belong to the lower Tithonian. The agglutinated assemblage is dramatically reduced in terms of both abundance and numbers of species. Spirillind and involutinid groups (not attacked by acid) appear in a high frequency. The assemblage in those limestones is represented by: Tolyppammina vagans (without Placopilina), Thurammina papillata, T. tuberosa, Ammodiscus siliceous, A. inconstans, Glomospira variabilis, G. pusilla, Reophax chrysalis, R. multilocularis, Haplophragmoids globigerinoides, "Recurvoides" universus, "R", pygmaeus, Verneulinoides favus, Verneulinella carpathica n.sp., Haghimashella arcuata, Bicazammina jurassica, Tritaxis lobata, Trochammina pulchra (rare), Textularia jurassica, Pseudomorulaeplecta franconica, Rashnovammina carpathica n.sp. Additionally, the following calcareous species are present: Patellina feifeli feifeli, P. feifeli elongata, and Neotrocholina cf. conica (frequent).

3. Vama Strunga - Tataru zone. This locality is situated on the western slope of the Bucegi area. This zone corresponds stratigraphically to the Galma Ialomitzei locality. Here, in the lower part of the grey and white limestones (with the casts of ammonites) the foraminiferal assemblage contains Tolyppammina vagans (without Placopilina), Thurammina papillata, T. tuberosa, Reophax chrysalis, R. multilocularis, Glomospira variabilis, G. pusilla, Ammodiscus siliceous, A. irregularis, Haplophragmoids globigeriniformis, "Recurvoides" universus, Haghimashella arcuata, Textularia jurassica, T. cf. punguicula, Pseudomorulaeplecta franconica, Tritaxis lobata, Verneulinoides favus, Verneulinella carpathica n.sp. and the calcareous species: Patellina feifeli feifeli, P. feifeli elevata, P. turbinella, and Neotrocholina conica.

4. Pelesului Valley. This is another large olistolith included within the Aiptan flysch deposits. At this locality, cherry-coloured nodular limestones lying on the polycoloured jasper contains the following assemblage: Tolyppammina vagans, Thurammina scruposa, Ammodiscus siliceous, Glomospira variabilis, Reophax multilocularis, R. chrysalis, Ammobaculites irregularis, Haplophragmoids globigerinoides, "Recurvoides" universus, Haghimashella arcuata, Bicazammina jurassica, Trochammina rotundata, T. neoparva, Textularia jurassica and Patellina feifeli feifeli. This assemblage lacks Pseudomorulaeplecta franconica. Instead, it contains numerous individuals of Rashnovammina carpathica. This assemblage closely resembles the Galma Ialomitzei locality where the deposits represent the upper Kimmeridgian hybonotum biozone.

Paleobiological considerations
The smaller agglutinated foraminifera listed above represent a typical foraminiferal assemblage from an epicontinental environment of warm, shallow water depths of normal salinity. This represents the environment from which populations of agglutinated foraminifera migrated after the opening and subsidence of the Lower Cretaceous Carpathian Flysch Basin. In this way it is possible to explain the remarkable occurrence of genera which subsequently became marker elements (due to the lack of planktonic or calcareous genera) useful in the biostratigraphy of deep-sea Lower Cretaceous sediments. In this situation the following genera occur: Haplophragmoids, "Recurvoides", Thalmannammina, Uvigerin-
Figure 1. Stratigraphic sections containing Upper Jurassic Limestones sampled in this study.
ammina, Verneuilinoides, not to mention the other more simple genera as Ammodiscus, Glomospira, etc.

Also, the high level of evolutionary development of these genera becomes explainable. These taxa acquired a more and more complex degree of the chamber coiling through geological time. Among them are: Uvigerinammina and the calcareous genus Falsogaudyinella (Kaminski et al., this volume) as well as Plectocuriocoides and Pokornyammina (Neagu & Platon, 1994) which were well-developed during the Cretaceous.

A very interesting example is offered by the genus "Recurvoides" which was described by Earland, 1934 from the Recent. The original diagnosis (fide Cushman, 1950) reads: "test free...coils of the early portion planispiral, later ones nearly at right angle to the earlier ones". Taking into account the high abundance of this group in the Romanian Kimmeridgian assemblages we assume that taxonomically speaking, its evolution started not later than during the Early Jurassic. What we consider as belonging to this genus is far from the original diagnosis. Only two morphological characteristics differentiate Recurvoides from Haplophragmoides and Trochina. These are the mode of coiling, which slightly deviates from planispiral enrolment in the case of Recurvoides, and the position of the aperture, which is areal on the last formed chamber. Gradually during the Late Jurassic to Recent time interval, the Jurassic ancestor became atypical Recurvoides (sensu Earland). As a logical conclusion, it is inevitable that all the intermediate stages of this long evolution must be recorded as distinct taxa (but not before clearing up the original diagnosis of the Earland's genus). If we consider the number of species assigned to this genus in its present conception, it is clear that the rate of evolution can justify more than one genus. For the genus Thalmanammina, which is so frequent in the Cretaceous flysch deposits, the coating is almost exclusively represented by chambers grouped in "U" shaped planes, perpendicular to one another. However, a certain irregularity of chambers, which probably are trochospirally arranged, is still visible on the early stages of the Kimmeridgian specimens. Also, it is interesting to point out the fact that the degree of selection of the quartz grains and the quantity of cement have increased during the Cretaceous. A similar phenomenon also appears within the genus Uvigerinammina. The Kimmeridgian specimens reveal a difference of grain selection between the early and the later stages. The early stages are made by larger grains and the later chambers are comprised of more delicate grains. The coating is largely trochospiral but the apertural tubes forming the chamber connections already exist. All these structures became more and more compact during the Cretaceous. The genus Verneuilinoides, present in the Upper Kimmeridgian assemblages (acanthicum biozone), evolved in the Cretaceous flysch sediments only by means of increasing its overall size.

CONCLUSIONS

The biostratigraphical study of these smaller agglutinated foraminifera has a direct meaning in offering the micropalaeontological possibility of correlating the Upper Jurassic limestones. The indirect meaning resides in explaining the origins of the similar benthic assemblages of the Lower Cretaceous flysch sediments. It is clear now that the Lower Cretaceous smaller agglutinated foraminifera have their origins among the epicontinental upper Jurassic assemblages. By migrating and progressively accommodating to their new environmental conditions of life in new ecological niches created by the opening of a large area of flysch sedimentation starting in some areas during the Tithonian, the appearance of new taxa became possible. The evolution of these assemblages was evidently conditioned and supported by new environmental conditions in which the phenomena of turbidity prevailed, eliminating totally or nearly totally the life conditions necessary for the calcareous benthonic taxa. These assemblages have also the merit to put in a new light the evolution of smaller foraminifera, whose dispersion appears now clearly determined as a normal and natural consequence of palaeogeographical and palaeoecological change.

SYSTEMATICS

Taxa are arranged systematically according to Loeblich & Tappan (1987). The specimens illustrated in this paper are deposited in the Laboratory of Palaeontology, University of Bucharest, and paratypes of the new species are deposited in the micropalaeontological collections of the Natural History Museum (London).

Suborder TEXTULARINA Delage & Herouard, 1896
Supafamily ASTRORHIZACEA Brady, 1881
Family SACAMMINIDAE Brady, 1884
Subfamily Thurammininae Mikuho-Maklay, 1962
Genus Thurammina Brady, 1879

Thurammina tuberosa Haeusler, 1883
Location: Haghimas Massif, Lacul Rosu lake, Rasnov.
Stratigraphic distribution: Kimmeridgian.
Hypotypes: L.P.B.IV.11 136

Thurammina papallata Brady, 1879
Thurammina papallata Brady, 1879, p. 45, pl. 5, figs. 4-8. - Haeusler, 1883, p. 60, pl. 4, figs. 10-13; p. 262, pl. 8, figs. 1-14, 17-19, 21-39. - Oesterle, 1968, p. 707, textfig. 6 (c-h).
Location: Haghimas Massif, Lacul Rosu lake, Rasnov.
Stratigraphic distribution: Kimmeridgian.
Hypotypes: L.P.B. IV 11 137

Superfamily AMMODISCACEA Reuss, 1862
Family AMMODISCIDAE Reuss, 1862
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Subfamily Tolypammininae Cushman, 1928
Genus *Tolypammina* Rhumbler, 1895

*Tolypammina vagans* (Brady, 1879)

*Hyperammina vagans* Brady, p. 33, pl. 5, fig. 3. - Haeusler, 1883, p. 58, pl.3, figs. 7-10.


Location: Haghamas Massif, Lacul Rosu lake; Bucegi Massif (Tataru); Rasnov; Ialomitza Valley (Galma Ialomitzei olistolith).

Stratigraphic distribution: Kimmeridgian.

Hypotypes: L.P.B.IV 11 138

Subfamily Ammocentrinae Saidova, 1981
Genus *Glomospira* Rzehak, 1885

*Glomospira pusilla* (Geinitz, 1848)

*Fig.* 1, Pls. 15-17

*Trochammina pusilla* (Geinitz). - Haeusler, 1882, p. 56, pl. 4, figs. 27-30.


Dimensions: Length 0.26-0.39 mm, breadth 0.14-0.21 mm.

Location: Haghamas Massif, Lacul Rosu lake, Bucegi Massif (Tataru); Ialomitza Valley (Galma Ialomitzei olistolith); Rasnov.

Stratigraphic distribution: Kimmeridgian-Tithonian.

Hypotypes: L.P.B.IV 11088-11090

*Glomospira variabilis* (Kubler & Zwingli, 1870)

*Fig.* 1, Pls. 3-14, Pls. 6, figs. 15-21

*Cornospira variabilis* Kubler & Zwingli, 1870, p. 33, pl. 41, fig. 4.

*Trochammina incerta irregularis* Kubler & Zwingli. - Haeusler, 1882, p. 54, pl. 3, figs. 4-7.

*Trochammina charoides* Jones & Parker. - Haeusler, 1882, p. 56, pl. 4, fig. 21.

*Trochammina gordialis* Jones & Parker. - Haeusler, 1882, p. 55, pl. 3, figs. 9-20.

*Ammodicis gordialis* Jones & Parker. - Haeusler, 1885, p. 24, pl. 3, figs. 11-13, 16-20, 31, not figs. 10, 14-15, 21-22.

*Ammodicis minutus* Paalzow, 1932, p. 93, pl. 4, figs. 10-11.


Dimensions: Diameter (small) 0.17-0.19 mm, (large) 0.17-0.21 mm.

Location: Haghamas Massif, Lacul Rosu lake; Bucegi Massif (Tataru); Ialomitza Valley (Galma Ialomitzei olistolith); Rasnov.

Stratigraphic distribution: Kimmeridgian-Tithonian.

Hypotypes: L.P.B.IV 11091-11092

Superfamily LITUOLACEA de Baliville, 1827
Family HAPLOPHRAGMOIDIDAE Maync, 1952
Genus *Haplophragmoides* Cushman, 1910


Dimensions: Diameter 0.24-0.26 mm, thickness 0.17 mm.

Location: Haghamas Massif, Lacul Rosu lake; Bucegi Massif (Tataru); Rasnov; Ialomitza Valley (Galma Ialomitzei olistolith).

Stratigraphic distribution: Kimmeridgian.

Hypotypes: L.P.B.IV 11095-11096

Family LITUOLIDAE de Blainville, 1827
Subfamily Ammomarginulininae Podobina, 1978
Genus *Ammobaculites* Cushman, 1910

*Ammobaculites irregularis* (Gümbel, 1862)

*Pl.* 3, Figs. 39-44

*Marginalina irregularis* Gümbel, 1862, p. 220, pl. 3, figs. 15a-b, 17-18.


Dimensions: Length 0.39-0.65 mm, thickness 0.13-0.39 mm (figured specimens).

Location: Haghamas Massif, Lacul Rosu lake, Bucegi Massif (Tataru); Ialomitza Valley (Galma Ialomitzei olistolith); Rasnov.

Stratigraphic distribution: Kimmeridgian.

Hypotypes: L.P.B.IV 11097-11098

Superfamily HAPLOPHRAGMIACEA Eimer & Fickert, 1899
Family AMMOSPHAERIDINIDAE Cushman, 1937
Subfamily Recurvoidinae Alekseychik-Mitskevich, 1973

Genus *Recurvoides* Earland, 1934

*Recurvoides pygmaeus* (Haequser, 1881)

*Pl.* 3, Figs. 24-38

*Rotula* *pygmaea* Haequser, 1881, p. 40, pl. 2, fig. 69.

*Haplophragmoides pygmaeus* (Haequser). - Oesterle, 1968, p. 731, textfigs. 25c, 28d, 29a-d.

Dimensions: Diameter (small) 0.19-0.21 mm; (large) 0.24-0.29 mm (figured specimens).

Location: Haghamas Massif, Lacul Rosu lake, Bucegi Massif (Tataru).

Stratigraphic distribution: Kimmeridgian-Tithonian.

Hypotypes: L.P.B.IV 11102

*Recurvoides universus* (Haequser, 1881)

*Pl.* 3, Figs. 9-23

*Rotula* *universus* Haequser, 1881, p. 28, pl. 2, fig. 38.

*Haplophragmoides universus* (Haequser). - Oesterle, 1968, p. 734, textfigs. 28e, 30a-c.

Dimensions: Diameter (small) 0.17-0.9 mm; (large) 0.21 mm (figured specimens).

Location: Haghamas Massif, Lacul Rosu lake, Bucegi Massif (Tataru); Rasnov; Ialomitza Valley (Galma Ialomitzei olistolith).

Stratigraphic distribution: Kimmeridgian.

Hypotypes: L.P.B.IV 11103
Genus *Thalmannammina* Pokorny, 1951

*Thalmannammina atanasiui* Neagu & Neagu, n.sp.

Pl. 6, Figs. 23-37

Description: Coarsely agglutinated test with angular grains of quartz and siliceous cement (insoluble in acid), globulous chambers (3-5 per whorl) with a typical thalmannaminiform streptospiral coiling ("U" shape of coiling planes making different angles among them but not 90°). Aperture areal, elliptical, not far from the base of the apertural face, with a very finely agglutinated lip.

Dimensions: Holotype diameter (small) 0.26 mm, (large) 0.29 mm; paratypes diameter (small) 0.26-0.36 mm, (large) 0.29-0.39 mm.

Material: 100 specimens.

Type Locality: Haghimas Massif, Lacul Rosu lake, gray clastic limestone with ammonites.

Stratigraphic distribution: Kimmeridgian.

Derivation of Name: This species is dedicated to Prof. Ion Atanasiu, a Romanian Geologist who carried out his doctoral research in the Haghimas area.

Holotype: LPB IV 11.104

Paratypes: LPB IV 11.105. Additional specimens are deposited in the micropalaeontological collections of the Natural History Museum (London), PF 53010.

Superfamily SPIROPLECTAMMINACEA Cushman, 1927

Family TEXTULARIOPSISIDAE Loeblich & Tappan, 1982

Genus *Haghimasella* Neagu & Neagu, n.gen.

Type species: *Haghimasella arcuata* (Haeusler, 1890)

Derivation of Name: from the Haghimas Mountains.

Description: Test free, finely agglutinated, smooth with siliceous cement (insoluble in acid). A short biserial early stage followed by a lax-uniserial adult stage, with 1-7 glandular-globulous chambers, and deep oblique sutures. Aperture terminal, circular or elliptical, supported by a short neck. Wall compact, non-canaliculate.

Remarks: The chambers in the adult portion of the test are not wholly uniserial, but are loosely uniserial or sprawling (lax-uniserial) as in the calcareous genus *Pleurostomella*. Because of this, the sutures in the adult part are not perpendicular to the axis of growth. This genus differs from *Bigenerina* d’Orbigny, 1826 by its compact non-canaliculate wall structure; from *Aaptotoichus* Loeblich & Tappan, 1982 by its smooth wall and the aspect of the adult uniserial chambers; and from *Pseudobolivina* Wiesner, 1931 in its terminal aperture.

*Haghimasella arcuata* (Haeusler, 1890)

Pl. 2, Figs. 1-11


Dimensions: 0.14-0.62 mm, thickness 0.096-0.14 mm.

Location: Haghimas Massif, Lacul Rosu lake; Bucegi Massif (Tataru); Ialomitza valley (Galma Ialomitzei olistolith); Pelesului Valley (Cota 1100 olistolith); Rasnov.

Stratigraphic distribution: Kimmeridgian-Lower Tithonian.

Hypotypes: LPB IV 11.106-11.108

Genus *Bicazammina* Neagu & Neagu, n.gen.

Type species: *Bicazammina jurassica* (Haeusler, 1890)

Derivation of name: from the town of Bicaz.

Description: Test free, moderately agglutinated, biserial in the early stage, becoming lax-uniserial to nearly uniserial. Chambers globular with depressed sutures. Aperture areal with an elliptical or circular outline, Wall siliceous, compact, non-canaliculate.

Remarks: This genus is strongly homeomorphic with *Bigenerina* d’Orbigny; however it differs from the latter in its non-canaliculate wall structure.

*Bicazammina jurassica* (Haeusler, 1890)

Pl. 2, Figs. 44-53

Pleurostomella jurassica Haeusler, 1890, p. 77, pl. 12, figs. 14-22.


Remarks: The specimens illustrated by Riegraf and Luterbacher (1989) as *Bigenerina jurassica* also most likely belong in *Bicazammina* if further study proves that they possess a siliceous, non-canaliculate wall.

Dimensions: Length 0.48-0.60 mm, breadth 0.14-0.17 mm.

Location: Haghimas Massif, Lacul Rosu lake.

Stratigraphic distribution: Lower Kimmeridgian.

Hypotypes: LPB IV 11.109

Genus *Rashnovammina* Neagu & Neagu, n.gen.

Type species: *Rashnovammina carpathica* Neagu & Neagu, n.gen.n.sp.

Derivation of name: from the village of Rasov.

Description: Test free, fine to moderate agglutinated with siliceous cement (insoluble in acid), textulariform, biserial with a tendency to become lax-uniserial in the last third part of the test, slightly globulous chambers with straight and depressed sutures. Aperture areal to terminal, elliptical or circular in outline, supported by a short neck. Wall compact, non-canaliculate.

Remarks: This genus differs from *Plectinella* Marie, 1956 to which it is homeomorphic externally, by its circular or elliptic apertural which is areal in position, supported by a short neck rather than an elliptical slit as in *Plectinella*. It differs from *Bimolinella* Eicher, 1960 (another homeomorph) by its areal circular or ellip-
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tical aperture supported by a neck rather than having a slit-like aperture.

**Rashnovammina carpathica** Neagu & Neagu, n.gen.n.sp.
Pl. 2, Figs. 12-27

**Description:** Test free, biserial, with the last part of the test become lax-uniserial, sutures straight and depressed, the twisted aspect of the test is extremely rare and slightly visible on the early stage, aperture terminal elliptical or circular in outline supported by a short neck, moderate to slowly finished agglutinated wall, compact non-canaliculate with siliceous cement.

**Dimensions:** Holotype: length 0.39 mm, breadth 0.14 mm; paratypes: length 0.21-0.39 mm, breadth 0.072-0.14 mm.

**Type Locality:** Rasnov, Bucegi Massif (Tataru), Ialomita valley (Galma Ialomitzae olistolith).

**Stratigraphic distribution:** Kimmeridgian- Lower Tithonian.

**Holotype:** L.P.B. IV 11.112

**Paratypes:** L.P.B. IV 11.111. Additional specimens are deposited in the micropaleontological collections of the Natural History Museum (London), PF 53011.

Superfamily TROCHAMMINACEA Schwager, 1877
Family TROCHAMMINIDAE Schwager, 1877
Subfamily Trochammininae Schwager, 1877

**Genus Trochammina** Parker & Jones, 1859

**Trochammina rotundata** Seibold & Seibold, 1960

Pl. 2, Figs. 4-9

**Trochammina rotundata** Seibold & Seibold, 1960, p. 345, textfig. 5 (s-u), pl. 8, fig. 13. - Oesterle, 1968, p. 751.

**Dimensions:** Diameter (small) 0.21-0.29 mm; (large) 0.31-0.34 mm.

**Location:** Haghimas Massif, Lacul Rosu lake, Rasnov.

**Stratigraphic distribution:** Lower Kimmeridgian.

**Hypotypes:** L.P.B. IV 11.114-11.115

**Trochammina pulchra** Ziegler, 1959

Pl. 4, Figs. 1-13

**Trochammina pulchra** Ziegler, 1959, p. 94, pl. 2, figs. 6-8.
**Trochammina pulchra** Ziegler. - Oesterle 1968, p. 751, textfig. 45f.

**Dimensions:** Diameter (small) 0.21-0.39 mm; (large) 0.29-0.48 mm.

**Location:** Haghimas Massif, Lacul Rosu lake, Rasnov.

**Stratigraphic distribution:** Lower Kimmeridgian.

**Hypotypes:** L.P.B. IV 11.118-11.119

**Trochammina neoparva** Oesterle, 1968

Pl. 5, Figs. 19-30

**Trochammina parva** Seibold & Seibold, 1960, p. 344, textfig. 5 (n-r), pl. 7, fig. 19.
**Trochammina neoparva** Oesterle (nomen novum), 1968, p. 748, textfig. 45(d).

**Dimensions:** Diameter (small) 0.19-0.34 mm, (large) 0.21-0.43 mm.

**Location:** Haghimas Massif, Lacul Rosu lake, Rasnov.

**Stratigraphic distribution:** Lower Kimmeridgian.

**Hypotypes:** L.P.B. IV 11.117

**Trochammina concava** Seibold & Seibold, 1960

Pl. 4, Figs. 14-18, Pl. 5. Figs. 1-3

**Trochammina concava** Seibold & Seibold, 1960. p. 342, textfig. 5 (h-k), pl. 8, fig. 8.

**Dimensions:** Diameter (small) 0.26-0.40 mm, (large) 0.34-0.48 mm.

**Remarks:** This species differs from *T. pulchra* Zeigler by more globulous aspect of the chambers, and its depressed umbilical side with a deep umbilicus.

**Location:** Haghimas Massif, Lacul Rosu lake.

**Stratigraphic distribution:** Lower Kimmeridgian.

**Hypotypes:** L.P.B. IV 11.120

**Trochammina rumana** Neagu & Neagu, n.sp.
Pl. 5, Figs. 10-18

**Description:** Test small with a conical shape (like *Globorotalites*). Spiral side flat, umbilical side high conical, with a (crateriform) umbilicus. Seven to nine chambers in the last whorl, which increases rapidly in height (evidently heteromorphic with Lower Cretaceous species of the genus *Globorotalites*). Aperture a small, umbilical arcuate slit bordered by a small lip. Wall moderate agglutinated with siliceous cement.

**Dimensions:** Holotype 0.24 mm small diameter, 0.31 mm large diameter, 0.19 mm height. Paratypes 0.26 - 0.29 mm in diameter, 0.17-0.19 mm in height.

**Remarks:** This species is very clearly delimited by its homeomorphy with the genus *Globorotalites*.

**Type Locality:** Haghimas Massif, Lacul Rosu lake, Rasnov.

**Stratigraphic distribution:** Lower Kimmeridgian.

**Derivation of name:** from the country Romania.

**Holotype:** L.P.B. IV 11.112

**Paratypes:** L.P.B. IV 11.122

**Genus Tritaxis** Schubert, 1921

**Tritaxis lobata** Seibold & Seibold, 1960

Pl. 6, Figs. 38-39

**Tritaxis heusleri** Galloway, 1933, p. 212 (nomen nudum).
**Valvulina lobata** Seibold & Seibold, 1960, p. 356, textfig. 4(f-g), pl. 8, fig. 11.


**Dimensions:** Diameter 0.21-0.74 mm, height 0.14-0.46 mm

**Location:** Haghimas Massif, Lacul Rosu lake, Rasnov; Ialomita Valley (Galma Ialomitzae olistolith).

**Stratigraphic distribution:** Kimmeridgian.

**Hypotypes:** L.P.B. IV 11.123

Superfamily VERNEUILINACEA Cushman, 1911
Family: PROLIXOPECTIDAE Loeblich & Tappan, 1985
Genus *Verneuillina* Tairov, 1956

*Verneuillina carpathica* Neagu & Neagu, n.sp.

\[\text{Pl. 6, Figs. 1-10}\]

**Description:** Test small, with a conical aspect, four chambers per whorl, growing gradually in dimensions, and arranged in a high trochospiral coil. Sutures slightly depressed. Wall compact, non-canaliculate, moderately agglutinated, with siliceous cement. Aperture interiomarginal on the basal part of apertural face of the last chamber, with an arched shape.

**Dimensions:** Holotype: length 0.2 mm, thickness 0.17 mm. Paratypes: length 0.19-0.24 mm; thickness 0.12-0.17 mm.

**Remarks:** This species clearly differs from *Verneuillinoides favus* Bartenstein found in the same assemblage by its quadriserial disposition of the chambers.

**Type Locality:** Rasnov, Ialomitza valley (Galma Ialomitzei olistolith).

**Stratigraphic distribution:** Kimmeridgian.

**Derivation of name:** from the Carpathian Mountains.

**Holotype:** L.P.B. IV 11.128

**Paratypes:** L.P.B. IV. 11.129-11.130. Additional specimens are deposited in the micropalaeontological collections of the Natural History Museum (London), PF 53009.

Family VERNEUILINIDAE Cushman, 1911

Subfamily Verneuillinoidiinae Suleymanov, 1973

Genus *Verneuillinoides* Loeblich & Tappan, 1949

*Verneuillinoides favus* (Bartenstein, 1937)

\[\text{Pl. 3, Figs. 45-51}\]

**Verneuillina favus** Bartenstein & Brand, 1937, p. 183, textfig. 18.

**Dimensions:** length 0.17-0.34 mm, thickness 0.096-0.14 mm.

**Location:** Haghimas Massif, Lacul Rosu lake, Bucegi Massif (Tataru), Ialomitza Valley (Galma Ialomitzei olistolith); Rasnov.

**Stratigraphic distribution:** Kimmeridgian.

**Hypotypes:** L.P.B. IV.11.124-11.127.

Genus *Uvigerinammina* Majzon, 1943

*Uvigerinammina uvigeriniformis* (Seibold & Seibold, 1960)

\[\text{Pl. 2, Figs. 28-43, Pl. 6, Figs. 11-14}\]

**Caudryna uvigeriniformis** Seibold & Seibold, 1960, p. 34, textfig. 8, pl. 7, fig. 4.

**Dimensions:** Length 0.29-0.36 mm, thickness 0.14 mm.

**Location:** Haghimas Massif, Lacul Rosu lake.

**Stratigraphic distribution:** Lower Kimmeridgian (acanthicum biozone).

**Hypotypes:** L.P.B. IV.11.131

Superfamily TEXTULARIAEAE Ehrenberg, 1838

Family TEXTULARIIDAE Ehrenberg, 1838

Genus *Textularia* Defrance, 1826

*Textularia jurassica* Gumbel, 1862

\[\text{Pl. 1, Figs. 1-2}\]

**Textularia jurassica** Gumbel, 1862, p. 228, pl. 4, fig. 17a-b. **Textularia jurassica** Gumbel. - Seibold & Seibold, 1953, p. 43, pl. 4, fig. 2. - Seibold & Seibold, 1960, p. 98, textfig. 2, pl. 13, fig. 1. - Oesterle, 1968, p. 741.

**Dimensions:** Length 0.43-0.96 mm, breadth 0.14-0.12 mm.

**Remarks:** Transversal sections through the test show the presence of a canaliculate wall. The biserial arrangement of the chambers demonstrate the affiliation of the Jurassic material to the genus *Textularia*. Even Loeblich & Tappan (1987) considered this genus to range only from Palaeocene.

**Location:** Haghimas Massif, Lacul Rosu lake, Rasnov; Ialomitza Valley (Galma Ialomitzei olistolith); Bucegi Massif (Tataru).

**Stratigraphic distribution:** Kimmeridgian-Tithonian.

**Hypotypes:** L.P.B. IV.11.133

Genus *Pseudomorulaeplacella* Neagu & Neagu, n.gen.

**Type species:** *Pseudomorulaeplacella franconica* (Gumbel, 1862).

**Derivation of name:** from its resemblance to the genus *Morulaeplacella* Höglund, 1947.

**Description:** Typical biserial textularoid test in the adult stage, a short low trochospirally coiled early stage with a bulbaceous aspect. Aperture interiomarginal, textularoid the basal part of the last formed chamber. Wall canaliculate, fine to moderately agglutinated wall with siliceous cement.

**Remarks:** This genus differs from *Textularia* Defrance, 1826 (with which it is homeomorphic) by its early low trochospirally coiled stage. It differs from *Morulaeplacella* Höglund, 1947 by its canaliculate wall structure.

*Pseudomorulaeplacella franconica* (Gumbel, 1862)

\[\text{Pl. 1, Figs. 23-32}\]

**Textularia franconica** Gumbel, 1862, p. 229, pl. 4, fig. 18a-b.

**Dimensions:** Length 0.25-0.96 mm, thickness 0.12-0.21 mm.

**Remarks:** Taking into consideration Seibold & Seibold's (1955) observations (Revision der Foraminiferen Bearbeitung C.W. Gumbel, 1862), Gumbel's originals were destroyed during the Second World War. Seibold attempted to designate neotypes from the type locality, but 21 of Gumbel's species were not found. The specimens they figured and described as a neotype for *Textularia jurassica* did not include (in our opinion) *T. franconica*, which differs from *T. jurassica* (as Gumbel pointed out) by its "shorter size, thicker and especially by the early chambers more robust ". In our opinion *T. franconica* is a valid name. Its "robust early chambers" represent the short trochospiral early stages. *Textularia franconica* is here...
designated the type-species of the new genus Pseudomorulaepecta.

**Location:** Hagimasa Massif, Lacul Rosu lake, Rasnov.

**Stratigraphic distribution:** Lower Kimmeridgian.

**Hypotypes:** L.P.B. IV. 11.134.

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