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Small Foraminifers from the Middle and Upper Eocene in the Burgas District. Calcareous benthic foraminifers — Part I.

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С. Даракчиева, С. Джуранов — Мелкие фораминиферы среднего и верхнего эоцена Бургасской области. Известковые бентосные фораминиферы — часть 1. Настоящая статья является первой из серии статей, в которой публикуются результаты анализа таксономического состава и стратиграфического значения сообществ мелких форминифер в эоценовых седиментах Бургасской области. Коллекция составлена из 29 скважин на территории Черноморского угольного бассейна (севернее Бургаса). Она включает микрофоссилии Мугрисской и Равнецкой свит. Описана бóльшая часть (50 таксонов) найденных бентосных мелких фораминифер, которые относятся к семействам *Spiroloculinidae* W i e s n e r до *Cibicididae* C u s h m a n по классификации (L o e b l i c h, T a p p a n, 1988).

Abstract. A series of papers is intended to be published in which the results from the analysis of the taxonomic composition and stratigraphic significance of the small foraminiferal assemblages in the Eocene sediments from the Burgas district will be presented. The collection studied includes microfossils from the Mugris Formation and the Ravnec Formation from 19 borehole sections on the territory of Černo More Coal Basin (North of Burgas). Most of the small benthic calcareous foraminifers (50 taxa) — from family Spiroloculinidae W i e s n e r to family Cibicididae C u s h m a n are described and illustrated in this study.

Introduction

The Eocene sediments in the Burgas district contain a rich and varied association of small foraminifers. Its taxonomic composition and stratigraphic importance will be the subject of five consecutive papers:

— Calcareous Benthic Foraminifers (from family Spiroloculinidae W i e s n e r to family Cibicididae C u s h m a n)

— Calcareous Benthic Foraminifers (from family Cymbaloporidae C u s h m a n to family Elphidiidae G a l l o w a y)

— Agglutinated Foraminifers

— Planktonic Foraminifers

— Small Foraminiferal Biostratigraphy of the Eocene in the Burgas district

The collection studied comprises samples from 19 borehole sections located on the territory of Černo More Coal Basin, to the north of Burgas (fig. 1). The drilling was done at different time (in the period between 1967 and 1990) in connection with the exploration of the coal layers at the base of the Eocene section.[1] The boreholes are si-

[1] The general data about the boreholes were supplied by the geologist Kamen Nedev, for which the authors thank him.

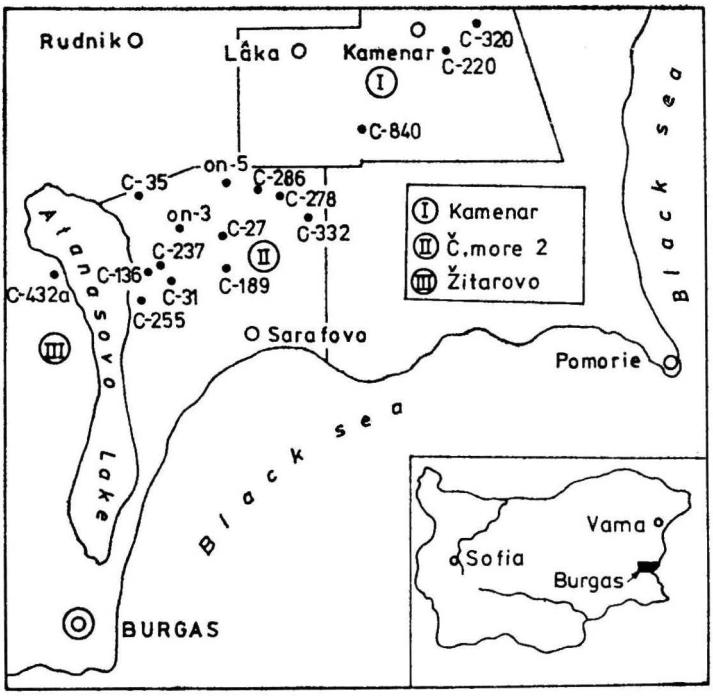

Fig. 1. Location of the studied boreholes sections with foraminiferal microfauna

tuated on three tracts of investigation — Kamenar (north-east), a part of Černo More Basin (central) and Žitarovo (west). The locations of three of the borehole sections (C-902, C-927 and C-28) were not determined but the first two mentioned are known to be located in the west tract (Žitarovo).

In all borehole sections, except for the above mentioned three, the already defined Ravnec Formation (Bartonian—Priabonian Stage) and Mugris Formation (Priabonian Stage) (Джуранов, 1992) are separated. The lithostratigraphic subdivision of the borehole sections and the sampled intervals on them are shown on fig. 2.

The collection includes microfossils from 460 samples. They cover the entire Mugris Formation and Ravnec Formation from top to bottom. The foraminifers from the Mugris Formation are quite more numerous, better preserved and more varied. They evidence that the formation is related to the Priabonian Stage. The foraminifers from the Ravnec Formation have been found mainly in its upper parts (over the coal beds) which also belong to the Priabonian Stage. In the lower parts, belonging to the Bartonian Stage, the foraminifers are scarce.

An analysis of the taxonomic composition of the small foraminiferal association from the Eocene in the Burgas district is published for the first time. Some data about it are present in the publications of Мандев (1954), Бецов, Дикова (1969). A small part of the taxa, forming the association in the Eocene of the Burgas district are found and described in our country in the Paleogene and the Miocene of other regions in North Bulgaria (Бакалов, 1942; Спасов, 1951; Цанева, 1952; Цанева, 1957; Станчева, 1959а; Станчева, 1959б; Дикова, 1961). The authors restrain from making a new description of them.

The majority of species in the association are described or found for the first time in Bulgaria. The presence of all species is documented by photographs of their individuals made with SEM.[2] Sample specimens, as well as all photographed specimens

[2] SEM photographs were made by Krassimir Rekalov in the Geology and Geophysics Survey Company with JSM-35 CF for which the authors thank him.

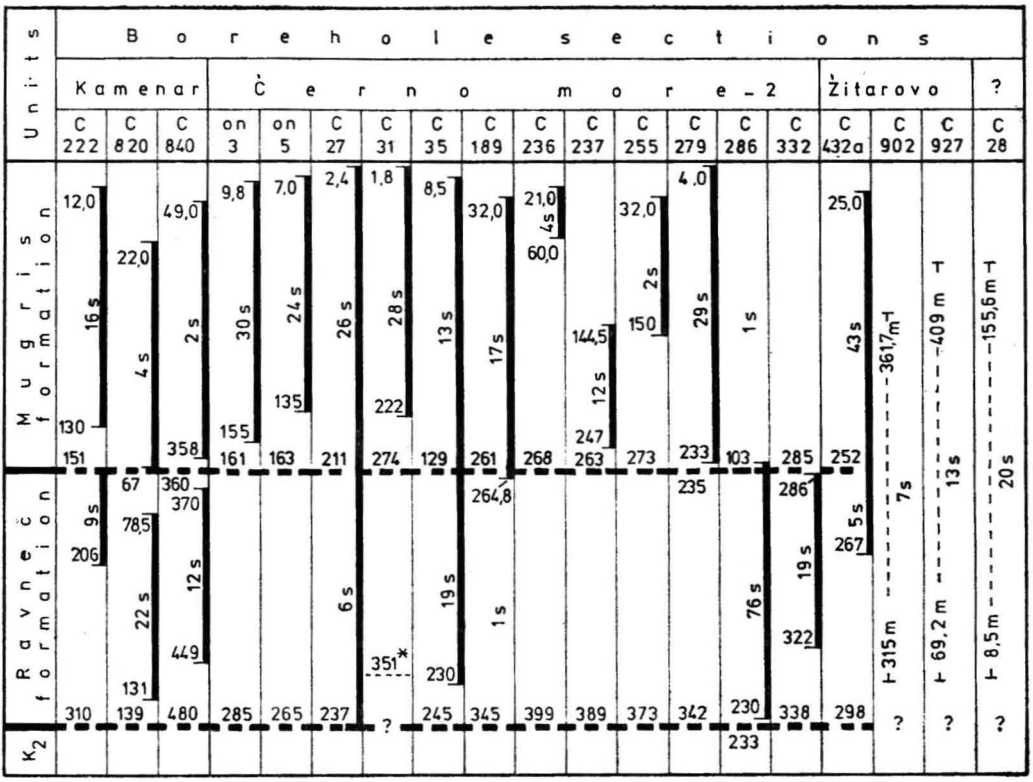

Fig. 2. Sketch on the lithostratigraphic subdivision of the boreholes sections. The lithostratigraphic boundaries are marked by a thick broken line. By a thick continuous line the sampled intervals are shown. The fixed depths are given in m. The number of samples for each interval is indicated

are kept at the Museum of Palaeontology and Historical Geology at the University of Sofia.

The criteria of generic and suprageneric classification are in conformity with the modern concept of L o e b l i c h, T a p p a n (1988).

Palaeontological description

The first paper of the series includes all 50 species and subspecies of benthic foraminifers with a calcareous test from family Spiroloculinidae W i e s n e r to family Cibicididae C u s h m a n found in the collection studied. All taxa defined in the absence of data about their holotype are described in the so-called "open nomenclature" and denoted by "ex grege".

Family **SPIROLOCULINIDAE** W i e s n e r, 1920

Genus ***Spiroloculina*** d'O r b i g n y, 1826

T y p e s p e c i e s: *Spiroloculina depressa* d'O r b i g n y, 1826; SD — C u s h m a n, (1917, p. 29).

Spiroloculina grateloupi d'O r b i g n y, 1826

Pl. I, fig. *1*

1826. *Spiroloculina grateloupi* d'Orbigny; d'Orbigny, p. 298, pl. 1, fig. 9—11.
1935. *Spiroloculina grateloupi* d'Orbigny; Cushman, p. 14, pl. 3, fig. 18-21.
1961. *Spiroloculina canaliculata* d'Orbigny; Kaasschieter, p. 154, pl. 3, fig. 23.
1970. *Spiroloculina grateloupi* d'Orbigny; Le Calvez, p. 60.
1984. *Spiroloculina grateloupi* d'Orbigny; Odrzywolska-Bienkowa, Pozaryska, p. 118, pl. 1, fig. 11.

Nomenclature. The holotype is not originally designated. The species is based on the only specimen illustrated which is accepted for a holotype. For the first time the species was described from the Eocene in the Paris Basin.

Description. The test is calcareous, multilocular, planispiral, of a miliolidic type of increasing, evolute. Each whorl is formed of two alternating chambers which are arch-shaped and have a rectangular cross section. The aperture is terminal, situated on a cylindrical neck at the end of the last formed chamber and round. The test is laterally depressed, its outlines are almost elliptic and tapering. The periphery is flat with two distinct contour rims. The wall is thick, smooth and unornamented.

Remarks. No presence of the species has been reported in the sections of the Paleogene System in Bulgaria.

Distribution. The species is spread in the Upper Eocene sediments of Poland, the Upper Eocene and the Oligocene of France and the Eocene in Belgium and England.

Occurrence. Mugris Formation: Kamenar — C-820 (63,00 m); Č. More 2 — C-27 (202,00 m); Žitarovo — C-432a (230,00-235,00 m). Ravnec Formation: Kamenar — C-840 (423,60—424,10 m); Č. More 2 — C-332 (286,00—298,50 m); C-286 (130,60 — 133,60 m).

Unsubdivided sequences: Žitarovo — C-927 (337,00 m).

Spiroloculina ex gr. ***communis communis*** Cushman et Todd, 1942

Pl. I, fig. *2*

1984. *Spiroloculina communis communis* Cushman and Todd; Odrzywolska-Bienkowa and Pozaryska, p. 118, pl. 1, fig. 10, 15, 22.

Nomenclature. We have no data on the holotype. It is identified here by the specimen shown on pl. 1, fig. 10 after Odrzywolska-Bienkowa, Pozaryska (1984).

Description. The test is calcareous, multilocular, planispiral, of a miliolidic type of increasing with two chambers in each whorl. Six distinct chambers are observed, equally wide along the whole length. Their size is increasing from the middle toward the periphery of the test. All chambers are arch-shaped. The chambers of the test core are indistinct. The test is flat and leaf-shaped. The periphery belt is flat. The surface is smooth. The aperture is terminal, elliptical, with a protruding mouth.

Remarks. The taxon is reported for the first time in Bulgaria. The subspecies *Sp. communis communis* Cushman and Todd is very close to *Sp. canaliculata* d'Orbigny from which it differs in the existence of a strongly protruding aperture mouth.

Distribution. The species is known from the Upper Eocene sediments of Poland and from the shallow water zones of the Pacific.

Occurrence. Mugris Formation: Kamenar — C-820 (33,50—33,70 m). Ravnec Formation: Kamenar — C-840 (423,60 m).

Unsubdivided sequences: Žitarovo — C-927 (347,50 m).

Family **HAUERINIDAE** Schwager, 1876

Genus ***Quinqueloculina*** d'Orbigny, 1826

Type species: *Serpula seminulum* Linne, 1758, p. 786; SD — Parker, Jones (1859, p. 480).

Quinqueloculina nicopolica Jartzeva, 1951

Pl. I, fig. *5*

1952. *Miliolina nicopolica* Jartzeva; Богданович, p. 137, pl. 16, fig. 4, pl. 17, fig. 1 а-в.
1969. *Quinqueloculina nicopolica* Jartzeva; Краева, Зернецкий, p. 36, pl. 13, fig. 1 а, б.

Nomenclature. The holotype originates from the Upper Eocene sediments in South Ukraine (the Nicopol region). It is kept under No 8 in the collection of the Ukrainian Bureau of Geology. It was refigured by Богданович (1952, pl. 16, fig. 4). This refiguration was used here when identifying the species.

Description. The test is calcareous, porcelaneous, multilocular, with a miliolidic way of increasing. There are 5 chambers in a whorl. In the final whorl they are directly visible. The side on which four chambers are visible is more inflated than the other one on which there are three visible chambers. All chambers are tubular, arch-curved and equally wide along their whole length. The test is oval and its length is almost twice the width. The peripheral rim is rounded. The chamber surface is covered with distinct, sharp, longitudinal costae from end to end of chamber usually. Branching out of the costae is observed in some cases. The aperture is terminal, round, with a small wedge-shaped tooth. Very rarely the apertural opening is contoured by a faint thin ring.

Remarks. The species is described for the first time in Bulgaria. It differs from *Quinqueloculina costata* (d' Orb.) to which it is morphologically similar in its shorter test, in the absence of a distinct apertural neck, in the more rounded periphery and more simple ornamentation. The specimens described here have a markedly rounded periphery.

Distribution. It is known only from the Upper Eocene sediments of the south regions of the Commonwealth of Independent States (CIS).

Occurrence. Mugris Formation: Č. More 2 — C-237 (237,00 m). Ravnec Formation: Č. More 2 — C-286 (158,10 m).

Unsubdivided sequences: C-28 (87,00-96,60 m).

Quinqueloculina ex gr. ***seminula*** (Linné, 1767)

Pl. I, fig. 7.

1932. *Quinqueloculina seminula* (Linnaeus); Howe and Wallace, p. 22, pl. 2, fig. 3.
1951. *Quinqueloculina seminulum* Linnė; Спасов, p. 106, pl. 1, fig. 4 а, в.
1952. *Miliolina seminulum* (Linné); Богданович, p. 134, pl. 16, fig. 2 а-в.
1961. *Quinqueloculina seminula* (Linné); Kaasschieter, p. 147, pl. 2, fig. 5-6.
1969. *Quinqueloculina seminulum* (Linné); Краева, Зернецкий, p. 36, pl. 13, fig. 1 а, б.
1970. *Quinqueloculina seminulum* (Linné); Le Calvez, p. 40, pl. 46, figs. 6, 7.
1984. *Quinqueloculina seminula* (Linné); Odrzywolska-Bienkova; Pozaryska, p. 122, pl. 1, fig. 20, 23-24; pl. 4, fig. 7-8, 10.

Nomenclature. The holotype is a contemporary specimen from the Adriatic. The species is identified after Богданович (1952) since no figure and description of the holotype are available.

Remarks. In Bulgaria the species was described from the Badenian sediments near Staropatica, Kula District (Спасов, 1951). It is known as a taxon with quite variable features.

. Distribution. The species is distributed all over Europe and in North America, from the Eocene to the present time.

Occurrence. Mugris Formation: Č. More 2 — C-286 (102,50 m). Ravnec Formation: Kamenar — C-820 (117,60-118,00 m); C-840 (424,10-443,00 m).

Unsubdivided sequences: Žitarovo — C-927 (397,00 m).

Genus ***Pyrgo*** Defrance, 1824

Type species: *Pyrgo laevis* Defrance, 1824.

Pyrgo bulloides (d'Orbigny, 1826)

Pl. I, fig. *3*

1826. *Biloculina bulloides* d'Orbigny; d'Orbigny, p. 13, pl. 1, fig. 1.
1952. *Pyrgo* aff. *bulloides* (d'Orbigny); Богдановић, p. 167, pl. 25, fig. 2 a, б.
1961. *Pyrgo bulloides* (d'Orbigny); Kaasschieter, p. 167, pl. 5, fig. 18.
1962. *Pyrgo bulloides* (d'Orbigny); Kiesel, p. 21, pl. 2, fig. 9.
1970. *Pyrgo bulloides* (d'Orbigny); Le Calvez, p. 54, pl. 6, fig. 5.
1975. *Pyrgo bulloides* (d'Orbigny); Samuel, p. 116, pl. 65, fig. 2a, b.
1984. *Pyrgo bulloides* (d'Orbigny); Odrzywolska-Bienkova and Pozariska, p. 122, pl. 2, fig. 2-3, 7;

Nomenclature. The holotype is not originally designated. The species is based on the only specimen illustrated, which is considered a holotype. For the first time it was described from the Paris Basin.

Description. The test is calcareous, multilocular, planispiral, involute and of a miliolidic type of increasing. Only the last two chambers, which take in the preceding ones, are visible on the test surface. The chambers are strongly inflated and hemispherical. The last formed chamber has a straight back part which is partially covered by a rectangular protrusion from the preceding chamber. The suture between the two chambers is depressed. The aperture is on the front peripheral part of the last formed chamber. It is round and with a big T-shaped tooth. The test periphery has elliptical outlines. It is rounded and formed by the last chamber only. The test width is almost equal to its thickness. The wall is thick, porcelaneous, smooth.

Remarks. In Bulgaria the species is described for the first time.

Distribution. It is known from the Upper Eocene of Poland and Czecho-Slovakia, from the Middle and Upper Eocene of France and from the Lower Oligocene of Belgium.

Occurrence. Ravnec Formation: Č. More 2 — C-332 (290,20-300,60 m).

Genus ***Triloculina*** d'Orbigny, 1826

Type species: *Miliolites trigonula* Lamarck, 1804, p. 351; SD — Cushman (1917, p. 65).

Triloculina gibba d'Orbigny, 1925

Pl. I, fig. *4*

1826. *Triloculina gibba* d'Orbigny; d'Orbigny, p. 133, fig. 3.
1846. *Triloculina gibba* d'Orbigny; d'Orbigny, p. 274, pl. 16, fig. 22-24.
1941. *Triloculina gibba* d'Orbigny; Бакалов, p. 4, pl. 1, fig. 6.
1952. *Miliolina gibba* (d'Orbigny); Богдановић, p. 99, pl. 6, fig. 3 a, б.
1955. *Miliolina gibba* (d'Orbigny); Серова, p. 313, pl. 6, fig. 1-3.
1961. *Triloculina gibba* d'Orbigny; Kaasschieter, p. 165, pl. 5, fig. 12-14.
1970. *Triloculina gibba* d'Orbigny; LeCalvez, p. 49, pl. 8, fig. 3-4.
1974. *Triloculina gibba* d'Orbigny; Luczkowska, p. 134, pl. 23, fig. 2 a-c, text-fig. 46/2.
1984. *Triloculina gibba* d'Orbigny; Odrzywolska-Bienkova, Pozarys-ka, p. 123, pl. 4, fig. 6a, b; 9 a, b.

1985. *Triloculina gibba* d'Orbigny; Papp, Schmid, p. 93, pl. 86, fig. 1-4; text-fig. 14-1.
1987. *Triloculina gibba* d'Orbigny; Wenger, p. 250, pl. 2, fig. 17-19.

Nomenclature. The holotype is not originally designated. The species is based on the only specimen illustrated (when making the original desription of the taxon) which is considered a holotype. For the first time it was described from the Eocene in the Paris Basin.

Remarks. In Bulgaria it was described from the Badenian of Opanec, near Pleven (Бакалов, 1941).

Distribution. The species was found in the Eocene of France, Austria and the CIS. It is known from the Upper Eocene of Poland, Belgium and Holland. It often occurs in the Miocene of the Vienna Basin, Italy and the CIS.

Occurrence. Mugris Formation: Kamenar — C-820 (63,00-64,00 m), Žitarovo — C-432a (230,00-245,00 m). Ravnec Formation: Kamenar — C-840 (423,60-443,00 m); Č. More 2 — C-286 (129,00-130,60 m); C-332 (298,50-311,50 m).

Unsubdivided sequences: Žitarovo — C-927 (337,00-368,80 m).

Genus ***Sigmoilina*** Schlumberger, 1887

Type species: *Planispirilina sigmoides* Brady, 1884, p. 197; SD — Cushman (1917, p. 60).

Sigmoilina ex gr. ***tenuis*** (Czjzek, 1848)

Pl. 1, fig. *6*

1947. *Sigmoilina* aff. *tenuis* (Czjzek); Богданович, p. 25, pl. 3, fig. 2, 3.
1952. *Sigmoilina tenuis* (Czjzek); Богданович, p. 159, p. 23, fig. 1 а, б, 3 а, б.
1959. *Sigmoilina tenuis* (Czjzek); Станчева, p. 240, pl. 4, fig. 6.
1961. *Sigmoilina tenuis* (Czjzek); Kaasschieter, p. 157, pl. 4, fig. 9, 10.
1969. *Sigmoilina tenuis* (Czjzek); Краева и Зерницкий, p. 38, pl. 13, fig. 8 а, б.
1987. *Sigmoilinita tenuis* (Czjzek); Reiser, p. 63, taf. 3, fig. 2, 8.

Nomenclature. We have no data on the holotype. For the first time it was found and described from the Miocene sediments of Austria. It is identified here after Reiser (1987).

Remarks. In Bulgaria the presence of the species in the Paleogene sediments is designated for the first time. Descriptions of specimens from the Tortonian (Badenian) in North-West Bulgaria (Станчева, 1959) give the general characteristic of the test morphology. In the case of our specimens the sutures are indistinct and slightly depressed. The test wall is not porcelaneous and smooth but fine-grained, The test is flatter and the chambers are vague. Having these features the specimens from the Eocene rocks in the Burgas district very closely resemble those figured by Reiser (1987).

Occurrence. Mugris Formation: Kamenar — C-820 (51,00-67,60 m); Č. More 2 — 0-3 (70,00-140,00 m), C-27 (37,00-122,00 m), C-35 (8,50-111,80 m), C-189 (173,20-256,00 m); C-237 (144,48-226,00 m), C-279 (233,00 m); Zitarovo — C-432a (170,00-240,00 m). Ravnec Formation: Kamenar — C-820 (68,60 m); Č. More 2 — C-286 (103,00 m).

Unsubdivided sequences: C-28 (37,80-96,60 m); Žitarovo — C-902 (315,00 m).

Family **NODOSARIIDAE** Ehrenberg, 1838

Genus ***Nodosaria*** Lamarck, 1812

Type species: *Nautilus radiculata* Linné, 1758, p. 711; SD — Lamarck (1816, p. 465).

Nodosaria pyrula d'Orbigny, 1826

Pl. II, fig. *2*

1826. *Nodosaria pyrula* d'Orbigny; d'Orbigny, p. 253, fig. 13.
1846. *Nodosaria semirugosa* d'Orbigny; d'Orbigny, p. 34, pl. 1, fig. 20-23 (=rugosa in pl.)
1969. *Nodosaria pyrula* d'Orbigny; Краева, Зернецкий, p. 46, pl. 16, fig. 2.
1985. *Nodosaria pyrula* d'Orbigny; Korecz-Laky, Nagy-Gellai, p. 254, pl. 35, fig. 5.
1985. *Nodosaria pyrula* d'Orbigny; Papp, Schmid, p. 24, pl. 4, fig. 6-8.

Nomenclature. The holotype is not originally designated but the species is based on the only specimen illustrated with the original description which is accepted for a holotype. For the first time the taxon has been described from the Eocene of the Paris Basin.

Description. The test is calcareous, multilocular, uniserial, erect. It is formed of 6-7 subglobular chambers separated from each other by long tubular apertural necks. The lower and the upper parts of the chambers have several short and distinct costae which go onto the connecting tubes too. The remaining portions of the chambers are smooth. The aperture is terminal, round and rimmed by a strongly sinuate and thickened ring.

Remarks. *Nodosaria pyrula* d'Orbigny has clear morphological features and though very often only fragments of one or two chambers of the test are found the species is easily identifiable. Here we follow the taxonomic revision (Papp, Schmid, 1985) according to which *Nodosaria semirugosa* d'Orbigny is synonymous with *Nodosaria pyrula* d'Orbigny, as the presence or absence of costae on the test surface is not considered a taxonomic feature. All of our specimens are with costae on the test.

Distribution. The species is found in Eocene sediments from England, in the Upper Eocene in the CIS and USA, the Oligocene in Germany and the Neogene in Italy.

Occurrence. Mugris Formation: Č. More 2—C-237 (175,00 m), C-286(102,50m)

Nodosaria ex gr. ***raphanistrum*** (Linné, 1758)

Pl. II, fig. *3*

1846. *Nodosaria bacillum* Defrance; d'Orbigny, p. 40, pl. 1, fig. 40-47.
1868. *Nodosaria bacillum* Defrance; Gümbel, p. 618, pl. 1, fig. 30.
1942. *Nodosaria bacillum* Defrance; Бакалов, p. 8, pl. 2, fig. 10.
1942. *Nodosaria affinis* d'Orbigny; Бакалов, p. 9, pl. 2, fig. 11.
1953. *Nodosaria bacillum* Defrance; Субботина, p. 175, pl. 5, fig. 7, 9, 10, 11 a, 6, 12.
1962. *Nodosaria bacillum* Defrance; Kiesel, p. 22, pl. 3, fig. 3.
1969. *Nodosaria bacillum* Defrance; Краева, Зернецкий, p. 42, pl. 14, fig. 9.
1970. *Nodosaria raphaninistrum* (Linné); LeCalvez, p. 79.
1985. *Nodosaria raphanintrum* (Linné); Papp, Schmid, p. 27, pl. 8, fig. 4-6, pl. 9, fig. 1-2.
1987. *Nodosaria raphanistrum* (Linné); Reiser, p. 71, pl. 5, fig. 3, 4.

Nomenclature. We have no data about the holotype. Herein the species is identified after the specimen figured by Papp, Schmid (1985, p. 8, fig. 5, 6).

Remarks. In Bulgaria the species was described from the Badenian sediments near Opanec as *Nodosaria bacillum* Defrance and *Nodosaria affinis* d'Orbigny (Бакалов, 1942). In the Paleogene it is designated for the first time.

We accept the revision according to which *Nodosaria affinis* d'Orbigny and

Nodosaria bacillum d'Orbigny are synonymous with *Nodosaria raphanistrum* (Linné) (Papp, Schmid, 1985).

Distribution. The species is known from the Eocene sediments in Bavaria, England, USA, CIS, from the Oligocene of Belgium and from the Miocene sediments in the Vienna Basin.

Occurrence: Mugris Formation: Kamenar — C-820 (61,50-64,00 m); Č. More 2 — 0-3 (9,80-155,00 m), C-27 (22,00-32,00 m), C-31 (192,00-222,00 m), C-35 (11,50-111,80 m), C-189 (101,00-256,00 m), C-236 (66,00 m); Žitarovo—C-432a (40,00-100,00 m).

Unsubdivided sequences: C-28 (29,00-96,60 m); Žitarovo — C-927 (69,20 m).

Nodosaria ex gr. ***spinulosa*** (Montagu, 1808)

Pl. II, fig. *1*

1969. *Nodosaria spinulosa* (Montagu); Краева, Зернецкий, p. 46, pl. 16, fig. 3.

Nomenclature. We have no data about the holotype. The species is identified after the only illustration available (Краева, Зернецкий, 1969).

Description. The test is calcareous, multilocular, uniserial, slightly curved. It consists of 7-8 oval chambers separated by narrow pinches. From the base toward the end of the test the chambers gradually increase. The test begins with a small and sharp spine. The whole surface is covered with thin costae, some of which are short and end as spines at the base of each chamber. The wall is coarse and thick. The aperture is terminal and with unclear morphology.

Remarks. In Bulgaria the species is found for the first time. The majority of specimens are with broken last chambers.

Distribution. The species has been found in the Upper Cretaceous of Germany and the USA, in the Paleogene of the CIS, in the Paleocene of Denmark and the USA and the Lower Eocene of England.

Occurrence. Mugris Formation: Č. More 2 — 0-3 (75,00 m); Žitarovo — C-432a (40,00-100,00 m).

Family **VAGINULINIDAE** Reuss, 1860

Genus ***Saracenaria*** Defrance, 1824

Type species: *Saracenaria italica* Defrance, 1824.

Saracenaria arcuata (d'Orbigny, 1846)

Pl. I, fig. *8*

1846. *Cristellaria arcuata* d'Orbigny; d'Orbigny, p. 87, pl. 3, fig. 34-36.
1875. *Cristellaria arcuata* d'Orbigny; Hantken, p. 53, pl. 5, fig. 5, 6.
1953. *Saracenaria arcuata* (d'Orbigny); Субботина, p. 193, pl. 8, fig. 1 а, б, 2 а, б, 3 а, б.
1969. *Saracenaria arcuata* (d'Orbigny); Краева, Зернецкий, p. 61, pl. 22, fig. 2 а-б.
1977. *Saracenaria arcuata* (d'Orbigny); Pozaryska, p. 25, pl. 2, fig. 22 a, b.
1985. *Lenticulina arcuata* (d'Orbigny); Papp, Schmid, p. 39, pl. 24, fig. 6, 9.
1987. *Saracenaria arcuata* (d'Orbigny); Wenger, p. 255, pl. 4, fig. 3, 4.
1987. *Saracenaria arcuata* (d'Orbigny); Reiser, p. 67.

Nomenclature. A holotype is not indicated. For the first time it was described from the Miocene sediments of the Vienna Basin. The lectotype was indicated by Papp, Schmid (1985, pl. 24, fig. 7). It is kept in the GBA 1981/03/93 collection.

Description. The test is calcareous and multilocular. In its early stage it is planispiral and later it tends to become straight. The spiral portion is involute, laterally depressed, inflated in its uniserial portion. The peripheral end is sharp and keeled in the majority of individuals. The last chamber is very large and its septal surface is heart-shaped with a sharp point on which a radial aperture is situated. The sutures are simple, slightly depressed and curved. The wall is smooth, thin, slightly porous and with a brilliant surface.

Remarks. In Bulgaria the species is described for the first time. The studied specimens are most similar to those described by Субботина (1953). Strongly prevailing are specimens with short tests and strongly inflated final chamber but there are also specimens like those described by d' Orbigny (1846) and Hantken (1875).

Distribution. It is known from the Upper Eocene sediments in the CIS, Hungary, USA and the Miocene of the Vienna Basin.

Occurrence. Mugris Formation: Kamenar — C-222 (21,00-120,60 m), C-820 (27,00-29,00 m); Č. More 2 — 0-3 (16,10-130,00 m), C-27 (9,00-192,00 m), C-31 (132,00-222,00 m), C-35 (8,50-122,00 m), C-189 (32,00-256,00 m), C-237 (147,50-237,50 m), C-279 (65,00-233,60 m), C-286 (102,50 m); Žitarovo — C-432a (40,00-245,00 m). Ravnec Formation: Č. More 2 — C-286 (103,00 m), C-332 (297,20-302,90 m).

Unsubdivided sequences: C-28 (18,30-96,60 m).

Genus ***Palmula*** Lea, 1833

Type species: *Palmula sigittaria,* Lea, 1833

Palmula budensis (Hantken, 1875)

Pl. I, fig. *9, 10*

1875. *Flabellina budensis* Hantken n. sp.; Hantken, s. 44, taf. 4, fig. 17.
1953. *Frondicularia budensis* (Hantken); Субботина, p. 199, pl. 7, fig. 6, 7.
1969. *Frondicularia budensis* (Hantken); Краева, Зернецкий, p. 52, pl. 17, fig. 1, 2 a, б.
1979. *Palmula budensis* (Hantken); Sztrakos, p. 65, pl. 14, fig. 10; pl. 33, fig. 9, 10.
1982. *Palmula budensis* (Hantken); Sztrakos, pl. 12, fig. 11.

Nomenclature. An original holotype is not indicated (Hantken, 1875) but one specimen only was illustrated which we accept for a holotype. The species was described from the *Clavulina szaboj* Beds near Ofen in Hungary.

Description. The test is calcareous, multilocular, uniserial. It is very flat and quite thin, elongated and leaf-shaped. The chambers are 10-12 in the form of an inverted V and increasing fast toward the apertural end. The first chamber is spherical to oval and slightly projecting above the other chambers. The sutures are distinct, broad, slightly depressed and with typical ornamentation. The aperture is terminal, radial and finely rimmed. The wall is smooth, finely porous, delicate. The surface is smooth and brilliant.

Remarks. In Bulgaria the species is described for the first time. The majority of the studied specimens are with broken apertural and peripheral parts of the tests.

Distribution. The species is known from the Upper Eocene sediments in the CIS and Hungary.

Occurrence. Mugris Formation: Kamenar — C-222 (16,00-110,60 m), C-820 (27,00-29,00 m), C-840 (49,00 m); Č. More 2 — 0-3 (30,00 m), C-27 (2,40-62,00 m), C-31 (82,00-141,00 m), C-35 (8,50-62,00 m), C-189 (32,00-173,20 m), C-236 (21,00-60,00 m), C-237 (144,48-226,00 m), C-279 (4,00-135,00 m); Žitarovo — C-432a (27,00-230,00 m).

Genus ***Marginulina*** d'Orbigny, 1826

Type species: *Marginulina raphanus* d'Orbigny, 1826 (non *Nautilus raphanus* Linné, 1788); SD — Deshayes (1830, p. 416).

Marginulina fragaria Gümbel, 1868

Pl. II, fig. *10*

1868. *Marginulina fragaria* n. sp.; Gümbel, p. 57, pl. 1, fig. 58 a-c.
1875. *Cristelaria fragaria* Gümbel; Hantken, p. 53, pl. 6, fig. 1-3.
1947. *Lenticulina fragaria* (Gümbel); Субботина, p. 85, pl. 8, fig. 6, 7.
1953. *Marginulina fragaria* Gümbel; Субботина, p. 162, pl. 4, fig. 1, 2 а, б, 3.
1956. *Marginulinopsis fragaria* (Gümbel); Hagn, p. 134, pl. 12, fig. 3, 8, 10.
1958. *Marginulina fragaria* (Gümbel); Nyiro, p. 34, fig. 8.
1975. *Marginulina fragaria* (Gümbel); Braga et al., p. 93, pl. 1, fig. 35.
1982. *Marginulinopsis fragaria* (Gümbel); Sztrakos, pl. 12, fig. 5.
1983. *Marginulinopsis fragaria* (Gümbel); Krhovsky, p. 76, pl. 1, fig. 3.

Nomenclature. In the original publication no holotype is indicated but there is one specimen illustrated which we accept for a holotype (Gümbel, 1868). It was described from the Upper Eocene numulitic marls in the Bavarian Alps.

Description. The test is calcareous, multilocular. The early portion is slightly planispiral and not forming a complete whorl. Subsequently the test becomes erect and uniserial. In the early portion the chambers are triangular and not easily discernable from the rich ornamentation of the test surface. In the uniserial portion the chambers are in the shape of narrow stripes. The sutures separating them are gently curved, wide and projecting. They are covered with big sharp spines which in the majority of specimens are arranged in regular rows transversely to the sutures. The cross-section of the test is elliptical. The peripheral and is tapering, with a slightly pronounced keel. The aperture is terminal, radial and situated on an elongated neck at the peripheral end of the last formed chamber. The wall is coarse, thick and slightly porous.

Remarks. In Bulgaria the species has not been described but its presence in the Paleogene sediments near Burgas is known (Мандев, 1954). The specimens studied here are closest in their morphology to those illustrated by Hantken (1875) and Субботина (1953).

Distribution. The species is known from the Upper Eocene sediments in the Crimea, the Caucasus, Hungary, Germany and from the Oligocene sediments in Czecho-Slovakia.

Occurrence. Mugris Formation: Kamenar — C-222 (16,00-120,60 m), C-820 (22,00-64,00 m); Č. More 2 — 0-3 (60,00-155,00 m), 0-5 (21,40-105,00 m), C-27 (92,00-202,00 m), C-31 (122,00-222,00 m), C-35 (11,50-111,60 m), C-189 (93,00-256,00 m), C-237 (144,46-247,00 m), C-279 (4,00-233,60 m); Žitarovo — C-432a (25,00-250,00 m). Ravnec Formation: Kamenar — C-820 (106,00-106,30 m); Č. More 2 C-27 (221,00 m), C-189 (264,80 m), C-332 (286,00-298,50 m).

Unsubdivided sequences: C-28 (27,60-87,00 m); Žitarovo — C-902 (315,00 m), C-927 (69,20-347,00 m).

Marginulina behmi (Reuss, 1866)

Pl. II, fig. *4, 5*

1866. *Cristelaria behmi* Reuss; Reuss, s. 138, pl. 2, fig. 37.
1875. *Marginulina behmi* (Reuss); Hantken, p. 48, pl. 5, fig. 1, 2; taf. 14, fig. 6.
1947. *Marginulina behmi* (Reuss); Самойлова, p. 82, pl., fig. 9.
1953. *Marginulina behmi* (Reuss); Субботина, p. 165, pl. 4, fig. 4-5.
1957. *Marginulina behmi* (Reuss); Hagn, p. 131, pl. 11, fig. 11.
1965. *Marginulina behmi* (Reuss); Краева, p. 4, pl. 21, fig. 1 а, б; 2 а, б.

1969. *Marginulina behmi* (Reuss); Краева, Зернецкий, p. 60, pl. 21, fig. 5, а, б, 6 а, б.
1975. *Marginulina behmi* (Reuss); Samuel, p. 126, pl. 70, fig. 11.
1977. *Marginulina behmi* (Reuss); Pozaryska, p. 24, pl. 2, fig. 27 a, b; pl. 3, fig. 1-9; pl. 8, fig. 1 a-c.
1979. *Marginulina behmi* (Reuss); Sztrakos, pl. 13, fig. 7.

Nomenclature. The holotype is not originally designated and the only illustrated specimen is accepted for such. It was described from the Oligocene in Germany for the first time.

Description. The test is calcareous, multilocular, heteromorphic. Its early portion is gently planispirally curved without forming a complete whorl. The last portion of the test is uniserial and slightly curved. In the early portion the chambers are very close to each other and are hardly discernable as they are covered with big coarse spines. The uniserial portion is formed of 2 or 3 gradually increasing chambers in subspherical shape, separated by deep sutures. The chamber surface is covered by 14 or 16 longitudinal costae formed by short spines. The aperture is terminal, stellate or circular and is situated at the top of an elongated neck.

Remarks. In Bulgaria the species is described for the first time but its presence in the Palaeogene rocks in the country is known, including the region of Burgas also (Мандев, 1954). Two groups of tests of *Marginulina behmi* (Reuss) exist which differ in the structure of their early portion. Prevailing are the specimens whose test is erect and is composed of spherical chambers (pl. II, fig. 5). Specimens with a slightly involute early portion consisting of laterally compressed chambers also occur (pl. II, fig. 4).

Distribution. The species is known from the Upper Eocene sediments in the CIS, Hungary, as well as from the Upper Eocene and the Oligocene sediments in Czecho-Slovakia and from the Oligocene only in Germany.

Occurrence. Mugris Formation: Kamenar — C-222 (16,00-85,80 m); Č. More 2 — 0-3 (60,00-125,00 m), 0-5 (75,00-90,00 m), C-27 (14,00-152,00 m), C-31 (141,00-202,00 m), C-35 (32,00-111,80 m), C-189 (32,00-240,00 m), C-237 (192,50-247,00 m), C-279 (4,00-226,00 m); Žitarovo — C-432a (155,00-215,00 m). Ravnec Formation: Č. More 2 — C-27 (221,00 m).

Genus ***Vaginulina*** d'Orbigny, 1826

Type species: *Nautilus legumen* Linne, 1758, p. 711; SD — Cushman (1917, p. 80).

Vaginulina ex gr. ***mexicana*** Nuttall, 1932

Pl. II, fig. 7

1953. *Vaginulina mexicana* Nuttall; Субботина, p. 196, pl. 8, fig. 4 а, б
1969. *Vaginulina mexicana* Nuttall; Краева, Зерницкий, p. 65, pl. 22, fig. 13 а, б.

Nomenclature. We have no data about the holotype. The species was described for the first time from Lower Oligocene rocks in Mexico. Here it is identified after the figured specimen from a Lagenidae zone (Субботина, 1953).

Description. The test is calcareous, multilocular, heteromorphous. In its early portion it is planispirally curved and in its later portion it is erect, uniserial. The test is formed of 10 chambers which are triangular in the early portion and band-like in the uniserial portion. The sutures are straight and slightly curved at one end toward the early portion of the test. They are strongly projecting in the form of rounded costae transverse on the test. In the peripheral portion they are thinner and hardly visible. The peripheral end is sharp and terminates with a keel. In cross section the test

is lenticular. The aperture is terminal, radial and situated on a short neck at the dorsal side of the last formed chamber. The wall is thin and slightly porous.

Remarks. In Bulgaria the species is described for the first time.

Distribution. It is known from the Eocene sediments in the CIS and the Oligocene sediments in Mexico.

Occurrence: Mugris Formation: Č. More 2 — 0-3 (25,00-65,00 m), 0-5 (16,10-80,00 m), C-27 (14,00-172,00 m), C-31 (62,00-222,00 m); Žitarovo — C-432a (86,00-150,00 m).

Unsubdivided sequences: C-28 (29,00-67,00 m); Žitarovo — C-927 (69,00 m).

Family **LAGENIDAE** Reuss, 1862

Genus ***Lagena*** Walker and Jacob, 1798

Type species: *Serpula (Lagena) sulcata* Walker and Jacob in Kanmacher, 1798; SD — Parker, Jones (1859, p. 337).

Lagena ex gr. ***hexagona*** (Williamson, 1848)

Pl. II, fig. *6*

1932. *Lagena hexagona* (Williamson); Howe, Wallace, p. 6, fig. 14.
1935. *Lagena hexagona* (Williamson); Cushman, p. 23, pl. 9, fig. 10.
1957. *Lagena hexagona* (Williamson); Hagn, p. 141, taf. 10, fig. 22.
1959. *Lagena hexagona* (Williamson); Станчева, p. 326, pl. 1, fig. 5.
1962. *Lagena hexagona* (Williamson); Kiesel, p. 41, pl. 6, fig. 18.
1969. *Lagena hexagona* (Williamson); Краева, Зернецкий, p. 46, pl. 16, fig. 11.
1984. *Lagena hexagona* (Williamson); Odrzywolska-Bienkowa, Pozaryska, p. 125, pl. 2, fig. 14.
1987. *Lagena hexagona* (Williamson); Reiser, p. 75.
1987. *Lagena hexagona* (Williamson); Wenger, p. 260, pl. 5, fig. 9.

Nomenclature. We have no data about the holotype. The species is identified after the specimen from the Eocene in the district of Pleven (Станчева, 1959, pl. 1, fig. 5).

Remarks. In Bulgaria the species was found and described from the Eocene sediments near the village of Tarnene, Pleven district (Станчева, 1959). It is known also from the Paleogene system in North-East Bulgaria. The studied specimens from the Eocene in Burgas district do not differ in their morphology from those described already.

Distribution. It is known from the Paleogene and the Neogene in Czecho-Slovakia, from the Upper Eocene and the Oligocene in Poland, from the Upper Eocene in USA, Germany, Hungary, from the Miocene in the Carpathians and South Italy.

Occurrence. Mugris Formation: Č. More 2 — C-35 (42,00 m).

Unsubdivided sequences: Žitarovo — C-927 (69,20 m).

Lagena ex gr. ***striata*** (d'Orbigny, 1839)

Pl. II, fig. *9*

1959. *Lagena striata* (d'Orbigny); Станчева, p. 251, pl. 6, fig. 9.
1961. *Lagena striata* (d'Orbigny); Kaasschieter, p. 179, pl. 7, fig. 26.
1962. *Lagena striata* (d'Orbigny); Kiesel, p. 42, pl. 6, fig. 42.
1969. *Lagena striata* (d'Orbigny); Краева, Зернецкий, p. 51, pl. 16. fig. 21.
1970. *Lagena striata* (d'Orbigny); Le Calvez, p. 82.
1975. *Lagena striata* (d'Orbigny); Samuel, p. 125, pl. 66, fig. 7, 8.
1987. *Lagena striata* (d'Orbigny); Wenger, p. 259, pl. 5, fig. 2, 3.

Nomenclature. We have no data about the holotype. The species is identified by the illustration of the specimen from the Badenian Stage in North-West Bulgaria (Станчева, 1959, pl. 6, fig. 9).

Remarks. In Bulgaria the species is known from the Middle Miocene sediments (Badenian Stage) in North-West Bulgaria — the village of Ohrid, Vraca District (Станчева, 1959). In the rocks of the Paleogene System it is documented for the first time. The specimens studied show no morphological differences from the previously described ones.

Distribution. The species is known from the Paleogene and the Miocene of Czecho-Slovakia, from the Miocene in Italy and the Vienna Basin, from the Burdigalian Stage in France and the contemporary marine sediments.

Occurrence. Mugris Formation: Kamenar — C-222 (85,00-85,40 m); Č. More 2 — 0-3 (15,00-100,00 m), 0-5 (55,00 m), C-31 (212,00 m), C-189 (191,40 m), C-237 (186,50-192,50 m), C-279 (65,00-165,00 m), C-286 (102,50 m). Ravnec Formation: Č. More 2 — C-332 (300,20-303,80 m).

Unsubdivided sequences: Žitarovo — C-902 (315,00 m).

Family **POLYMORPHINIDAE** d'Orbigny, 1839

Genus ***Globulina*** d'Orbigny, 1839

Typespecies: *Polymorphina (Globuline) gibba* d'Orbigny, 1826, p. 266; SD — Cushman (1927, p. 189).

Globulina gibba (d'Orbigny, 1826)

Pl. III, fig. *4*

1826. *Globulina gibba* d'Orbigny; d'Orbigny, p. 100, fig. 20
1846. *Globulina gibba* d'Orbigny; d'Orbigny, p. 227, pl. 13, fig. 13, 14.
1934. *Globulina gibba* d'Orbigny; Cushman, p. 59, pl. 8, fig. 4 a-d.
1961. *Globulina gibba* (d'Orbigny); Kaasschieter, p. 183, pl. 8, fig. 6, 7.
1962. *Globulina gibba* d'Orbigny; Венглінський, p. 95, pl. 12, fig. 1 а, б.
1962. *Globulina gibba* d'Orbigny; Kiesel, p. 48, pl. 7, fig. 10.
1970. *Globulina gibba* d'Orbigny; Le Calvez, p. 84, pl. 17, fig. 3, 4.
1985. *Globulina gibba* d'Orbigny; Papp, Schmid, p. 79, pl. 71, fig. 9-12.
1987. *Globulina gibba* (d'Orbigny); Wenger, p. 262, pl. 5, fig. 18, 19.

Nomenclature. The holotype is not originally designated so the only specimen illustrated is accepted for such. For the first time the species was described from the Eocene in the Paris Basin.

Description. The test is calcareous, multilocular, conical-spiral with a very small height of the spire. Three chambers are visible on the test surface which are overlapping. The sutures are obscure and flush with the surface. The aperture is terminal and radial. The wall is glasy, smooth and without ornamentation. The shape of the test is oval with a tapering apertural end.

Remarks. In Bulgaria the species is described for the first time but its presence in the whole Paleogene section of North-East Bulgaria is known (Мандев, 1954). It possesses very distinct morphological features.

Distribution. It is known from the Palaeocene and Upper Eocene rocks, as well as from the Miocene in the CIS, from the Eocene in Belgium, from the Lower and the Middle Eocene in France, the Upper Eocene in England, the Oligocene in Germany, the Middle Miocene of the Central Parathetis.

Occurrence. Mugris Formation: Kamenar — C-222 (110,00-110,60 m), Č. More 2 — 0-3 (100,00-140,00 m), 0-5 (110,00 m) C-27 (9,00-202,00 m), C-35 (42,00-92,00 m), C-189 (32,00-231,00 m), C-226 (60,00 m), C-237 (175,00-186,50 m); Žitarovo — C-432a (70,00-245,00 m). Ravnec Formation: Č. More 2 — C-332 (303,20-307,40 m)

Unsubdivided sequences: C-28 (37,80-87,50 m).

Genus ***Guttulina*** d'Orbigny, 1839

Typespecies: *Polymorphina (Guttuline) communis* d'Orbigny, 1826, p. 266; SD — Galloway, Wissler (1927, p. 56).

Guttulina irregularis (d'Orbigny, 1846)

Pl. III, fig. *1*

1846. *Globulina irregularis* d'Orbigny; d'Orbigny, p. 266, pl. 13, fig. 9-10.
1932. *Guttulina irregularis* (d'Orbigny); Howe, Waelace, p. 48, pl. 8, fig. 8.
1935. *Guttulina irregularis* (d'Orbigny); Cushman, p. 24, pl. 9, fig. 13-16.
1961. *Guttulina irregularis* (d'Orbigny); Kaasschieter, p. 181, pl. 8, fig. 2, 3.
1969. *Guttulina irregularis* (d'Orbigny); Краева, Зернецкий, p. 66, pl. 24, fig. 3, 4.
1970. *Guttulina irregularis* (d'Orbigny); Le Calvez, p. 92, pl. 20, fig. 3.
1985. *Guttulina communis* d'Orbigny; Papp, Schmid, p. 79, pl. 71, fig. 1-4.

Nomenclature. No holotype is designated but accepted for such is the only illustrated specimen from the Miocene sediments in the Vienna Basin (d'Orbigny, 1846).

Description. The test is calcareous, multilocular, conical-spiral. There are 3 chambers on the one side and 4 on the other. Their shape is specific, they are elongate in the direction of the test increase. The sutures are thin, straight, slightly depressed, obscure. The aperture is terminal and radial. The test is tapering at the apertural end and is pyriform. Its cross-section at the apertural end is elliptic and at the opposite end — triangular. The test surface is smooth.

Remarks. In Bulgaria it is described for the first time but it is known from the Priabonian Stage in the district of Plovdiv (Драгоманов et al., 1980) and from the Paleogene in North-East Bulgaria (Мандев, 1954).

Distribution. The species is found in the Middle Eocene of France, the Upper Eocene in CIS, England and USA, in the Oligocene in Germany, in the Miocene of the Vienna Basin.

Occurrence. Mugris Formation: Kamenar — C-222 (16,00-130,00 m); Č. More 2 — 0-3 (15,00-120,00 m), 0-5 (16,10-40,00 m), C-27 (2,40-236,00 m), C-31 (122,00-222,00 m), C-35 (42,00-122,00 m), C-189 (33,00 m), (132,60-256,00 m), C-236 (42,00 m), C-255 (150,00 m), C-237 (144,48-226,00 m), C-279 (4,00-233,00 m); Žitarovo — C-432a (35,00-350,00 m); Ravnec Formation: Č. More 2 — C-27 (236,00-238,00 m), C-286 (103,00-130,60 m).

Unsubdivided sequences: C-28 (67,00-96,60 m); Žitarovo — C-927 (347,00 m).

Guttulina problema d'Orbigny, 1826

Pl. III, fig. *2*

1826. *Guttulina problema* d'Orbigny; d'Orbigny, p. 100, fig. 14.
1846. *Guttulina problema* d'Orbigny; d'Orbigny, p. 224, pl. 12, fig. 26-28.
1861. *Guttulina problema* (d'Orbigny); Kaasschieter, p. 181, pl. 7, fig. 30-32.
1962. *Guttulina problema* (d'Orbigny); Венглінський, p. 94, pl. 2, fig. 3 а, б.
1962. *Guttulina problema* d'Orbigny; Kiesel, p. 45, pl. 7, fig. 4.
1969. *Guttulina problema* d'Orbigny; Краева, Зернецкий, p. 66, pl. 24, fig. 2 а, б.
1970. *Guttulina problema* d'Orbigny; Le Calvez, p. 94, pl. 19, fig. 4.
1975. *Guttulina problema* d'Orbigny; Samuel, p. 128, pl. 71, fig. 2, 3.
1984. *Guttulina problema* d'Orbigny; Odrzywolska-Bienkowa, Pozarys-ka, p. 127, pl. 3, fig. 3; pl. 2, fig. 15.
1985. *Guttulina communis* d'Orbigny; Papp, Schmid, p. 78, pl. 70, fig. 2-7.
1987. *Guttulina problema* (d'Orbigny); Wenger, p. 264, pl. 6, fig. 5, 6.

Nomenclature. The holotype is not originally designated and the only specimen illustrated is accepted for such. For the first time the taxon was described from the Eocene in the Paris Basin.

Description. The test is calcareous, multilocular, conical-spiral with a considerable height of spire, which gives the aciniform aspect of the test. The chambers are comparatively separate and oval. The sutures are thin, straight, depressed. The aperture is terminal and radial. The periphery is rounded and strongly serrate. The apertural end of the test is tapering. The wall is smooth, thin, without ornamentation.

Remarks. In Bulgaria the species is found for the first time. The authors do not share the opinion of Papp, Schmid (1985) according to which *Guttulina problema* d'Orbigny and *Guttulina irregularis* (d'Orbigny) are considered as junior synonyms and ecological varieties of *Guttulina communis* d'Orbigny. In Burgas district the species are found in concomitance and reflect the same ecological environment.

Distribution. It is known from the Paleogene and the Miocene in the CIS, from the Palaeocene in Poland, from the Eocene and Oligocene in Belgium, from the Middle Eocene in France, the Upper Eocene in Texas, the Middle Miocene in the Central Parathetis and the Pliocene in Italy.

Occurrence. Mugris Formation: Kamenar — C-222 (120,00-120,60 m), C-820 (22,00-33,70 m), C-840 (49,00 m); Č. More 2 — 0-5 (70,00-135,00 m), C-27 (3,40-92,80 m) C-31 (162,00-202,00 m), C-35 (8,50-52,00 m), C-189 (231,00 m); Žitarovo — C-432a (25,00-135,00 m).

Unsubdivided sequences: C-28 (87,00 m).

Family **GLANDULINIDAE** Reuss, 1860

Genus ***Glandulina*** d'Orbigny, 1839

Type species: *Nodosaria (Glanduline) laevigata* d'Orbigny, 1826, p. 252; SD — Cushman, 1927, p. 189.

Glandulina laevigata (d'Orbigny, 1846)

Pl. III, fig. *3*

1826. *Nodosaria* (S. G. *Glandulina*) *laevigata* d'Orbigny; d'Orbigny, p. 86, fig. 1.
1846. *Glandulina laevigata* (d'Orbigny); d'Orbigny, p. 29, pl. 1, fig. 4, 5.
1875. *Glandulina laevigata* d'Orbigny; Hantken, s. 40, pl. 4, fig. 7.
1932. *Glandulina laevigata* (d'Orbigny); Howe, Wallace, p. 45, pl. 8, fig. 5, 6.
1951. *Glandulina laevigata* (d'Orbigny); Спасов, p. 112, pl. 2, fig. 3.
1961. *Glandulina laevigata* (d'Orbigny); Kaasschieter, p. 187, pl. 8, fig. 17.
1962. *Glandulina laevigata* d'Orbigny; Kiesel, p. 32, pl. 8. fig. 1.
1962. *Glandulina laevigata* (d'Orbigny); Венглінський, p. 96, pl. 12, fig. 2 а-в.
1969. *Glandulina laevigata* d'Orbigny; Краева, Зернецкий, p. 68, pl. 24, fig. 6a.
1970. *Glandulina laevigata* (d'Orbigny); Le Calvez, p. 100.
1983. *Glandulina laevigata* (d'Orbigny); Basov, Krasheninnikov, p. 763, pl. 12, fig. 10.
1985. *Glandulina ovula* d'Orbigny; Papp, Schmid, p. 21, pl. 2, fig. 1-6.

Nomenclature. The holotype is not originally designated and the only specimen illustrated is accepted for such. For the first time the taxon was described from the Eocene in the Paris Basin.

Remarks. In Bulgaria the species is known and described from the Badenian stage near the village of Staropatica, Kula district (Спасов, 1951). The specimens from the Eocene in Burgas district studied here have morphological features typical for the species. We cannot take up a position on the taxonomic revision of the species

(P a p p, S c h m i d, 1985) as we do not possess enough information about *Glandulina ovula* d' O r b i g n y.

D i s t r i b u t i o n. The species is known from the Eocene and the Oligocene in Belgium, from the Upper Eocene in CIS, England, Poland, and from the Miocene in the Vienna Basin.

O c c u r r e n c e. Mugris Formation: Kamenar — C-222 (110,00-120,60 m); Č. More 2 — 0-3 (9,80-70,00 m), O-5 (30,00-95,00 m), C-27 (3,40-192,00 m), C-31 (102,00-172,00 m), C-35 (82,00-111,80 m), C-189 (93,00-256,00 m), C-236 (21,00 m), C-237 (147,00-186,00 m), C-279 (4,00-233,00 m); Žitarovo — C-432a (35,00-230,00 m). Ravnec Formation: Č. More 2 — C-332 (304,90 m).

U n s u b d i v i d e d s e q u e n c e s: C-28 (27,60-87,00 m); Žitarovo — C-927 (69,20 m).

Family **CERATOBULIMINIDAE** C u s h m a n, 1927

Genus ***Ceratobulimina*** T o u l a, 1915

T y p e s p e c i e s: *Rotalina contraria* R e u s s, 1851, p. 76.

Ceratobulimina evoluta C u s h m a n and J a r v i s, 1929

Pl. III, fig. *5, 6*

1929. *Ceratobulimina evoluta* C u s h m a n and J a r v i s, n. sp., G u s h m a n, J a r v i s, p. 16, pl. 3, fig. 17

1963. *Ceratobulimina (Ceratobulimina) evoluta* C u s h m a n and J a r v i s; K i e s e l, L o t s c h, p. 17, pl. 12, fig. 2.

N o m e n c l a t u r e. The holotype is originally designated and is from Bamboo Clay of Cipero Section, Trinidad. It is kept in Cushman Coll. No 10103.

D e s c r p t i o n. The test is calcareous, multilocular, conical-spiral. The spiral side is depressed with hardly discernable initial whorls and very rapidly increasing final whorl. The spiral line is well visible only in its final portion. The sutures are short, straight, radial. On the umbilical side only the last whorl including about 7 triangular chambers can be seen. The umbilical side is strongly inflated. The sutures are straight, radial, deeply cut into the umbilical region and fairly distinct toward the periphery. The aperture is a wide slit from the umbilicus to the periphery and is situated entirely on the apertural surface which is negatively curved around the aperture. The periphery is broadly rounded. The wall is not ornamented.

R e m a r k s. In Bulgaria the species is found for the first time.

D i s t r i b u t i o n. It is known from the Upper Eocene in Germany and the Oligocene in Trinidad.

O c c u r r e n c e. Mugris Formation: Kamenar — C-222 (110,00-120,60 m); Č. More 2 — 0-3 (45,00-155,00 m), C-27 (192,00-202,00 m), C-35 (102,00-111,80 m), C-189 (231,00-256,00 m), C-237 (186,50-237,00), C-279 (225,00-233,60 m), C-286 (102,50 m); Žitarovo — C-432a (210,00-245,00 m). Ravnec Formation: Č. More 2 — C-286 (103,00-130,50 m); Žitarovo — C-432a (257,00 m).

U n s u b d i v i d e d s e q u e n c e s: C-28 (87,00-107,02 m); Žitarovo — C-902 (315,00 m), C-927 (337,00-347,00 m).

Family **EPISTOMINIDAE** W e d e r i n d, 1937

Genus ***Hoeglundina*** B r o t z e n, 1948

Type species *Rotalia elegans* d'Orbigny, 1826, p. 272.

Hoeglundina paleogenica Mjatliuk, 1953

Pl. III, fig. *7, 10*

1953. *Epistomina paleogenica* Mjatliuk sp. n.; Мятлюк, p. 228, pl. 8, fig. 1 а-в.

Nomenclature. The holotype was described from the Lower Oligocene sediments (Lopenezkaja Formation) in the East Carpathians. It is kept in the VNIGRI collection — No 2678 (Мятлюк, 1953).

Description. The test is calcareous, multilocular, conical-spiral. There are 3 full whorls on the spiral side, of which only the final one is well discernable. It is formed of max. 10 chambers. At the inner whorls the chambers are either triangular or semicircular and slightly concave. The spiral edge and the sutures are wide, depressed and projecting. The umbilical side is less inflated than the spiral one. The chambers on it are triangular in shape. The sutures between them are straight, radial and wide, like white stripes. The aperture is a slit at the base of the last formed chamber on the umbilical side. The peripheral margin is not serrate and is slightly tapering. The wall is thick and smooth.

Remarks. In Bulgaria the species is found for the first time. The assignment of *Hoeglundina paleogenica* (Mjatliuk) to genus *Hoeglundina* Brotzen is made according to the accepted classification (Loeblich, Tappan, 1988).

Distribution. The species was found in the Upper Eocene of the USA, in Upper Eocene and the Oligocene of the CIS, in the Upper Oligocene of Poland.

Occurrence. Mugris Formation: Kamenar — C-820 (63,00 m); Č. More 2 — 0-3 (140,00-155,00 m), 0-5 (130,00-135,00 m), C-27 (182,00-202,00 m), C-31 (102,00 m), C-189 (231,00-256,00 m), C-237 (222,00-226,00 m); Žitarovo — C-432a (210,00-235,00 m). Ravnec Formation: Č. More 2 — C-27 (216,00 m).

Unsubdivided sequences: C-28 (87,00-96,00 m); Žitarovo — C-927 (69,00-347,00 m).

Family **BOLIVINIDAE** Glaessner, 1937

Genus ***Bolivina*** d'Orbigny, 1839

Type species: *Bolivina plicata* d'Orbigny, 1839; SD — Cushman, 1911, p. 31.

Bolivina antegressa Subbotina, 1953

Pl. IV, fig. *3*

1947. *Bolivina* ex gr. *aenariensis* (Costa); Самойлова, p. 85, fig. 16, 17.
1947. *Bolivina* ex gr. *aenariensis* (Costa); Субботина, p. 97, pl. 9, fig. 4, 5.
1953. *Bolivina antegressa* sp. n.; Субботина, p. 226, pl. 10, fig. 11-16.
1969. *Bolivina antegressa* Subbotina; Краева, Зернецкий, p. 161, pl. 74, fig. 6 а, б.
1975. *Bolivina antegressa* Subbotina; Braga et al., p. 94.

Nomenclature. The holotype originates from the Upper Eocene sediments in the Crimea, Simpheropol (*Globigerinodes conglobatus* Zone). It is kept in the collection of VNIGRI — No. 3257.

Description. The test is calcareous, multilocular, biserial and leaf-shaped. The chambers are in separate rows oblique to the test axis and slightly shifted toward each other. The sutures are slightly depressed, getting finer towards the periphery. A straight and slightly projecting seam is formed along the axis. The aperture is situated on the axial wall of the last formed chamber. It has a tooth lamella. The test periphery

is acute and its cross-section is elliptic to rhomboid. The wall is porous, covered with numerous thin but distinct longitudinal costae. The last two chambers are not ornamented.

Remarks. Though it has not been described and illustrated in Bulgaria, the species is known from Ezerovo Formation in Trakia (Драгоманов et al., 1980) and the Priabonian Stage in Burgas district (Бецов, Дикова, 1969).

Occurrence. Mugris Formation: Kamenar — C-222 (16,00-120,60 m), C-820 (22,00 m), C-840 (49,00 m); Č. More 2 — 0-3 (15,00-149,00 m), O-5 (21,40-100,00 m), C-27 (2,40-202,00 m), C-31 (2,40-212,00 m), C-35 (8,50-122,00 m), C-189 (32,00-240,00 m), C-236 (41,00-60,00 m), C-237 (114,48-222,00 m), C-279 (4,00-205,00 m); Žitarovo — C-432a (25,00-240,00 m). Ravnec Formation: Č. More 2 — C-27 (238,00 m), C-286 (103,00 m), C-332 (303,20 m).

Unsubdivided sequences: C-28 (29,00-87,00 m): Žitarovo — C-927 (69,20-347,00 m).

Bolivina nobilis Hantken, 1875

Pl. IV, fig. *1, 2*

1875. *Bolivina nobilis* Hantken n. sp.; Hantken, p. 65, taf. 15, fig. 4 a-b.
1937. *Bolivina nobilis* Hantken; Cushman, p. 51, pl. 7, fig. 1-4.
1947. *Bolivina nobilis* Hantken; Самойлова, p. 83, fig. 11, 12.
1947. *Bolivina nobilis* Hantken; Субботина, p. 96, pl. 9, fig. 3.
1953. *Bolivina nobilis* Hantken; Субботина, p. 225, pl. 10, fig. 10.
1956. *Bolivina nobilis* Hantken; Hagn, p. 147.
1957. *Bolivina nobilis* Hantken; Цанева, p. 22, pl. 4, fig. 6 а-в.
1969. *Bolivina nobilis* Hantken; Краева, Зернецкий, p. 164, pl. 75, fig. 4.
1970. *Bolivina nobilis* Hantken; Le Calvez, p. 115.
1975. *Bolivina nobilis* Hantken; Samuel, p. 134, pl. 74, fig. 4-6.
1983. *Bolivina nobilis* Hantken; Krhovsky, p. 77, pl. 1, fig. 8.
1984. *Bolivina nobilis* Hantken; Odrzywolska-Bienkowa, Pozaryska, p. 129, pl. 3, fig. 7.
1987. *Bolivina nobilis* Hantken; Reiser, p. 90, pl. 9, fig. 10, 16.

Nomenclature. The holotype was described from the *Clavulina szaboj* Bed near Budapest (Hantken, 1875).

Remarks. This is one of the frequent species found in the Upper Eocene sediments in Bulgaria. It was described from the Upper Eocene in North-East Bulgaria (Цанева, 1957) and it was indicated to be present also in the rocks of the same age near Burgas (Мандев, 1954; Бецов, Диков, 1969). The specimens studied by us show no differences from the morphological characteristic of the species. The variability of the taxon in the collection is demonstrated through its illustrations (pl. IV, fig. 1 and fig. 2).

Distribution. The species is known from the Eocene sediments in Hungary, France, Nigeria, from the Upper Eocene in Crimea, Caucasus and Poland, from the Upper Eocene and the Oligocene sediments in Czecho-Slovakia.

Occurrence. Mugris Formation: Kamenar — C-222 (16,00-120,60 m), C-820 (27,00 m), C-840 (49,00 m); Č. More 2 — 0-3 (25,00-149,50 m), 0-5 (7,00-130,00 m), C-27 (2,40-202,00 m), C-31 (2,40-222,00 m), C-35 (8,50-122,00 m), C-189 (32,00-256,00 m), C-236 (41,00-60,00 m), C-237 (144,48-247,00 m), C-279 (55,00-205,00 m). Ravnec Formation: Kamenar — C-222 (170,00-170,50 m); Č. More 2 — C-27 (239,00 m), C-286 (102,50-103,00 m).

Unsubdivided sequences: C-28 (87,00-96,60 m); Žitarovo — C-927 (347,00 m).

Bolivina reticulata Hantken, 1875

Pl. IV, fig. *4*

1875. *Bolivina reticulata* n. sp.; Hantken, p. 65, pl. 15, fig. 6 a-b.
1937. *Bolivina reticulata* Hantken; Cushman, p. 50, pl. 6, fig. 24-27.
1953. *Bolivinoides reticulatus* (Hantken); Субботина, p. 250, pl. 13, fig. 10-15.
1957. *Bolivinoides reticulatus* (Hantken); Цанева, p. 23, pl. 5, fig. 1 а, б.
1959. *Bolivinoides reticulatus* (Hantken); Станчева, p. 330, pl. 2, fig. 1.
1962. *Bolivina reticulata* Hantken; Kiesel, p. 61, pl. 9, fig. 8.
1969. *Bolivinoides reticulatus* (Hantken); Краева, Зернецкий, p. 160, pl. 74, fig. 1.
1971. *Bolivina reticulata* Hantken; Popescu, Iva, p. 44, pl. 6, fig. 5.
1975. *Bolivina reticulata* Hantken; Samuel, p. 134, pl. 73, fig. 7, 8 a, b.
1987. *Bolivina reticulata* Hantken; Reiser, p. 89, pl. 9, fig. 1, 5.

Nomenclature. The holotype was described from the *Clavulina szaboj* Beds near Ofen, Hungary (Hantken, 1875).

Remarks. In Bulgaria the species was described from the Upper Eocene sediments in North-East Bulgaria (Цанева, 1957) and from the Eocene in Pleven District (Станчева, 1959) as *Bolivinoides reticulatus* (Hantken). The specimens from Burgas District studied by us have morphological features typical for the species.

Distribution. It is known from the Upper Eocene sediments in CIS and Central Europe.

Occurrence. Mugris Formation: Kamenar — C-222 (21,00-49,40 m); Č. More 2 — 0-3 (30,00-149,50 m), 0-5 (55,00-130,00 m), C-27 (240,00 m), C-189 (85,00 m); Žitarovo — C-432a (105,00-150,00 m). Ravnec Formation: Č. More 2 — C-27 (238,00 m).

Unsubdivided sequences: C-28 (55,00-130,00 m).

Family **CASSIDULINIDAE** d'Orbigny, 1839

Genus ***Cassidulina*** d'Orbigny, 1826

Type species: *Cassidulina laevigata* d'Orbigny, 1826.

Cassidulina laevigata d'Orbigny, 1826

Pl. III, fig. *9, 12*

1826. *Cassidulina laevigata* d'Orbigny; d'Orbigny, p. 282, pl. 15, fig. 4, 5.
1947. *Cassidulina laevigata* d'Orbigny; Самойлова, p. 93, fig. 29, 30.
1952. *Cassidulina laevigata* d'Orbigny; Волошинова, p. 95, pl. 1, fig. 6-8.
1969. *Cassidulina laevigata* d'Orbigny; Краева, Зернецкий, p. 158, pl. 73, fig. 4 а-б.

Nomenclature. The holotype is not originally designated and the only specimen figured is accepted for such. Later this specimen was refigured (Волошинова, 1952, pl. 1, fig. 6). Eocene — Paris Basin.

Description. The test is calcareous, multilocular, planispiral, involute. The umbilical region on both sides is protruding, the test is biconvex. Only the final whorl which is formed of 4-5 chambers is visible. The sutures are strongly curved, flush with the surface and alternating one short by one long. The short ones are curved toward the initial portion of the whorl and the long — toward its final portion. At the central portion, there are compact capsules on both sides. The aperture is a narrow slit situated on the periphery of the last formed chamber. The periphery is tapering but no sharp keel is formed. The wall is thin, smooth and unornamented.

Distribution. The species is known from the Oligocene in CIS, from the Miocene in the Far East of the CIS and from the Pliocene in Japan. According to the data we possess, in Burgas district the species is found for the first time in the Upper Eocene.

Occurrence. Mugris Formation: Kamenar — C-222 (31,00-85,80 m), C-840 (49,00 m); Č. More 2 — 0-5 (7,00-100,00 m), C-27 (2,40-72,00 m), C-31 (13,00-151,80 m), C-35 (52,00 m), C-189 (32,00-33,00 m and 72,00-189,00 m), C-236 (42,00 m), C-237 (182,00-197,00 m), C-279 (4,00-65,00 m); Žitarovo — C-432a (35,00-160,00 m).

Unsubdivided sequences: C-28 (29,00 m).

Genus ***Globocassidulina*** Voloshinova, 1960

Type species: *Cassidulina globosa* Hantken, 1875.

Globocassidulina globosa (Hantken, 1875)

Pl. III, fig. *8, 11*

1875. *Cassidulina globosa* n. sp.: Hantken, p. 64, pl. 16, fig. 2a, b.
1935. *Cassidulina globosa* Hantken; Cushman, p. 49, pl. 26, fig. 12.
1952. *Cassidulina globosa* Hantken; Волошинова, p. 99, pl. 4, fig. 10.
1956. *Cassidulina globosa* Hantken; Hagn, p. 167, pl. 14, fig. 9, 10.
1960. *Cassidulina globosa* Hantken; Субботина et al., p. 100, pl. 10, fig. 6 а-в.
1969. *Cassidulina globosa* Hantken; Краева, Зернецкий, p. 158, pl. 73, fig. 3.
1979. *Globocassidulina globosa* Hantken; Strakos, p. 27, fig. 13.

Nomenclature. The holotype was described from the Layers with *Clavulina szaboj* in Hungary ('Hantken, 1875) and refigured by Волошинова (1952, pl. 4, fig. 10 а, б).

Description. The test is calcareous, multilocular, planispiral to heteromorphous, the final chambers being uniserial. The last whorl is formed of 4 slightly inflated chambers with pentagonal outlines and rounded margins. The test is involute in its spiral portion. The sutures are thin, slightly depressed. The aperture is a small slit situated at the middle of the apertural surface of the last formed chamber. The wall is very thin, finely porous and smooth. The test is minute with subspherical to oval shape.

Remarks. The presence of the species in Bulgaria is indicated for the first time. The assignment of *Globocassidulina globosa* (Hantken) to genus *Globocassidulina* Voloshinova is made according to the accepted classification (Loeblich, Tappan, 1988).

Distribution. The species is known from the Upper Eocene all over South Europe and North America, as well as from the Middle Oligocene in Germany.

Occurrence. Mugris Formation: Kamenar — C-222 (31,00-130,00 m), C-820 (22,00-53,00 m); Č. More 2 — 0-3 (10,65-149,50 m), 0-5 (16,10-115,00 m), C-27 (172,00 m), C-31 (92,00-222,00 m), C-35 (42,00-82,00 m), C-189 (93,00-240,00 m), C-237 (182,00-222,00 m), C-279 (8,00-226,00 m); Žitarovo — C-432a (35,00-235,00 m). Ravnec Formation: Kamenar — C-222 (170,00-170,50 m); Č. More 2 — C-27 (238,00 m).

Unsubdivided sequences: C-28 (27,60-87,00 m)

Family **SIPHOGENERINOIDINAE** Saidova, 1981

Genus ***Rectuvigerina*** Mathews, 1945

Type species: *Siphogenerina multicostata* Cushman and Jarvis, 1929 p. 14.

Rectuvigerina cf. ***lacera*** (Subbotina, 1953)

Pl. V, fig. *6*

1953. *Siphogenerina lacera* sp. n.; Субботина, p. 243, pl. 13, fig. 2, 3.

Nomenclature. The holotype originates from the Upper Eocene sediments (*Globigerinoides conglobatus* Zone) in Crimea. It is kept under No 3292 in the VNIGRI collection and it is figured in the publication of Субботина (1953, pl. 13, fig. 2).

Description. The test is calcareous, multilocular, conical-spiral, heteromorphous with a triserial-biserial early portion and a later uniserial portion. The triserial and biserial portion is formed of about 10 chambers with triangular outlines. The early chambers are hardly discernable. The uniserial portion consists of 2-3 chambers of uniform size and quadrangular outlines which are easily discernable. These uniserially arranged chambers cover about half of the test length. The sutures are distinct, gently curved, depressed. They are better discernable at the uniserial portion of the test. The aperture is terminal, situated on a short neck and round. It has a thickened lip. The test surface is covered with thin, dense, longitudinal costae which break up at each suture. The test is cylindrical with a sligtly tapering initial portion.

Remarks. The species is found for the first time in Bulgaria. Due to the insufficient material for comparison it is described in open nomenclature. Difficult to discern is the arrangement of the chambers at its initial portion but the costae, which cover the test break up at the sutures and by this feature the species is closer to the type species of genus *Rectuvigerina* Mathews, than to the type species of genus *Siphogenerina* Schlumberger.

Distribution. The species is known to us only from the Upper Eocene of Crimea (CIS).

Occurrence. Mugris Formation: Kamenar — C-222 (21,00-38,00 m); Č. More 2 — 0-3 (10,65 m), O-5 (70,00 m), C-27 (2,40 m), C-189 (32,00 m).

Family **BULIMINIDAE** Jones, 1875

Genus ***Bulimina*** d'Orbigny, 1826

Type species: *Bulimina marginata* d'Orbigny, 1826; SD — Cushman (1911, p. 76).

Bulimina pyrula d'Orbigny, 1846

Pl. IV, fig. *8*

1846. *Bulimina pyrula* d'Orbigny; d'Orbigny, p. 184, pl. 11, fig. 9-10.
1846. *Bulimina ovata* d'Orbigny; d'Orbigny, p. 185, pl. 11, fig. 13-14.
1926. *Bulimina ovata* d'Orbigny; Cushman, p. 55, pl. 7, fig. 1.
1932. *Bulimina ovata* d'Orbigny; Cushman, Ponton, p. 67, pl. 9, fig. 1-2.
1935. *Bulimina ovata* d'Orbigny; Cushman, p. 35, pl. 13, fig. 15-16.
1953. *Bulimina ovata* d'Orbigny; Субботина, p. 210, pl. 9, fig. 15-16.
1953. *Bulimina ovata* d'Orbigny; Быкова, p. 68, pl. 2, fig. 4-6.
1957. *Bulimina ovata* d'Orbigny; Цанева, p. 14, pl. 2, fig. 2 a-c.
1959. *Bulimina ovata* d'Orbigny; Станчева, p. 259, pl. 7, fig. 8.
1961. *Bulimina ovata* d'Orbigny; Kaasschieter, p. 191, pl. 9, fig. 6.
1969. *Bulimina ovata* d'Orbigny; Краева, Зернецкий, p. 147, pl. 70, fig. 6-7.
1969. *Bulimina pyrula* d'Orbigny; Краева, Зернецкий, p. 148, pl. 70, fig. 11 a-6.
1974. *Bulimina ovata* d'Orbigny; Szczechura, Pozaryska, p. 53, pl. 5, fig. 13.
1975. *Bulimina ovata* d'Orbigny; Samuel, p. 135, pl. 75, fig. 3.
1977. *Bulimina ovata* d'Orbigny; Pozaryska, p. 29, pl. 2, fig. 24 a-c.
1985. *Bulimina pyrula* d'Orbigny; Papp, Schmid, p. 69, pl. 62, fig. 2-10.

Nomenclature. A holotype is not originally designated. The species was described from the Badenian in the Vienna Basin. Upon a taxonomic revision of the original collection of d'Orbigny (Papp, and Schmid, 1985) a lectotype was indicated — GBA 1981/03/314.

Remarks. In Bulgaria the species was described as *Bulimina ovata* d'Orbigny from the Eocene in Varna district (Цанева, 1957) and from the Miocene in North-

West Bulgaria (Станчева, 1959). The authors of the present paper accept the revision of Papp, Schmid according to which *Bulimina pyrula* d'Orbigny, *Bulimina ovata* d'Orbigny and *Bulimina pupoides* d'Orbigny are considered synonymous under the valid name of *Bulimina pyrula* d'Orbigny. The different correlations of height to width of the test are interpreted as a variability within the species. By this feature only specimens figured by d'Orbigny (1846) as *Bulimina ovata* d'Orbigny are contained in the collection examined.

Distribution. The species is known from the Eocene and the Miocene sediments in the CIS, from the Eocene of France and Hungary, the Upper Eocene of USA and Belgium, the Lower Oligocene in Mexico, the Miocene in the Vienna Basin, the Pliocene in Italy and Spain, from the bottom of the Mediterranean and the Pacific.

Occurrence. Mugris Formation: Kamenar — C-222 (31,00-130,00 m), Č. More 2 — 0-3 (15,00-149,50 m), O-5 (16,10-135,00 m), C-27 (3,40-192,00 m), C-31 (122,00-222,00 m), C-35 (8,50-111,80 m), C-189 (32,00-256,00 m), C-237 (144,48-237,00 m), C-279 (105,00-225,00 m); Žitarovo — C-432a (96,00-234,00 m).

Unsubdivided sequences: C-28 (29,00-87,00 m); Žitarovo — 927 (388,00 m).

Bulimina ex gr. ***sculptilis*** Cushman, 1923

Pl. IV, fig. *5-6*

1947. *Bulimina sculptilis* Cushman; Субботина, p. 93, pl. 8, fig. 27-29
1953. *Bulimina sculptilis* Cushman; Субботина, p. 212, pl. 9, fig. 17-19.
1957. *Bulimina sculptilis* Cushman; Цанева, p. 17, pl. 3, fig. 3 a-c.
1987. *Bulimina sculptilis* Cushman; Reiser, p. 77, pl. 6, fig. 13, 14.

Nomenclature. The holotype is kept in Cushman Coll. under No 4333 but we possess no other data. Here the species is identified by the specimen from the Upper Eocene, illustrated by Субботина (1953, pl. 9, fig. 18).

Remarks. In Bulgaria the species is known from a number of sections of the Upper Eocene (Мандев, 1954; Мандев, 1955; Цанева, 1957). It was described and figured from the Upper Eocene in North-East Bulgaria (Цанева, 1957). The examined specimens from the Upper Eocene in Burgas District bear the typical for the taxon morphological characteristics. The correlation of height to width of the test shows a variability to the utmost degree, which is demonstrated on the figures suggested (pl. IV, fig. *5, 6*).

Distribution. The taxon was found in the Eocene sediments all over Europe, USA, Mexico, Venezuela and in the Upper Eocene of the Commonwelth of Independent States.

Occurrence. Mugris Formation: Kamenar — C-820 (27,00-63,00 m); Č. More 2 — 0-3 (25,00-120,00 m), 0-5 (70,00-130,00 m), C-27 (2,40-202,00 m), C-31 (172,00-222,00 m), C-35 (8,50-122,00 m), C-189 (33,00-256,00 m), C-236 (21,00 m), C-237 (144,48-237,00 m), C-279 (145,00-233,60 m); Žitarovo — C-432a (25,00-245,00 m). Ravnec Formation: Č. More 2 — C-27 (238,00 m), C-286 (105,00-116,50 m), C-332 (286,00 m).

Unsubdivided sequences: C-28 (27,60-107,20 m); Žitarovo — C-902 (361,70 m), C-927 (69,20 m).

Familiy **UVIGERINIDAE** Hoeckel, 1894

Genus ***Uvigerina*** d'Orbigny, 1826

Type species: *Uvigerina pygmaea* d'Orbigny, 1826 (also as *pigmaea*, p. 269); SD — Parker, Jones, Brady (1865, p. 36).

Uvigerina pygmea d'Orbigny, 1826

Pl. IV, fig. 7

1826. *Uvigerina pygmaea* d'Orbigny; d'Orbigny, p. 103, fig. 2.
1846. *Uvigerina pygmea* d'Orbigny; d'Orbigny, p. 190, pl. 11, fig. 25, 26.
1875. *Uvigerina pygmea* d'Orbigny; Hantken, p. 62, pl. 7, fig. 4.
1953. *Uvigerina pygmea* d'Orbigny; Субботина, p. 239, pl. 12, fig. 1 а, б, 2-6.
1955. *Uvigerina pygmea* d'Orbigny; Серова, p. 366, pl. 24, fig. 7, 8.
1957. *Uvigerina pygmea* d'Orbigny; Цанева, p. 31, pl. 7, fig. 8-10.
1958. *Uvigerina pygmea* d'Orbigny; Венглінський, p. 142, pl. 30, fig. 6-9.
1958. *Uvigerina pygmea* d'Orbigny; Nyiro, p. 35, pl. 1, fig. 9 a-d.
1969. *Uvigerina pygmea* d'Orbigny; Краева, Зернецкий, p. 154, pl. 72, fig. 6, 7.
1975. *Uvigerina pygmea* d'Orbigny; Samuel, p. 137, pl. 76, fig. 1, 2.
1985. *Uvigerina pygmoides* d'Orbigny; Papp, Schmid, pl. 65, fig. 1-5.

Nomenclature. The holotype is not originally designated and the only specimen figured is accepted for such. For the first time the taxon was described from the Eocene of the Paris Basin.

Remarks. In Bulgaria the species was described from the Upper Eocene and from the Miocene sediments in North-East Bulgaria (Цанева, 1952). The specimens from the Eocene sections in Burgas district do not show any substantial morphological differences from the ones already described. Their tests only are smoother.

Distribution. Eocene — recent, in Italy, France, Hungary, Vienna Basin, Germany, Algeria and from the Middle Eocene to the Miocene in Slovakia.

Occurrence. Mugris Formation: Kamenar — C-222 (31,00-85,80 m); Č. More 2 — 0-3 (70,00-140,00 m), C-27 (202,00 m), C-189 (231,00-240,00 m), C-237 (226,00 m), C-279 (223,00-225,00 m); Žitarovo — C-432a (235,00-250,00 m).

Uvigerina ex gr. ***hispida*** Schwager, 1866

Pl. V, fig. *2*

1953. *Uvigerina hispida* Schwager; Субботина, p. 235, pl. 11, fig. 11-13;
1969. *Uvigerina hispida* Schwager; Краева, Зернецкий, p. 153, pl. 72 fig. 1
1975. *Uvigerina hispida* Schwager; Samuel, p. 136, pl. 76, fig. 4, 5.
1977. *Uvigerina hispida* Schwager; Pozaryska, p. 31, pl. 10, fig. 5.

Nomenclature. We have no data about the holotype. The species is identified here by a specimen from the Upper Eocene (*G. conglobatus* Zone) in Crimea (Субботина, pl. 11, fig. 13).

Description. The test is calcareous, multilocular, high conical-spiral, heteromorphous. In its early portion it is triserial and later it becomes biserial. The chambers in the early portion are hard to discern and of an obscure shape. In the biserial portion the chambers are subglobular. All chambers are closely adjoining. The last formed chamber is considerably larger and ending with a short neck. The sutures are depressed, gently curved and indistinct. The aperture is terminal and situated on the neck. It is round and surrounded by an annular lip. The wall is coarse and covered with numerous short and thick spines. They cover uniformly and densely the whole surface of the test.

Remarks. In Bulgaria the species is found for the first time.

Distribution. Known from the Upper Eocene sediments in the Commonwealth of Independent States, Czecho-Slovakia and Poland.

Occurrence. Mugris Formation: Kamenar — C-222 (85,40-85,80 m), Č. More 2 — C-189 (240,00 m and 32,00 m).

Unsubdivided sequences: Žitarovo — C-927 (347,00 m).

Uvigerina costellata Morozova, 1939

Pl. V, fig. *1*

1939. *Uvigerina costellata* n. sp.; Морозова, p. 76, pl. 2, fig. 5.
1953. *Uvigerina costellata* Morozova; Субботина, p. 237, pl. 9, fig. 14, 15.
1969. *Uvigerina costellata* Morozova; Краева, Зернецкий, p. 153, pl. 71, fig. 15.
1975. *Uvigerina costellata* Morozova; Samuel, p. 136, pl. 76, fig. 5a-c.
1977. *Uvigerina costellata* Morozova; Pozaryska, p. 30, pl. 2, fig. 18-19; pl. 10, fig. 3.

Nomenclature. The holotype was not indicated in the first description of the species. Lectotype here designated is the only figured syntype from the Upper Eocene in the section near Karakemer (CIS) (Морозова, 1939, pl. 2, fig. 5).

Description. The test is calcareous, multilocular, high conical-spiral. The arrangement of the chambers is triserial. They are slightly inflated and gradually increasing, closely adjoining to each other. The sutures are depressed and distinct. The test surface is covered with numerous thin, translucent, longitudinal costae which break up at the zone of the sutures. The aperture is terminal and situated on a short neck. It is round with an annular outer lip. The wall is thick and coarse. The test transverse section is round and its shape is suboval. The test is widest at the base of its last whorl.

Remarks. In Bulgaria the species is found for the first time.

Distribution. It is known from the Upper Eocene in CIS, Czecho-Slovakia, Poland.

Occurrence. Mugris Formation: Kamenar — C-222 (120,00-141,20 m), C-820 (51,00-63,00 m); Č. More 2 — C-35 (52,00 m), C-189 (119,00-240,00 m), C-270 (225,00 m); Žitarovo—C-432a (25,00 m). Ravnec Formation: Kamenar—C-820 (67,60m).

Uvigerina jacksonensis Cushman, 1925

Pl. IV, fig. *10*

1925. *Uvigerina jacksonensis* Cushman; Cushman, p. 67, pl. 10, fig. 13.
1932. *Uvigerina jacksonensis* Cushman; Howe, Wallace, p. 65, pl. 12, fig. 7, 8.
1935. *Uvigerina jacksonensis* Cushman; Cushman;, p. 40, pl. 16, fig. 1-3.
1953. *Uvigerina jacksonensis* Cushman; Субботина, p. 241, pl. 12, fig. 7-9; pl. 13, fig. 10.
1957. *Uvigerina jaksonensis* Cushman; Цанева, p. 29, pl. 7, fig. 4, 5.
1969. *Uvigerina jacksonensis* Cushman; Краева, Зернецкий, p. 154, pl. 72, fig. 3.

Nomenclature. The holotype is from the Upper Eocene sediments in Alabama — Jackson Formation. It is kept in U.S.N.M. Coll. No 353685.

Remarks. In Bulgaria the species is known from the Upper Eocene and the Oligocene sediments in Varna district, where it was described from (Цанева, 1957), as well as from their analogues of the same age in Burgas District (Бецов, Дикова, 1969), the Upper Eocene in Burgas district (Мандев, 1954; Бецов, Дикова, 1969). The specimens from our collection have no differences from those already described.

Distribution. It is known from the Middle and Upper Eocene in Belgium and Holland, from the Upper Eocene in USA, England, Germany, CIS, Poland, New Zealand.

Occurrence. Mugris Formation: Kamenar — C-820 (22,00-33,70 m), C-222 (31,00-130,00 m); Č. More 2 — O-3 (15,00-155,00 m), O-5 (16,10-135,00 m), C-27 (2,40-192,00 m), C-31 (111,70-222,00 m), C-35 (8,50-122,00 m), C-189 (205,00-256,00 m), C-236 (21,00-60,00 m), C-237 (182,00-237,00 m), C-279 (35,00-233,60 m); Žitarovo — C-432a (25,00-250,00 m). Ravnec Formation: Kamenar — C-222 (150,00-170,50 m), C-820 (94,00 m); Č. More 2 — C-27 (212,00-226,00 m), C-35 (131,00-183,00 m), C-286 (102,50-103,00 m), C-332 (286,00-298,50 m); Žitarovo — C-432a (257,00-267,00 m).

Unsubdivided sequences: C-28 (8,50-107,20 m); Žitarovo — C-902 (361,70 m); C-927 (69,20-388,00 m).

Genus ***Angulogerina*** Cushman, 1927

Type species: *Uvigerina angulosa* Williamson, 1858, p. 67.

Angulogerina ex gr. ***angulosa*** (Williamson, 1858)

Pl. IV, fig. *9, 11*

1953. *Angulogerina angulosa* (Williamson); Субботина, p. 245, pl. 13, fig. 4-7.
1958. *Angulogerina angulosa* (Williamson); Венглінський, p. 145, pl. 31, fig. 3.
1960. *Angulogerina angulosa* (Williamson); Субботина и др., p. 98, pl. 8, fig. 4, 5.
1961. *Angulogerina angulosa* (Williamson); Крашенинников, p. 175, pl. 4, fig. 8.
1967. *Angulogerina angulosa* (Williamson); Romeo, p. 52, pl. 2, fig. 25.
1969. *Angulogerina angulosa* (Williamson); Краева, Зернецкий, pl. 155, pl. 72, fig. 9 a, б.
1975. *Angulogerina angulosa* (Williamson); Samuel, p. 137, pl. 77, fig. 7 a, b.
1975. *Angulogerina angulosa* (Williamson); Венглінський, p. 198, pl. 33, fig. 12-14
1983. *Trifarina angulosa* (Williamson); Basov, Krasheninnikov, p. 767, pl. 17, fig. 6.
1987. *Trifarina angulosa* (Williamson); Wenger, p. 282, pl. 9, fig. 7 a, b.

Nomenclature. We have no data about the holotype. For the first time the species was described from the recent sediments of the Atlantic Ocean. Herein, it is identified by a specimen from the Upper Eocene (*G. conglobatus* Zone) in Crimea (Субботина, 1953, pl. 13, fig. 6).

Description. The test is calcareous, multilocular, high conical-spiral with a tapering initial portion. The chambers are arranged in three rows but in the initial portion of the chamber they are more difficult to be discerned. In the later stages of increasing the arrangement becomes biserial, the chambers rapidly increasing their size. The sutures are distinct and depressed. The aperture is terminal, situated on a short neck and round in shape. The test surface is covered with numerous short and thin longitudinal costae. In the zone of the sutures they break up or they are less distinct. The test is triangular in transverse section and with rounded angles. The wall is thick.

Remarks. In Bulgaria the species is described for the first time. Its presence in the Upper Eocene subsequence in Varna District was found out beforehand (Мандев, 1955).

Distribution. The species is known from the Paleogene and the Neogene in CIS, Czecho-Slovakia, from the Miocene in Italy, from the recent sediments in the North-West part of the Pacific and the Sea of Okhotsk.

Occurrence. Mugris Formation: Kamenar — C-222 (21,00-85,40 m); Č. More 2 — C-27 (2,40-172,00 m), C-31 (151,80-212,00 m), C-189 (32,00-33,00 m), C-236 (41,00 m), C-237 (144,48 m), C-279 (226,00-233,00 m); Žitarovo — C-432a (45,00-195,00 m). Ravnec Formation: Č. More 2 — C-27 (238,00 m), C-286 (102,50-210,80 m).

Unsubdivided sequences: C-28 (29,00-107,20 m); Žitarovo — C-927 (69,20 m).

Family **REUSSELLIDAE** Cushman, 1933

Genus ***Reussella*** Galloway, 1933

Type species: *Verneuilina spinulosa* Reuss, 1950, p. 374.

Reussella sculptilis (Cushman, 1926)

Pl. V, fig. *3*

1926. *Verneuilina sculptilis* Cushman, n. sp.; Cushman, p. 34, pl. 5, fig. 3.
1935. *Reussella sculptilis* (Cushman); Cushman, p. 38, pl. 13, fig. 6, 7.

1984. *Reussella sculptilis* (Cushman); Odrzywolska-Bienkova, Pozaryska, p. 130, pl. 12, fig. 7 a, b.

Nomenclature. The holotype is originally designated and it is from Pea River, Geneva Co., Alabama. It is kept in U.S.N.M. Coll. No 354117.

Description. The test is calcareous, multilocular, triserial, conical-spiral. It is shaped like a triwall pyramid with flat or slightly depressed sides and tapering margines. The chambers are low, wide and large. The sutures are projecting, straight or gently curved and inclined toward the test margines. The aperture is situated at the base of the last formed chamber on the apertural surface. It is like a slit or a very small arch. The initial portion of the test is tapering, occasionally with a spine. Its surface is distinctly ornamented.

Remarks. In Bulgaria the species is found for the first time but the material is scarce and poorly preserved.

Distribution. It is known from the Upper Eocene in USA and Poland only.

Occurrence. Mugris Formation: Kamenar — C-820 (27,00 m). Ravnec Formation: Č. More 2 — C-332 (298,50 m).

Family **FURSENKOINIDAE** Loeblich, Tappan, 1961

Genus ***Fursenkoina*** Loeblich, Tappan, 1961

Type species: *Virgulina squammosa* d'Orbigny, 1926, p. 267.

Fursenkoina acuta (d'Orbigny, 1846)

Pl. V, fig. *5*

1846. *Polymorphina acuta* d'Orbigny; d'Orbigny, p. 234, pl. 13, fig. 4, 5; pl. 14, fig. 5-7.
1875. *Virgulina schreibersi* Czjzek; Hantken, p. 63, pl. 7, fig. 15.
1937. *Virgulina schreibersiana* Czjzek; Cushman, p. 13, pl. 2, fig. 11-20.
1953. *Virgulina schreibersiana* Czjzek; Субботина, p. 218, pl. 10, fig. 3 а, б.
1958. *Virgulina schreibersiana* Czjzek; Венглінський, p. 136, pl. 29, fig. 10 а-в.
1959. *Virgulina schreibersiana* Czjzek; Крашенинников, p. 56, pl. 10, fig. 7.
1959. *Virgulina schreibersiana* Czjzek; Станчева, p. 262, pl. 7, fig. 3 а, б.
1961. *Virgulina schreibersiana* Czjzek; Hornibrook, p. 64, pl. 8, fig. 13 b.
1961. *Virgulina schreibersiana* Czjzek; Hornibrook, p. 64, pl. 8, fig. 138.
1969. *Virgulina schreibersiana* Czjzek; Краева, Зернецкий, p. 143, pl. 69, fig. 7.
1970. *Virgulina schreibersiana* Czjzek; LeCalvez, p. 129.
1975. *Virgulina schreibersiana* Czjzek; Samuel, p. 139, pl. 74, fig. 9.
1985. *Fursenkoina acuta* (d'Orbigny); Papp, Schmid, p. 82, pl. 75, fig. 1-6.
1987. *Fursenkoina acuta* (d'Orbigny); Wenger, p. 273, pl. 7, fig. 19, 20.

Nomenclature. The holotype is not designated. The first species described is from the region around Vienna. Designated as a lectotype is specimen No. GBA 1981/03/385/.

Remarks. In Bulgaria the presence of the species is known. It was described from the Badenian Stage in North-West Bulgaria (Станчева, 1959) as *Virgulina schreibersiana* Czjzek. It was found also in the Priabonian Stage in Plovdiv District (Драгоманов et al., 1980). The studied specimens from Burgas District possess all characteristic features of the taxon. The interpretation of the species is according to the taxonomic revision of Papp, Schmid (1985).

Distribution. It is known from the Eocene to the Meioce in Slovakia, from the Upper Eocene and the Oligocene in Crimea, from the Oligocene in the Caucasus and Ukraine, from the Oligocene, Miocene and Pliocene in Germany, Austria, Hungary and France, from the Miocene in Africa, from the recent sediments around the Philipines.

Occurrence. Mugris Formation: Kamenar — C-22 (110,00 m), C-820 (22,00-63,00 m); Č. More 2 — O-3 (155,00 m), C-27 (192,00 m), C-31 (132,00 m), C-35 (102,00-122,00 m), C-189 (256,00 m), C-279 (8,00-233,00 m) m); Žitarovo — C-432a (240,00-250,00 m). Ravnec Formation: Č. More 2 — C-27 (216,00-226,00 m), C-189 (264,80 m), C-286 (103,00-142,10 m), C-332 (294,20-300,20 m).

Unsubdivided sequences: C-28 (96,60 m); Žitarovo — C-902 (315,00 m).

Family **PLEUROSTOMELLIDAE** Reuss, 1860

Genus ***Pleurostomella*** Reuss, 1860

Type species: *Dentalina subnodosa* Reuss, 1851, p. 2 =*Dentalina nodosa* d'Orbigny of Reuss, 1846, p. 28; SD — Cushman (1911, p. 49).

Pleurostomella ex gr. ***bellardii*** Hantken, 1883

Pl. V, fig. *7, 8.*

1927. *Pleurostomella bellardi* Hantken; Cushman, p. 156, pl. 28, fig. 1.
1957. *Pleurostomella bellardi* Hantken; Foraminiferi Padani, pl. 32, fig. 7.

Description. The test is calcareous, multilocular, heteromorphous. In its initial portion it is conical-spiral, biserial and occasionally the last two chambers are uniserial. The sutures are straight, depressed, strongly inclined toward the test axis. The aperture is terminal and situated on the depressed apertural surface. Its size is comparatively large and its shape round. The surface is very finely hatched.

Remarks. In Bulgaria the taxon is found for the first time. The specimens described before differ from those known to us (Cushman, 1935; For. Pad., 1957) in the presence of ornamentation, which is observable on SEM photoes only. It is not unlikely for the "smooth" specimens of Cushman (1935) to have a similar ornamentation at the same conditions.

Occurrence. Mugris Formation: Č. More 2 — O-5 (35,00-65,00 m), C-237 (182,00 m), C-279 (105,00 m); Žitarovo — C-432a (25,00-86,00 m). Ravnec Formation: Kamenar — C-820 (103,30-119,00 m), C-840 (423,80-443,00 m), C-222 (205,00-206,00 m).

Unsubdivided sequences: Žitarovo — C-927 (69,20 m).

Family **STILOSTOMELLIDAE** Finlay, 1947

Genus ***Siphonodosaria*** Silvestri, 1924

Type species: *Nodosaria abyssorum* Brady, 1881, p. 63; SD — Cushman (1927, p. 67).

Siphonodosaria adolphina (d'Orbigny, 1846)

Pl. V, fig. *4*

1846. *Dentalina adolphina* d'Orbigny; d'Orbigny, p. 51, pl. 11, fig. 18-20.
1868. *Dentalina adolphina* d'Orbigny; Gümbel, p. 45, pl. 1, fig. 32.
1951. *Dentalina adolphina* d'Orbigny; Спасов, p. 100, pl. 1, fig. 11.
1953. *Siphonodosaria adolphina* (d'Orbigny); Субботина, p. 180, pl. 6, fig. 1, 2.
1969. *Nodosaria adolphina* (d'Orbigny); Краева, Зернецкий, p. 41, pl. 14, fig. 6.
1975. *Nodosaria adolphina* (d'Orbigny); Samuel, p. 119, pl. 70, fig. 2 a, b.
1983. *Stilostomella adolphina* (d'Orbigny); Krhovsky, p. 78, pl. 2, fig. 2.
1985. *Stilostomella adolphina* (d'Orbigny); Papp, Schmid, p. 31, pl. 14, fig. 8-11.

Nomenclature. The holotype is not designated. For the first time the species was described from the Miocene sediments in the Vienna Basin. The lectotype was designated by Papp, Schmid (1985, pl. 14, fig. 9) and is kept in GBA Coll. No 1981/03/58/.

Remarks. In Bulgaria the species was described from the Badenian Stage near Staropatica, Kula District (Спасов, 1951). It was also found in the Palaeogene sediments in Burgas district (Бецов, Дикова, 1969). The morphological characteristic of our specimens from the Paleogene in Burgas District is entirely the same that of the specimens from the Badenian Stage. The species is assigned to genus *Siphonodosaria* Silvestri and not to genus *Stilostomella* Guppy as the aperture is round and has no tooth.

Distribution. The species is known from the Upper Eocene in CIS, USA, from the Upper Eocene and the Oligocene in Czecho-Slovakia, from the Oligocene in Holland and Jugoslavia, from the Miocene in the Vienna Basin, and from the Neogene in Romania.

Occurrence. Mugris Formation: Kamenar — C-222 (110,00-110,60 m), C-820 (27,00-67,60 m); Č. More 2 — O-5 (55,00-135,00 m), C-27 (2,40-202,00 m), C-31 (151,80-212,00 m), C-35 (11,50-92;00 m), C-189 (32,00 m and 93,00-240,00 m), C-255 (32,00 m), C-237 (144,48-211,00 m), C-279 (4,00-233,60 m); Žitarovo — C-432a (100,00-235,00 m).

Unsubdivided sequences: C-28 (37,80-96,60 m); Žitarovo — C-927 (69,20 m).

Family **BAGGINIDAE** Cushmna, 1927

Genus ***Baggina*** Cushman, 1926

Type species: *Baggina californica* Cushman, 1926.

Baggina iphigenia (Samoilova, 1947)

Pl. V, fig. *9, 10*

1947. *Valvulineria iphigenia* Samoilova; Самойлова, p. 32, fig. 24-26.
1952. *Valvulineria iphigenia* Samoilova; Цанева, p. 499, pl. 2, fig. 5.
1953. *Baggina iphigenia* (Samoilova); Мятлюк, p. 97, pl. 12, fig. 8.
1955. *Valvulineria iphigenia* Samoilova; Маслакова, p. 66, pl. 9, fig. 10-12.
1963. *Baggina iphigenia* (Samoilova); Kiesel, Lotsch, p. 14, pl. 2, fig. 2.
1969. *Baggina iphigenia* (Samoilova); Краева, Зернецкий, p. 76, pl. 25, fig. 7 а-в.
1977. *Baggina iphigenia* (Samoilova); Pozaryska, p. 33, pl. 11, fig. 2, 4.

Nomenclature. The holotype is from the Upper Eocene layers in Crimea — "*Almaena taurica* Horizon". It is kept in MGPI Coll. No 730.

Remarks. The species was described from the Upper Eocene and Oligocene sediments in North-East Bulgaria (Цанева, 1952) and later its presence was confirmed in Varna District (Мандев, 1955) and in Burgas District as well (Бецов, Дикова, 1969). The specimens from the Burgas District studied by us correspond entirely to those described by Цанева (1952). The species is assigned to genus *Baggina* Cushman as there is an unperforated region of a semicircular shape on the apertural surface.

Distribution. It is known from the Upper Eocene in Poland and from the Upper Eocene and Oligocene in CIS.

Occurrence. Mugris Formation: Č. More 2 — C-189 (231,00 m); Kamenar — C-820 (61,10-63,00 m). Ravnec Formation: Č. More 2 — C-332 (294,00-311,50 m), C-286 (103,00 m).

Explanation to the plates

PLATE I

1. Spiroloculina grateloupi d'Orbigny. C-840 (424, 10 m), Ravnec Formation, Upper Eocene, SEM×72.
2. Spiroloculina ex gr. *communis communis* Cushman et Todd. C-820. (33,50-33,70 m), Mugris Formation, Upper Eocene, SEM×60.
3. Pyrgo bulloides (d'Orbigny). C-332 (290,20 m), Ravnec Formation, Upper Eocene, SEM×130.
4. Triloculina gibba d'Orbigny. C-286 (130, 60 m), Ravnec Formation, Upper Eocene, SEM×60.
5. Quinqueloculina nicopolica Jartzeva. C-286 (158,10 m), Ravnec Formation, Middle Eocene, SEM×54.
6. Sigmoilina ex gr. *tenuiss* (Čzjzek). C-820 (51,00-53,00 m), Mugris Formation, Upper Eocene, SEM×72.
7. Quinqueloculina ex gr. *seminula* (Linné). C-820 (117, 60m), Ravnec Formation, Upper Eocene, SEM×86.
8. Saracenaria arcuata (d'Orbigny). C-35 (111, 80m), Mugris Formation, Upper Eocene, SEM×72.
9. 10. Palmula budensis (Hantken). Mugris Formation, Upper Eocene; *9*—C-27 (2,40m), SEM×72; *10* – C-189 (33,00m), SEM×36.

PLATE II

1. Nodosaria ex gr. *spinulosa* (Montagu). ОП-3 (75,00 m), Mugris Formation, Upper Eocene, SEM×54.
2. Nodosaria pyrula (d'Orbigny). C-286 (102,50 m), Mugris Formation, Upper Eocene, SEM×78.
3. Nodosaria ex gr. *raphanistrum* (Linné). C-927 (69,20 m), Upper Eocene, SEM×44.
4, 5. Marginulina behmi (Reuss). Mugris Formation, Upper Eocene, *4* — C-35 (111,80 m), SEM×60; *5* — C-279 (145,00 m), SEM×48.
6. Lagena ex gr. *hexagona* (Williamson). C-927 (69,20 m), Upper Eocene, SEM×120.
7. Vaginulina ex gr. *mexicana* Nuttall. C-927 (69,20 m), Upper Eocene, SEM×44.
8. Marginulina sp. indet. C-189 (32,00 m), Mugris Formation, Upper Eocene, SEM×94.
9. Lagena ex gr. *striata* (d'Orbigny). C-279 (165,00 m), Mugris Formation Upper Eocene, SEM×160.
10. Marginulina fragaria Gümbel. C-902 (315,80m), Upper Eocene, SEM×54.

PLATE III

1. Guttulina irregularis (d'Orbigny). C-35 111,80m), Mugris Formation, Upper Eocene, SEM×48.
2. Guttulina problema d'Orbigny. C-432a (135,00 m), Mugris Formation, Upper Eocene, SEM ×40.
3. Glandulina laevigata (d'Orbigny). C-35 (111,80m), Mugris Formation, Upper Eocene, SEM×66.
4. Globulina gibba d'Orbigny. C-332 (304,00m), Ravnec Formation, Upper Eocene, SEM×54.
5, 6. Ceratobulimina evoluta Cushman. Upper Eocene; *5* — umbilical side, C-927 (337,00 m), SEM×66; *6* — spiral side, C-286 (102,50 m) Mugris Formation, SEM×78.
7, 10. Hoeglundina paleogenica Mjatliuk. Mugris Formation, Upper Eocene; *7* — spiral side, C-237 (222,00 m), SEM×78; *10* — umbilical side, C-820 (63,00 m), SEM×66.
8, 11. Globocassidulina globosa (Hantken). Mugris Formation, Upper Eocene; *8* — C-279 (223,00 m), SEM×150; *11* — C-432 a (50,00 m), SEM×120.
9, 12. Cassidulina laevigata d'Orbigny. Mugris Formation, Upper Eocene, C-189 (132,00 m), SEM×66.

PLATE I

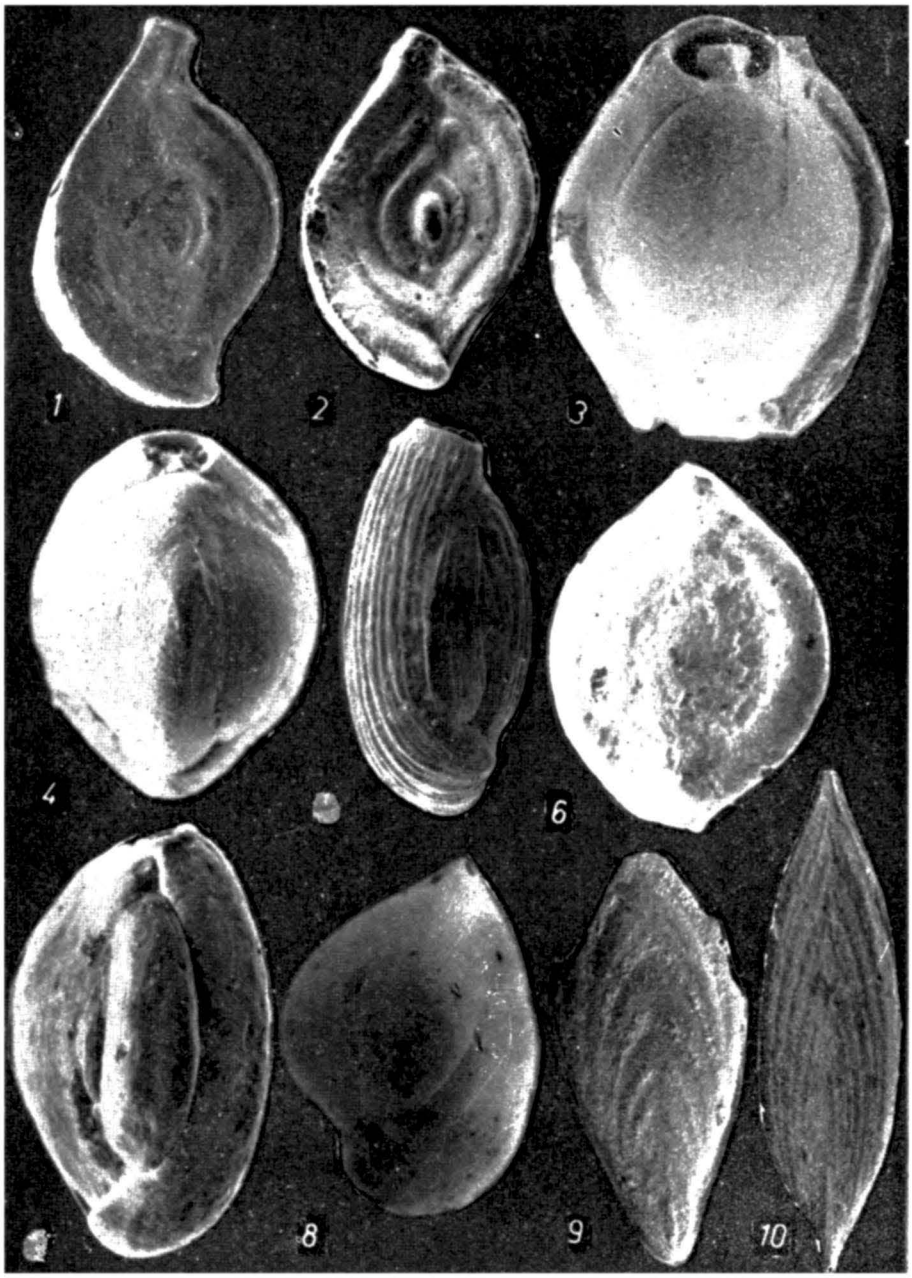

PLATE II

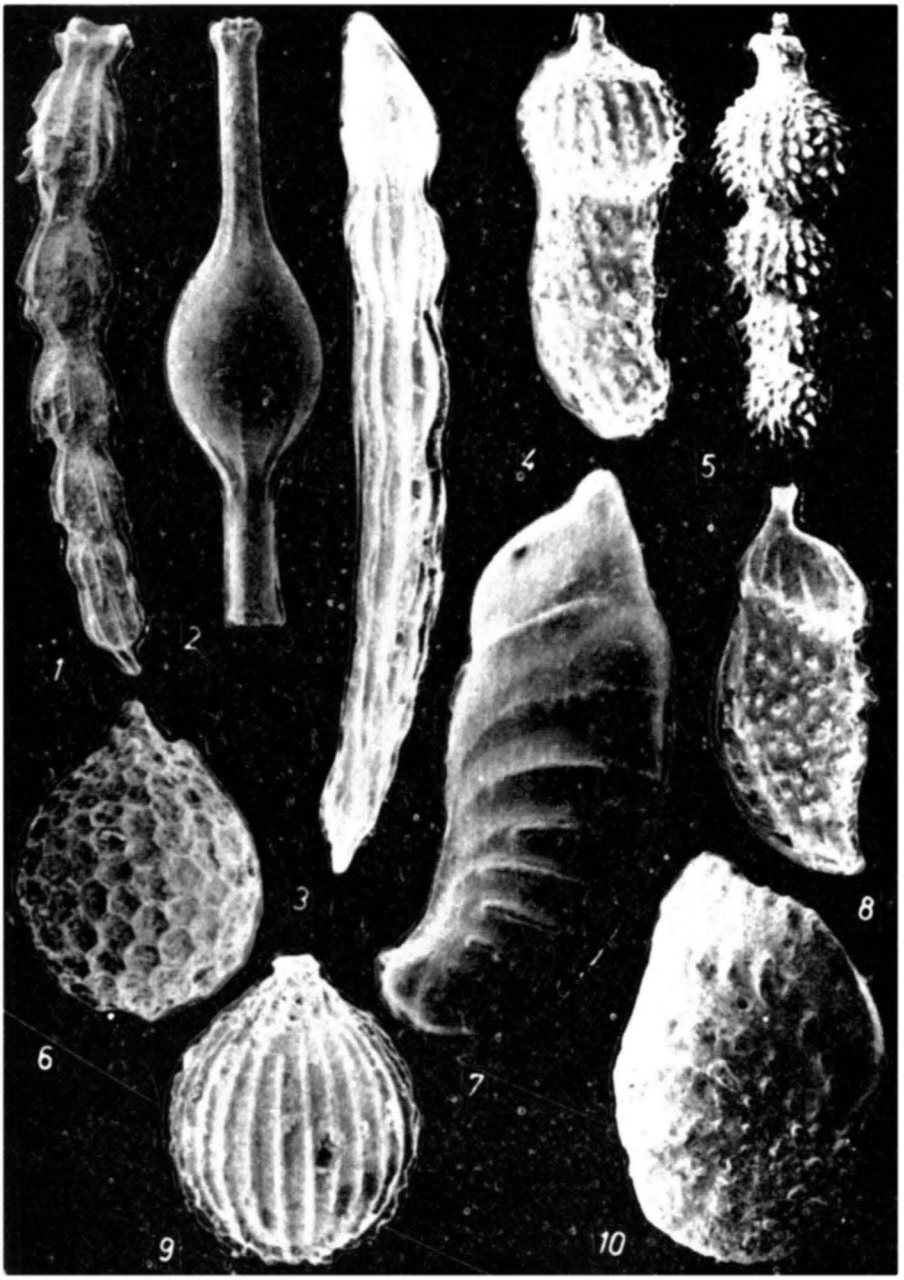

PLATE III

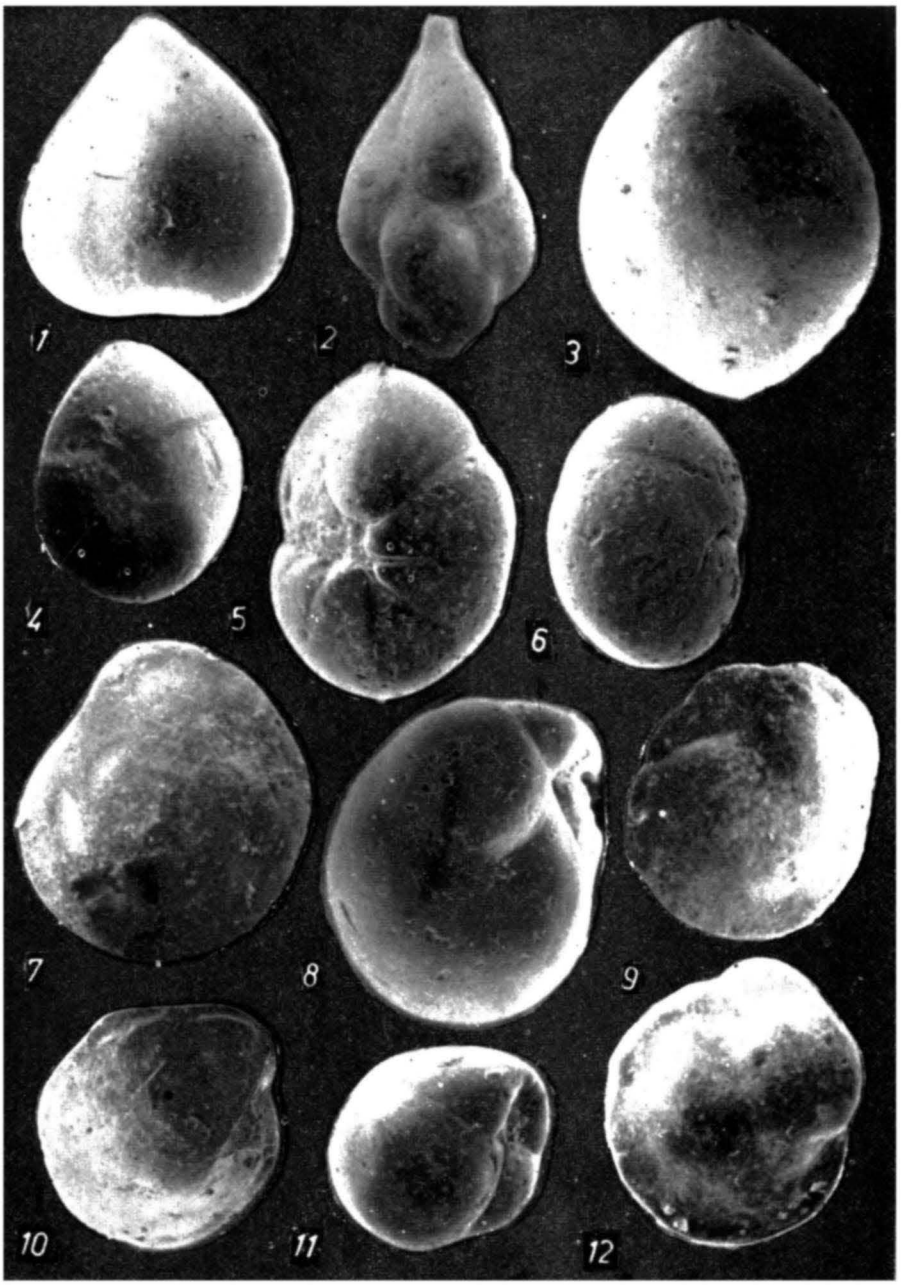

PLATE IV

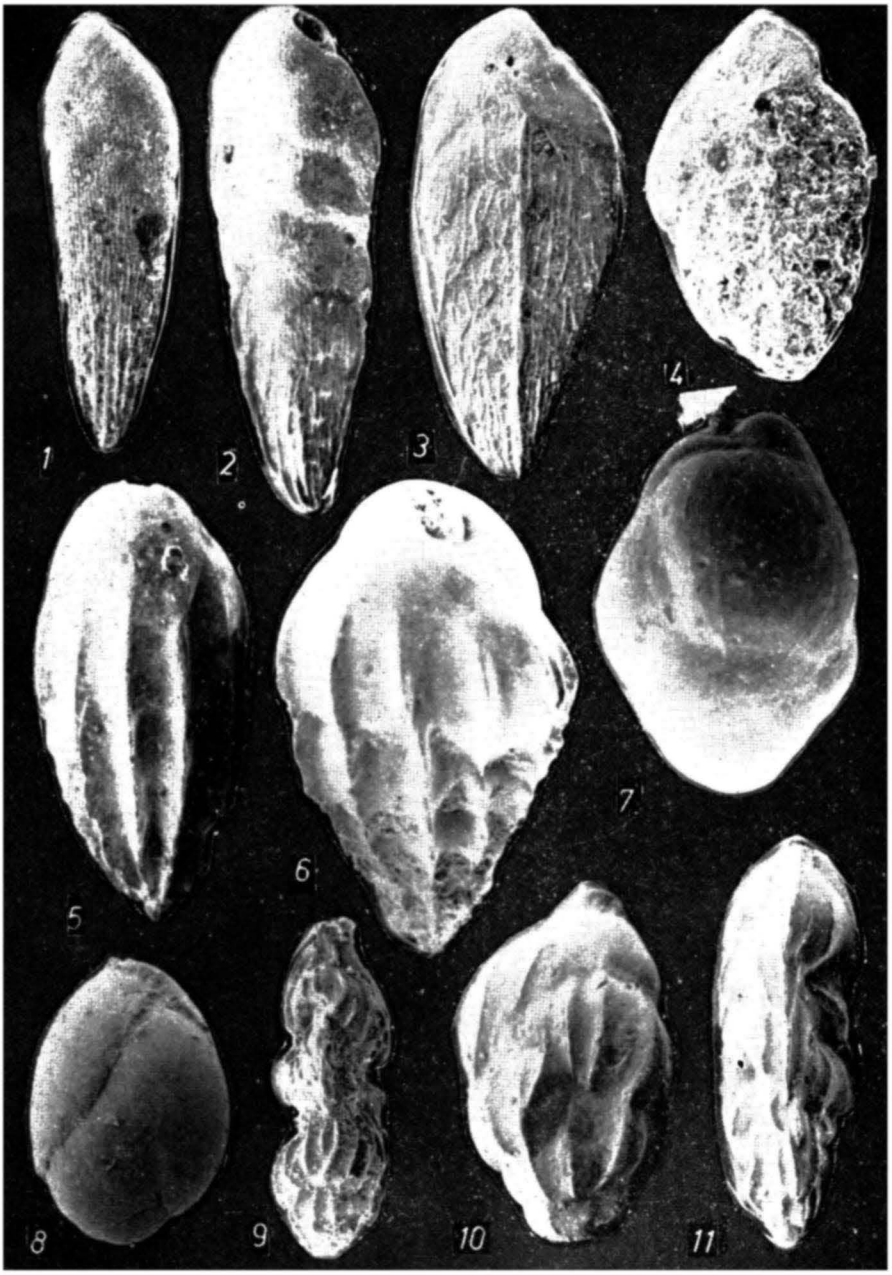

PLATE V

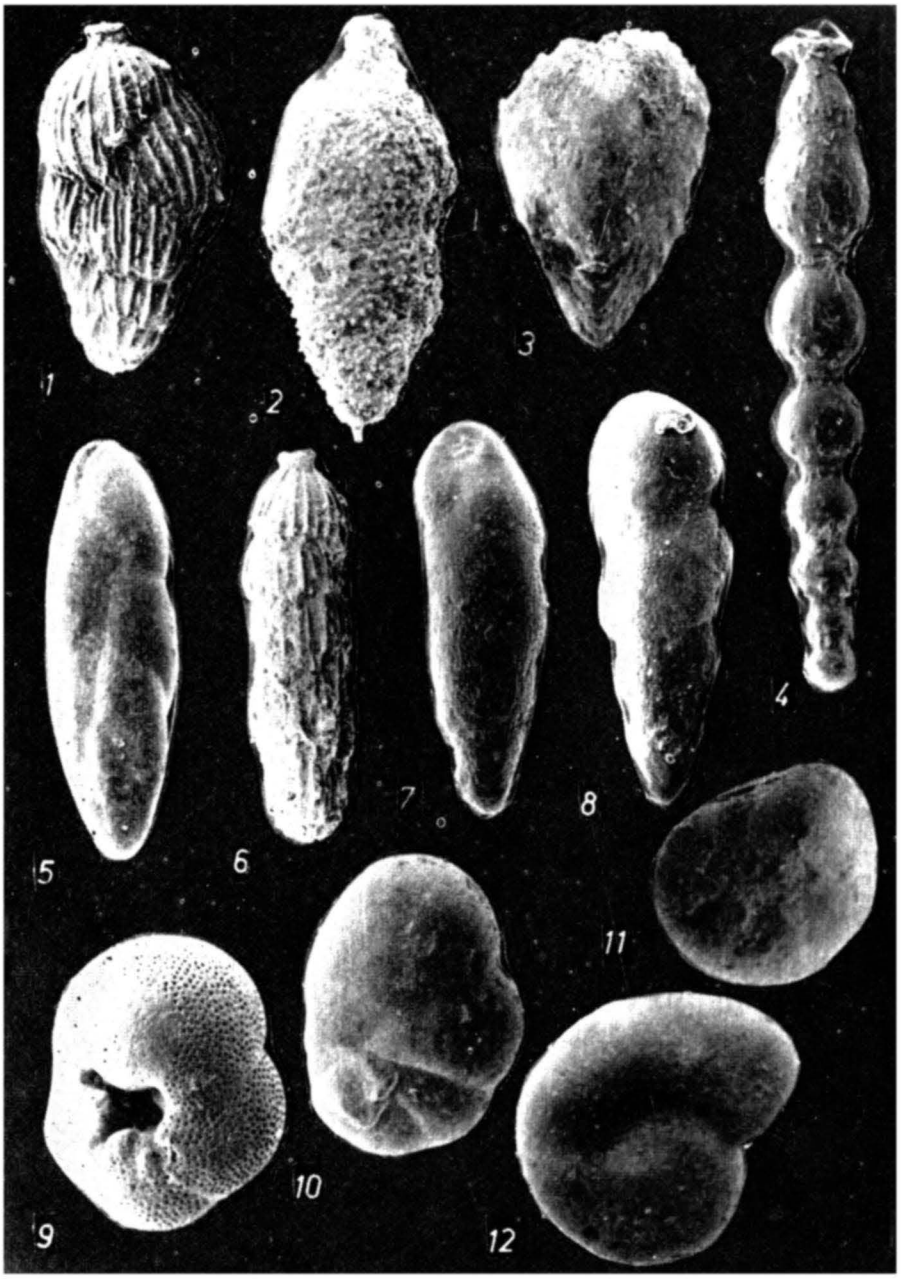

PLATE VI

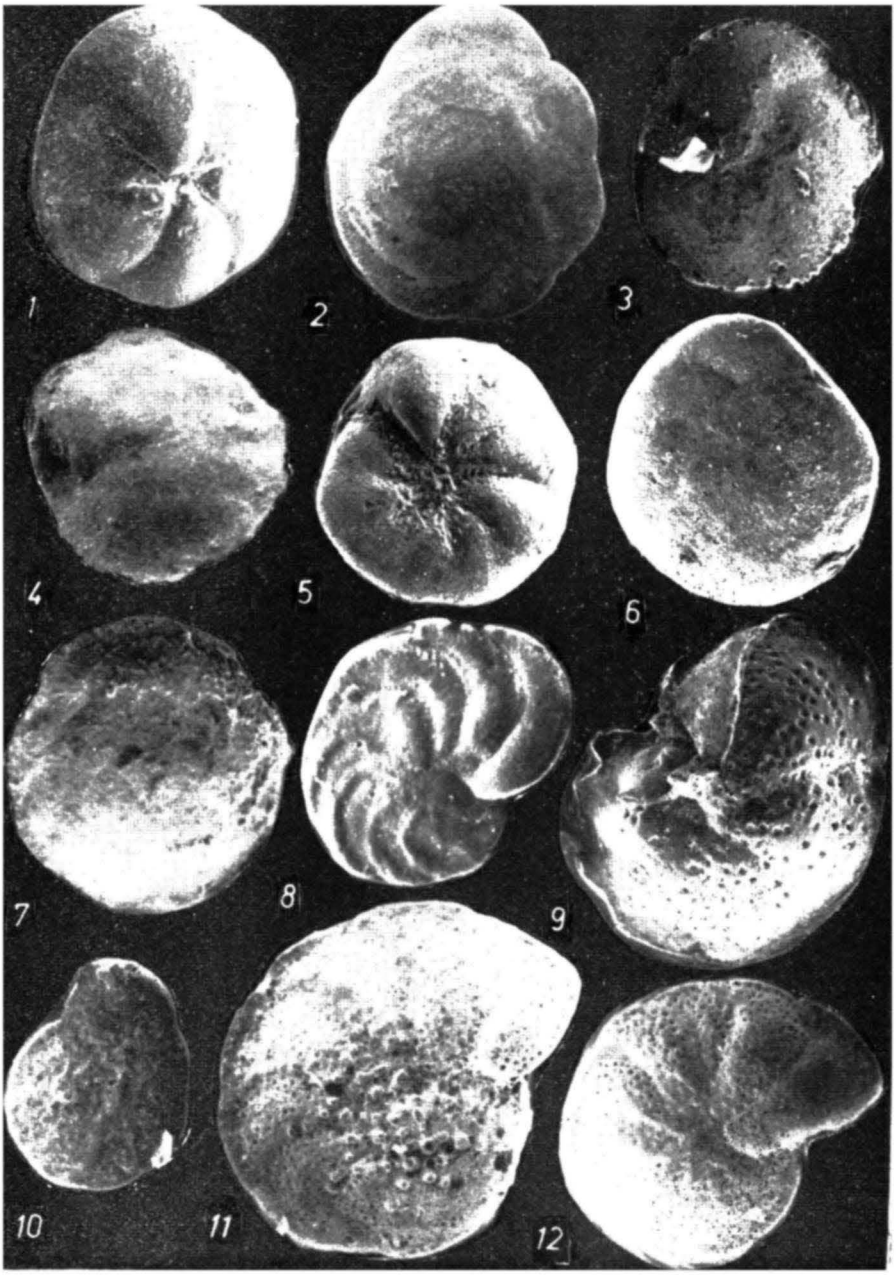

PLATE IV

1, 2. Bolivina nobilis Hantken. Mugris Formation, Upper Eocene; *1*—C-35 (111,80m), SEM×86; *2*—C-286 (102,50m), SEM×54.
3. Bolivina antegressa Subbotina. C-279 (185,00m), Mugris Formatibn, Upper Eocene, SEM×86.
4. Bolivina reticulata Hantken. C-189 (85,00 m), Mugris Formation, SEM×120.
5, 6. Bulimina ex gr. *sculptilis* Cushman. Upper Eocene; *5* — C-820 (27,00-29,00 m), Mugris Formation, SEM×60; *6* — C-927 (69,20 m), SEM×66.
7. Uvigerina pygmea d'Orbigny. C-279 (233,00 m), Mugris Formation, Upper Eocene, SEM×72.
8. Bulimina pyrula d'Orbigny. C-432a (96,00 m), Mugris Formation, Upper Eocene, SEM×48.
9, 11. Angulogerina ex. gr. *angulosa* (Williamson). Upper Eocene; *9* — C-189 (32,00 m), Mugris Formation, SEM×120; *11* — C-927 (69,20 m), SEM×110.
10. Uvigerina jacksonensis Cushman. C-27 (3,40 m), Mugris Formation, Upper Eocene, SEM×66.

PLATE V

1. Uvigerina costellata Morozova. C-820 (64,00-81,50 m), Mugris Formation, Upper Eocene, SEM×78.
2. Uvigerina ex gr. *hispida* Schwager. C-189 (32,00 m), Mugris Formation, Upper Eocene, SEM × 180.
3. Reussella sculptilis (Cushman). C-332 (298,50 m), Ravnec Formation, Upper Eocene, SEM × 60.
4. Siphonodosaria adolphina (d'Orbigny). C-927 (69,20 m), Upper Eocene, SEM ×150.
5. Fursenkoina acuta (d'Orbigny). C-286 (113,00 m), Ravnec Formation, Upper Eocene, SEM × 78.
6. Rectuvigerina cf. *lacera* Subbotina. C-189 (32,00 m), Mugris Formation, Upper Eocene, SEM × 86.
7, 8. Pleurostomella ex. gr. *bellardii* Hantken. Ravnec Formation, Upper Eocene; *7* — C-840 (443,00 m), SEM×100; *8* — C-840 (432,60 m), SEM×150.
9, 10. Baggina iphigenia (Samoilova). Ravnec Formation, Upper Eocene; *9* — umbilical side, C-332 (311,50 m), SEM×78; *10* — spiral side, C-286 (103,00 m), SEM×66.
11, 12. Valvulineria jacksonensis Cushman. Mugris Formation, Upper Eocene; *11* — umbilical, C-189 (33,00 m), SEM×54; *12* — spiral side C-27 (3,40 m), SEM×60.

PLATE VI

1, 2. Neoeponides schreibersi (d'Orbigny), Upper Eocene; *1* — umbilical side, C-27 (211,00 m), Ravnec Formation, SEM×48, *2* — spiral side, C-902 (315,80 m), SEM×54.
3. Siphonina ex gr. *praereticulata* Krajeva. C-189 (32,00 m), Mugris Formation, Upper Eocene, SEM×160.
4, 7. Pseudoparella ex gr. *culter* (Parker et Jones). C-31 (2,40 m), Mugris Formation, Upper Eocene; *4* — umbilical side, SEM×44; *7* — spiral side, SEM×54.
5, 6. Eponides minima Cushman. C-840 (443,00 m), Ravnec Formation, Upper Eocene; *5* — umbilical side, SEM×100; *6* — spiral side, SEM×120.
8. Planulina costata Hantken. C-35 (111,80 m), Mugris Formation, Upper Eocene, SEM×60.
9, 10. Cibicides lobatulus (Walker et Jacob). C-840 (370,00 m), Ravnec Formation, Upper Eocene; *9* — umbilical side, SEM×86; *10* — spiral side, SEM×78.
11, 12. Cibicides ungerianus (d'Orbigny). Mugris Formation, Upper Eocene; *11* — spiral side, C-286 (102,50 m), SEM×78; *12* — umbilical side, C-279 (223,00 m), SEM×72.

Genus ***Valvulineria*** Cushman, 1926

Type species: *Valvulineria californica* Cushman, 1926.

Valvulineria jacksonensis Cushman, 1933

Pl. V, fig. *11, 12*

1933. *Valvulineria jacksonensis* Cushman, n. sp.; Cushman, p. 16, pl. 2, fig. 9.
1935. *Valvulineria jacksonensis* Cushman; Cushman, p. 44, pl. 18, fig. 2.
1953. *Valvulineria intenta* Bykova; Мятлюк, p. 87, pl. 10, fig. 4, 5.
1959. *Valvulineria jacksonensis* Cushman; Станчева, p. 333, pl. 2, fig. 6 а-в.

Nomenclature. The holotype is originally designated and is from the Eocene in USA — Ocala limestone, NE of Brooklyn, Ala. It is kept in U.S.N.M. Coll. No 371559.

Remarks. In Bulgaria the species was described from the Eocene in Pleven District (Станчев, 1959). The specimens from the Eocene in Burgas District have the same characteristic.

Distribution. It is known from the Eocene in the CIS and the USA.

Occurrence. Mugris Formation: Kamenar — C-222 (31,00 m); Č. More 2 — O-3 (104,80 m), O-5 (50,00 m), C-27 (2,40-3,40 m), C-35 (92,00 m), C-189 (33,00 m and 231,00 m), C-286 (42,00 m); Žitarovo — C-432a (110,00-115,00 m).

Family **EPONIDIDAE** Hofker, 1951

Genus ***Eponides*** Montfort, 1808

Type species: *Nautilus repandus* Fichtel, Moll, 1798, p. 35.

Eponides minima Cushman, 1933

Pl. VI, fig. *5, 6*

1933. *Eponides minima* Cushman, n. sp.; Cushman, p. 17, pl. 2, fig. 8.
1935. *Eponides minima* Cushman; Cushman, p. 47, pl. 19, fig. 3 a-c.

Nomenclature. The holotype is originally designated and is kept in U.S.N.M. Coll. No 371564. It was described for the first time from the Eocene in the USA — Cooper marl, Highway No. 17, Berkeley Co., S. C.

Description. The test is calcareous, multilocular, conical-spiral, slightly biconvex. On the umbilical side 8-9 chambers are discerned which form the last whorl. The chambers are with triangular outlines and differ in size a little. The sutures are deeply indented into the umbilical region and poorly apparent at the periphery. They are wide, radial and slightly arch-shaped. On the spiral side only the chambers of the last whorl are better discernable. Their outlines are almost rhomboidal. The final sutures are slightly depressed and the remaining are smooth. They are short and gently arched. The aperture is slit-like situated at the base of the last formed chamber on the umbilical side, from the umbilical region to the periphery. The peripheral end is round and tapering. The wall is thin, finely porous and smooth. The test is small in size.

Remarks. In Bulgaria the species is found for the first time.

Distribution. We do not possess enough data. The species is known only from the Eocene in the USA (South Carolina).

Occurrence. Ravnec Formation: Kamenar — C-222 (205,00-206,00 m), C-820 (67,80-119,70 m), C-840 (398,80-449,30 m); C. More 2 — C-35 (197,40-230,15 m),

C-286 (142,00-195,00 m), C-332 (303,80-321,80 m); Žitarovo — C-432a (255,00-259,00 m).

Unsubdivided sequences: C-28 (123,70 m); Žitarovo — C-902 (360,20-361,70 m), C-927 (384,00-408,25 m).

Family **DISCORBIDAE** Ehrenberg, 1938

Genus ***Neoeponides*** Reuss, 1960

Type species: *Rotalina schreibersii* d'Orbigny, 1846, p. 154.

Neoeponides schreibersi (d'Orbigny, 1846)

Pl. VI, fig. *1, 2*

1846. *Rotalina schreibersi* d'Orbigny; d'Orbigny, p. 154, pl. 8, fig. 4-6.
1951. *Eponides schreibersi* (d'Orbigny); Спасов, p. 117.
1961. *Eponides schreibersi* (d'Orbigny); Kaasschieter, p. 210, pl. 11, fig. 14,15.
1963. *Eponides schreibersi* (d'Orbigny); Kiesel, Lotsch, p. 12, taf. 4, fig. 2.
1967. *Eponides schreibersi* (d'Orbigny); Romeo, p. 60.
1970. *Neoeponides schreibersi* (d'Orbigny); Le Calvez, p. 177, pl. 42, fig. 3.
1977. *Neoeponides schreibersi* (d'Orbigny); Pozaryska, p. 37, pl. 5, fig. 2 a-c.
1984. *Neoeponides schreibersi* (d'Orbigny); Odrzywolska-Bienkova, Pozaryska, p. 139, pl. 9, fig. 7, 8, 11.
1985. *Neoeponides schreibersi* (d'Orbigny); Papp, Schmid, p. 59, pl. 49, fig. 7-12.
1987. *Neoeponides schreibersi* (d' Orbigny); Reiser, p. 308, tpl. 16, fig. 1-3.

Nomenclature. Holotype is not designated. For the first time the species was described from the Miocene of the Vienna Basin (d'Orbigny, 1846). The lectotype was designated by Papp, and Schmid (1985, pl. 49, fig. 10). It is kept in GBA Coll. No 1981/03/ 226.

Description. The test is calcareous, multilocular, conical-spiral, biconvex. The umbilical side is less inflated and the chambers (six) of the final whorl are discernable on it. Their outlines are triangular. The last-formed chamber is larger. The sutures are depressed, straight to slightly curved and radial. They are better visible at the umbilical zone and worse toward the periphery. The spiral side is strogly projecting. The two final whorls are distinct and the initial ones are poorly discernable. The chambers have semicircular outlines. The spiral line is distinct and slightly projecting. The sutures are wide, protruding, oblique to the spiral line. The aperture is in the form of a narrow slit situated between the periphery and the umbilicus at the base of the last formed chamber on the umbilical side. The test surface is smooth, finely perforated. The periphery is sinuate and tapering but without a sharp edge.

Remarks. In Bulgaria the species is described for the first time but it is known from the Miocene in the country (Спасов, 1951).

Distribution. It is known from the Upper Eocene sediments in Italy, France, Germany, Belgium, Austria, Poland, USA.

Occurrence. Mugris Formation: Kamenar — C-222 (49,00-120,60 m), C-820 (22,00-67,60 m); Č. More 2 — O-3 (95,00-155,00 m), O-5 (30,00-110,00 m), C-27 (172,00-211,00 m), C-31 (222,00 m), C-35 (8,50-122,00 m), C-189 (33,00-256,00 m), C-237 (144,48-273,00 m), C-279 (205,00-233,60 m), C-286 (102,50 m); Žitarovo — C-432a (160,00-245,00 m). Ravnec Formation: Č. More 2 — C-27 (212,00 m), C-189 (264,80 m), C-286 (103,00-116,50 m), C-332 (286,00-297,20 m).

Unsubdivided sequences: C-28 (47,00-112,30 m); Žitarovo — C-902 (315,80 m).

Family **SIPHONINIDAE** Cushman, 1927

Genus ***Siphonina*** Reuss, 1850

Type species: *Siphonina fimbriata=Rotalina reticulata* Czjzek, 1848, p. 145.

Siphonina ex gr. ***praereticulata*** Kraejeva, 1956

Pl VI, fig. *3*.

1963. *Siphonina praereticulata* (Krajeva); Kiesel' Lotsch, p. 13, pl. 1, fig. 4.
1969. *Siphonina praereticulata* Krajeva; Краева, Зернецкий, p. 80, pl. 29, fig. 4 а-в.

Nomenclature. We have no data about the holotype. The species was described for the first time from the Oligocene in the trough adjoining to the Black Sea (CIS). It is identified here by the illustration of a specimen from the Upper Eocene in the region adjacent to the North Black Sea (Краева, Зернецкий, 1969).

Description. The test is calcareous, multilocular, conical-spiral, biconvex. The spiral side is less projecting. Two whorls of the test are well discernable The final whorl consists of 4-5 chambers in the shape of a half-moon. The sutures are depressed, strongly curved, with slight hatches transversely situated and creating the impression of overlapping of the chambers. On the umbilical side only the chambers of the final whorl (4 or 5) are observable. Their outlines are irregularly triangular. The sutures are depressed and meandering. They are hard to discern in the umbilical region. The aperture is situated on the peripheral margin at the end of the last formed chamber (on a short neck). Its shape is elliptic. The periphery is tapering, with a hatched and sinuate keel. The wall is smooth and finely perforated.

Remarks. In Bulgaria the species is described for the first time. The specimens from the Eocene of Burgas District do not have a well preserved and distinct keel on the periphery.

Distribution. It is known only from the Upper Eocene in CIS and Germany.

Occurrence. Mugris Formation: Č. More 2 — C-27 (3,40 m), C-5 (55,00 m), C-31 (212,00 m), C-189 (32,00 m), C-236 (41,00 m); Žitarovo — C-432a (165,00 m).

Family **PSEUDOPARRELLIDAE** Voloshinova, 1952

Genus ***Pseudoparella*** Cushman, Ten Dam, 1948

Type species: *Pulvinulinella subperuviana* Cushman, 1926, p. 53.

Pseudoparella ex gr. ***culter*** (Parker, Jones, 1865)

Pl. VI, fig. *7, 10*

1929. *Pulvinulinella culter* (Parker et Jones); Cushman, p. 100, pl. 14, fig. 13 a-c.
1947. *Pulvinulinella culter* (Parker et Jones); Субботина, p. 104, pl. 4, fig. 1-3.
1952. *Pseudoparella? culter* (Parker et Jones); Волошинова, p. 82, pl. 1, fig. 1 а-в.
1969. *Pseudoparella culter* (Parker et Jones); Краева, Зернецкий, p. 81, pl. 29, fig. 6 а-в.

Nomenclature. Data about the holotype are not available. The species was described for the first time from the recent sediments in the northern parts of the At-

lantic. Here, the species is identified by the specimen from the Palaeocene in North Caucasus (Субботина, 1947).

Description. The test is calcareous, multilocular, conical-spiral and biconvex. The spiral side includes about 3 complete whorls, the final one consisting of 10-11 trapezium-shaped or rhomboid chambers. The spiral seam is well discernable. The sutures are short, straight, gently curved and oblique to the spiral seam. On the umbilical side only the chambers from the final whorl are visible, which are with triangular outlines. The sutures are depressed, curved and radial. At the centre of the umbilical side there is often a small translucent papilla. The aperture is a small slit parallel to the peripheral end. The periphery is tapering and with a keel of varying width. The test is round. The wall is smooth and without additional ornamentation.

Distribution. The species is known from the Palaeogene in CIS, from the Lower Eocene in Holland, USA, from the recent sediments in the Atlantic and the Pacific (from 600 to 2600 m depth).

Occurrence. Mugris Formation: Č. More 2 — C-31 (240,00 m).

Family **PLANULINIDAE** Bermudez, 1952

Genus ***Planulina*** d'Orbigny, 1826

Type species: *Planulina ariminensis* d'Orbigny, 1826; Galloway, Wissler (1927, p. 66).

Planulina costata (Hantken, 1875)

Pl. VI, fig. *8*

1875. *Truncatulina costata* n. sp.; Hantken, p. 73, pl. 9, fig. 2.
1947. *Planulina costata* (Hantken); Субботина, p. 135, pl. 8, fig. 20-22.
1954. *Cibicides (Planulina) costata* (Hantken); Василенко, p. 199, pl. 36, fig. 2 а-в.
1961. *Planulina costata* (Hantken); Дикова, p. 324, pl. 6, fig. 1 а-в.
1969. *Cibicides costata* (Hantken); Краева; Зернецкий, p. 91, pl. 37, fig. 6, 7 а-в.
1971. *Planulina costata* (Hantken); Popescu, Iva, p. 45, pl. 8/3.
1979. *Planulina costata* (Hantken); Sztrakos, p. 35, fig. 5.
1982. *Planulina costata* (Hantken); Sztrakov, pl. 20, fig. 3.
1987. *Planulina costata* (Hantken); Reiser, p. 117, pl. 19, fig. 5, 6, 9;

Nomenclature. A holotype is not originally indicated but accepted for such is the only illustrated specimen (Hantken, 1875, pl. 9, fig. 2). For the first time the species was described from the *Clavulina szaboj* Beds near Ofen (Hungary).

Remarks. The species is known from the Palaeogene and the Neogene in North-East Bulgaria (Мандев, 1955; Дикова, 1961) where it was described from. The specimens from Burgas district studied by us have a strongly depressed central portion of the spiral side and in this they differ from the ones already described.

Distribution. It is known from the Upper Eocene and the Oligocene in CIS, Hungary and from the Oligocene in Romania.

Occurrence. Mugris Formation: Kamenar — C-222 (21,00-120,60 m), C-820 (22,00-29,00 m); Č. More 2 — O-3 (20,00-27,00 m), O-5 (8,50-122,00 m), C-189 (32,00-33,00 m and 152,00-256,00 m), C-237 (175,00-226,00 m), C-279 (105,00-215,00 m); Žitarovo — C-432a (35,00-245,00 m). Ravnec Formation: Č. More 2 — C-27 (238,00 m).

Unsubdivided sequences: C-28 (27,60-57,00 m).

Family **CIBICIDIDAE** Cushman, 1927

Genus ***Cibicides*** Montfort, 1808

Type species: *Cibicides refulgens* Montfort, 1808.

Cibicides lobatulus (Walker & Jacob, 1798)

Pl. VI, fig. *9, 10*

1846. *Truncatulina lobatula* d'Orbigny; d'Orbigny, p. 168, pl. 9, fig. 18-23.
1935. *Cibicides lobatulus* (Walker et Jacob); Cushman, p. 52, pl. 22, fig. 4-6.
1952. *Truncatulina lobatula* d'Orbigny; Цанева, p. 508, pl. 3, fig. 12.
1954. *Cibicides (Cibicides) lobatulus* (Walker et Jacob) emend. d'Orbigny; Василенко, p. 138, pl. 22, fig. 1-5.
1955. *Cibicides lobatulus* (Walker et Jacob); Серова, pl. 29, fig. 1-3.
1958. *Cibicides lobatulus* (Walker et Jacob); Nyiro, p. 36, fig. 12 a-b.
1959. *Cibicides lobatulus* (Walker et Jacob) emend d'Orbigny; Станчева, p. 283, pl. 10, fig. 1-2:
1961. *Cibicides lobatulus* (Walker et Jacob); Дикова, p. 321, pl. 4, fig. 3 а-в.
1961. *Cibicides lobatulus* (Walker et Jacob); Kaasschieter, p. 221, pl. 14, fig. 5.
1962. *Cibicides lobatulus* (Walker et Jacob); Венглінський, pl. 13, fig. 3 а-в.
1962. *Cibicides lobatulus* (Walker et Jacob); Kiesel, p. 74, taf. 11, fig. 3.
1967. *Cibicides lobatulus* (Walker et Jacob); Romeo, p. 63.
1969. *Cibicides lobatulus* (Walker et Jacob); Краева и Зернецкий, p. 94.
1970. *Cibicides lobatulus* (Walker et Jacob); Le Calvez, p. 181.
1975. *Cibicides lobatulus* (Walker et Jacob); Samuel, p. 148, pl. 86, fig. 5 a-b.
1977. *Cibicides lobatulus* (Walker et Jacob); Pozaryska, p. 39, pl. 6, fig. 1-4.
1984. *Cibicides lobatulus* (Walker et Jacob); Odrzywolska-Bienkova, Pozaryska, p. 140, pl. 12, fig. 8; pl. 13, fig. 2.
1985. *Cibicides lobatulus* (Walker et Jacob); Wenger, p. 325, pl. 22, fig. 1-3.
1985. *Cibicides lobatulus* (Walker et Jacob); Papp, Schmid, p. 66, pl. 56, fig. 1-5.

Nomenclature. Original data about the holotype which is a recent specimen from the coast line of England (Kent) are not available. The species is identified here by a refigured illustration of the holotype (Василенко, 1954, pl. 22, fig. 1). For a "hypotype" in the sense of neotype Vasilenko recommended (groundlessly and in contrast to the nomenclature requirements) a specimen from the collection of d'Orbigny (1846) from the Miocene in the Vienna Basin (Василенко, 1954, p. 139).

Remarks. In Bulgaria the species was described several times from the Badenian Stage in North-West Bulgaria (Станчева, 1959), from the Upper Eocene and the Chokrak Regional Stage in North-East Bulgaria (Цанева, 1952) and from the Paleogene sediments in North-East Bulgaria (Дикова, 1961). It is known from the Paleogene in Burgas District (Бецов, Дикова, 1969) and from the Priabonian Stage in Plovdiv Distirct (Драгоманов и др., 1980). The specimen from the collection from the Burgas District studied here does not show any deviations from the morphological characteristic described.

Distribution. The species is known from the Eocene to the Miocene in Germany, Belgium, France, Italy, Czecho-Slovakia, England, CIS snd America, from the Miocene of Poland, Austria, Nigeria and Italy.

Occurrence. Mugris Formation: Kamenar — C-222 (110,00-141,20 m), C-820 (27,00-63,00), C-840 (49,00-358,00 m); Č. More 2-O-3 (60,00-149,00 m), O-5 (90,00-135,00 m), C-27 (72,00 m), C-31 (2,40-13,00 m), C-35 (32,00-82,00 m), C-237 (186,50-197,00 m), C-279 (145,00-233,60 m), C-286 (102,50 m); Zitarovo — C-432a (140,00-202,00 m), Ravnec Formation: Kamenar — C-222 (150,00-151,00 m), C-820 (68,60-107,00 m), C-840 (370,00-380,40 m); Č. More 2-C-27 (236,00 m), C-35 (131,00-169,00 m), C-286 (103,00-141,00 m), C-332 (287,40-321,80 m).

Unsubdivided sequences: C-28 (27,60-107,20 m); Zitarovo — C-902 (315,00 m), C-927 (69,20-393,00 m).

Cibicides ungerianus (d'Orbigny, 1846)

Pl. VI, fig. *11, 12*

1846. *Rotalina ungeriana* d'Orbigny; d'Orbigny, p. 157, pl. 8, fig. 16-18.
1947. *Cibicides ungerianus* (d'Orbigny); Субботина, p. 137, pl. 7, fig. 18-22.
1952. *Truncatulina ungeriana* (d'Orbigny); Цанева, p. 509, pl. 4, fig. 14.
1954. *Cibicides ungerianus* (d'Orbigny); Василенко, p. 172, pl. 29, fig. 7 а-в; pl. 30, fig. 1 а-в.
1956. *Cibicides ungerianus* (d'Orbigny); Hagn, pl. 17, fig. 10, 11.
1958. *Cibicides ungerianus* (d'Orbigny); Nyiro, p. 35, fig. 10, a, b.
1959. *Cibicides ungerianus* (d'Orbigny); Станчева, p. 343, pl. 5, fig. 1 а-в.
1961. *Cibicides ungerianus* (d'Orbigny); Дикова, p. 323, pl. 5, fig. 4 а-в.
1962. *Cibicides ungerianus* (d'Orbigny); Kiesel, p. 75, pl. 9, fig. 7.
1967. *Cibicides ungerianus* (d'Orbigny); Romeo, p. 64, pl. 4, fig. 6, a, b.
1969. *Cibicides ungerianus* (d'Orbigny); Краева, Зернецкий, p. 98, pl. 39, fig. 4 а-в.
1985. *Cibicides ungerianus* (d'Orbigny); Papp, Schmid, p. 60, pl. 51, fig. 7-11.
1987. *Cibicides ungerianus ungerianus* (d'Orbigny); Reiser, p. 116, pl. 18, fig. 15-17.

Nomenclature. A holotype is not originally designated. For the first time the species was described from the Miocene in the Vienna Basin. The illustration of a syntype was refigured by Василинко (1954, pl. 30, fig. 1 а-в). A lectotype was designated in the revision by Papp, Schmid (1985, pl. 35, fig. 2). It is kept in the collection of GBA-N 181 /03/236.

Remarks. The species was several times described from the Upper Eocene in North-East Bulgaria (Цанева, 1952), from the Palaeogene sediments in North-East Bulgaria (Дикова, 1961) and from the Badeninan Stage in North-East Bulgaria (Станчева, 1959). It is known also from the Palaeogene in Burgas District (Бецов, Дикова, 1969) and from the Priabonian Stage in Plovdiv District (Драгоманов et al., 1980).

Distribution. The species is known from the Eocene and the Oligocene in CIS, from the Oligocene in West Europe and America, from the Miocene in the Vienna Basin and Italy.

Occurrence. Mugris Formation: Kamenar — C-222 (16,00-110,00 m), C-820 (22,00-24,80 m); Č. More 2 — O-3 (10,65-155,00 m), O-5 (16,10-70,00 m), C-27 (2,40-202,00 m), C-31 (122,00-222,00 m), C-35 (11,50-122,00 m), C-189 (32,00-33,00 m and 72,00-256,00 m), C-236 (21,00-42,00 m), C-237 (144,48-247,00 m), C-279 (4,00-233,60 m), C-286 (102,50 m); Žitarovo — C-432a (27,00-250,00 m). Ravnec Formation: Č. More 2 — C-27 (238,00 m), C-35 (131,00 m), C-189 (264,80 m), C-286 (103,00-127,50 m); Žitarovo — C-432a (257,00-259,00 m).

Unsubdivided sequences: C-28 (8,50-107,20 m); Žitarovo — C-902 (315,00-361,70 m), C-927 (69,20 m).

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