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GENUS LENTICULINA LAMARCK, 1804 FROM THE PALEOCENE OF THE COASTAL PART OF EAST STARA PLANINA

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ABSTRACT. A rich and diverse (over 230 species) foraminiferal microfauna, including representatives of genus *Lenticulina* Lamarck, 1804, was established as a result of the detailed taxonomical study of the small benthic foraminifera from the Paleocene of the coastal part of east Stara Planina carried out in the last few years. The considerable taxonomical diversity as well as the publishing of the second edition of the Loeblich, Tappan's (1988) catalogue made us to revise the existing concepts about the generic belonging of many of the species.
The present article represents taxonomical descriptions of 12 species small benthic foraminifera from the Paleocene of the coastal part of east Stara Planina belonging to genus *Lenticulina* Lamarck, 1804. 5 of them are first described in Bulgaria, 7 –first described in the Bulgarian Paleocene, 7 –first described in the coastal part of East Stara Planina. The stratigraphical distribution of 1 species was broadened. The Loeblich, Tappan's (1988) classification is applied in the article.
KEY WORDS: small benthic foraminifera, taxonomy, Paleocene, East Stara Planina.

РОД LENTICULINA LAMARCK, 1804 ОТ ПАЛЕОЦЕНСКАТА СЕРИЯ В ПРИМОРСКАТА ЧАСТ НА ИЗТОЧНА СТАРА ПЛАНИНА

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РЕЗЮМЕ. В резултат от проведените през последните няколко години детайлни таксономични изследвания върху малките бентосни фораминифери от палеоценската серия в приморската част на Източна Стара планина беше установено наличието на богата и разнообразна фораминиферна микрофауна (повече от 230 вида), включваща и представители на род *Lenticulina*. Значителното таксономично разнообразие, както и публикуването на второто издание на каталога на Loeblich, Tappan (1988) налагат ревизия на съществуващите в българската микропалеонтоложка литература схващания за родовата принадлежност на голяма част от видовете.
Настоящата статия представя таксономични описания на 12 вида малки бентосни фораминифери от палеоценската серия в приморската част на Източна Стара планина принадлежащи на род *Lenticulina* Lamarck, 1804. 5 от тях се описват за първи път в България, 7 – за първи път в палеоценската серия в нашата страна, 7 – за парви път в приморската част на Източна Стара планина. Разширено е стратиграфското разпространение на 1 вид. При таксономичните описания е използвана класификацията на Loeblich, Tappan (1988).
КЛЮЧОВИ ДУМИ: малки бентосни фораминифери, таксономия, палеоценска серия, Източна Стара планина.

Introduction

The first taxonomical descriptions of lenticulinids in Bulgaria were made by Бакалов (1942). The author described a few species from the Miocene of North Bulgaria. Later Станчева (1959) published descriptions of various representatives of the genus from "the Cretaceous and Tertiary" of the North-East Bulgaria. Both authors reffered the species to the genera *Cristelaria* and *Robulus*. A rich and diverse (over 230 species – Valchev, 2003a, b) foraminiferal microfauna, including representatives of genus *Lenticulina* Lamarck, 1804, was established as a result of the detailed taxonomical study of the small benthic foraminifera from the Paleocene of the coastal part of east Stara Planina carried out in the last few years. The considerable taxonomical diversity as well as the publishing of the second edition of the Loeblich, Tappan's (1988) catalogue made us to revise the existing concepts about the generic belonging of many of the species. For this purpose 251 samples from holes and outcrops (including 74 samples from the geological mapping in M 1:50 000, carried out in 1993) were investigated. A sketch with the location of the studied sections and outcrops was published by Valchev (2003b). The stratigraphical distribution of the species was determined on the base of the planktic foraminiferal (Juranov, 1983; Джуранов, 1994) and calcareous nannoplankton (Ivanov, Staykova, 1994; Sinnyovsky, Sultanov, 1994; Sinnyovsky, Stoykova, 1995; Sinnyovsky, 2001) zonations for the studied area. The microphotographs were made in the Central Laboratory of Mineralogy and Crystalography of the Bulgarian Academy of Sciences by scanning electron microscope "Philips SEM-515" (U_{op} = 25 kV).

Taxonomical descriptions

The present article represents taxonomical descriptions of 12 species small benthic foraminifera from the Paleocene of the coastal part of east Stara Planina belonging to genus *Lenticulina* Lamarck, 1804. 5 of them are first described in Bulgaria, 7 –first described in the Bulgarian Paleocene, 7 –first described in the coastal part of East Stara Planina. The stratigraphical distribution of 1 species was broadened. The Loeblich, Tappan's (1988) classification is applied in the article.

Order FORAMINIFERIDA Eichwald, 1830.

Suborder LAGENINA Delage and Herouard, 1896.

Superfamily NODOSARIACEA Ehrehberg, 1838
Family VAGINULINIDAE Reuss, 1860
Subfamily LENTICULININAE Chapman, Parr, and Collins, 1934
Genus ***Lenticulina*** Lamarck, 1804

Type species: *Lenticulites rotulatus* Lamarck, 1804 (subsequently designated by Children, 1823);

Distribution: Triassic – Holocene; cosmopolitan.

Lenticulina clypeiformis (d'Orbigny, 1846)

Plate I, Fig. 1

1846. *Robulina clypeiformis* d'Orbigny; d'Orbigny, p. 101, tab. 4, fig. 23, 24.
1863. *Robulina limbosa* Reuss, S. 55, Taf. 6, Fig. 69.
1942. *Robulina* (*Cristelaria*) *clypeiformis* d'Orb.; Бакалов, с.11, табл. 3, фиг. 6.
1959. *Robulus clypeiformis* (d'Orbigny); Станчева, с. 147, табл. 10, фиг. 1,2.
1985. *Lenticulina clypeiformis* (d'Orbigny); Papp, Schmidt, p. 43, pl. 31, figs. 1-5.
1998. *Lenticulina clypeiformis* (d'Orbigny); Rögl in Cicha et al., p. 110, pl. 23, fig. 8.

Nomenclature. The lectotype was designated by Papp, Schmidt (1985, pl. 31, fig. 3). The species was first described from the Badenian of the Viena Basin.

Material. Byala Formation (23 specimens).

Remarks. The species was described from the Upper Eocene of the North-East Bulgaria (Станчева, 1959) and the Miocene of the North Bulgaria (Бакалов, 1942). Here it is first described from Paleocene sediments.

Distribution. It is known from the Upper Eocene of North America, the Miocene of Ukraine, Viena Basin.

Occurence. C-12 (204.00 m - P1b Zone), C-29 (476.30 m - P5 Zone), Byala 2b Section (NP1-NP3 Zones), the Byala Reka Valley (Paleocene).

Lenticulina cultrata (Montfort, 1808)

Plate I, Fig. 2

1846. *Robulina cultrata* d'Orbigny; d'Orbigny, p. 96, tab. 4, fig. 10-13.
1846. *Robulina similis* d'Orbigny; d'Orbigny, p. 98, tab. 4, fig. 14, 15.
1942. *Cristelaria* (*Robulina*) *cultrata* d'Orb.; Бакалов, с. 10, табл. 3, фиг. 5.
1959. *Robulus cultratus* (d'Orbigny); Станчева, с. 150, табл. 7, фиг. 2.
1962. *Robulus cultratus* (Montfort); Hillebrandt, S. 54, Taf. 3, Fig. 15, 16.
1985. *Lenticulina cultrata* (d'Orbigny); Papp, Schmidt, p. 41, pl. 26, figs. 4-7, pl. 29, figs. 1-5.
1988. *Lenticulina cultrata* (d'Orbigny); Loeblich, Tappan, pl. 446, figs. 9, 10.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (61 specimens).

Remarks. The species was described from the Upper Eocene of the North-East Bulgaria (Станчева, 1959) and the Miocene of the North Bulgaria (Бакалов, 1942). I accept the Papp, Schmidt's (1985) revision according to which *L. similis* d'Orbigny is sinonimous with *L. cultrata* (Montfort).

Distribution. The species is known from the Paleocene of the Alps, the Eocene of the USA, the Oligocene of Bavaria, the Miocene of the Viena Basin, Bavaria. It was also established in recent deposits.

Occurence. C-11 (191.60 m - P1c Zone), C- 12 (167.00 m – Lower Paleocene, 219.00-270.00 m - P1c Zone), C-25 (P1b Zone), C-30 (83.90-86.30 m - P4 Zone), Byala 2b Section (NP1-NP3 Zones), the Byala Reka and Koundilaki Cheshme Valleys (Paleocene).

Lenticulina degolyeri (Plummer, 1926)

Plate I, Fig.3

1951. *Robulus degolyeri* (Plummer); Cushman, p. 14, pl. 3, figs. 21, 22.
1964. *Robulus degolyeri* (Plummer); Pozaryska, p. 540, pl. 1, fig. 22.
1965. *Robulus degolyeri* (Plummer); Pozaryska, p. 62, pl. 7, fig. 4.
1971. *Lenticulina degolyeri* (Plummer); Каптаренко-Черноусова, с. 107, табл. 6, фиг. 2.
1976. *Lenticulina degolyeri* (Plummer); Aubert, Berggren, p. 414, pl. 2, fig. 14.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (26 specimens), Emine Formation (1 specimen).

Description. Test is slightly elongated, moderately laterally flattened. Chambers are triangular, slightly curved backwards, gradually increasing in size. Sutures are clear, slightly elevated and curved around the central boss. Periphery bears narrow translucent keel. Apertural surface is slightly convex, aperture is terminal, radiate.

Distribution. The species is known from the Paleocene of the USA, Poland, Tunisia, Ukraine.

Occurence. Byala Formation: C-12 (264.00 m – Lower Paleocene), C-29 (474.30 m - P5 Zone), C-30 (99.50 m - P5 Zone), Byala 2b Section (NP2-NP3 Zones); Emine Formation: a sample from the geological mapping (Paleocene).

Lenticulina disca (Brotzen, 1948)

Plate I, Fig. 4

1948. *Robulus discus* n. sp.; Brotzen, p. 42, pl. 7, figs. 3-5, text-fig. 7.
1957. *Robulus discus* Brotzen; Pozaryska, p. 130, text-fig. 29.
1965. *Planularia discus* (Brotzen); Pozaryska, p. 67, pl. 5, fig. 5.
1971. *Lenticulina discus* (Brotzen); Каптаренко-Черноусова, с. 101, табл. 5, фиг. 7.

Nomenclature. The holotype (S. G. U. No. 2226) is from the Paleocene of Sweden (Klagshamn conglomerate). It was figgured by Brotzen (1948, pl. 7, fig. 4).

Material. Byala Formation (2 specimens).

Description. Test is strongly laterally flattened, composed of low triangular chambers. Sutures are slightly depressed, curved backwards. Central boss is small-sized, convex. Surface is smooth. Aperture is not visible because of the poor preservation of the specimens.

Distribution. The species is known from the Upper Cretaceous of Poland, the Paleocene of Sweden, Danemark, Poland, Australia.

Occurence. Byala 2b Section(NP2-NP3 Zones).

Lenticulina inornata (d'Orbigny, 1846)

Plate I, Fig. 5

1846. *Robulina inornata* d'Orbigny; d'Orbigny, p. 102, tab. 4, fig. 25, 26.

1846. *Robulina simplex* d'Orbigny; d'Orbigny, p.103, tab. 4, fig. 27, 28.
1846. *Robulina austriaca* d'Orbigny; d'Orbigny, p. 103, tab. 5, fig. 1, 2.
1846. *Robulina intermedia* d'Orbigny; d'Orbigny, p. 104, tab. 5, fig. 3, 4.
1866. *Cristelaria inornata* d'Orb.; Reuss, S. 144.
1942. *Robulina* (*Cristelaria*) *inornata* d'Orb.; Бакалов, с. 11, табл. 3, фиг. 10.
1944.*Cristelaria* (*Robulus*) *inornata* (d'Orbigny); Ten Dam, S. 88.
1953. *Cristelaria inornata* (Orbigny); Субботина, с. 156, табл. 1, фиг. 1.
1959. *Robulus inornatus* d'Orbigny; Станчева, с. 153, табл. 5, фиг. 8.
1969. *Robulus inornatus* d'Orbigny; Краева, Зернецкий, с. 59, табл. 21, фиг. 1.
1971. *Lenticulina inornata* (d'Orbigny); Каптаренко-Черноусова, с. 108, табл. 7, фиг. 1, 2.
1985. *Lenticulina inornata* (d'Orbigny); Papp, Schmidt, p. 43, pl. 31, figs. 6-8.
1998. *Lenticulina inornata* (d'Orbigny); Rögl in Cicha et al., p. 110, pl. 23, fig. 1.

Nomenclature. The lectotype (GBA Coll. No. 1981/03/120) was designated by Papp, Schmidt (1985, pl. 31, fig. 7). The species was first described from the Badenian of the Viena Basin.

Material. Byala Formation (over 400 specimens), Emine Formation (25 specimens).

Remarks. The species was described from the Upper Eocene of the North-East Bulgaria (Станчева, 1959) and the Miocene of the North Bulgaria (Бакалов, 1942). I accept the Papp, Schmidt's (1985) revision according to which *L. simplex* d'Orb., *L. austriaca* d'Orb., *L. intermedia* d'Orb. are sinonimous with *L. inornata* d' Orbigny.

Distribution. The species is known from the Paleocene of Danemark, Sweden, the Netherlands, Arkansas, East Kamchatka, the Eocene of the Netherlands, the Upper Eocene of Hungary, Ukraine, North Caucasus, the Oligocene of Hungary, the Miocene of Bavaria.

Occurence. Byala Formation: C-11 (191.60-247.00 m - P1c Zone), C-12 (167.00- 169.70 m – Lower Paleocene, 204.00-289.20 m - P1c Zone, 296.10-303.40 m - P1b Zone), C-21 (22.00-38.50 m - P1b Zone), C-23 (271.20 m - P1b Zone), C-24 (40.00 m - P2 Zone), C-28 (56.90 m - P1c Zone), C-29 (433.50-476.30 m - P5 Zone), C-30 (83.90-86.30 m - P4 Zone, 99.50 m - P5 Zone), Byala 1 (NP3-NP5 Zones), Byala 2b (NP1-NP3 Zones), and Byala 2c(NP1-NP2 Zones) Sections, the Byala Reka and Koundilaki Cheshme Valleys (Paleocene); Emine Formation: Emona section (NP1 Zone).

Lenticulina macrodisca (Reuss, 1862)
Plate I, Fig.6
1862. *Cristelaria macrodisca* m.; Reuss, S. 78, Taf. 9, Fig. 5.
1928. *Lenticulina macrodisca* (Reuss); White, p. 198, pl. 28, fig. 7.
1959. *Lenticulina macrodisca* (Reuss); Станчева, с. 136, табл.1, фиг. 4.

Nomenclature. Holotype is the specimen figgured by Reuss (1862, Taf. 9, Fig. 5). The species was first described from the Upper Cretaceous of North Germany.

Material. Byala Formation (1 specimen).

Remarks. The species was described from the Upper Cretaceous of North-East Bulgaria (Станчева, 1959).

Distribution. It is known from the Upper Cretaceous of Mexico (Velasco Shale), North Germany, Poland, the Paleocene of Venezuela, the Upper Paleocene and Lower Eocene of Turkmenia.

Occurence. Byala 2b Section(NP3 Zone).

Lenticulina ovalis (Reuss, 1845)
Plate I, Fig. 7
1845. *Cristelaria ovalis* Reuss; Reuss, S. 23, Taf. 8, Fig. 49, Taf. 12, Fig. 19, Taf. 13, Fig. 60-63.
1953. *Lenticulina ovalis* (Reuss); Hagn, S. 36, Taf. 3, Fig. 6.
1959. *Lenticulina ovalis* (Reuss); Станчева, с. 141, табл. 4, фиг. 4.
1971. *Lenticulina ovalis* (Reuss); Каптаренко-Черноусова, с. 105, табл. 6, фиг. 3.

Nomenclature. I have no data about the holotype. The species was first described from the Upper Cretaceous of Central Europe.

Material. Byala Formation (9 specimens), Emine Formation (5 specimens).

Remarks. The species was described from the Upper Cretaceous of North-East Bulgaria (Станчева, 1959).

Distribution. It is known from the Upper Cretaceous of West and central Europe, the Paleocene of Ukraine.

Occurence. Byala Formation: C-12 (303.40 m - P1b Zone), C-30 (86.30 m - P4 Zone), Byala 2b Section (NP1-NP3 Zone), the Byala Reka and Koundilaki Cheshme Valleys (Paleocene); Emine Formation: Kochan Section (P1c Zone); samples from the geological mapping (Paleocene).

Lenticulina pseudomamilligera (Plummer, 1926)
Plate I, Fig.8
1946. *Robulus pseudo-mamilligerus* (Plummer); Cushman, Todd, p. 47, pl. 7, fig. 10.
1951. *Robulus pseudo-mamilligerus* (Plummer) Cushman; Cushman, p. 13, pl. 4, figs. 1-5.
1962. *Robulus pseudomamilligerus* (Plummer); Hillebrandt, S. 55, Taf. 3, Fig. 17.
1965. *Robulus pseudo-mamilligerus* (Plummer); Pozaryska, p. 63, pl. 7, fig. 1.
1965. *Robulus pseudomamilligerus* (Plummer); McGowran, p. 27, text-fig. 2 (8).
1969. *Lenticulina mamilligera* Karrer; Краева, Зернецкий, с. 56, табл. 19, фиг. 4.
1971. *Lenticulina pseudomamilligera* (Plummer); Каптаренко-Черноусова, с. 109, табл.6, фиг. 1, табл. 10, фиг. 4.
1976. *Lenticulina pseudomamilligera* (Plummer); Aubert, Berggren, p. 415, pl. 3, fig. 2.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (over 250 specimens), Emine Formation (26 specimens).

Description. Test is slightly elongated, laterally flattened, composed of low triangular chambers gradually increasing in size. The last whorl comprises 6-11 chambers. Sutures are slightly elevated, branching at the peripheral area. Central boss is irregular or indistinct. Periphery with narrow thin keel. Apertural surface is slightly convex, elongated, bordered with narrow edges. Aperture is terminal, radiate.

Remarks. There are variations in the chamber number and the test inflation.

Distribution. The species is known from the Paleocene of North America, Ukraine, Austria, Australia, Tunisia.

Occurence. Byala Formation: C-12 (204.00-219.00 m - P1c Zone, 296.40-303.40 m - P1b Zone), C-23 (271.20 m - P1b Zone), C-25 (41.00 m- P1b Zone), C-28 (15.00 m - P2 Zone), C-29 (365.00 m - P3 Zone, 395.20-420.60 m - P4 Zone, 433.50-476.20 m - P5 Zone), C-30 (83.90-86.30 m - P4 Zone, 99.50-107.90 m - P5 Zone), Byala 1(NP3-NP5 Zones), Byala 2b (NP1-NP3 Zones), and Byala 2c (NP1-NP2 Zones) Sections, the Byala Reka and Koundilaki Cheshme Valleys (Paleocene); Emine Formation: Kochan (P1c Zone), Emona (NP1 Zone), and Banya-Southwest (Lower Paleocene) Sections; samples from the geological mapping (Paleocene).

Lenticulina turbinata (Plummer, 1926)

Plate I, Fig. 9

1956. *Robulus arcuato-striatus* (Hantken); Hagn, S. 127, Taf. 11, Fig. 4.

1971. *Lenticulina klagshamensis* (Brotzen); Каптаренко-Черноусова, с. 103, табл. 5, фиг. 6 (with synonymy).

1976. *Lenticulina turbinata* (Plummer); Aubert, Berggren, p. 415, pl. 3, fig. 4.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (38 specimens).

Description. Test is moderately laterally flattened. The last whorl is composed of 7-8 chambers gradually increasing in size. Sutures are slightly elevated, curved backwards. Keel is narrow, sharp. Central boss is convex. Apertural surface is narrow, bordered with narrow lips. Aperture is terminal, radiate.

Distribution. The species is known from the Paleocene of Central Europe, Sweden, Ukraine, Texas, New Jersey, Tunisia, the Eocene of Turkmenia, the Oligocene of Hungary, deep-sea cores in the Atlantic.

Occurence. C-25 (26.40 m - P1b Zone), Byala 2b Section (NP2 Zone).

Lenticulina velascoensis White, 1928

Plate I, Fig. 10

1928. *Lenticulina velascoensis* n. sp.; White, p. 199, pl. 28, fig. 8.

1959. *Robulus velascoensis* (White); Станчева, с. 159, табл. 8, фиг. 6.

1962. *Robulus velascoensis* (White); Hillebrandt, S. 55, Taf. 3, Fig. 20, 21 (with synonymy).

Nomenclature. The holotype (Columbia University Paleo. Coll. No. 19 884) is from the Paleocene of Mexico (Tampico embayment, locality No. 33).

Material. Byala Formation (40 specimens), Emine Formation (14 specimens).

Remarks. The species was described from the Upper Cretaceous of North-East Bulgaria (Станчева, 1959).

Distribution. It is known from the Upper Cretaceous of Trinidad, the Paleocene of Mexico, California, Central Europe, Georgia, the Upper Eocene of Italy and Panama. It was also established in the deep-sea cores in the Atlantic (Paleocene).

Occurence. Byala Formation: C-12 (203.00-287.00 m - P1c Zone), C-23 (130.50 m - P3 Zone), C-24 (23.00 m - P3 Zone), C-29 (433.50 m - P5 Zone), C-30 (107.90 m - P5 Zone), Byala 1(NP3 Zones), and Byala 2b, (NP1-NP3 Zones) Sections, the Byala Reka and Koundilaki Cheshme Valleys (Paleocene); Emine Formation: samples from the geological mapping (Paleocene).

Lenticulina vortex (Fichtel&Moll, 1798)

Plate I, Fig. 11

1846. *Robulina imperatoria* d'Orbigny; d'Orbigny, p. 104, tab. 105, fig. 5, 6.

1926. *Cristelaria* sp.?; Cushman, p. 601, pl. 19, figs. 11, 14.

1928. *Lenticulina vortex* (Fichtel and Moll); White, p. 199, pl. 28, fig. 9.

1946. *Robulus vortex* (Fichtel and Moll); Cushman, p. 6, pl. 1, figs. 3, 4.

1959. *Robulus vortex* (Fichtel and Moll); Станчева, с. 158, табл. 13, фиг. 5.

1962. *Robulus* cf. *vortex* (Fichtel and Moll); Hillebrandt, S. 56, Taf. 3, Fig. 22.

1985. *Lenticulina vortex* (Fichtel&Moll); Papp, Schmidt, p. 44, pl. 33, figs. 4-8.

1998. *Lenticulina vortex* (Fichtel&Moll); Rögl in Cicha et al., p. 110, pl. 23, fig. 2.

Nomenclature. I have no data about the holotype. Cushman (1946) refigured the original Fichtel and Moll's (1798) images.

Material. Byala Formation (83 specimens).

Remarks. The species was described from the Upper Eocene of North-East Bulgaria (Станчева, 1959). I accept the Papp, Schmidt's (1985) revision according to which *L. imperatoria* (d'Orbigny) is sinonimous with *L. vortex* (Fichtel and Moll).

Distribution. The species is known from the Paleocene of Trinidad, East Kamchatka, the Oligocene of Hungary, from Paleogene to recent sediments in Germany, Italy, Mexico, the Viena Basin.

Occurence. C-12 (204.00-287.90 m - P1c Zone, 296.10 m - P1b Zone), C-28 (15.00 m - P2 Zone, 513.00 m - P3 Zone), C-29 (420.60 m - P4 Zone, 433.50-476.30 m - P5 Zone), C-30 (107.90 m - P5 Zone), Byala 1 (NP3 Zone), and Byala 2b (NP2-NP3 Zones) Sections, the Byala Reka and Koundilaki Cheshme Valleys (Paleocene).

Lenticulina wilcoxensis (Cushman&Ponton, 1932)

Plate I, Fig. 12

1932. *Robulus wilcoxensis* Cushman and Ponton, n. sp.; Cushman and Ponton, p. 52, pl. 7, fig. 3.

1951. *Robulus wilcoxensis* Cushman and Ponton; Cushman, p. 15, pl. 4, fig. 17.

1962. "*Darbyella*" sp. H; Ebensberger, S. 62, Taf. 6, Fig. 8, 9.

1962. *Robulus wilcoxensis* Cushman and Ponton; Hillebrandt, S. 56, Taf. 3, Fig. 24.

1965. *Robulus wilcoxensis* Cushman and Ponton; Pozaryska, p. 65, pl. 7, fig. 2, pl. 8, fig. 3.

1971. *Lenticulina wilcoxensis* Cushman et Ponton; Каптаренко-Черноусова, с. 99, табл. 5, фиг. 2.

Nomenclature. The holotype (Cushman Coll. No. 16186) is from the Eocene of Alabama.

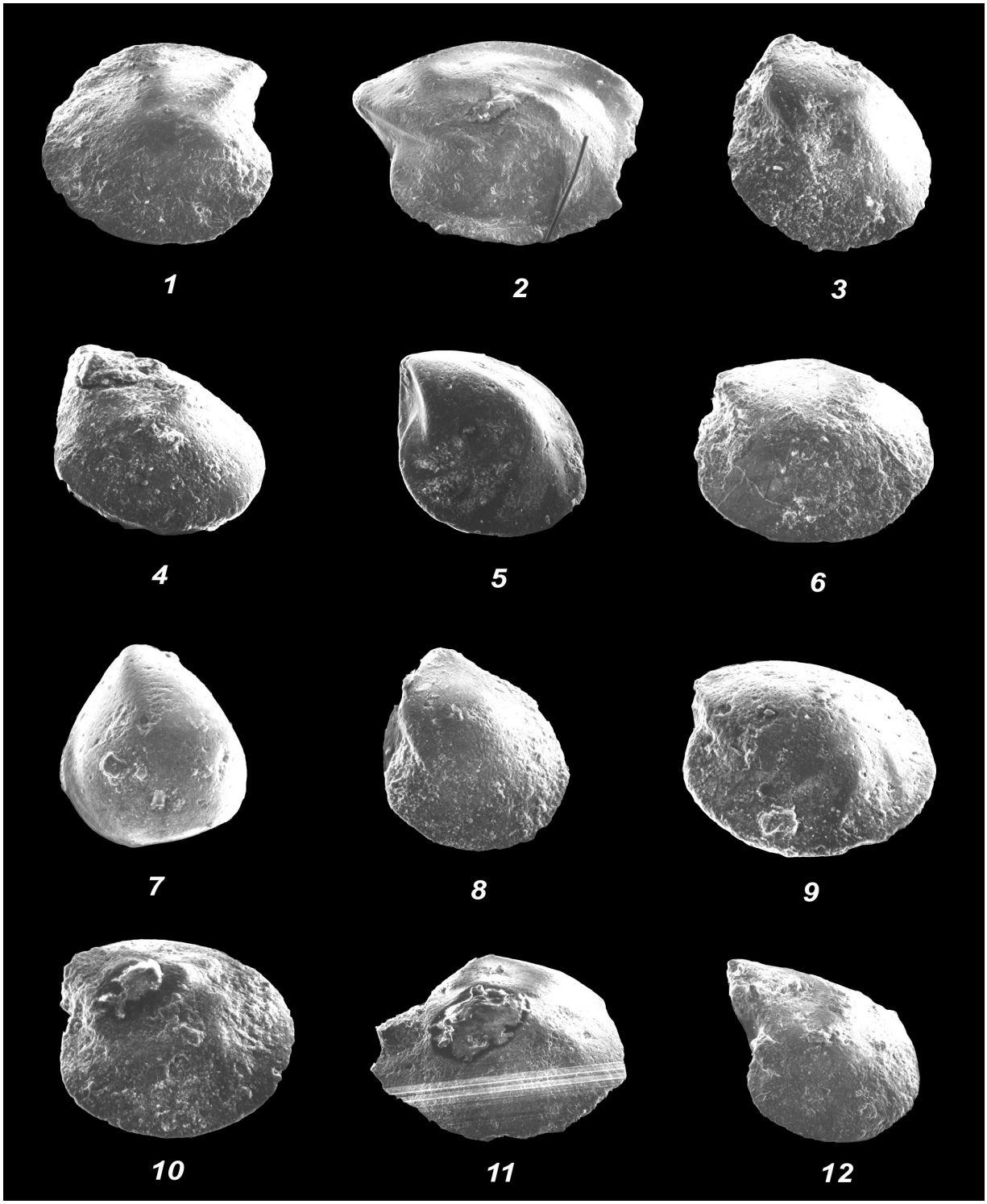
Material. Byala Formation (9 specimens), Emine Formation (1 specimen).

Description. Test is laterally flattened, close-coiled excluding the last 1-2 chambers, that are uniserialy arranged. The last whorl is composed of 9-10 chambers separated by flush or slightly depressed sutures, curved backwards and branching at the peripheral area. Periphery is acute. Aperture is terminal, radiate.

Distribution. The species is known from the Paleocene of the USA, Poland, the Alps, the Upper Eocene of the USA. It was also established in the deep-sea cores from the Atlantic (Paleocene).

Occurence. Byala Formation: C-12 (219.20 m - P1b Zone), C-30 (86.30 m - P4 Zone, 107.90 m - P5 Zone), Byala 2b Section (NP2 Zone), the Byala Reka Valley (Paleocene); Emine Formation: Kochan Section (P1c Zone).

Plate I



1. Lenticulina clypeiformis d'Orbigny, 1846. Byala Formation, Byala 2b Section, Lower Paleocene, NP3 Zone, sample Б2b-13; SEMx93
2. Lenticulina cultrata (Montfort, 1808). Byala Formation, C-30, 99.50 m, Upper Paleocene, P5 Zone, sample C-30-14; SEMx85
3. Lenticulina degolyeri (Plummer, 1926). Byala Formation, C-25, 40.40 m, Lower Paleocene, P1b Zone, sample C-25-6; SEMx150
4. Lenticulina disca (Brotzen, 1948). Byala Formation, C-12, 268.50 m, Lower Paleocene, P1c Zone, sample C-12-99; SEMx143
5. Lenticulina inornata (d'Orbigny, 1846). Byala Formation, C-28, 16.00 m, Middle Paleocene, P2 Zone, sample C-28-2; SEMx156
6. Lenticulina macrodisca (Reuss, 1863). Byala Formation, Byala 2b Section, Lower Paleocene, NP2 Zone, sample Б2b-11; SEMx 97
7. Lenticulina ovalis (Reuss, 1845). Byala Formation, C-12, 303.40 m, Lower Paleocene, P1b Zone, sample C-12-111; SEMx203
8. Lenticulina pseudomamilligera (Plummer, 1926). Byala Formation, C-25, 40.40 m, Lower Paleocene, P1b Zone, sample C-25-6; SEMx150
9. Lenticulina turbinata (Plummer, 1926). Byala Formation, C-25, 26.40 m, Lower Paleocene, P1b Zone, sample C-25-3; SEMx178
10. Lenticulina velascoensis White, 1928. Byala Formation, Byala 2b Section, Lower Paleocene, NP3 Zone, sample Б2b-13; SEMx221
11. Lenticulina vortex (Fichtel&Moll, 1798). Byala Formation, C-30, 88.70 m, Upper Paleocene, P4 Zone, sample C-30-10; SEMx156
12. Lenticulina wilcoxwnsis (Cushman&Ponton, 1932). Byala Formation, Byala 2b Section, Lower Paleocene, NP2 Zone, sample Б2b-9; SEMx93

References

Aubert, T, W. A. Berggren. 1976. Paleocene benthic foraminiferal biostratigraphy and paleoecology of Tunusia.- *Bull. Centre Res. Pau - SNPA, 10*, 2, 379-469.

Brotzen, F. 1948. The Swedish Paleocene and its Foraminiferal Fauna.- *Sverig. Geol. Unders., Ser. C 493, 4*, 2, 3-140.

Cushman, J. A. 1926. The Foraminifera of the Velasco Shale of the Tampico Embayment.- *Bull. Amer. Ass. Petrol. Geol*., *10*, 581-612.

Cushman, J. A. 1946. The Species of Foraminifera Named and Figgured by Fichtel and Moll in 1798 and 1803.- *Cushman Lab. For. Res*., *Sp. Publ., 17*, 15p.

Cushman, J. A. 1951. Paleocene Foraminifera of the Gulf Coastal Region of the United States and Adjacent Areas.- *Geol. Survey Prof. Paper*, 232, 1-75.

Cushman, J. A., G. Ponton. 1932. An Eocene Foraminiferal Fauna of Wilcox Age from Alabama.- *Contrib. Cush. Lab. For. Res*., *8*, 3, 51-72.

ten Dam, A. 1944. Die stratigraphische Gliederung des Niederländischen Paläocäns und Eozäns nach Foraminiferen (mit Ausnahme von Sud-Limburg).- *Meded. Geol. Sticht*., *ser. C -V, 3*, 5-142.

Ebensberger, H., 1962. Stratigraphische und mikropalaeontologische untersuchungen in der Aachener Oberkreide, besonders der Maastricht-Stufe.- *Palaeontographica*, A, 120, 1-120.

Hagn, H. 1953. Die Foraminiferen der Pingswanger Schichten (Untres Obercampan). Ein Beitrag zur Mikropaläontologie der helwetischen Oberkreide Sudbayerns.- *Palaeontographica*, *104*, A, 1-119.

Hillebrandt, A. 1962. Das Paleozän und seine Foraminiferenfauna im Becken von Reichenhall und Salzburg.- *Bayer. Acad. Wiss*., *math-natw. Cl., Abh., (N. F.),* 108, 1-192.

Ivanov, M., K. Stoykova. 1994. Cretaceous/Tertiary boundary in the area of Bjala, Eastern Bulgaria - biostratigraphical results.- *Geol. Balc., 24*, 6, 3-22.

Juranov, S. 1983. Planctonic foraminiferal zonation of the Paleocene and the Lower Eocene in part of East Balkan Mountains.- *Geol. Balc., 13*, 2, 59-73.

Loeblich, A., H. Tappan. 1988. *Foraminiferal genera and their classification*. New York, Van Nostrand Reinhold C. 970p.

McGowran, B. 1965. Two Paleocene Foraminiferal Faunas from the Wangerrip Group, Pebble Point Coastal Section, WesternVictoria.- *Proc. Royal Soc. Victoria*, *79*, 1, 9-74.

Orbigny, A. 1846. *Foraminifères fossiles du bassin Tertiaire de Vienne*. Paris, Gide et Comp., 312 s.

Papp, A., A. E. Schmidt. 1985. Die fossilen Foraminiferen des Tertiären Becken von Vien. Revision der Monographie von Alcide d'Orbigny (1846).- *Abh. Geol. Bundesanstalt, 37*, 310 p.

Pozaryska, K. 1957. Lagenidae du Crétacé Supérior de Pologne.- *Palaeont. Polonica*, *8*, 190 p.

Pozaryska, K. 1964. On some Foraminifera from the Boryszew Boring (Central Poland).- *Acta Palaeont. Polonica*, *9*, 4, 539-548.

Pozaryska, K. 1965. Foraminifera and Biostratigraphy of the Danian and Montian in Poland.- *Paleont. Polonica*, *14*, 156p.

Reuss, A. E. 1845. *Die Versteinerungen der Bömischen Kreideformation*.- 1 Teil, 1-58, Stuttgart.

Reuss, A. E. 1862. Die Foraminiferen des Norddeutschen Hils und Gault.- *Sitz. Akad. Wiss. Wien, math.-naturw., Kl., 46*, 5-100.

Reuss, A. E. 1866. Über die Foraminiferen, Antozoen und Bryozoen des deutschen Septarienthones.- *Denkschr. Akad. Wiss. Wien*, 25, 117-238.

Rögl, F. 1998. Taxonomical Index.- In: Cicha, I., F. Rögl, C. Rupp, J. Ctyroka (eds.), Oligocene - Miocene foraminifera of the Central Paratethys.- *Abh. Senckenberg. Naturforsch. Ges*., *549*, 78-136.

Sinnyovsky, D. 2001. Periodites from the Cretaceous-Tertiary boundary interval in several sections from East Bulgaria.- *C. R. Acad. bulg. Sci., 54*, 4, 65-70.

Sinnyovsky, D., K. Stoykova. 1995. Cretaceous/Tertiary boundary in the Emine Flysh Formation, East Balkan, Bulgaria: nannofossil evidences.- *C. R. Acad. bulg. Sci.,48*, 3, 45-48.

Sinnyovsky, D., A. Sultanov. 1994. Biostratigraphy and Sedimentology of the Emine Flysh Formation in the near-shore part of the East Balkan.- *C. R. Acad. bulg. Sci., 47*, 1, 73-76.

Valchev, B. 2003a. Two Types of Paleocene Benthic Foraminiferal Assemblages from the Coastal Part of East Stara planina.- *C. R. Acad. bulg. Sci., 56*, 3, 43-47.

Valchev, B. 2003b. Paleocene Benthic Foraminiferal Assemblages from the Coastal Part of East Stara planina.- *Год. СУ, Геол.-геогр. ф-т, 96*, Кн. 1 – Геология. (in press)

White, M. P. 1928. Some Index Foraminifera of the Tampico Embayment Area of Mexico. Part I.- *J. Paleont., 2*, 177-215.

Бакалов, П. 1942. Тортонска фораминиферна фауна от Северна България.- *Год. СУ, ФМФ, 38*, 1, 1-21.

Джуранов, С. 1994. Палеоценски планктонни фораминифери от типовата област на Еминска флишка свита.- *Палеонт. стратигр. и литол., 30*, 1-30.

Каптаренко-Черноусова, О. К. 1971. *Палеоценові нодозаріїди північно-східної України*.- Київ, "Науковая думка", 147 с.

Краева, Е. Я., Б. Ф. Зернецкий. 1969. Фораминиферы палеогена Украины.- *Палеонтол. сборник, 3*, 197 с.

Станчева, М. 1959. *Lenticulina* и *Robulus* от кредата и терциера в Североизточна България.- *Тр. геол. Б-я, сер. палеонт., 1*, 115-228.

Субботина, Н. Н. 1953. Верхнеоценовые лягениды и булиминиды юга СССР. В: *Микрофауна СССР, Тр. ВНИГРИ, 6*, 115-283.

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