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Paleogene hyaline benthic foraminifera (LAGENINA and ROTALIINA) from the Republic of Macedonia

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Палеогенски хиалинни бентосни фораминифери (LAGENINA и ROTALIINA) от Република Македония

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Резюме. Настоящата статия представя 49 вида, принадлежащи на 28 рода, 15 подсемейства, 20 семейства, 12 надсемейства от подразредите LAGENINA Delage and Hérouard, 1896 и ROTALIINA Delage and Hérouard, 1896. 36 вида се описват за първи път в Република Македония. Останалите 13 вида са описани и фигурирани в по-ранна публикация, посветена на разрез Чардаклия от Овчеполския басейн, поради което тук е посочено само стратиграфското им разпространение в останалите изучени разрези. Изследваният материал е получен от 122 проби от горната флишка задруга и задругата на жълтите пясъчници от 11 разреза в 6 палеогенски басейна, развити във Вардарската зона и Сръбско-Македонския масив.

Ключови думи: Палеоген, хиалинни бентосни фораминифери, таксономия, Република Македония.

Abstract. The present article aims to represent 49 species belonging to 28 genera, 15 subfamilies, 20 families, 12 superfamilies of the suborders LAGENINA Delage and Hérouard, 1896 and ROTALIINA Delage and Hérouard, 1896. 36 of the species are first described in the Republic of Macedonia. The other 13 ones were described and figured before from Chardaklija section of the Ovche Pole basin, and therefore here is shown only their stratigraphical distribution in the other studied sections. The studied foraminiferal specimens have been obtained from 122 samples coming from the upper flysh unit and the unit of yellow sandstones of 11 sections from 6 Paleogene basins developed in the Vardar Zone and Serbo-Macedonian Massif.

Key words: Paleogene, hyaline benthic foraminifera, taxonomy, Republic of Macedonia.

Introduction

The Paleogene sediments in the Republic of Macedonia crop out in 7 sedimentary basins (Fig. 1): Skopje–Kumanovo, Ovche Pole, Tikvesh, Valandovo–Gevgelija, Deve Bair, Delchevo, and Strumica. They are located in two tectonic zones (Dumurdzhanov et al., 2005): Vardar Zone (the first 4 basins) and Serbo-Macedonian Massif (the last 3 ones). Five lithostratigraphical units (basal unit, lower flysh unit, unit of yellow sandstones, upper flysh unit and carbonate-sandy unit) have been recognized, as their lithology, thickness and spatial relationships were discussed in several works (Maksimovič et al., 1954; Stojanova, 2008; Stojanova et al., 2011; Stojanova, Petrov, 2012; Stojanova et al., 2012; Stojanova et al., 2013). The age of the studied sediments (Late Eocene–Early Oligocene) has been determined by means of macrofossils and microfossils (planctonic and benthic foraminifers). First data for Late Eocene (Priabonian) age, based on gastropods, bivalves, corals, and nummulitids from the Ovche Pole and Tikvesh basins, gave Maksimovič et al. (1954). Later on Mitrovič-Petrovič et al. (1990), confirmed the Priabonian age on the base of echinoids, and noted that the uppermost levels of the sediments of the Ovche Pole basin are of Early Oligocene age. Stojanova (Stojanova, 2008; Stojanova et al., 2011; Stojanova, Petrov, 2012; Stojanova et al., 2012) also confirmed the Upper Eocene-Oligocene range of the sediments, but pointed out that it is difficult to place the E/O boundary by means of benthic foraminifers, because of their broad stratigraphical

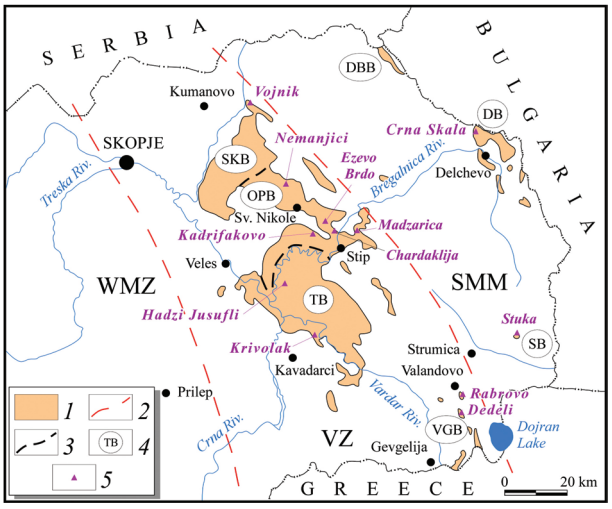

Fig. 1. Sketch with the location of the Paleogene basins in Republic of Macedonia and the studied sections (modified after Dumurdzanov et al., 2005)
1, distribution of Paleogene sediments; *2*, tectonic boundary (WMZ, Western Macedonian Zone; VZ, Vardar Zone; SMM, Serbian-Macedonian Massif); *3*, basin boundary; *4*, basins (SKB, Skopje-Kumanovo; OPB, Ovche Pole; TB, Tikvesh; VGB, Valandovo-Gevgelija; DBB, Deve Bair; DB, Delchevo; SB, Strumica); *5*, section

Фиг. 1. Скица с разпространението на палеогенските басейни в Република Македония и изучените разрези (по Dumurdzanov et al., 2005, с изменения)
1 – разпространение на палеогенските седиментни скали; *2* – тектонска граница (WMZ – Западномакедонска зона, VZ – Вардарска зона, SMM – Сръбско-Македонски масив); *3* – басейнова граница; *4* – басейни (SKB – Скопско-Кумановски, OPB – Овчеполски, TB – Тиквешки, VGB – Валандово-Гевгелийски, DBB – Девебаирски, DB – Делчевски, SB – Струмички–; *5* – разрез

distribution. Despite this fact, she indicated Bolivina antegressa Subzone from the Planulina costata Zone. Juranov (in Stojanova et al., 2013), using planktonic foraminifers, determined Early Oligocene age for the Nemanjici section of the Ovche Pole basin and it was proposed that the upper levels of the upper flysh unit are of the same age.

The first foraminiferal taxonomical investigations of the Paleogene sediments from the Republic of Macedonia was published at the end of the 20-th century when Džuranov et al. (1999) gave descriptions of 21 species including 2 agglutinated, 6 porcelaneous, and 13 hyaline ones from Chardaklija section of the Ovche Pole basin. Later on Stojanova et al. (2013) presented 5 taxa of planktonic foraminifers from 5 basins, and Valchev et al. (2013) introduced one porcelaneous and 7 agglutinated taxa from 4 basins.

The present study is focused on the taxonomy of the hyaline foraminifers from the Paleogene basins of this part of the Balkan Peninsula. 143 samples from 11 of totally 12 outcrop sections (Figs. 2–9) from 6 basins (the Paleogene sediments of the Deve Bair basin are poorly exposed) have been investigated. The foraminiferal specimens were obtained from 122 of them. 135 samples come from the upper flysh unit and only in the Vojnik section the samples have been picked from the unit of yellow sandstones.

Taxonomy

The following pages represent 49 species belonging to 28 genera, 15 subfamilies, 20 families, 12 superfamilies of the suborders LAGENINA Delage and Hérouard, 1896 and ROTALIINA Delage and Hérouard, 1896. 36 of the species are first described in the Republic of Macedonia. The other 13 ones were described and figured from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999) that is why here is shown only their stratigraphical distribution in the other studied sections. One species is first recorded from Priabonian sedimentary rocks.

Taxonomical determination at generic level is based on the classification of Loeblich and Tappan (1988).

Suborder LAGENINA Delage and Herouard, 1896
Superfamily NODOSARIACEA Ehrehberg, 1838
Family NODOSARIIDAE Ehrehberg, 1838
Subfamily NODOSARIINAE Ehrenberg, 1838
Genus ***Nodosaria*** Lamarck, 1812
Nodosaria ewaldi Reuss, 1851
Plate I, Fig. 1

1851. N. (*Nodosaria*) *ewaldi* m.; Reuss, S. 58, Taf. 3, Fig. 2.
1969. *Nodosaria ewaldi* Reuss; Krayeva, Zernetskij, p. 43, pl. 15, fig. 6 (in Russian).
1971. *Nodosaria ewaldi* Reuss; Kaptarenko-Chernousova, p. 62, pl. 1, figs. 16, 17 (in Ukrainian).
2001. *Nodosaria ewaldi* Reuss; Valchev, p. 112, pl. 1, fig. 5.

Nomenclature. The holotype is the specimen figured by Reuss (1851, Taf. 3, Fig. 2). The species was first described from the Oligocene (Septarien clays) near Berlin (Germany).
Material. 7 specimens, with different degree of preservation.
Description. The test is elongated, straight or slightly arcuate. The initial chamber is spherical and bears a short spine. The late chambers are cylindrical or tubular, separated by grooved horizontal sutures. The surface is smooth.
Distribution. The species is known from the Paleocene of Bulgaria and the Netherlands, the Upper Eocene of the USA and Ukraine, the Oligocene of Germany and the Netherlands.
Occurrence. Valandovo-Gevgelija basin (Rabrovo section – samples 6, 8; Dedeli section – samples 4, 6).

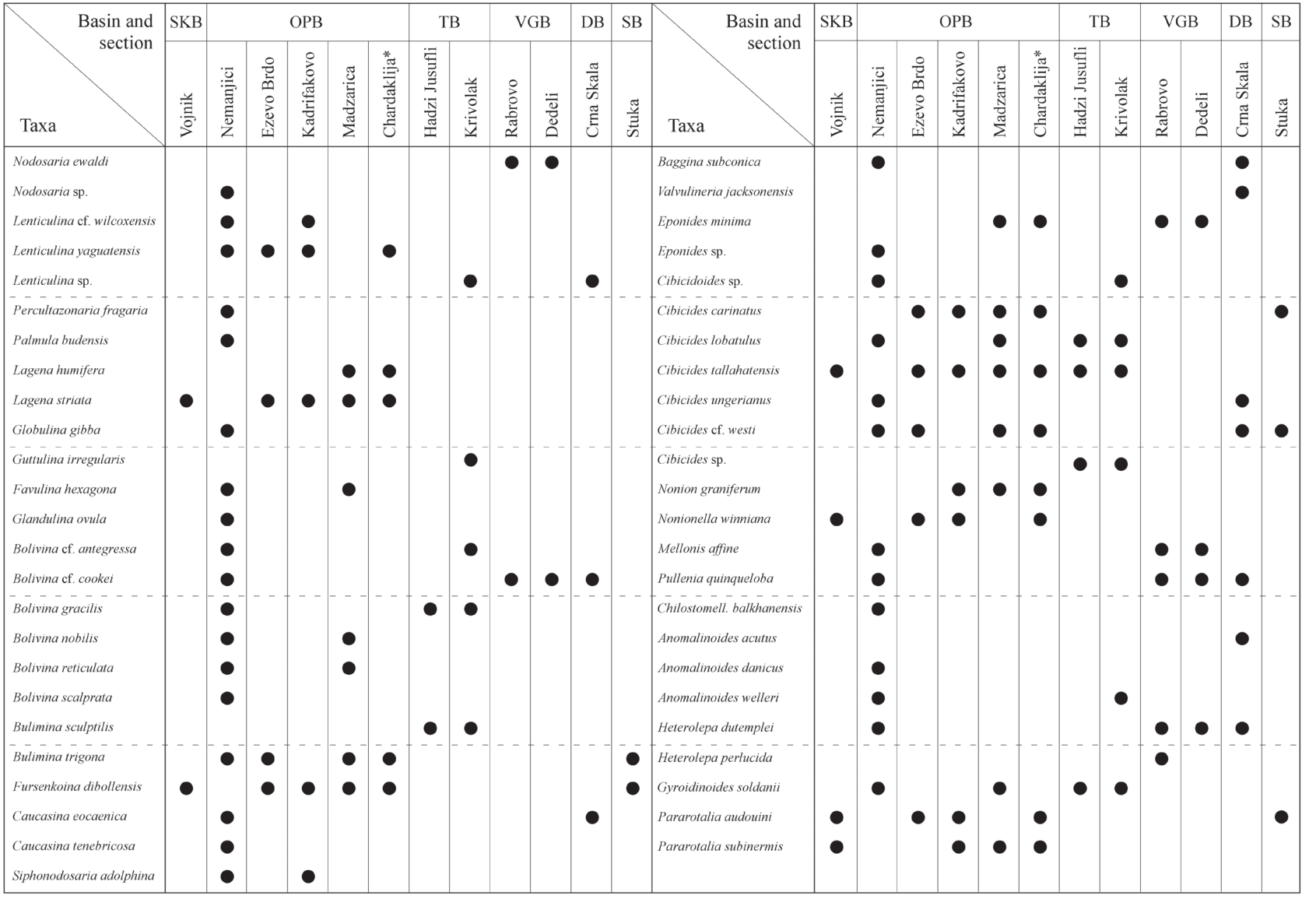

Fig. 2. Distribution of the established hyaline taxa in the studied sections (*the data for Chardaklija section were published by Džuranov et al., 1999)

Фиг. 2. Разпространение на установените хиалинни таксони в изучените разрези (*данните за разрез Чардаклия са публикувани от Džuranov et al., 1999)

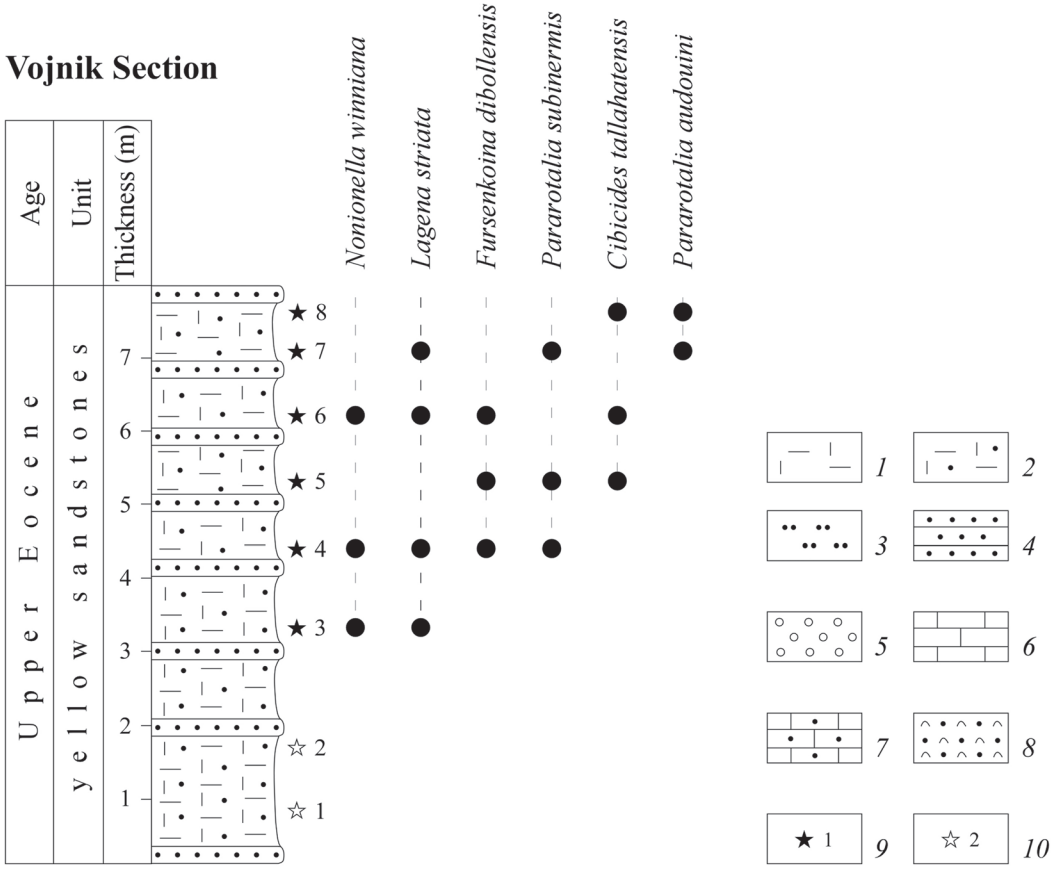

Fig. 3. Stratigraphical distribution of hyaline taxa in Vojnik section
1, clayey-carbonate sediments; *2*, clayey-carbonate-sandy sediments; *3*, siltstones; *4*, thin bedded sandstones; *5*, conglomerates; *6*, limestones; *7*, sandy limestones; *8*, tuffs; *9*, sample containing hyaline specimens; *10*, sample barren of hyaline specimens

Фиг. 3. Стратиграфско разпространение на хиалинните таксони в разрез Войник
1 – глинесто-карбонатни седименти; *2* – глинесто-карбонатно-песъчливи седименти; *3* – алевролити; *4* – тънкопластови пясъчници; *5* – конгломерати; *6* – варовици; *7* – песъчливи варовици; *8* – туфи; *9* – проба, съдържаща хиалинни екземпляри; *10* – проба без хиалинни екземпляри

***Nodosaria* sp.**
Plate I, Fig. 2

Material. 10 well preserved specimens.
Description. The test is elongate, straight or slightly arcuate. The chambers are subspgerical, separated by broad horizontal depressed sutures.
Remarks. Only test fragments have been found.
Occurrence. Ovche Pole basin (Nemanjici section, samples 2, 3, 6, 8, 16–18).

Family VAGINULINIDAE Reuss, 1860
Subfamily LENTICULININAE Chapman, Parr, and Collins, 1934
Genus ***Lenticulina*** Lamarck, 1804

Lenticulina* cf. *wilcoxensis (Cushman, Ponton, 1932)
Plate I, Fig. 3

1932. *Robulus wilcoxensis* Cushman, Ponton, n. sp.; Cushman, Ponton, p. 52, pl. 7, fig. 3.
1951. *Robulus wilcoxensis* Cushman, Ponton; Cushman, p. 15, pl. 4, fig. 17.
1962. "*Darbyella*" sp. H; Ebensberger, S. 62, Taf. 6, Fig. 8, 9.
1962. *Robulus wilcoxensis* Cushman, Ponton; Hillebrandt, S. 56, Taf. 3, Fig. 24.
1965. *Robulus wilcoxensis* Cushman, Ponton; Pozaryska, p. 65, pl. 7, fig. 2, pl. 8, fig. 3.
1971. *Lenticulina wilcoxensis* Cushman, Ponton; Kaptarenko–Chernousova, p. 99, pl. 5, fig. 2 (in Ukrainian).

Fig. 4. Stratigraphical distribution of hyaline taxa in Nemanjici section (legend on Fig. 3)

Фиг. 4. Стратиграфско разпространение на хиалинните тексони в разрез Неманци (легенда на фиг. 3)

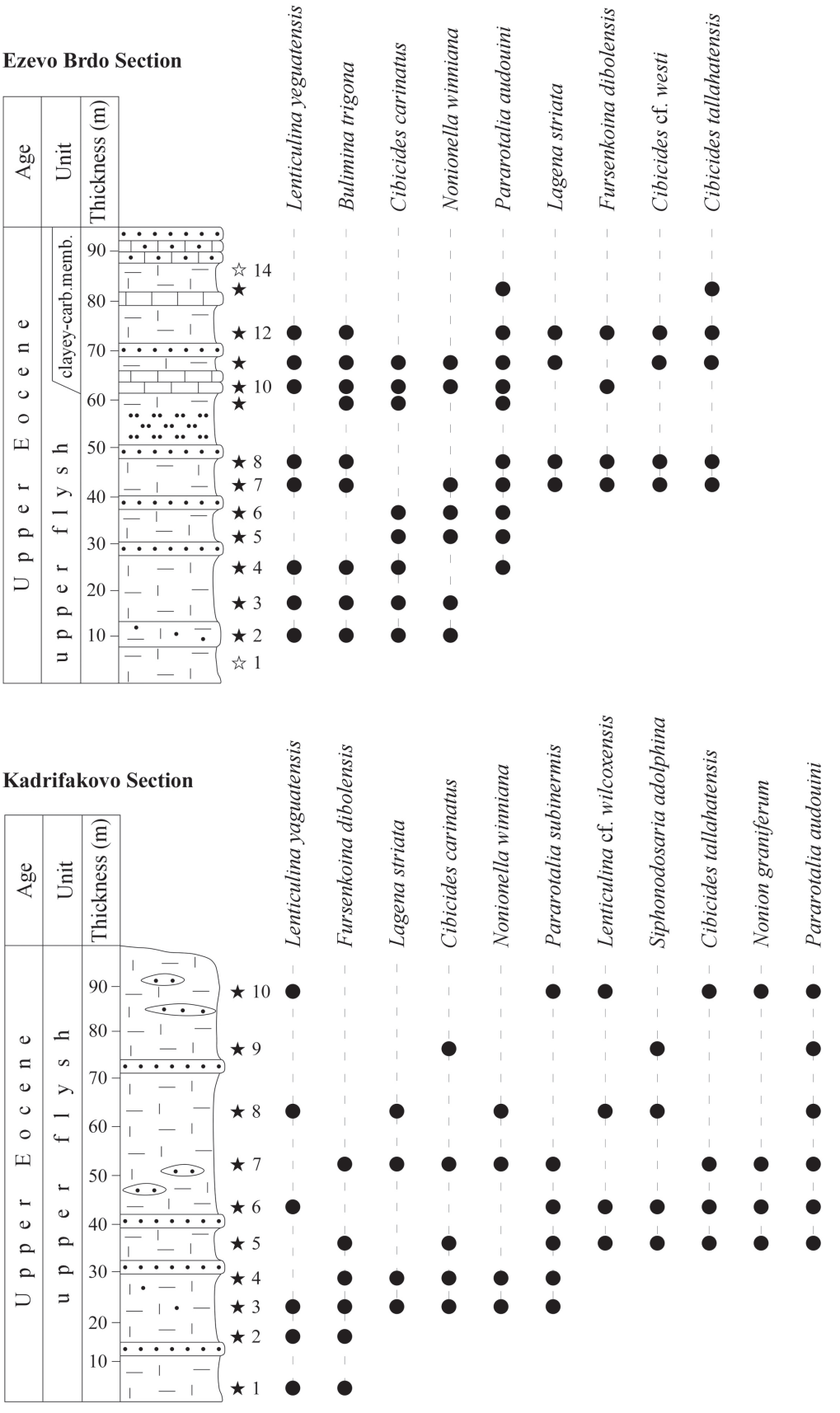

Fig. 5. Stratigraphical distribution of hyaline taxa in Ezevo Brdo and Kadrifakovo sections (legend on Fig. 3)

Фиг. 5. Стратиграфско разпространение на хиалинните тексони в разрези Ежево бърдо и Кадрифаково (легенда на фиг. 3)

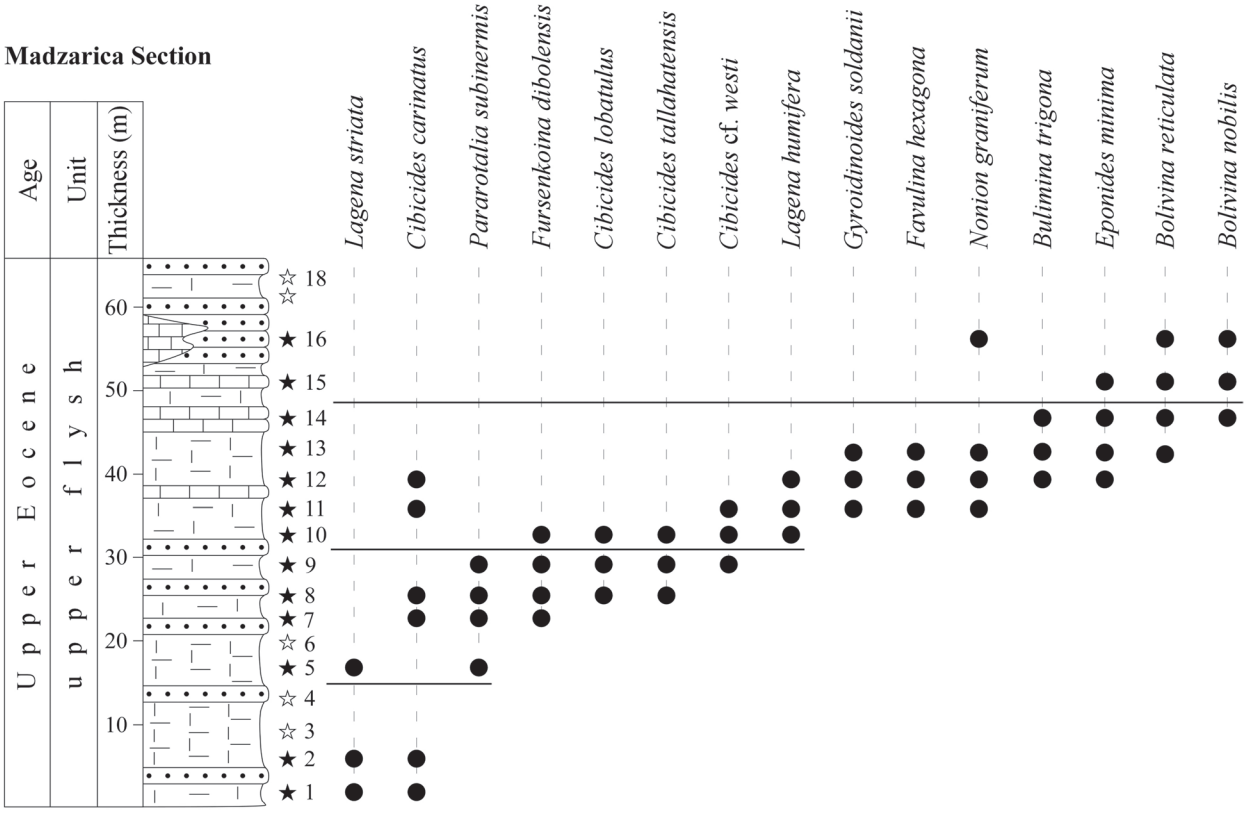

Fig. 6. Stratigraphical distribution of hyaline taxa in Madzarica section (legend on Fig. 3)

Фиг. 6. Стратиграфско разпространение на хиалинните тексони в разрез Маджарица (легенда на фиг. 3)

2004. *Lenticulina wilcoxensis* Cushman, Ponton; Valchev, p. 54, pl. 1, fig. 12.

Nomenclature. The holotype (Cushman Coll. No. 16186) is from the Eocene of Alabama.
Material. More than 30 well preserved specimens.
Description. The test is close-coiled. The last whorl is composed of 9–10 chambers separated by flush or slightly depressed sutures, curved backwards and branching at the peripheral area. The periphery is acute. The aperture is terminal, radiate.
Distribution. The species is known from the Paleocene of the USA, Poland, the Alps, Bulgaria, the Upper Eocene of the USA. It was also established in the deep-sea cores from the Atlantic (Paleocene).
Occurrence. Ovche Pole basin (Nemanjici section, samples 2, 3, 5, 9–18; Kadrifakovo section, samples 5, 6, 8, 10).

Lenticulina yaguatensis (Bermudez, 1949)

Material. About 30 specimens with different degree of preservation.
Remarks. The species was described from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999, p. 62, pl. 1, Fig. 9).
Occurrence. Ovche Pole basin (Nemanjici section, samples 5, 6, 10, 11, 16–18; Ezevo Brdo section, samples 2–4, 7, 8, 10–12; Kadrifakovo section, samples 1–3, 6, 8, 10).

***Lenticulina* sp.**
Plate I, Fig. 4

Material. 9 badly preserved specimens.
Description. The test is laterally depressed, close-coiled. The last whorl is composed of 6–7 chambers, separated with slightly depressed sutures curved backwards. The periphery is slightly keeled. The aperture is not distinct.
Occurrence. Tikvesh basin (Krivolak section, samples 1, 2, 4), Delchevo basin (Crna Skala section, samples 7, 8).

Genus ***Percultazonaria*** Loeblich and Tappan, 1986
Percultazonaria fragaria (Gümbel, 1868)
Plate I, Fig. 5

1949. *Marginulinopsis fragaria* (Gumbel); Cuvillier, Szakall, p. 69, pl. 26, figs. 15, 17–19.
1970. *Marginulina fragaria* Gümbel; Shutskaya, pl. 11, fig. 4 (in Russian).

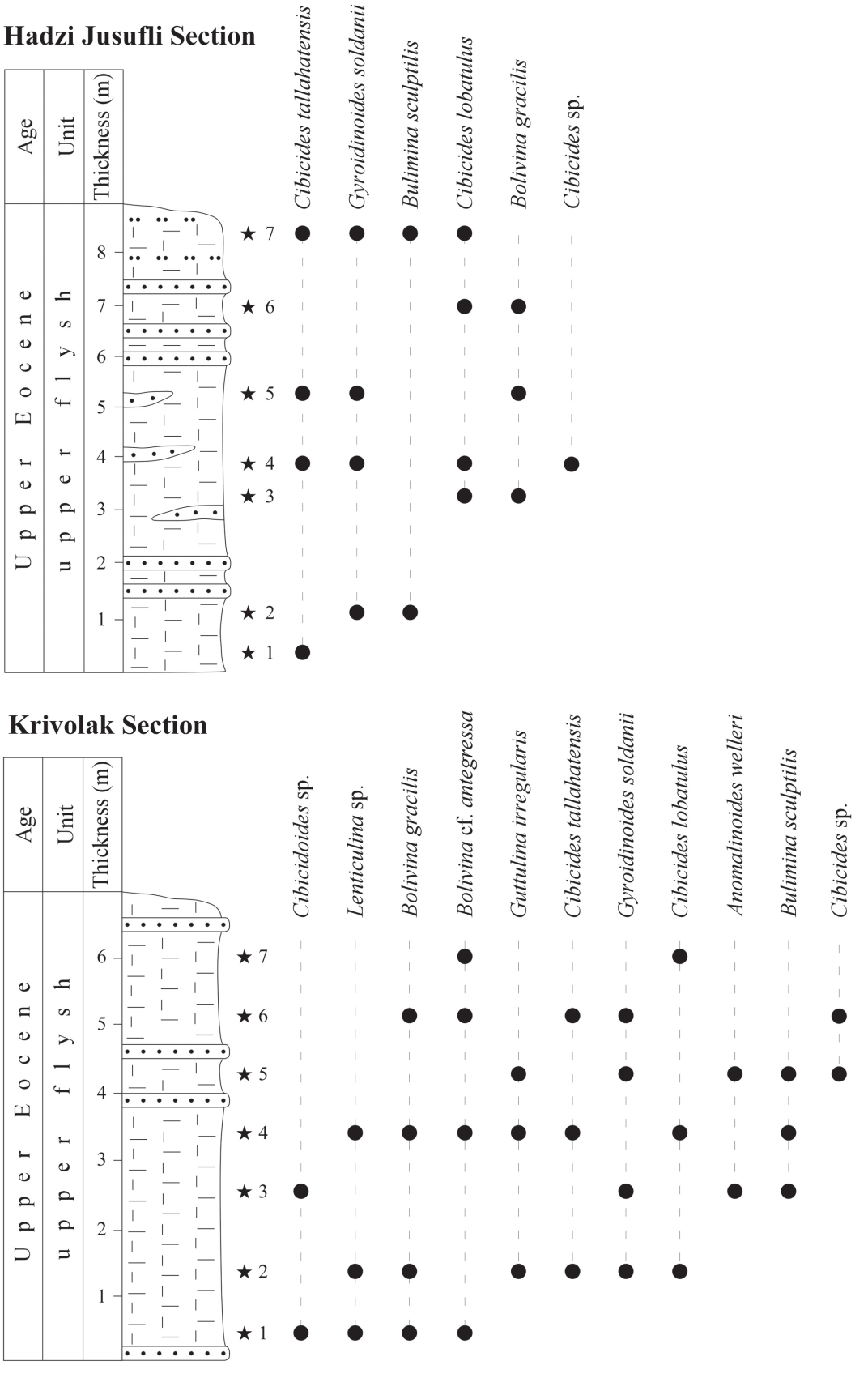

Fig. 7. Stratigraphical distribution of hyaline taxa in Hadzi Jusufli and Krivolak sections (legend on Fig. 3)

Фиг. 7. Стратиграфско разпространение на хиалинните тексони в разрези Хаджи Юсуфли и Криволак (легенда на фиг. 3)

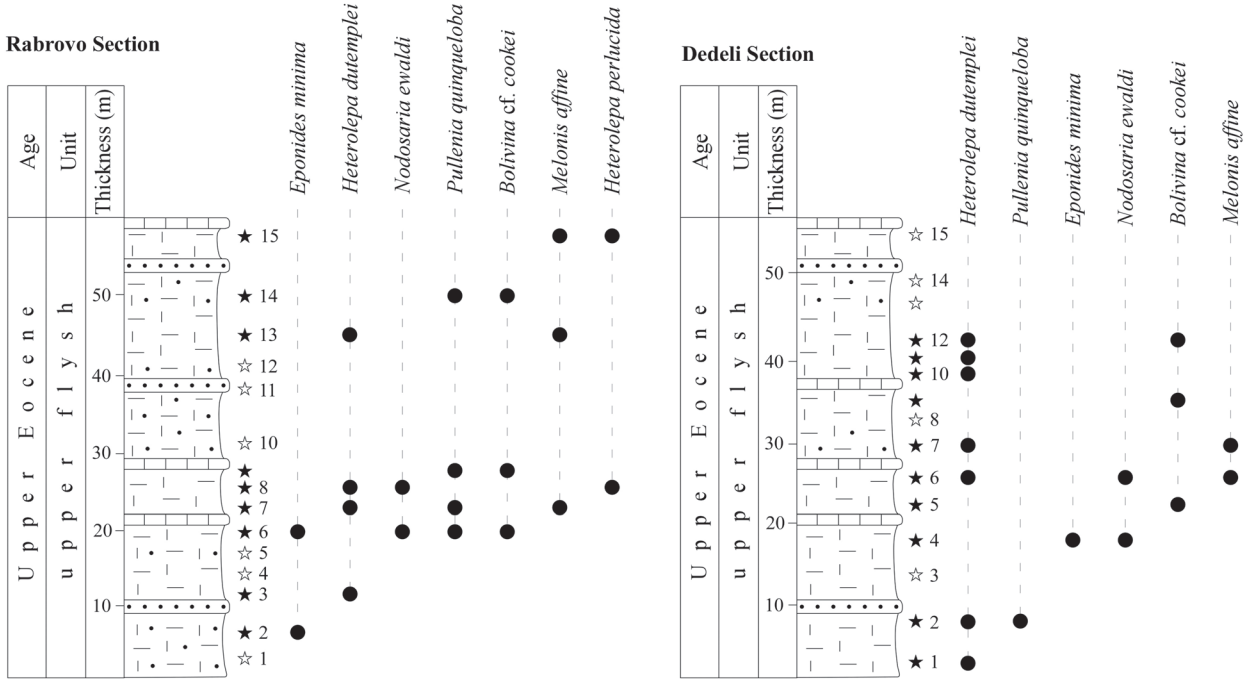

Fig. 8. Stratigraphical distribution of hyaline taxa in Rabrovo and Dedeli sections (legend on Fig. 3)

Фиг. 8. Стратиграфско разпространение на хиалинните тексони в разрези Раброво и Дедели (легенда на фиг. 3)

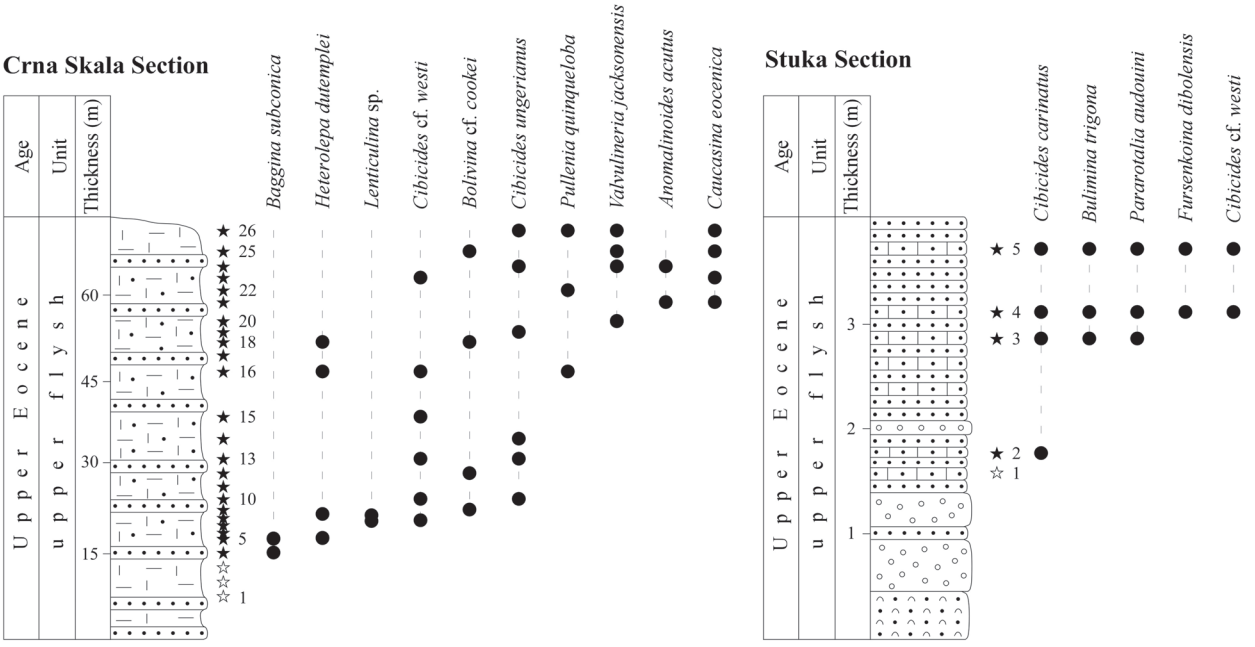

Fig. 9. Stratigraphical distribution of hyaline taxa in Crna Skala and Stuka sections (legend on Fig. 3)

Фиг. 9. Стратиграфско разпространение на хиалинните тексони в разрези Црна скала и Щука (легенда на фиг. 3)

PLATE I **ТАБЛИЦА I**

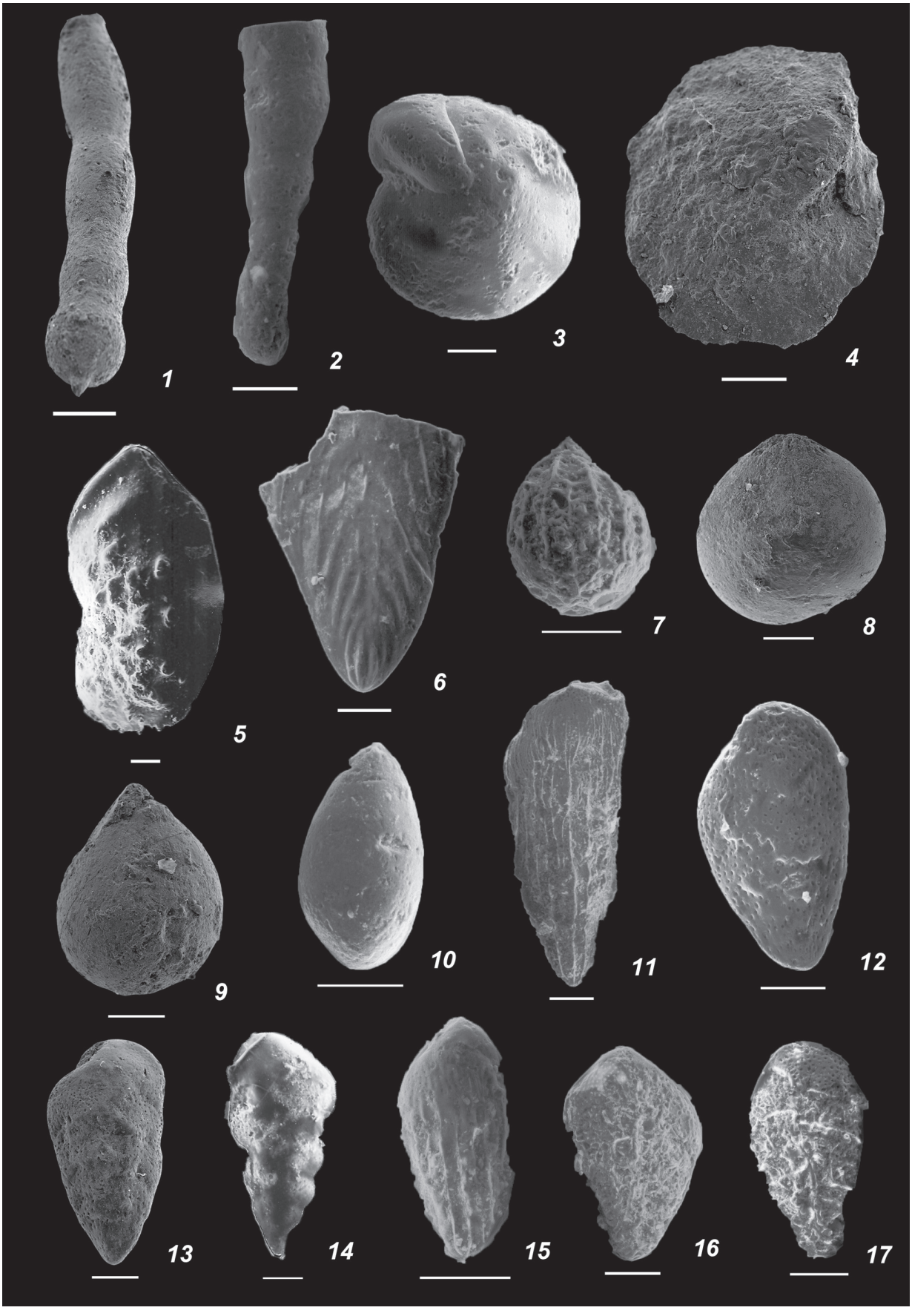

PLATE I

1. ***Nodosaria ewaldi*** Reuss, 1851
Valandovo–Gevgelija basin, Dedeli section, upper flysh unit, sample 6; SEMx65
2. ***Nodosaria*** **sp.**
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 6; SEMx200
3. ***Lenticulina*** **cf.** ***wilcoxensis*** (Cushman and Ponton, 1932)
Ovche Pole basin, Kadrifakovo section, upper flysh unit, sample 6; SEMx340
4. ***Lenticulina*** **sp.**
Tikvesh basin, Krivolak section, upper flysh unit, sample 2; SEMx180
5. ***Percultazonaria fragaria*** (Gümbel, 1868)
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 10; SEMx110
6. ***Palmula budensis*** (Hantken, 1875)
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 5; SEMx180
7. ***Favulina hexagona*** (Williamson, 1848)
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 5; SEMx340
8. ***Globulina gibba*** d'Orbigny, 1826
Tikvesh basin, Krivolak section, upper flysh unit, sample 7; SEMx170
9. ***Guttulina irregularis*** (d'Orbigny, 1846)
Tikvesh basin, Krivolak section, upper flysh unit, sample 5; SEMx200
10. ***Glandulina ovula*** d'Orbigny
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 5; SEMx400
11. ***Bolivina*** **cf.** ***antegressa*** Subbotina, 1953
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 8; SEMx140
12, 13. ***Bolivina*** **cf.** ***cookei*** Cushman, 1922
Ovche Pole basin, Nemanjici section, upper flysh unit; 14, sample 13, SEMx130; 15, sample 8, SEMx250
14. ***Bolivina gracilis*** Cushman and Applin, 1926
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 6; SEMx185
15. ***Bolivina nobilis*** Hantken, 1875
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 12; SEMx325
16. ***Bolivina reticulata*** Hantken, 1875
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 12; SEMx250
17. ***Bolivina scalprata*** Scwager, 1883
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 10; SEMx250
Scale bar – 100 μm

ТАБЛИЦА I

1. ***Nodosaria ewaldi*** Reuss, 1851
Валандово–Гевгелийски басейн, разрез Дедели, горна флишка задруга, пр. 6; SEMx65
2. ***Nodosaria*** **sp.**
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 6; SEMx200
3. ***Lenticulina*** **cf.** ***wilcoxensis*** (Cushman and Ponton, 1932)
Овчеполски басейн, разрез Кадрифаково, горна флишка задруга, пр. 6; SEMx340
4. ***Lenticulina*** **sp.**
Тиквешки басейн, разрез Криволак, горна флишка задруга, пр. 2; SEMx180
5. ***Percultazonaria fragaria*** (Gümbel, 1868)
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 10; SEMx110
6. ***Palmula budensis*** (Hantken, 1875)
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 5; SEMx180
7. ***Favulina hexagona*** (Williamson, 1848)
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 5; SEMx340
8. ***Globulina gibba*** d'Orbigny, 1826
Тиквешки басейн, разрез Криволак, горна флишка задруга, пр. 7; SEMx170
9. ***Guttulina irregularis*** (d'Orbigny, 1846)
Тиквешки басейн, разрез Криволак, горна флишка задруга, пр. 5; SEMx200
10. ***Glandulina ovula*** d'Orbigny
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 5; SEMx400
11. ***Bolivina*** **cf.** ***antegressa*** Subbotina, 1953
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 8; SEMx140
12, 13. ***Bolivina*** **cf.** ***cookei*** Cushman, 1922
Овчеполски басейн, разрез Неманци, горна флишка задруга, 14 – пр. 13, SEMx130; 15 – пр. 8, SEMx250
14. ***Bolivina gracilis*** Cushman and Applin, 1926
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 6; SEMx185
15. ***Bolivina nobilis*** Hantken, 1875
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 12; SEMx325
16. ***Bolivina reticulata*** Hantken, 1875
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 12; SEMx250
17. ***Bolivina scalprata*** Scwager, 1883
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 10; SEMx250

1975. Marginulina fragaria Gümbel; Braga et al., p. 93, t. 1, fig. 35.
1983. "Cristellaria fragaria Gümb."; Geroch, Verdenius, pl. 3, fig. 3.
1984. *Marginulina fragaria* Gümbel; Olszewska, Szymakowska, p. 129, tabl. 1, fig. 17.
1985. *Marginulinopsis fragaria* (Gümbel); Grünig, p. 262, pl. 5, figs. 24–28.
1991. *Marginulinopsis fragaria* (Gümbel); Barbin, Keller–Grünig, pl. 2, figs. 6–12.
2006. *Percultazonaria* fragaria (Gümbel); Cimerman et al., p. 24, pl. 5, figs 4, 5.

Nomenclature. The species was first described from the Eocene of the Alpes. Here it is identified after the images of Cimerman et al. (2006, pl. 5, Figs. 4, 5).
Material. 15 very well preserved specimens.
Description. The test is heteromorphous, slighltly inflated, with planispiral initial portion and short rectilinear later one. The chambers are broad and low. The periphery is subacute. The sutures are elevated and ornamented by nodes. The aperture is terminal, radiate.
Remarks. We refered our specimens to genus *Percultazonaria* Loeblich and Tappan because of the presence of nodes covering the sutures.
Distribution. The species is known from the Paleocene and Eocene of Spain, California, the Upper Eocene of SE United States, the Eocene to Miocene of the Carpathians, France, the Paleocene to Oligocene of Italy, the Eocene of Caucasus, Crimea and Middle Asia.
Occurrence. Ovche Pole basin (Nemanjici section, samples 1, 2, 5, 6, 9, 10, 12–14, 16–18).

Subfamily PALMULINAE Saidova, 1981
Genus ***Palmula*** Lea, 1833
Palmula budensis (Hantken, 1875)
Plate I, Fig. 6

1949. *Frondicularia budensis* (Hantken); Cuvillier, Szakall, p. 84, pl. 30, fig. 14.
1969. *Frondicularia budensis* (Hantken); Krayeva, Zernetskij, p. 52, pl. 17, figs. 1, 2a–b (in Russian).
1975. *Frondicularia budensis* (Hantken); Braga et al., p. 104.
1984b. *Plectofrondicularia budensis* (Hantken); Olszewska, p. 57, Tabl. 1, fig. 12.
1984. *Plectofrondicularia budensis* (Hantken); Olszewska, Szymakowska, p. 130, Tabl. 1, fig. 13.
1985. *Frondicularia budensis* (Hantken). Grünig, p. 261, pl. 4, fig. 21.
1992. *Palmula budensis* (Hantken); Darakchieva, Juranov, p. 12, pl. I, fig. 9. not fig. 10.
1993. *Palmula budensis* (Hantken); Sztrakos (In: Mathelin, Sztrakos), p. 76, pl. 9, fig. 10.
2003. *Palmula budensis* (Hantken); Horvath, p. 18, pl. 3, fig. 8, pl. 4, fig. 8.
2006. *Palmula budensis* (Hantken); Cimerman et al., p. 24, pl. 5, fig. 7.

Nomenclature. The species was first described from the Eocene of Hungary (Clavulina Szaboi Schichten). Here it is identified after the SEM images of Horvath (2003, pl. 3, Fig. 8, pl. 4, Fig. 8).
Material. 10 specimens with different degree of preservation.
Description. Test is elongate, flattened, with planispirally coiled early portion. Later the arrangement of the chambers becomes uncoiled, rectilinear. The chambers are broad, low and arched, 12–15 in number. Sutures are flush. Aperture is terminal, radiate.
Distribution. The species is known from the Eocene of Bulgaria, Italy, Spain, France, the Upper Eocene of Slovenia, the Eocene and Oligocene of Poland, the Paleogene of Ukraine.
Occurrence. Ovche Pole basin (Nemanjici section, samples 4–6, 11–13, 16, 17).

Family LAGENIDAE Reuss, 1862
Genus ***Lagena*** Walker and Jacobs, 1798
Lagena humifera Bandy, 1949

Material. 7 very well preserved specimens.
Remarks. The species was described from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999, p. 62, pl. 1, Fig. 10).
Occurrence. Ovche Pole basin (Madzarica section, samples 10–12).

Lagena striata (d'Orbigny, 1839)

Material. 20 very well preserved specimens.
Remarks. The species was described from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999, p. 62, pl. 1, Fig. 11).
Occurrence. Skopje–Kumanovo basin (Vojnik section, samples 3, 4, 6, 7), Ovche Pole basin (Ezovo Brdo section, samples 7, 8, 11, 12; Kadrifakovo section, samples 3, 4, 7, 8; Madzarica section, samples 1, 2, 5).

Family POLYMORPHINIDAE d'Orbigny, 1839
Subfamily POLYMORPHININAE d'Orbigny, 1839
Genus *Globulina* d'Orbigny, 1839
Globulina gibba d'Orbigny, 1826
Plate I, Fig. 8

1846. *Globulina Gibba* d'Orbigny; d'Orbigny, p. 227, tab. 13, fig. 13, 14.
1882. Globulina gibba d'Orbigny; Terquem, p. 130, pl. 13, figs. 22–27.
1934. Globulina gibba d'Orbigny; Cushman, Dusenbery, p. 59, pl. 8, fig. 4.
1948. Globulina gibba d'Orbigny; Brotzen, p. 46, fig. 10 – 1, 2.
1949. Globulina gibba d'Orbigny; Cuvillier, Szakall, p. 87, pl. 31, fig. 2.
1950. Globulina gibba d'Orbigny; Vassilenko, p. 196, pl. 2, figs. 1a–c (in Russian).
1956. Globulina gibba d'Orbigny; Haque, p. 107, pl. 30, fig. 4.
1960. Globulina gibba d'Orbigny; Olsson, p. 25, pl. 3, fig. 25.
1961. Globulina gibba d'Orbigny; Kaasschieter, p. 183, pl. 8, fig. 6–7.

1962. *Globulina gibba* d'Orbigny; Kiesel, S. 48, Taf. 7, Fig. 10.
1965. *Globulina gibba* d'Orbigny; Pozaryska, p. 86, pl. 13, fig. 3.
1969. Globulina gibba d'Orbigny; Krayeva, Zernetskij, p. 67, pl. 23, fig. 4 (in Russian).
1970. *Globulina gibba* d'Orbigny; Le Calvez, p. 84, pl. 17, figs. 3–4.
1984a. *Globulina gibba* d'Orbigny; Olszewska, p. 21, tabl. 2, fig. 12.
1985. *Globulina gibba* d'Orbigny; Grünig, p. 263, pl. 6, figs. 7–9.
1985. *Globulina gibba* d'Orbigny; Papp, Schmidt, p. 79, pl. 71, figs. 9–12.
1992. *Globulina gibba* d'Orbigny; Darakchieva, Juranov, p. 16, pl. 3, fig. 4.
2005. *Globulina gibba* d'Orbigny; Valchev, p. 161, pl. 1, fig. 1.

Nomenclature. The species was first described from the Eocene of France (Bordeaux vicinities). Here it is identified after the refigured d'Orbigny's specimens (Papp, Schmidt, 1985, pl. 71, Figs. 9–12).
Material. About 25 specimens, most of them well preserved.
Description. The test is rounded; the later chambers embrace the earlier ones. The sutures are slightly depressed, curved. The surface is smooth. The aperture is terminal, broad-ovate, radiate.
Distribution. The species is known from the Senonian of Germany, the Paleocene of Alabama, the Netherlands, Sweden, Ukraine, Caucasus, Australia, the upper Paleocene of England, the Paleocene and Eocene of Bulgaria, the Eocene of Belgium, the Lower and Middle Eocene of France, the Upper Eocene of Ukraine, Caucasus, England, the Oligocene of Germany, Hungary, the Miocene of the Vienna Basin, the Lower Miocene of Dominican Republic, the Middle Miocene of the central Paratethys. Widely distributed in recent sediments.
Occurrence. Ovche Pole basin (Nemanjici section, samples 3, 4, 7–9, 13, 14).

Genus ***Guttulina*** d'Orbigny, 1839
Guttulina irregularis (d'Orbigny, 1846)
Plate I, Fig. 9

1846. *Globulina irregularis* d'Orbigny; d'Orbigny, p. 266, tab. 13, fig. 9–10.
1935. *Guttulina irregularis* (d`Orbigny); Cushman, p. 24, pl. 9, figs. 13–16.
1959. *Guttulina irregularis* (d`Orbigny); Mallory, p. 177, pl. 14, fig. 13.
1961. *Guttulina irregularis* (d`Orbigny); Kaasschieter, p. 181, pl. 8, figs. 2–3.
1969. *Guttulina irregularis* (d'Orbigny); Krayeva, Zernetskij, p. 66, pl. 24, figs. 3, 4 (in Russian).
1970. *Guttulina irregularis* (d'Orbigny); Le Calvez, p. 92, pl. 20, fig. 3.
1985. *Guttulina communis* (d'Orbigny); Papp, Schmidt, p. 79, pl. 71, figs. 1–4.
1992. *Guttulina irregularis* (d'Orbigny); Darakchieva, Juranov, p. 17, pl. 3, fig. 1.
2005. *Guttulina irregularis* (d'Orbigny, 1846); Valchev, p. 162, pl. 1, fig. 4.

Nomenclature. A holotype was not designated. The species was first described from the Badenian of the Vienna Basin. Here it is identified after the refigured d'Orbigny's specimens (Papp, Schmidt, 1985, pl. 71, Figs. 1–4).
Material. 8 well preserved specimens.
Description. The test is inflated, asymmetrical, rounded in outline. Three chambers are visible on both sides. The sutures are slightly depressed, curved. The surface is smooth. The aperture is terminal, narrow-ovate, and radiate.
Distribution. It is known from the Paleocene of the Netherlands, the Paleocene and Eocene of Bulgaria, the Middle Eocene of France, the Upper Eocene of Ukraine, England, USA, the Oligocene of Germany, the Miocene of Austria.
Occurrence. Tikvesh basin (Krivolak section, samples 2, 4, 5).

Family ELLIPSOLAGENIDAE A. Silvestri, 1923
Subfamily OOLININAE Loeblich and Tappan, 1961
Genus ***Favulina*** Patterson and Richarson, 1987
Favulina hexagona (Williamson, 1848)
Plate I, Fig. 7

1956. *Lagena hexagona* (Williamson); Hagn, S. 141, Taf. 10, Fig. 22.
1959. *Lagena hexagona* (Williamson); Stancheva, p. 326, pl. 1, fig. 6 (in Bulgarian).
1969. *Lagena hexagona* (Williamson); Krayeva, Zernetskij, p. 48, pl. 16, fig. 11 (in Russian).
1971. *Lagena hexagona* (Williamson); Kaptarenko-Chernousova, p. 52, pl. 1, fig. 12 (in Ukrainian).
1988. *Favulina hexagona* (Williamson); Loeblich, Tappan, pl. 462, figs. 1, 2.
1992. *Lagena hexagona* (Williamson); Darakchieva, Juranov, p. 15, pl. 2, fig. 6.
1999. *Favulina hexagona* (Williamson); Darakchieva, p. 36.
2002. *Favulina hexagona* (Williamson); Valchev, p. 25, pl. 1, fig. 11 (in Bulgarian).

Nomenclature. The species was first described from recent sediments of Scotland. Here it is identified after the images of Loeblich, Tappan (1988, pl. 462, Figs. 1, 2).
Material. 15 very well preserved specimens.
Description. The test is unilocular, moderately inflated, slightly elongated. The surface is covered with regular hexagonal reticulations. The aperture is terminal, on a short neck.
Distribution. The species is known from the Maastrichtian and Paleocene of the Netherlands, the Paleocene of New Jersey, Ukraine, Poland, Australia, East Kamchatka, the upper Paleocene of England, the Paleocene, Eocene and Oligocene of Bulgaria, the Eocene of Germany, USA, the Upper Eocene of Donbas

basin, Hungary, the Oligocene of the Netherlands, Hungary, the Miocene of the Vienna basin, Bavaria, Dominican Republic, the Middle Miocene of the Netherlands. Nowadays it lives at depth 520–4200 m.
Occurrence. Ovche Pole basin (Nemanjici section, samples 1, 2, 5, 6; Madzarica section, samples 11–13).

Family GLANDULINIDAE Reuss, 1860
Subfamily GLANDULININAE Reuss, 1860
Genus ***Glandulina*** d'Orbigny, 1839
Glandulina ovula d'Orbigny, 1846
Plate I, Fig. 10

1846. *Glandulina Laevigata* d'Orbigny; d'Orbigny, p. 29, tab. 1, fig. 4, 5.
1846. *Glandulina Ovula* d'Orbigny; d'Orbigny, p. 29, tab. 1, fig. 6, 5.
1930. *Glandulina laevigata* d`Orbigny; Cushman, Ozawa, p. 143, pl. 40, figs. 1a–b.
1956. *Glandulina laevigata* d`Orbigny; Haque, p. 103, pl. 11, figs. 13–14.
1961. *Glandulina laevigata* d`Orbigny; Kaasschieter, p. 187, pl. 8, fig. 17.
1962. *Glandulina laevigata* d`Orbigny; Kiesel, S. 51, taf. 8, fig. 3.
1965. *Glandulina laevigata* d`Orbigny; Pozaryska, p. 91, pl. 22, fig. 7.
1985. *Glandulina ovula* d'Orbigny; Papp, Schmidt, p. 21, pl. 2, figs. 1–9.
1992. *Glandulina laevigata* d'Orbigny; Darakchieva, Juranov, p. 18, pl. 3, fig. 3.
2005. *Glandulina laevigata* d'Orbigny, 1846; Valchev, p. 163, pl. 1, fig. 8 (with synonymy).

Nomenclature. The species was first described from the Badenian of the Vienna Basin. The lectotype was figured by Papp, Schmidt (1985, pl. 2, Fig. 8).
Material. 41 well preserved specimens.
Description. The test is elongate-oval, round in cross section. Both ends are tapered. The surface is smooth. The aperture is terminal, radiate.
Remarks. We accept the Papp, Schmidt's (1985) opinion that *G. laevigata* d'Orbigny is subjective junior synonym of *G. ovula* d'Orbigny.
Distribution. The species is known from the Upper Cretaceous of Poland, the Upper Paleocene of England, the Eocene of Bulgaria, the Eocene and Oligocene of Belgium, the Upper Eocene of Ukraine, Caucasus, England, Poland, the Oligocene of Turkmenia, the Miocene of Vienna Basin and Bulgaria. It was also established in deep sea holes in Southeast Atlantic (Upper Eocene). Nowadays it is cosmopolitan.
Occurrence. Ovche Pole basin (Nemanjici section, samples 2–6, 13–18).

Suborder ROTALIINA Delage and Herouard, 1896
Superfamily BOLIVINACEA Glaessner, 1937
Family BOLIVINIDAE Glaessner, 1937
Genus ***Bolivina*** d'Orbigny, 1839

Bolivina* cf. *antegressa Subbotina, 1953
Plate I, Fig. 11

1953. *Bolivina antegressa* n. sp.; Subbotina, p. 226, pl. 10, figs. 11–16 (in Russian).
1975. *Bolivina antegressa* Subbotina; Braga et al., p. 94.
1978. *Bolivina antegressa* Subbotina; Proto Decima, Bolli, p. 790, pl. 2, fig. 2.
1985. *Bolivina antegressa* Subbotina; Grünig, p. 264.
1988. *Bolivina antegressa* Subbotina; Parisi, Coccioni, pl. 2, figs. 3–4.

Nomenclature. The holotype (VNIGRI Coll. No. 3257) is from the Upper Eocene of Crimea.
Material. About 30 specimens, most of them well preserved.
Description. The test is biserial, elongate, tapered at the initial part, then broadening slowly. The chambers are low. The surface is covered with irregular longitudinal costae. The periphery is subacute. The apertute is low, loop-shaped, basal.
Remarks. Our specimens are more elongate than the holotype.
Distribution. The species is known from the Paleocene–Lower Oligocene of Italy, the Eocene of France, Spain, the Atlantic, the Upper Eocene of Crimea.
Occurrence. Ovche Pole basin (Nemanjici section, samples 3, 4, 7–9, 15–18), Tikvesh basin (Krivolak section, samples 1, 4, 6, 7).

Bolivina* cf. *cookei Cushman, 1922
Plate I, Figs. 12, 13

1961. *Bolivina cookei* Cushman; Kaasschieter, p. 195, pl. 8, figs. 25–26.
1975. *Bolivina cookei* Cushman; Samuel, p. 133, pl. 74, fig. 3.
1977. *Bolivina cookei* Cushman; Pozaryska, p. 27, pl. 9, fig. 3.
1984. *Bolivina cookei* Cushman; Odrzywolska–Bienkowa, Pozaryska, p. 128, pl. 3, figs. 9–10.
1984a. *Bolivina cookei* Cushman; Olszewska, tabl. 8, fig. 9.

Nomenclature. The species was first described from the Oligocene of the USA (Mississippi). Here it is identified after the Kaasschieter's images (1961, pl. 8, Figs. 25–26).
Material. 20 well preserved specimens.
Description. The test is biserial, slightly tapered at the initial part. The sutures are oblique, curved and slightly depressed, the chambers are moderately high.
Remarks. Our specimens are characterized by the lack of distinct longitudinal costae that are typical for the species.
Distribution. The species is known from the Middle–Upper Eocene of Belgium, the Upper Eocene and Oligocene of the Paris basin, the Carpathians (Poland, Slovakia) and the USA.
Occurrence. Ovche Pole basin (Nemanjici section, samples 4, 5, 12–14), Valandovo–Gevgelija basin (Rabrovo section, samples 6, 9, 14; Dedeli section, samples

5, 8, 12), Delchevo basin (Crna Skala Section, samples 9, 12, 18, 25).

Bolivina gracilis Cushman and Applin, 1926
Plate I, Fig. 14

1935. *Bolivina gracilis* Cushman et Applin; Cushman, p. 37, pl. 14, figs. 8–10.
1975. *Bolivina gracilis* Cushman et Applin; Braga et al., p. 106.
1985. *Bolivina gracilis* Cushman et Applin; Grünig, p. 265, pl. 5, figs. 9–10.

Nomenclature. The species was first described from the Eocene of Texas. Here it is identified after the images of Grünig (1985, pl. 5, Figs. 9–10).
Material. 15 specimens with different degree of preservation.
Description. The test is slender, tapered at the distal end. The chambers are distinct, separated by oblique depressed sutures. Initial part of the test is covered with indistinct longitudinal costae, while the later one is smooth.
Remarks. Grünig (1985) noted the presence of intermediate forms between *B. gracilis* Cushman and Applin and *B. nobilis* Hantken and she pointed out that it is ecologically controlled lineage. We are not able to confirm or reject this statement, because our observation is based on limited number of specimens.
Distribution. The species is known from the Eocene of Italy, France, Spain, and the USA.
Occurrence. Ovche Pole basin (Nemanjici section, samples 2, 3, 6), Tikvesh basin (Hadzi Jusufli section, samples 3, 5, 6; Krivolak section, samples 1, 2, 4, 6).

Bolivina nobilis Hantken, 1875
Plate I, Fig. 15

1947. *Bolivina nobilis* Hantken; Subbotina, p. 96, pl. 9, fig. 3 (in Russian).
1957. *Bolivina nobilis* Hantken; Sacal, Debourle, p. 27, pl. 8, fig. 20.
1970. *Bolivina nobilis* Hantken; Le Calvez, p. 115.
1975. *Bolivina nobilis* Hantken; Braga et al., p. 106, t. 5, figs. 1–2.
1975. *Bolivina nobilis* Hantken; Samuel, p. 134, pl. 74, figs. 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.
1984. *Bolivina nobilis* Hantken; Olszewska, Szymakowska, p. 130, tabl. 1, fig. 15.
1985. Bolivina nobilis Hantken; Grünig, p. 265, pl. 5, figs. 12–14.
1990. *Bolivina nobilis* Hantken; Barbieri, t. 3, fig. 3.
2006. *Bolivina nobilis* Hantken; Cimerman et al., p. 26, pl. 6, figs. 9, 10.

Nomenclature. The species was first describen from Eocene of Hungary (Clavulina Szaboi Schichten). Here it is identified after the images of Grünig (1985, pl. 5, Figs. 12–14).
Material. More than 20 specimens with different degree of preservation.
Description. The test is slightly elongated with almost parallel sides. The periphery is slightly acute. The surface is covered with fine longitudinal costae that become indistinct at the later part of the test.
Distribution. The species is known from the Eocene of Italy, France, Spain, the Upper Eocene of Libya, Caucasus and Middle Asia, the Eocene and Oligocene of the Carpathians, the Oligocene of the Paris basin, the Miocene of France.
Occurrence. Ovche Pole basin (Nemanjici section, samples 2–6, 9, 11–18; Madzarica section, samples 14–16).

Bolivina reticulata Hantken, 1875
Plate I, Fig. 16

1957. *Bolivina reticulata* Hantken; Sacal, Debourle, p. 27, pl. 8, fig. 13.
1962. *Bolivina reticulata* Hantken; Kiesel, S. 61, Taf. 9, Fig. 8.
1975. *Bolivina reticulata* Hantken; Samuel, p. 134, pl. 73, figs. 7, 8.
1980. *Bolivina reticulata* Hantken; Jutson, p. 378, pl. 1, fig. 16.
1984a. *Bolivina reticulata* Hantken; Olszewska, p. 23, tabl. 3, fig. 5.
1984b. *Bolivina reticulata* Hantken; Olszewska, p. 58, tabl. 1, fig. 7.
1984. *Bolivina reticulata* Hantken; Olszewska, Szymakowska, p. 131, tabl. 1, fig. 18.
1985. *Bolivina reticulata* Hantken; Olszewska, p. 227, pl. 1, fig. 13.

Nomenclature. The species was first described from Eocene of Hungary (Clavulina Szaboi Schichten). Here it is identified after the images of Samuel (1975, pl. 73, Figs. 7, 8).
Material. 20 specimens, most of them with broken periphery.
Description. The test is tapered at the initial part. The periphery is narrowly rounded. The chambers are low, separated by oblique, straight, and slightly depressed sutures. The surface is covered with simple longitudinal reticulations.
Distribution. The species is known from the Upper Eocene–Miocene of the Carpathians, the Oligocene of Germany, the Oligocene–Miocene of Spain, the Miocene of France.
Occurrence. Ovche Pole basin (Nemanjici section, samples 4, 5, 7, 12–15, 17, 18; Madzarica section, samples 13–16).

Bolivina scalprata Schwager, 1883
Plate I, Fig. 17

1960. *Bolivina scalprata* Schwager; Subbotina et al., p. 110, pl. 7, figs. 1, 2 (in Russian).

1984a. *Bolivina scalprata* Schwager; Olszewska, p. 23, tabl. 3, fig. 6.

Nomenclature. The species was first described from the Eocene of Egypt. Here it is identified after the images of Subbotina et al. (1960, pl. 7, Figs. 1, 2).
Material. About 20 specimens with different degree of preservation.
Description. The test is elongated, tapered at the initial part and gradually broadening towards the late part. The chambers are distinct, low, separated by oblique and straight sutures, which are ornamented with fine and sharp costae. The chamber surface is also covered with irregularly distributed costae. The periphery bears a narrow keel.
Distribution. The species is known from the Eocene of Egypt, the Eocene–Oligocene of the Carpathians, the Miocene of Hungary.
Occurrence. Ovche Pole basin (Nemanjici section, samples 3, 4, 6, 7, 10, 12–16).

Superfamily BULIMINACEA Jones, 1875
Family BULIMINIDAE Jones, 1875
Genus ***Bulimina*** d'Orbigny, 1826
Bulimina sculptilis Cushman, 1923
Plate II, Fig. 1

1947. *Bulimina sculptilis* Cushman; Cushman, Parker, p. 103, pl. 24, fig. 12.
1947. *Bulimina sculptilis* Cushman; Subbotina, p. 93, pl. 8, figs. 27–29 (in Russian).
1948. *Bulimina sculptilis* Cushman; Chalilov, pl. 12, fig. 7 (in Russian).
1953. *Bulimina sculptilis* Cushman; Subbotina, p. 212, pl. 9, figs. 17–19 (in Russian).
1968. *Bulimina sculptilis* Cushman; Hofker, p. 5, pl. 1, figs. 2–3.

Nomenclature. The species was first described from the Oligocene of Mississippi (USA). Here it is identified after the image of Cushman, Parker (1947, pl. 24, Fig. 12).
Material. 18 well preserved specimens.
Description. The test is moderately elongate, slightly tapered at the initial part. The sutures are horizontal, the surface is ornamented with longitudinal straight, sharp and thin costae beginning at the base of the last formed chambers. The aperture is broad, loop-shaped.
Distribution. The species is known from the Eocene of the Alps, the Upper Eocene and Oligocene of Caucasus and Middle Asia, the Oligocene of Ecuador, the Eocene to Miocene of the USA, the Olicocene to Miocene of Venezuela.
Occurrence. Tikvesh basin (Hadzi Jusufli section, samples 2, 7; Krivolak section, samples 3–5).

Bulimina trigona Terquem, 1882

Material. 25 specimens, most of them well preserved.
Remarks. The species was described from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999, p. 63, pl. 1, Fig. 22).
Occurrence. Ovche Pole basin (Nemanjici section, samples 2–3, 12–14, 16–18; Ezevo Brdo section, samples 2–4, 7–12; Madzarica section, samples 12–14), Strumica basin (Stuka section, samples 2–5).

Superfamily FURSENKOINACEA Loeblich and Tappan, 1961
Family FURSENKOINIDAE Loeblich and Tappan, 1961
Genus ***Fursenkoina*** Loeblich and Tappan, 1961
Fursenkoina dibollensis (Cushman et Applin, 1926)

Material. About 50 specimens with different degree of preservation.
Remarks. The species was described from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999, p. 63, pl. 1, Figs. 12, 13).
Occurrence. Skopje–Kumanovo basin (Vojnik section, samples 4–6), Ovche Pole basin (Ezevo Brdo section, samples 7, 8, 10, 12; Kadrifakovo section, samples 1–5, 7; Madzarica section, samples 7-10), Strumica basin (Stuka section, samples 4–5).

Superfamily DELOSINACEA Parr, 1950
Family CAUCASINIDAE N. K. Bykova, 1959
Subfamily BAGGATELLINAE N. K. Bykova, 1959
Genus ***Caucasina*** Khalilov, 1951
Caucasina eocaenica Chalilov, 1958
Plate II, Fig. 2

1967. *Caucasina eocaenica* Chalilov; Chalilov, p. 164, pl. 36, fig. 2 (in Russian).
1996. *Caucasina eocaenica* Chalilov; Sztrakos, pl. 3, figs. 27–28.
2004. *Caucasina eocaenica* Chalilov; Bugrova, p. 98, pl. 39, fig. 13 (in Russian).

Nomenclature. The species was first described from the Upper Eocene of Azerbaijan. Here it is identified after the image of Chalilov (1967, pl. 36, Fig. 2).
Material. About 20 well preserved specimens.
Description. The test is elongate, subcylindrical, high trochospiral. The chambers are slightly inflated, those from the last whorl comprise 1/3 of the test length. The sutures are almost horizontal, depressed. The surface is smooth. The aperture is elongate, loop-shaped.
Distribution. The species is known from the Paleocene and Eocene of France, the Eocene of Crimea, Caucasus, Turkmenia, Azerbaijan.
Occurrence. Ovche Pole basin (Nemanjici section, samples 2, 3, 5–7, 13–16), Delchevo basin (Crna Skala section, samples 21, 23, 25, 26).

Caucasina tenebricosa Pishvanova, 1960
Plate II, Fig. 3

1960. *Caucasina tenebricosa* Pischvanova, sp. n.; Subbotina et al., p. 90, pl. 6, fig. 2 (in Russian).

1960. *Caucasina tenebricosa* Pischvanova; Subbotina, p. 212, pl. 4, figs. 2–4 (in Russian).
1972. *Caucasina tenebricosa* Pischvanova; Pishvanova, p. 265, pl. 21, fig. 1 (in Russian).
1975. *Caucasina tenebricosa* Pischvanova; Samuel, p. 140, pl. 80, fig. 11.
1979. *Caucasina* cf. *tenebricosa* Pischvanova; Sztrakos, p. 87, pl. 27, fig. 12.
1984a. *Caucasina tenebricosa* Pischvanova; Olszewska, tabl. 9, fig. 17.
1984b. *Caucasina tenebricosa* Pischvanova; Olszewska, p. 63, tabl. 4, fig. 3.
1984. *Caucasina tenebricosa* Pischvanova; Olszewska, Szymakowska, p. 133, tabl. 2, fig. 4.

Nomenclature. The holotype (VNIGRI Coll. No. 5197) is from the Oligocene of the Precarpathian area (Dzvinyach Village).
Material. 15 well preserved specimens.
Description. The test is elongate, tapered at the initial part, gradually broadening towards the apertural end. The chambers are inflated, increasing gradually in size. The sutures are deep, especially at the initial part. The surface is smooth. The aperture is broad, elongate, loop-shaped.
Distribution. The species is known from the Upper Eocene–Miocene of the Carpathians, the Oligocene–Miocene of the Precarpathian region.
Occurrence. Ovche Pole basin (Nemanjici section, samples 2, 3, 7, 8, 13–16).

Superfamily STILOSTOMELLACEA Finlay, 1947
Family STILOSTOMELLIDAE Finlay, 1947
Genus ***Siphonodosaria*** A. Silvestri, 1924
Siphonodosaria adolphina (d'Orbigny, 1846)
Plate II, Fig. 6

1846. *Dentalina Adolphina* d'Orbigny; d'Orbigny, p. 51, tab. 2, fig. 18–20.
1926. *Nodosaria* cf. *adolphina* (d'Orbigny); Cushman, p. 597, pl. 18, fig. 2.
1951. *Dentalina adolphina* d'Orbigny; Spasov, p. 100, pl. 1, fig. 11 (in Bulgarian).
1953. *Siphonodosaria adolphina* (d'Orbigny); Subbotina, p. 180, pl. 6, figs. 1, 2 (in Russian).
1969. *Nodosaria adolphina* (d'Orbigny); Krayeva, Zernetskij, p. 41, pl. 14, fig. 6 (in Russian).
1985. *Stilostomella adolphina* (d'Orbigny); Papp, Schmidt, p. 31, pl. 14, figs. 8–11.
1992. *Siphonodosaria adolphina* (d'Orbigny); Darakchieva, Juranov, p. 30, pl. 5, fig. 4.
2007. *Siphonodosaria adolphina* (d'Orbigny); Valchev, p. 133, pl. 1, fig. 14.

Nomenclature. The species was first described from the Badenian of the Vienna Basin. The lectotype (GBA Coll. No. 1981/03/58) was designated by Papp, Schmidt (1985, pl. 14, Fig. 9).
Material. 13 well preserved specimens.
Description. The test is uniserial, slender, composed of globular chambers connected with short and thin neck. The surface is smooth. The aperture is round, terminal, on a short neck.
Distribution. It is known from the Upper Senonian of Germany, the Paleocene of Texas (Midway Formation), Mexico, Poland, Bulgaria, the Eocene of Bulgaria, Ukraine, Caucasus, Crimea, Turkmenia, California, Venezuela, the Middle Eocene of Dalmatian, the Oligocene of the Netherlands, Hungary, the Miocene of the Vienna Basin, Bavaria, Bulgaria.
Occurrence. Ovche Pole basin (Nemanjici section, samples 3, 4, 10, 14–16; Kadrifakovo section, samples 5–6, 8–9).

Superfamily DISCORBACEA Ehrenberg, 1838
Family BAGGINIDAE Cushman, 1927
Subfamily BAGGININAE Cushman, 1927
Genus ***Baggina*** Cushman, 1926
Baggina subconica (Terquem, 1882)
Plate II, Figs. 4, 5

1882. *Rotalina subconica* Terq.; Terquem, p. 61, pl. 4, fig. 5.
1961. *Cancris subconicus* (Terquem); Kaasschieter, p. 213, pl. 12, figs. 6–8.
1970. *Cancris subconicus* (Terquem); Le Calvez, p. 145, pl. 43, fig. 6.
1975. *Cancris subconicus* (Terquem); Samuel, p. 141, pl. 82, fig. 4.
1977. *Baggina subconica* (Terquem); Pozaryska, p. 33, pl. 11, fig. 1.
1981. *Cancris subconicus* (Terquem); Hughes, p. 202, pl. 15.4, figs. 5–7.
1983. *Cancris subconicus* (Terquem); King, p. 29, pl. 3, figs. 16–17.
1983. *Cancris* aff. *subconicus* (Terquem); Krhovsky, p. 79, pl. 4, figs. 3–5.
1984. *Baggina subconica* (Terquem); Odrzywolska-Bienkowa, Pozaryska, p. 134, pl. 6, figs. 4, 8–9.
1984a. *Baggina subconica* (Terquem); Olszewska, p. 25, tabl. 4, fig. 1.

Nomenclature. The holotype is the specimen figured by Terquem (1882, pl. 4, Fig. 5). The species was first described from the Eocene (Lutetian) of the Paris Basin.
Material. 17 specimens with different degree of preservation.
Description. The test is very low trochospirally coiled, with 6–7 chambers in the last whorl. The final chamber comprises one-half of it. The periphery is broadly rounded. The surface is smooth. The aperture is broad, umbilical, at the base of the last chamber.
Distribution. The species is known from the Eocene of Belgium, France, the Eocene and Oligocene of the Carpathians and the North Sea.
Occurrence. Ovche Pole basin (Nemanjici section, samples 5–7, 13–15), Delchevo basin (Crna Skala section, samples 4, 5).

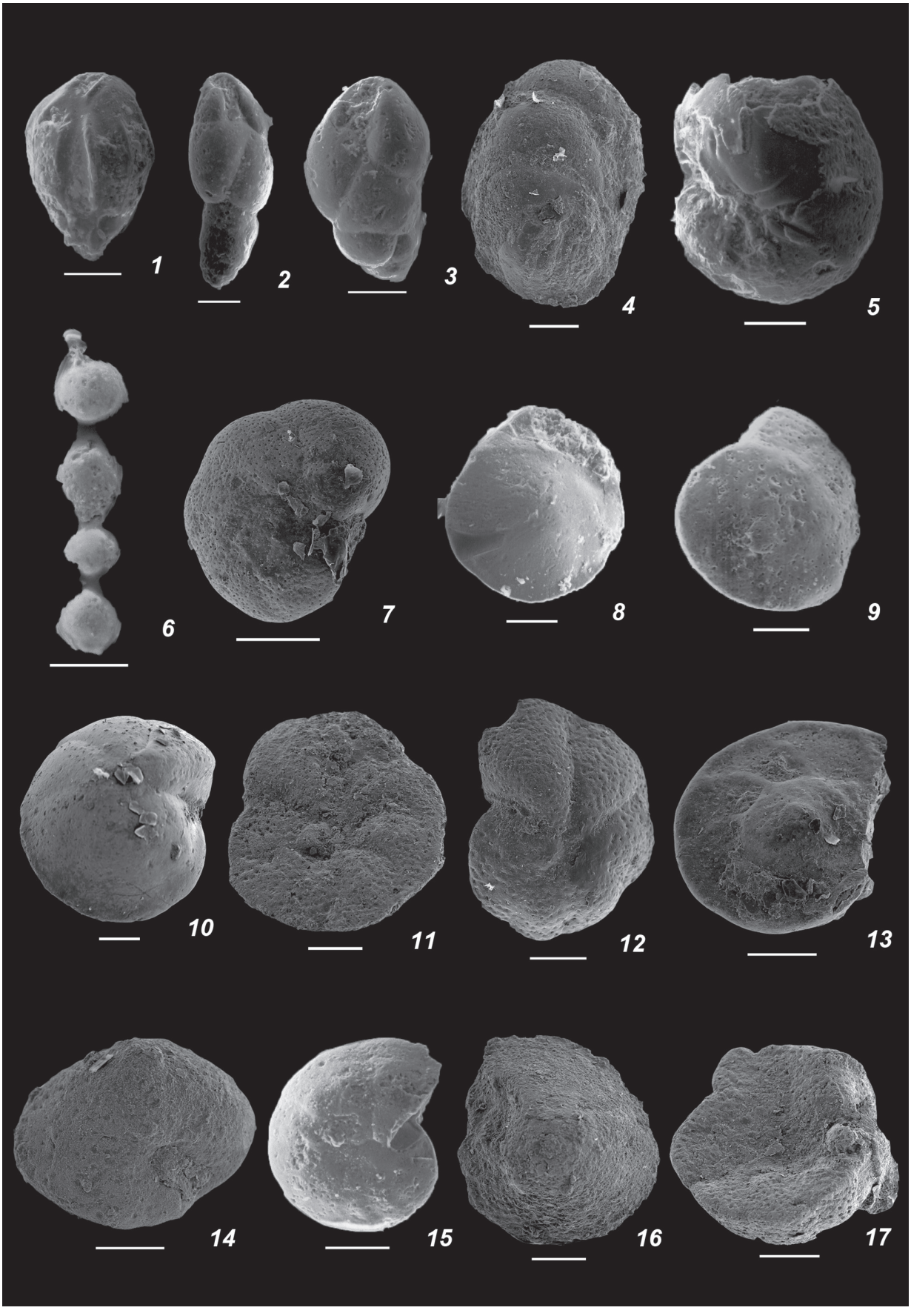
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PLATE II

1. ***Bulimina sculptilis*** Cushman, 1923
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 6; SEMx300
2. ***Caucasina eocenica*** Chalilov, 1958
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 6; SEMx240
3. ***Caucasina tenebricosa*** Pishvanova, 1960
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 14; SEMx300
4, 5. ***Baggina subconica*** (Terquem, 1882)
8, Delchevo basin, Crna Skala section, upper flysh unit, sample 5, SEMx150; 9, Ovche Pole basin, Nemanjici section, upper flysh unit, sample 7, SEMx180
6. ***Siphonodosaria adolphina*** (d'Orbigny, 1846)
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 16; SEMx110
7. ***Valvulineria jacksoensis*** Cushman, 1933
Delchevo basin, Crna Skala section, upper flysh unit, sample 24; SEMx270
8. ***Eponides*** **sp.**
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 10; SEMx200
9, 10. ***Cibicidoides*** **sp.**
9, Ovche Pole basin, Nemanjici section, upper flysh unit, sample 4, spiral view, SEMx200; 10, Tikvesh basin, Krivolak section, upper flysh unit, sample 3, umbilical view, SEMx140
11, 12. ***Cibicides lobatulus*** (Walker and Jakobs, 1798)
Tikvesh basin, Hadzi Jusufli section, upper flysh unit, sample 7: 11, spiral view; SEMx180; 12, umbilical view; SEMx160
13–15. ***Cibicides ungerianus*** (d'Orbigny, 1846)
13, 14, Delchevo basin, Crna Skla section, upper flysh unit, sample 24: 13, spiral view, SEMx200; 14, umbilical view, SEMx250; 15, Ovche Pole basin, Nemanjici section, upper flysh unit, sample 3, umbilical view, SEMx160
16, 17. ***Cibicides*** **sp.**
Tikvesh basin, Krivolak section, upper flysh unit, sample 6: 16, umbilical view, SEMx160; 17, spiral view, SEMx180
Scale bar – 100 μm

ТАБЛИЦА II

1. ***Bulimina sculptilis*** Cushman, 1923
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 6; SEMx300
2. ***Caucasina eocenica*** Chalilov, 1958
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 6; SEMx240
3. ***Caucasina tenebricosa*** Pishvanova, 1960
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 14; SEMx300
4, 5. ***Baggina subconica*** (Terquem, 1882)
8 – Делчевски басейн, разрез Црна скала, горна флишка задруга, пр. 5, SEMx150; 9 – Овчеполски басейн, разрез Неманици, горна флишка задруга, пр. 7, SEMx180
6. ***Siphonodosaria adolphina*** (d'Orbigny, 1846)
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 16; SEMx110
7. ***Valvulineria jacksoensis*** Cushman, 1933
Делчевски басейн, разрез Црна скала, горна флишка задруга, пр. 24; SEMx270
8. ***Eponides*** **sp.**
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 10; SEMx200
9, 10. ***Cibicidoides*** **sp.**
9 – Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 4, спирална страна, SEMx200; 10 – Тиквешки басейн, разрез Криволак, горна флишка задруга, пр. 3, умбиликална страна, SEMx140
11, 12. ***Cibicides lobatulus*** (Walker and Jakobs, 1798)
Тиквешки басейн, разрез Хаджи Юсуфли, горна флишка задруга, пр. 7: 11 – спирална страна, SEMx180; 12 – умбиликална страна, SEMx160
13–15. ***Cibicides ungerianus*** (d'Orbigny, 1846)
13, 14 – Делчевски басейн, разрез Црна скала, горна флишка задруга, пр. 24: 13 – спирална страна, SEMx200; 14 – умбиликална страна, SEMx250; 15 – Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 3, умбиликална страна, SEMx160
16, 17. ***Cibicides*** **sp.**
Тиквешки басейн, разрез Криволак, горна флишка задруга, пр. 6: 16 – умбиликална страна, SEMx160; 17 – спирална страна, SEMx180

Genus ***Valvulineria*** Cuchman, 1926
Valvulineria jacksonensis Cushman, 1933
Plate II, Fig. 7

1933. *Valvulineria jacksonensis* Cushman, sp. n.; Cushman, p. 18, pl. 2, fig. 9.
1935. *Valvulineria jacksonensis* Cushman; Cushman, p. 44, pl. 18, fig. 2.
1957. *Valvulineria* aff. *jacksonensis* Cushman; Sacal, Debourle, p. 35, pl. 12, fig. 2.
1971. *Valvulineria* cf. *jacksonensis* Cushman; Ferrer, p. 51, lam. 6, figs. 16–17.
1984a. *Valvulineria* aff. *jacksonensis* Cushman; Olszewska, p. 25, tabl. 4, fig. 4.

Nomenclature. The holotype (U.S.N.M. Coll. No. 371559) is from the Upper Jackson Eocene of the Southeastern Coastal Plain Region of the United States (Ocala Limestone, Brooklyn, Ala).
Material. 9 specimens with different degree of preservation.
Description. The test is low-trochospiral, biconvex. The last whorl is composed of 8 chambers, gradually increasing in size. The sutures on the umbilical side are straight, radial slightly depressed, while on the dorsal one they are curved and flush. The surface is smooth. The aperture is umbilical covered with narrow lobe of the last-formed chamber.
Distribution. The species is known from the Upper Paleocene–Middle Eocene of Spain, the Eocene of the USA, the Upper Eocene of France, The Eocene and Oligocene of the Carpathians.
Occurrence. Delchevo basin (Crna Skala section, samples 20, 24–26).

Family EPONIDIDAE Hofker, 1951
Subfamily EPONIDINAE Hofker, 1951
Genus ***Eponides*** de Montfort, 1808
Eponides minima Cushman, 1933

Material. 10 specimens, some of them badly preserved.
Remarks. The species was described from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999, p. 63).
Occurrence. Ovche Pole basin (Madzarica section, samples 12–15), Valandovo–Gevgelija basin (Rabrovo section, samples 2, 6; Dedeli section, sample 4).

***Eponides* sp.**
Plate II, Fig. 8

Material. About 15 well preserved specimens.
Description. The test is low-trochospiral, biconvex. The spiral side comprises two whorls, as the last one is composed of 6–7 indistinct chambers separated by slightly curved backwards, oblique, almost flush sutures. The umbilicus is narrow, flush. The periphery is acute, the surface is smooth. The aperture is arch-shaped, interiomarginal.
Occurrence. Ovche Pole basin (Nemanjici section, samples 4–6, 10–12, 17, 18).

Superfamily DISCORBINELLACEA Sigal, 1952
Family PARRELBIDIDAE Hofker, 1956
Genus ***Cibicidoides*** Thalman, 1939
***Cibicidoides* sp.**
Plate II, Figs. 9, 10

Material. About 29 specimens with different degree of preservation.
Description. The test is low trochospiral, biconvex, lenticular. The umbilical side is more elevated. The spiral side reveals 2–2.5 whorls. The last whorl comprises 10–11 chambers gradually increasing in size. The periphery is angled. The spiral side is coarsely perforated. The aperture is low arch, interimarginal.
Occurrence. Ovche Pole basin (Nemanjici section, samples 3, 4, 8, 9, 15–18), Tikvesh basin (Krivolak section, samples 1, 3).

Superfamily PLANORBULINACEA Schwager, 1877
Family CIBICIDIDAE Cushman, 1927
Subfamily CIBICIDINAE Cushman, 1927
Genus ***Cibicides*** de Montfort, 1808
Cibicides carinatus (Terquem, 1882)

Material. 40 specimens, most of them well preserved.
Remarks. The species was described from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999, p. 64, pl. 1, Fig. 14).
Occurrence. Ovche Pole basin (Ezevo Brdo section, samples 2–6, 9–11; Kadrifakovo section, samples 3–5, 7, 9; Madzarica section, samples 1, 2, 7, 8, 11, 12), Strumica basin (Stuka section, samples 2–5).

Cibicides lobatulus (Walker and Jakobs, 1798)
Plate II, Figs. 11, 12

1935. *Cibicides lobatulus* (Walker and Jacobs); Cushman, p. 52, pl. 22, figs. 4–6.
1954. *Cibicides* (*Cibicides*) *lobatulus* (Walker and Jacobs) emend. d'Orb.; Vassilenko, p. 138, pl. 22, figs. 1–5, pl. 23, fig. 1 (in Russian).
1961. *Cibicides lobatulus* (Walker and Jacobs); Kaasschieter, p. 221, pl. 14, fig. 5.
1973. *Cibicides lobatulus* (Walker and Jacobs); Ferrer et al., p. 56, fig. 17(4).
1975. *Cibicides lobatulus* (Walker and Jacobs); Samuel, p. 148, pl. 86, fig. 5.
1979. *Cibicides lobatulus* (Walker and Jacobs); Sztrakos, p. 86, pl. 26, fig. 7.
1981. *Cibicides lobatulus* (Walker and Jacobs); Hughes, p. 202, pl. 15.4, figs. 13, 15–16.
1984. *Cibicides lobatulus* (Walker and Jacobs); Odrzywolska-Bienkowa, Pozaryska, p. 140, pl. 12, fig. 8, pl. 13, fig. 2.
1984b. *Cibicides lobatulus* (Walker and Jacobs); Olszewska, p. 62, tabl. 3, fig. 10.
1991. *Cibicides lobatulus* (Walker and Jacobs); Barbin, Keller-Grünig, pl. 1, figs. 17–18.

Nomenclature. The species was first described from recent sediments of England. Here it is identified after the SEM images of Barbin, Keller-Grünig (1991, pl. 1, Figs. 17–18).
Material. About 20 specimens, most of them well preserved.
Description. The test is planoconvex, ovate to round in outline, with convex umbilical side and slightly concave spiral one. The last whorl is composed of 7–8 gradually increasing in size chambers, separated by slightly depressed sutures. The last ones are curved backwards on the spiral side and almost straight on the umbilical one. The periphery is acute to keeled. The aperture is slit-like, at the base on the last-formed chamber.
Remarks. The species differs from *C. carinatus* (Terquem) by the more convex umbilical side and the slightly concave spiral one. Kaasschieter (1961) considered intergradation between the two species.
Distribution. It is known from the Paleocene and Eocene of Spain, France, Italy, Pakistan, Ukraine, the Eocene of Belgium, the USA, Caucasus and Middle Asia, the Eocene–Miocene of the Carpathians, the Oligocene of Germany, the Paris Basin, the North Sea, the Oligocene–Miocene of the Netherlands, Hungary, Florida, Sahalin Peninsula, widespread in recent sediments.
Occurrence. Ovche Pole basin (Nemanjici section, samples 1, 4, 6, 8–12, 14–17; Madzarica section, samples 8–10), Tikvesh basin (Hadzi Jusufli section, samples 3–4, 6–7; Krivolak section, samples 2, 4, 7).

Cibicides tallahatensis Bandy, 1949

Material. About 50 specimens with different degree of preservation.
Remarks. The species was described from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999, p. 64, pl. 1, Fig. 15).
Occurrence. Skopje-Kumanovo basin (Vojnik section, samples 5, 6, 8), Ovche Pole basin (Ezevo Brdo secton, sam 7, 8, 12, 13; Kadrifakovo section, samples 5–7, 10; Madzarica section, samples 8–10), Tikvesh basin (Hadzi Jusufli section, samples 1, 4, 5, 7; Krivolak section, samples 2, 4, 6).

Cibicides ungerianus (d'Orbigny, 1846)
Plate II, Figs. 13–15

1846. *Rotalina Ungeriana* d'Orbigny; d'Orbigny, p. 157, pl. 8, figs. 16–18.
1954. *Cibicidoides ungerianus* (d'Orbigny); Vassilenko, p. 172, pl. 29, figs. 6, 7, pl. 30, fig. 1 (in Russian).
1961. *Cibicides ungerianus* (d'Orbigny); Kaasschieter, p. 220, pl. 14, fig. 3.
1975. *Planulina ungeriana* (d'Orbigny); Samuel, p. 148, pl. 87, figs. 1–3.
1976. *Cibicides ungerianus* (d'Orbigny); Salaj et al., p. 158, pl. 16, figs. 3–4.
1978. *Planulina (?) ungeriana* (d'Orbigny); Kantorova, S. 208, t. 46, figs. 1–2.
1978. *Heterolepa ungeriana* (d'Orbigny); Proto Decima, Bolli, p. 794, pl. 6, figs. 18–19.
1978. *Cibicides ungerianus* (d'Orbigny); Odrzywolska-Bienkowa, et al., p. 275, pl. 12, fig. 7.
1979. *Cibicidoides ungerianus* (d'Orbigny); Sztrakos, p. 88, pl. 30, fig. 3.
1981. *Cibicides ungerianus* (d'Orbigny); Hughes, p. 198, pl. 15.2, figs. 1–3.
1983. *Cibicidoides ungerianus* (d'Orbigny); Tjalsma, Lohmann, p. 28, pl. 18, fig. 1, pl. 21, figs. 5–6.
1984. *Cibicides ungerianus* (d'Orbigny); Odrzywolska-Bienkowa, Pozaryska, p. 142, pl. 12, fig. 11.
1984a. *Cibicides ungerianus* (d'Orbigny); Olszewska, p. 28, tabl. 5, fig. 4.
1985. *Heterolepa ungeriana* (d'Orbigny); Grünig, p. 276, pl. 11, figs. 10–12.
1985. *Cibicides ungerianus* (d'Orbigny); Papp, Schmidt, p. 60, pl. 51, figs. 7–11.
2001. *Cibicidoides ungerianus* (d'Orbigny); Scherbacher et al., p. 626, pl. 2, figs. 5–6.

Nomenclature. The species was first described from the Badenian of the Vienna Basin. The lectotype (GBA 1981/03/236) was figured by Papp, Schmidt (1985, pl. 51, Figs. 8, 9).
Material. More than 20 specimens, most of them well preserved.
Description. The test is planoconvex, low-trochospiral. The last worl comprises 10–13 chambers. The sutures are radial; on the umbilical side they are straight, while on the spiral one curved backwards. The periphery is acute or with very narrow keel. The aperture is slit-like, at the base on the last-formed chamber.
Remarks. The species have been referred to different genera, but the planoconvex test and the presence of a narrow keel is characteristic feature for the genus Cibicides de Montfort.
Distribution. The species is known from the Paleocene of Tunisia, the Paleocene and Eocene of Italy, Spain, France, Caucasus and Middle Asia, the Paleocene–Oligocene of Malij Balhan, the Paleocene-Miocene of Ukraine, Sahalin Peninsula, the Eocene of Belgium, the Eocene–Oligocene of the Netherlands, the Atlantic, the bay of Biscay, the Eocene-Miocene of France, the Carpathians, the Oligocene of Germany, the Former Republic of Jugoslavia, the North Sea, the Oligocene-Miocene of Hungary, Spain, Austria.
Occurrence. Ovche Pole basin (Nemanjici section, samples 1–3, 5–7), Delchevo basin (Crna Skala section, samples 10, 13, 14, 19, 23, 26).

Cibicides cf. ***westi*** Howe, 1939

Material. 30 specimens with different degree of preservation.
Remarks. The species was described from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999, p. 65, pl. 1, Fig. 16).

Occurrence. Ovche Pole basin (Nemanjici section, samples 1–3, 8–12, 15–17; Ezevo Brdo section, samples 7, 8, 12; Madzarica section, samples 9–11), Delchevo basin (Crna Skala Section, samples 9, 10, 13, 15, 16, 19, 23), Strumica basin (Stuka section, samples 4–5).

***Cibicides* sp.**
Plate II, Figures 16, 17

Material. 10 specimens, with different degree of preservation.
Description. The test is low-trochospiral, with convex umbilical side and slightly concave spital one. The last worl comprises 6–7 chambers very slowly increasing in size. They are separated by straight, radial, slightly depressed sutures. The periphery is acute or bears narrow keel. The aperture is indistinct.
Occurrence. Tikvesh basin (Hadzi Jusufli section, sample 4; Krivolak section, samples 5, 6).

Superfamily NONIONACEA Schultze, 1854
Family NONIONIDAE Schultze, 1854
Subfamily NONIONINAE Schultze, 1854
Genus ***Nonion*** de Montfort, 1808
Nonion graniferum (Terquem, 1882)

Material. 20 specimens, most of them well preserved.
Remarks. The species was described from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999, p. 65, pl. 1, Fig. 19).
Occurrence. Ovche Pole basin (Kadrifakovo section, samples 5–7, 10; Madzarica section, samples 11–13, 16).

Genus ***Nonionella*** Cushman, 1926
Nonionella winniana Howe, 1939

Material. More than 30 well preserved specimens.
Remarks. The species was described from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999, p. 65, pl. 1, Figs. 17, 18).
Occurrence. Skopje-Kumanovo basin (Vojnik section, samples 3–4, 6), Ovche Pole basin (Ezevo Brdo section, samples 2, 3, 5–7, 10, 11; Kadrifakovo section, samples 3–4, 7–8).

Subfamily PULLENIINAE Schwager, 1877
Genus ***Mellonis*** de Montfort, 1808
Mellonis affine (Reuss, 1851)
Plate III, Fig. 1

1851. *N. (Nonionina) affinis* m.; Reuss, S. 72, Taf. 5, Fig. 32.
1939. *Nonion affine* (Reuss); Cushman, p. 9, pl. 2, fig. 13.
1961. *Nonion affine* (Reuss); Kaasschieter, p. 203, pl. 11, figs. 3–4.
1962. *Nonion affine* (Reuss); Kiesel, S. 65, Taf. 9, Fig. 14.
1970. *Nonion affine* (Reuss); Le Calvez, p. 190, pl. 27, fig. 2.
1975. *Nonion affine* (Reuss); Samuel, p. 150, pl. 79, fig. 2.
1977. *Melonis affine* (Reuss); Matl, Smigielska, p. 25, pl. 2–2, fig. 4.
1978. *Melonis affine* (Reuss); Odrzywolska-Bienkowa et al., p. 278, pl. 14, figs. 1–2.
1984. *Melonis affine* (Reuss); Odrzywolska-Bienkowa, Pozaryska, p. 145, pl. 14, figs. 7–8.

Nomenclature. The holotype is the specimen figured by Reuss (1851, Taf. 5, Fig. 32). The species was first described from the Oligocene (Septarien clays) of Germany (Hermsdorf surroundings).
Material. 30 samples, most of them are well preserved.
Description. The test is planispiral, involute, oval in outline. The last whorl comprises 11–12 chambers gradually increasing in size. The umbilicus is narrow, slightly depressed. The sutures are flush. The periphery is broadly rounded. The wall is moderately perforated.
Distribution. The species is known from the Eocene of Belgium, the Eocene–Oligocene of the Carpathians, Germany, France, the Eocene–Miocene of the Netherlands, the Oligocene of the USA.
Occurrence. Ovche Pole basin (Nemanjici section, samples 1–2, 5, 7–11, 15), Valandovo-Gevgelija basin (Rabrovo section, samples 7, 13, 15; Dedeli section, samples 6–7).

Genus ***Pullenia*** Parker and Jones, 1862
Pullenia quinqueloba (Reuss, 1851)
Plate III, Fig. 2

1851. *N.* (*Nonionina*) *quinqueloba* m.; Reuss, S. 71, Taf. 5, Fig. 31.
1942. *Pullenia quinqueloba* (Reuss); Dam ten, Reinhold, p. 94, t. 7, fig. 7.
1957. *Pullenia quinqueloba* (Reuss); Sacal, Debourle, p. 52, pl. 22, fig. 14.
1959. *Pullenia quinqueloba* (Reuss); Mallory, p. 246, pl. 34, figs. 1a–b.
1976. *Pullenia quinqueloba* (Reuss); Salaj et al., p. 160, pl. 11, fig. 3.
2008a. *Pullenia quinqueloba* (Reuss); Valchev, p. 116, pl. 1, fig. 7 (with synonymy).

Nomenclature. The holotype is the specimen figured by Reuss (1851, Taf. 5, Fig. 31). The species was first described from the Oligocene (Septarien clays) of Germany (Hermsdorf surroundings).
Material. About 30 specimens, most of them well preserved.
Description. The test is planispiral, involute, elliptical in outline. The last whorl is composed of 5 chambers gradually increasing in size. The periphery is narrowly rounded. The aperture is arch-shaped, at the base of the last formed chamber.
Remarks. The species differs from P. jarvisi Cushman by the presence of 5 chambers in the last whorl.
Distribution. It is known from the Senonian of Saratov and Volgograd Districts, Turkmenia, France, the Paleocene of Denmark, North Caucasus, Turkmenia, Tunisia, the Netherlands, the Upper Paleocene of England, the Eocene of Bulgaria, Ukraine, Donets

basin, the Carpathians, Belgium, the Netherlands, England, Turkmenia, the Oligocene of Germany, Belgium, the Netherlands, Trinidad, Turkmenia, the Upper Miocene of Dominican Republic, the Miocene of Vienna basin, Bavaria, the Miocene and Pliocene of the Netherlands. It was also established during the deep-sea drilling in the Atlantic (Eocene–Oligocene, Upper Miocene, Pleistocene), Bay of Biscay (Upper Eocene–Oligocene), Norwegian Sea (Lower Eocene). Nowadays it lives in calm waters and great depths.
Occurrence. Ovche Pole basin (Nemanjici section, samples 1–3, 9–12, 14–16), Valandovo–Gevgelija basin (Rabrovo section, samples 6, 7, 9, 14; Dedeli section, sample 2), Delchevo basin (Crna Skala section, samples 16, 22, 26).

Superfamily CHILLOSTOMELLACEA Brady, 1881
Family CHILOSTOMELLIDAE Brady, 1881
Subfamily CHILOSTOMELLINAE Brady, 1881
Genus ***Chilostomelloides*** Cushman, 1926
Chilostomelloides balkhanensis (Dain et Chalilov, 1952)
Plate III, Fig. 3

1952. *Chilostomella balkhanensis* Dain et Chalilov, sp. n.; Dain, p. 125, pl. 2, figs. 3–4 (in Russian).
1967. *Chilostomella balkhanensis* Dain et Chalilov; Chalilov, p. 110, pl. 22, fig. 2 (in Russian).

Nomenclature. The holotype (VNIGRI Coll. No. 4282) is from the Upper Eocene–Lower Oligocene (Bolivina Zone) of Western Turkmenia (Malij Balkhan).
Material. 12 badly preserved specimens.
Description. The test is elongate, fusiform, with strongly embracing chambers. Only the final two of them are visible from the exterior. The sutures are oblique, slightly depressed. The aperture is circular, situated at the base of the last formed chamber.
Remarks. The circular aperture, as well as the form of the test made us to refer this species to genus Chilostomelloides Cushman.
Distribution. The species is known from the Upper Eocene of Azerbaijan, the Upper Eocene–Lower Oligocene of Turkmenia.
Occurrence. Ovche Pole basin (Nemanjici section, samples 1–4).

Family HETEROLEPIDAE Gonzales–Donoso, 1969
Genus ***Anomalinoides*** Brotzen, 1942
Anomalinoides acutus (Plummer, 1926)
Plate III, Fig. 4

1948. *Anomalinoides acuta* (Plummer); Brotzen, p. 87, pl. 14, fig. 2.
1960. *Anomalinoides acuta* (Plummer); Olsson, p. 51, pl. 11, figs. 4–5.
1961. *Anomalina acuta* Plummer; Kaasschieter, p. 216, pl. 12, figs. 12-13; pl.13, fig. 4.
1983. *Anomalinoides acuta* (Plummer); Hanzlikova, p. 60, pl. 10, fig. 12.
2008b. *Anomalinoides acutus* (Plummer); Valchev, p. 123, pl. 1, figs. 1, 2 (with synonymy).

Nomenclature. The species was first described from the Paleocene of Texas. Here it is identified after the SEM images of Valchev (2008b, pl. 1, Figs. 1, 2).
Material. 7 well preserved specimens.
Description. The test is low trochospiral, compact, slightly convex on both sides. The spiral side comprises 2.5 whorls. The last whorl is composed of 10–11 inflated chambers separated by slightly depressed, oblique, and curved backwards sutures. The wall is coarsely perforate. The aperture is low interiomarginal arch.
Distribution. It is known from the Upper Cretaceous and the Paleocene of Texas, the Upper Cretaceous, Paleocene and Eocene of Bulgaria, the Paleocene of Trinidad, Arkansas, the Netherlands, Sweden, Tunisia, Caucasus, Middle Asia, the Lower Eocene of England, the Eocene of Ukraine, Byelorussia, Caucasus, Ural, North Turkmenia, Germany, Belgium. It was also found during the deep-sea drilling in Norwegian Sea (Lower Eocene) and the Atlantic (Eocene).
Occurrence. Delchevo basin (Crna Skala Section, samples 21, 25).

Anomalinoides danicus (Brotzen, 1940)
Plate III, Fig. 5

1968. *Anomalina danica* (Brotzen); Pozaryska, Szczechura, p. 86, pl. 14, figs. 6–11.
1970. *Anomalina* ex gr. *danica* (Brotzen); Shutskaya, pl. 4, fig. 10, pl. 12, fig. 10, pl. 37, fig. 3 (in Russian).
1975. *Anomalina* cf. *danica* (Brotzen); Braga et al., p. 97, t. 2, figs. 12a–c.
1975. *Gavelinella danica* (Brotzen); Berggren, Aubert, p. 155, pl. 6, figs. 3, pl. 11, fig. 1, pl. 13, fig.1, pl. 14, fig. 4, pl. 17, fig. 7; pl. 19, fig. 4.
1976. *Anomalina danica* (Brotzen); Salaj et al., p. 162, pl. 9, figs. 4–5.
1983. *Gavelinella danica* (Brotzen); King, p. 35, pl. 5, figs. 16–17.
2008b. *Anomalinoides danicus* (Brotzen); Valchev, p. 124, pl. 1, figs. 3, 4 (with synonymy).

Nomenclature. The species was first described from the Maastrichtian of the Netherlands. Here it is identified after the SEM images of Valchev (2008b, pl. 1, Figs. 3, 4).
Material. 15 specimens with different degree of preservation.
Description. The test is low trochospiral, compact. The spiral side comprises 2–2.5 worls. The last whorl is composed of 8–9 chambers gradually increasing in size. The sutures are radial, slightly curved backwards, depressed. The wall is coarsely perforated. The periphery is broadly rounded. The aperture is arch-shaped, interiomarginal.
Distribution. It is known from the Upper Cretaceous of Germany, the Maastrichtian of Tunisia, Ukraine, the

PLATE III **ТАБЛИЦА III**

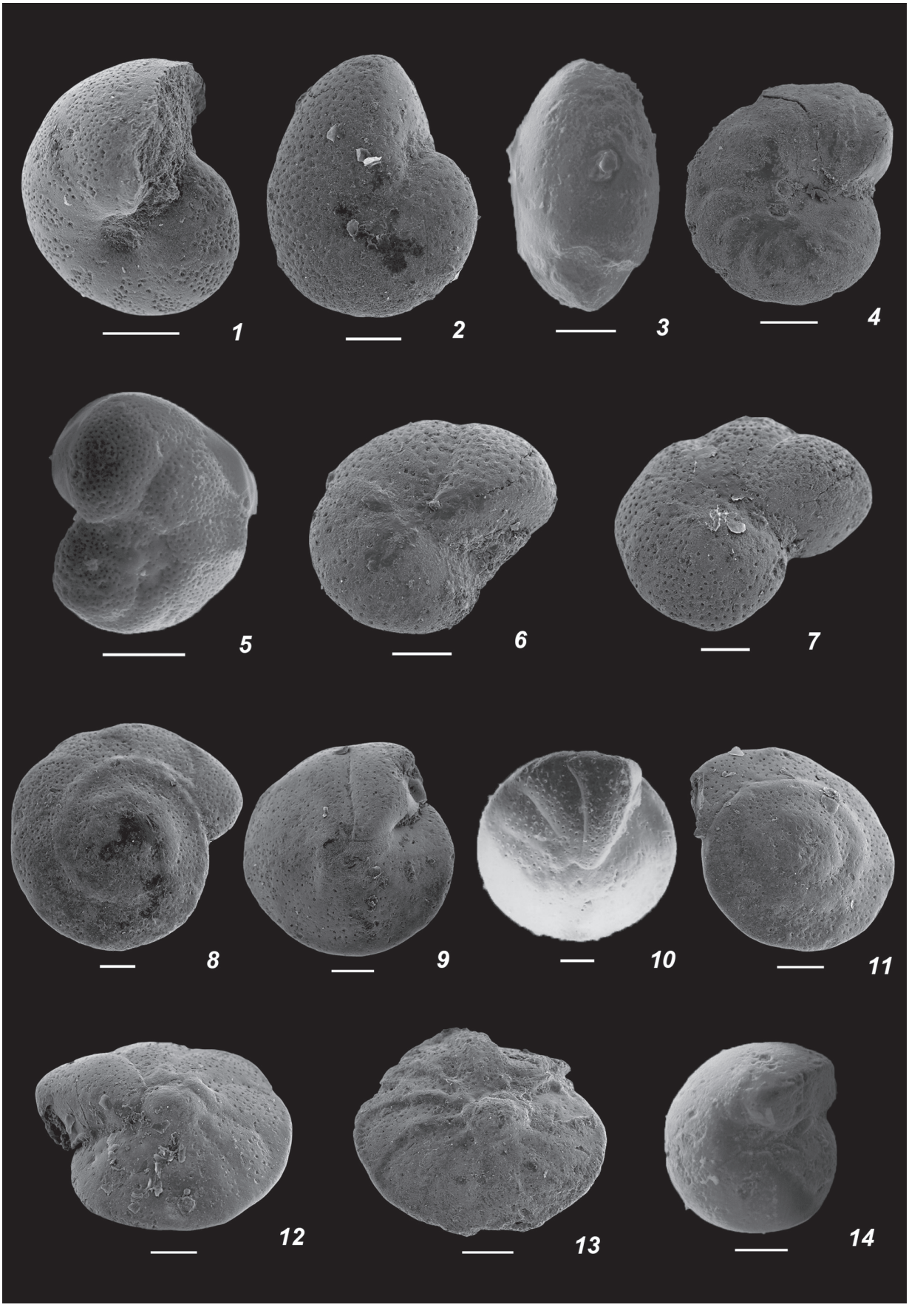

PLATE III

1. ***Mellonis affine*** (Reuss, 1851)
Valandovo–Gevgelija basin, Rabrovo section, upper flysh unit, sample 15, spiral view; SEMx230
2. ***Pullenia quinqueloba*** (Reuss, 1851)
Delchevo basin, Crna Skala section, upper flysh unit, sample 16, spiral view; SEMx140
3. ***Chilostomelloides balkhanensis*** (Dain et Chalilov, 1952)
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 3; SEMx250
4. ***Anomalinoides acutus*** (Plummer, 1926)
Delchevo basin, Crna Skala section, upper flysh unit, sample 24, umbilical view; SEMx180
5. ***Anomalinoides danicus*** (Brotzen, 1940)
Ovche Pole basin, Nemanjici section, upper flysh unit, sample 13, umbilical view; SEMx280
6, 7. ***Anomalinoides welleri*** (Plummer, 1926)
Tikvesh basin, Krivolak section, upper flysh unit, sample 3: 6, umbilical view, SEMx150; 7, spiral view, SEMx190
8–11. ***Heterolepa dutemplei*** (d'Orbigny, 1846)
8, 9, Delchevo basin, Crna Skala section, upper flysh unit, sample 5: 8, spiral view, SEMx120; 9, umbilical view, SEMx130; 10, Ovche Pole basin Nemanjici section, upper flysh unit, sample 7, umbilical view, SEMx120; 11, Valandovo–Gevgelija basin, Dedeli section, upper flysh unit, sample 11, spiral view, SEMx150
12, 13. ***Heterolepa perlucida*** **(Nautall,1932)**
Valandovo–Gevgelija basin, Rabrovo section, upper flysh unit, sample 15: 12, umbilical view, SEMx150; 13, spiral view, SEMx180
14. ***Gyroidinoides soldanii*** **(**d'Orbigny, 1826)
Ovche Pole basin, Madzarca section, upper flysh unit, sample 12, umbilical view, SEMx220
Scale bar – 100 μm

ТАБЛИЦА III

1. ***Mellonis affine*** (Reuss, 1851)
Валандово–Гевгелийски басейн, разрез Раброво, горна флишка задруга, пр. 15, спирална страна; SEMx230
2. ***Pullenia quinqueloba*** (Reuss, 1851)
Делчевски басейн, разрез Црна скала, горна флишка задруга, пр. 16, спирална страна; SEMx140
3. ***Chilostomelloides balkhanensis*** (Dain et Chalilov, 1952)
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 3; SEMx250
4. ***Anomalinoides acutus*** (Plummer, 1926)
Делчевски басейн, разрез Црна скала, горна флишка задруга, пр. 24, умбиликална страна; SEMx180
5. ***Anomalinoides danicus*** (Brotzen, 1940)
Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 13, умбиликална страна; SEMx280
6, 7. ***Anomalinoides welleri*** (Plummer, 1926)
Тиквешки басейн, разрез Криволак, горна флишка задруга, пр. 3: 6 – умбиликална страна, SEMx150; 7 – спирална страна, SEMx190
8–11. ***Heterolepa dutemplei*** (d'Orbigny, 1846)
8, 9 – Делчевски басейн, разрез Црна скала, горна флишка задруга, пр. 5: 8 – спирална страна, SEMx120; 9 – умбиликална страна, SEMx130; 10 – Овчеполски басейн, разрез Неманци, горна флишка задруга, пр. 7, умбиликална страна, SEMx120; 11 – Валандово–Гевгелийски басейн, разрез Дедели, горна флишка задруга, пр. 11, спирална страна, SEMx150
12, 13. ***Heterolepa perlucida*** **(Nautall, 1932)**
Валандово–Гевгелийски басейн, разрез Раброво, горна флишка задруга, пр. 15: 12 – умбиликална страна, SEMx150; 13 – спирална страна, SEMx180
14. ***Gyroidinoides soldanii*** **(**d'Orbigny, 1826)
Овчеполски басейн, разрез Маджарица, горна флишка задруга, пр. 12; умбиликална страна, SEMx220

Netherlands, the Paleocene of North Europe, Poland, Ukraine, North Caucasus, Crimea, Tunisia, Bulgaria, the Eocene of Spain, France, Italy, Caucasus, Middle Asia, the Carpathians, deep-sea holes in the Atlantic (Paleocene–Lower Eocene), and Norwegian Sea (Lower Eocene).

Occurrence. Ovche Pole basin (Nemanjici section, samples 6–8, 13–15).

Anomalinoides welleri (Plummer, 1926)
Plate III, Figs. 6, 7

1951. *Anomalina welleri* (Plummer); Cushman, p. 63, l. 18, fig. 12.
1954. *Anomalina* (*Anomalina*) *welleri* (Plummer); Vassilenko, p. 62, pl. 3, figs. 6, 7.
1975. *Anomalinoides welleri* (Plummer); Berggren, Aubert, p. 151, pl. 5, fig. 3, pl. 13, fig. 7, pl. 18, fig. 6, pl. 19, fig. 1.
1976. *Anomalinoides welleri* (Plummer); Aubert, Berggren, p. 430, pl. 9, fig. 5.
1992. *Anomalinoides welleri* (Plummer); Kaiho, p. 255, pl. 4, fig. 3.
2008b. *Anomalinoides welleri* (Plummer); Valchev, p. 124, pl. 1, fig. 7.

Nomenclature. The species was first described from the Paleocene of Texas. Here it is identified after the SEM images of Kaiho (1992).
Material. 12 specimens with different degree of preservation.
Description. Test is trochospiral, biconvex, moderately flattened. Spiral side is evolute and it reveals 2–2.5 whorls, as the chambers are distinct in the last one only. 10–12 triangular chambers with gradually increasing sizes are visible on the umbilical side. Sutures are radial, slightly depressed, curved backwards. Umbilicus is narrow, deep, usually filled with secondary deposits. Periphery is broadly rounded. Wall is finely perforated. Aperture is slit-like, extended from periphery to umbilicus.
Distribution. The species is known from the Maastrichtian and Paleocene of the Tethys region. It was also established in the deep-sea holes in the North Atlantic (Paleocene).
Occurrence. Ovche Pole basin (Nemanjici section, samples 1, 2, 16–18), Tikvesh basin (Krivolak section, samples 3, 5).

Genus ***Heterolepa*** Franzenau, 1894
Heterolepa dutemplei (d'Orbigny, 1846)
Plate III, Figs. 8–11

1846. *Rotalina Dutemplei* d'Orbigny; d'Orbigny, p. 157, pl. 8, figs. 19–21.
1942. *Cibicides dutemplei* (d'Orbigny); Dam ten, Reinhold, p. 99, t. 8, fig. 3.
1954. *Cibicides* (*Gemellides*) *dutemplei* (d'Orbigny); Vassilenko, p. 195, pl. 35, figs. 1, 3 (in Russian).
1957. *Cibicides dutemplei* (d'Orbigny); Sacal, Debourle, p. 68, pl. 32, fig. 7.
1961. *Cibicides dutemplei* (d'Orbigny); Kaasschieter, p. 218, pl. 12, fig. 15.
1962. *Cibicides* cf. *dutemplei* (d'Orbigny); Kiesel, S. 73, taf. 11, fig. 1.
1970. *Heterolepa dutemplei* (d'Orbigny); Le Calvez, p. 202.
1975. *Heterolepa dutemplei* (d'Orbigny); Braga et al., p. 109, t. 6, fig. 1–3.
1978. *Heterolepa dutemplei* (d'Orbigny); Kantorova, p. 206, t. 45, figs. 1–6.
1979. *Heterolepa dutemplei* (d'Orbigny); Sztrakos, p. 88, pl. 31, fig. 1.
1980. *Heterolepa dutemplei* (d'Orbigny); Jutson, p. 381, pl. 2, fig. 14.
1985. *Heterolepa dutemplei* (d'Orbigny); Grünig, p. 275, pl. 11, figs. 4–6.
1985. *Heterolepa dutemplei* (d'Orbigny); Papp, Schmidt, p. 61, pl. 52, figs. 1–6.

Nomenclature. The species was first described from the Badenian of the Vienna Basin. The lectotype (GBA Coll. No. 1981/03/240) was designated by Papp, Schmidt (1985, pl. 14, Fig. 2).
Material. About 25 specimens, most of them well preserved.
Description. The test is low trochospiral, biconvex, as the umbilical side is more elevated. The spiral one is compose of 2–2.5 worls. The last worl comprises 10–12 chambers separated by radial, curved backwards, slightly depressed (on the umbilical side) or flush (on the spiral side) sutures. The wall is moderately perforated. The periphery is subangular. The aperture is slit-shaped, interiomarginal.
Distribution. The species is known from the Paleocene of Ukraine, the Carpathians, the Eocene of Belgium, France, Spain, Italy, the Oligocene of Germany, Turkmenia, the Former republic of Yugoslavia, the Eocene–Miocene of the Carpathians, Sahalin Peninsula, the Oligocene–Miocene of Spain, Hungary, the Netherlands,
Occurrence. Ovche Pole basin (Nemanjici section, samples 3, 4, 6–8, 11–13, 17–18), Valandovo-Gevgelija basin (Rabrovo section, samples 3, 7–8; Dedeli section, samples 1, 2, 6, 7, 10–12), Delchevo basin (Crna Skala Section, samples 4, 9, 16, 18).

Heterolepa perlucida (Nuttall, 1932)
Plate III, Figs. 12, 13

1954. *Cibicides* (*Gemellides*) *perlucidus* Nuttall; Vassilenko, p. 191, pl. 34, figs. 2, 4.
1957. *Cibicides perlucidus* Nuttall; Sacal, Debourle, p. 69, pl. 31, fig. 8.
1971. *Heterolepa perlucida* (Nautall); Ferrer, p. 61, lam. 7, figs. 13–14.
1978. *Cibicides perlucidus* Nuttall; Shutskaya et al., pl. 3, fig.7 (in Russian).
1979. *Cibicidoides perlucidus* (Nuttall); Schnitker, pl. 11, figs. 10–12.
1984. *Heterolepa perlucida* (Nautall); Odrzywolska-Bienkowa, Pozaryska, p. 144, pl.14, fig. 4.
1984a. *Heterolepa perlucida* (Nautall); Olszewska, p. 31, tabl. 7, fig. 8.
2008b. *Heterolepa perlucida* (Nuttal); Valchev, p. 125, pl. 1, figs. 11, 12 (with synonymy).

Nomenclature. The species was first described from the Lower Oligocene of Mexico. Here it is identified after the SEM images of Valchev (2008b, pl. 1, Figs. 11, 12).

Material. 5 specimens with different degree of preservation.
Description. The test is low trochospiral, biconvex. The spiral one is compose of 2–2.5 worls. The last worl comprises 9–10 chambers separated by radial, curved backwards, slightly depressed (on the umbilical side) or flush (on the spiral side) sutures. The wall is moderately perforated. The periphery is subangular. The aperture is slit-shaped, interiomarginal.
Remarks. The species differs from *H. grimsdalei* (Nuttall) by its smaller pore's diameter on the spiral side, and from *H. dutemplei* (d'Orbigny) by the less convex test.
Distribution. It is known from the Paleocene and Eocene of Bulgaria, Spain, Turkmenia, France, North Caucasus, Crimea, the Carpathians, the Upper Eocene of Poland, the Oligocene of Mexico and the Carpathians, the Oligocene and Miocene of France.
Occurrence. Valandovo-Gevgelija basin (Rabrovo section, samples 8, 13, 15).

Family GAVELINELLIDAE Hofker, 1956
Subfamily GYROIDINOIDINAE Saidova, 1981
Genus ***Gyroidinoides*** Brotzen, 1942
Gyroidinoides soldanii (d'Orbigny, 1826)
Plate III, Fig. 14

1846. *Rotalina Soldanii* d'Orbigny; d'Orbigny, p. 155, pl. 8, figs. 10–12.
1947. *Gyroidina soldanii* d'Orbigny; Subbotina, p. 99, pl. 3, figs. 20–22 (in Russian).
1953. *Gyroidina soldanii* d'Orbigny; Myatlyuk, p. 61, pl. 5, figs. 3–5 (in Russian).
1957. *Gyroidina soldanii* d'Orbigny; Sacal, Debourle, p. 36, pl. 13, figs. 7–8.
1962. *Gyroidina soldanii* d'Orbigny; Kiesel, S. 69, taf. 10, fig. 6.
1975. *Gyroidina soldanii* d'Orbigny; Samuel, p. 151, pl. 81, figs. 3–4.
1975. *Gyroidinoides soldanii* (d'Orbigny); Braga et al., p. 97, t. 2, figs. 19a–c; p. 109, t. 6, figs. 10–11.
1977. *Gyroidina soldanii* d'Orbigny; Pozaryska, p. 43, pl. 4, figs. 4a-c, pl. 13, figs. 12–13.
1978. *Gyroidina soldanii* d'Orbigny; Odrzywolska–Bienkowa et al., p. 277, pl. 13, fig. 6.
1978. *Gyroidinoides soldanii* (d'Orbigny); Proto Decima, Bolli, p. 794, pl. 5, figs. 1–2.
1979. *Gyroidinoides soldanii* (d'Orbigny); Sztrakos, p. 87, pl. 29, fig. 6.
1980. Gyroidina soldanii d'Orbigny; Jutson, p. 381, pl. 2, fig. 12.
1984a. *Gyroidina soldanii* d'Orbigny; Olszewska, p. 30, tabl. 6, fig. 13.
1984. *Gyroidina soldanii* d'Orbigny; Olszewska, Szymakowska, p. 134, tabl. 2, fig. 13.
1985. *Gyroidinoides soldanii* (d'Orbigny); Grünig, p. 275, pl. 10, figs. 12–14.
1985. *Gyroidina soldanii* d'Orbigny; Papp, Schmidt, p. 60, pl. 50, figs. 4–9.
1987. *Gyroidina soldanii* d'Orbigny; Ponomareva, p. 64, pl. 2, fig. 2 (in Russian).
1988. *Gyroidinoides soldanii* (d'Orbigny); Parisi, Coccioni, p. 104, pl. 3, figs. 20–22; pl. 4, figs. 1–3.

Nomenclature. The species was first described from the Eocene of France (Bordeaux vicinities). Here it is identified after the images of Papp, Schmidt (1985, pl. 50, Figs. 4–9).
Material. About 30 specimens with different degree of preservation.
Description. The test is trochospiral, with flat or slightly convex spiral side and highly convex umbilical one. The spiral side comprises 2–2.5 whorls. The last whorl is composed of 11–12 chambers gradually increasing in size. The last formed one is subconical in shape. The umbilicus is open, narrow. The sutures are radial, flush to slightly depressed on the umbilical side, and oblique, depressed on the spiral side. The periphery is narrowly rounded, the surface is smooth. The aperture is slit-like, interiomarginal.
Distribution. The species is known from the Paleocene and Eocene of France, Italy, Spain, the Paleocene–Oligocene of Caucasus and Middle Asia, the Upper Eocene of the Carpathians, the Eocene–Oligocene of the Atlantic, the Eocene-Pleistocene of the Carpathians, the Oligocene of Germany, the Oligocene–Neogene of Hungary, Spain, the Miocene of the Vienna Basin, Paris Basin.
Occurrence. Ovche Pole basin (Nemanjici section, samples 3, 4, 6–10, 16–18; Madzarica section, samples 11–13), Tikvesh basin (Hadzi Jusufli section, samples 2, 4, 5, 7; Krivolak section, samples 2, 3, 5, 6).

Superfamily ROTALIACEA, Ehrenberg, 1839
Family ROTALIIDAE Ehrenberg, 1839
Subfamily PARARPTALIINAE Reiss, 1963
Genus ***Pararotalia*** Le Calvez, 1949
Pararotalia audouini (d'Orbigny, 1826)

Material. 40 specimens with different degree of preservation.
Remarks. The species was described from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999, p. 66, pl. 1, Fig. 20).
Occurrence. Skopje–Kumanovo basin (Vojnik section, samples 7, 8), Ovche Pole basin (Ezevo Brdo section, samples 4–14; Kadrifakovo section, samples 5–10), Strumica basin (Stuka section, samples 3–5).

Pararotalia subinermis Bhatia, 1955

Material. 25 specimens, most of them well preserved.
Remarks. The species was described from Chardaklija section of the Ovche Pole basin (Džuranov et al., 1999, p. 66, pl. 1, Fig. 21).
Occurrence. Skopje–Kumanovo basin (Vojnik section, samples 4, 5, 7), Ovche Pole basin (Kadrifakovo section, samples 3–7, 10; Madzarica section, samples 5, 7–9).

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