ГОДИШНИК НА МИННО-ГЕОЛОЖКИЯ УНИВЕРСИТЕТ "СВ. ИВАН РИЛСКИ", Том 48, Св. I, Геология и геофизика, 2005
ANNUAL OF THE UNIVERSITY OF MINING AND GEOLOGY "ST. IVAN RILSKI", Vol. 48, Part I, Geology and Geophysics, 2005

PALEOCENE POLYMORPHINIDS AND GLANDULINIDS (ORDER *FORAMINIFERIDA*) FROM THE COASTAL PART OF EAST STARA PLANINA (EAST BULGARIA)

Boris Valchev

University of Mining and Geology *"St. Ivan Rilski", Department of Geology and Paleontology, 1700 Sofia; b_valchev@mgu.bg*

ABSTRACT. The rich and diverse Paleocene benthic foraminiferal assemblages from the coastal part of East Stara Planina (over 230 species – Valchev, 2003a) include some species of polymorphinids and glandulinids. As a whole this group is rarely described in the micropaleontological literature, that's why this article is dedicated to its taxonomy. Taxonomical descriptions of 8 species small benthic foraminifera are introduced in the article. The species belong to 5 genera (*Globulina* – 1 species, *Guttulina* – 4 species, *Pyrulinoides* – 1 species, *Ramulina* – 1 species, *Glandulina* – 1 species), 3 subfamilies and 2 families. 6 of the species are first described in Bulgaria, while the other 2 species were first found in Bulgarian Paleocene.
The Loeblich & Tappan's (1988) classification is applied in the article.
Key words: small benthic foraminifera, taxonomy, Paleocene, East Stara Planina

ПАЛЕОЦЕНСКИ ПОЛИМОРФИНИДИ И ГЛАНДУЛИНИДИ (РАЗРЕД *FORAMINIFERIDA*) ОТ ПРИМОРСКАТА ЧАСТ НА ИЗТОЧНА СТАРА ПЛАНИНА (ИЗТОЧНА БЪЛГАРИЯ)

Борис Вълчев

Минно-геоложки университет "Св. Иван Рилски", Катедра "Геология и палеонтология", София 1700; b_valchev@mgu.bg

РЕЗЮМЕ. Богатите и разнообразни палеоценски бентосни фораминиферни асоциации от приморската част на Източна Стара планина (повече от 230 вида – Valchev, 2003a) съдържат няколко вида полиморфиниди и гландулиниди. Като цяло тази група е рядко описвана в микропалеонтоложката литература, поради което настоящата статия е посветена на нейната таксономия. Представени са таксономични описания на 8 вида малки бентосни фораминифери , принадлежащи на 4 рода (*Globulina* – 1 вид, *Guttulina* – 4 вида, *Pyrulinoides* – 1 вид, *Ramulina* – 1 вид, *Glandulina* – 1 вид), 3 подсемейства и 2 семейства. 6 от видовете се описват за първи път в България, а два вида се установяват за първи път в Палеоценската серия на българска територия.
Използвана е класификацията на Loeblich & Tappan (1988).
Ключови думи: малки бентосни фораминифери, таксономия, Палеоенска серия, Източна Стара планина

Introduction

The rich and diverse Paleocene benthic foraminiferal assemblages from the coastal part of East Stara Planina (over 230 species – Valchev, 2003a) include some species of polymorphinids and glandulinids. As a whole this group is rarely described in the micropaleontological literature, that's why this article is dedicated to its taxonomy.

A sketch with the location of the studied sections and outcrops was published by Valchev (2003b). The biostratigraphical framework of the Paleocene in the coastal part of East Stara Planina was discussed in the same article. 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 aims to introduce taxonomical descriptions of 8 species small benthic foraminifera from the Paleocene of the Coastal Part of East Stara Planina, East Bulgaria. The species belong to 5 genera, 3 subfamilies and 2 families. 6 of the species are first described in Bulgaria, while the other 2 species were first found in Bulgarian Paleocene. The Loeblich&Tappan's (1988) classification is applied in the article.

Suborder LAGENINA Delage and Herouard, 1896
Superfamily NODOSARIACEA Ehrehberg, 1838
Family POLYMORPHINIDAE d'Orbigny, 1839
Subfamily POLYMORPHININAE d'Orbigny, 1839
Genus ***Globulina*** d'Orbigny, 1839

Type species. *Polymorphina* (les Globulines) *gibba* d'Orbigny, 1826 (subsequently designated by Cushman, 1927).
Distribution. Callovian-Holocene; cosmopolitan.

Globulina gibba d'Orbigny, 1826
Plate I, Figure 1

1846. *Globulina gibba* d'Orbigny; d'Orbigny, p. 227, tab. 13, fig. 13, 14.
1934. *Globulina gibba* d'Orbigny; Cushman, Dusenbery, p. 59, pl. 8, fig. 4.

1969. *Globulina gibba* d'Orbigny; Краева, Зернецкий, с. 67, табл. 23, фиг. 4.
1970. *Globulina gibba* d'Orbigny; Le Calvez, p. 84, tab. 17, fig. 3, 4.
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.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (6 specimens).

Remarks. The species was described from the Eocene in Bourgas District (Darakchieva, Juranov, 1992).

Distribution. It is known from the Senonian of Germany, the Paleocene of Alabama, the Netherlands, Sweden, Ukraine, Caucasus, Australia, the upper Paleocene of England, 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.

Occurrence. C-12 (167.00-169.70 m – Lower Paleocene, 296.10 m – P1b Zone), C-21 (37.00 m - P1b Zone), C-24 (74.25 m - P1b Zone), Section Byala 2b (NP1 Zone).

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

Type species. Polymorphina (les Guttulines) *communis* d'Orbigny, 1826 (subsequently designated by Gallowey and Wissler, 1927).

Distribution. Middle Jurassic - Holocene; cosmopolitan.

Guttulina communis d'Orbigny, 1826
Plate I, Figure 2

1846. *Guttulina communis* d'Orbigny; d'Orbigny, p. 224, tab. 13, fig. 6-8.
1928. *P.* (*Polymorphina*) *communis* d'Orbigny; Franke, S. 118, Taf. 11, Fig. 4, 5.
1928. *Polymorphina* (*Guttulina*) *communis* d'Orbigny; White, p. 213, pl. 29, fig. 15.
1951. *Guttulina problema* d'Orbigny; Cushman, p. 32, pl. 9, figs. 15-18.
1962. *Guttulina communis* d'Orbigny; Hillebrandt, S. 63, Tabl. 4, Fig. 23.
1985. *Guttulina communis* d'Orbigny; Papp, Schmidt, p. 78, pl. 70, figs. 2-12.
1988. *Guttulina communis* d'Orbigny; Loeblich, Tappan, pl. 458, figs. 1-4.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (32 specimens).

Description. The test is trochospiral with 4 chambers on both sides. They increase sharply in size. The sutures are depressed, slightly curved. The surface is smooth. The aperture is terminal, radiate.

Distribution. The species is known from the Upper Cretaceous and Paleocene of North Germany, Austrian Alps, the Paleocene of Denmark, Sweden, Central America, North Caucasus, the Paleocene and Eocene of Paris Basin, the Miocene of Vienna Basin.

Occurrence. C-12 (167.00 m - долен палоцен, 296.10 m - P1b Zone), C-21 (7.50 m - P1c Zone), C-24 (23.00 m P3 Zone), C-29 (365.00 m – P3 Zone, 399.20-420.60 m – P4 Zone, 440.30-476.30 m – P5 Zone), Sections Byala 2b (NP1 Zone), Byala 2c (NP1-2 Zones), Byala River and Koundilaki Cheshme Valleys (Paleocene).

Guttulina ipatovcevi Vassilenko, 1950
Plate I, Figure 3

1950. *Guttulina ipatovcevi* n. sp.; Василенко, с. 199, табл. 2, фиг. 2.

Nomenclature. The holotype (VNIGRI Coll. No. 2241) is from the Paleocene of Ukraine (the second horizon of the Montian in Dnepr-Donetsk lowering).

Material. Byala Formation (31 specimens), Emine Formation (2 specimens).

Description. The test is strongly inflated, asymmetrical, trochospiral. The initial portion is broad, the later one is narrow. The apertural end is tapered. Six chambers are visible from both sides, as the last two ones embrace the previous and the first whorl is almost invisible. The sutures are curved, slightly depressed. The surface is smooth, shining. The aperture is terminal, radiate.

Remarks. The species resembles morphologically (sutures shape, chamber arrangement) *G. communis* d'Orbigny, but it differs by the asymmetrical test.

Distribution. It is known from the Paleocene of Ukraine and Caucasus.

Occurrence. Byala Formation: C-12 (167.00 m – Lower Paleocene, 204.00 m - P1c Zone, 296.10-303.40 m - P1b Zone), C-21 (22.00 m - P1b Zone), C-25 (22.50 m - P1b Zone), C-28 (15.00 m - P2 Zone), C-29 (361.00 m - P3 Zone, 399.20 m - P4 Zone), Sections Byala 1 (NP3 Zone), Byala 2b (NP3 Zone), Byala River Valley (Paleocene).; Emine Formation: samples from the geological mapping (Paleocene).

Guttulina irregularis (d'Orbigny, 1846)
Plate I, Figure 4

1846. *Globulina irregularis* d'Orbigny; d'Orbigny, p. 266, tab. 13, fig. 9-10.
1969. *Guttulina irregularis* (d'Orbigny); Краева, Зернецкий, с. 66, табл. 24, фиг. 3, 4.
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.
1996. *Guttulina irregularis* (d'Orbigny); Ujetz, p. 113, pl. 4, figs. 18, 19.

Nomenclature. A holotype was not designated. The species was first described from the Badenian of the Vienna Basin.

Material. Byala Formation (39 specimens).

Remarks. The species was described from the Eocene in Bourgas District (Darakchieva, Juranov, 1992).

Distribution. It is known from the Paleocene of the Netherlands, the middle Eocene of France, the Upper Eocene of Ukraine, England, USA, the Oligocene of Germany, the Miocene of Austria.

Occurrence. C-12 (204.00 m- P1c Zone), C-21 (22.00 m - P1b Zone), C-24 (40.00 m – P2 Zone), C-29 (420.60 m - P4

Zone, 433.20-476.30 m - P5 Zone), C-30 (99.50 m - P5 Zone), Sections Byala 1 (NP5 Zone), Byala 2b (NP1-2 Zone), Byala 2c (NP2 Zone), Byala River and Koundilaki Cheshme Valleys (Paleocene).

Guttulina lidiae Vassilenko, 1950
Plate I, Figure 5

1950. *Guttulina lidiae* sp. n.; Василенко, с. 201, табл. 4, фиг. 1.

Nomenclature. The holotype (VNIGRI Coll. No. 2242) is from the second horizon of the Montian near Hmelovo Village, Romnen Region (Dnepr-Donetsk lowering, Ukraine).

Material. Byala Formation (2 specimens).

Description. The test is rhomboid in outline, slightly tapered at both ends. Fife inflated chambers are visible on both sides. The last two chambers comprise 2/3 to 3/4 of the test length. The sutures are flush in the initial portion, later become slightly depressed. The surface is smooth. The aperture is terminal, radiate.

Distribution. The species is known from the Paleocene of Ukraine.

Occurrence. Sections Byala 2b (NP3 Zone), Byala 2c (NP1 Zone).

Genus ***Pyrulinoides*** Marie, 1941

Type species. *Pyrulina acuminata* d'Orbigny, 1840 (original designation).

Distribution. Rhaetian – Early Oligocene; cosmopolitan.

Pyrulinoides cylindroides (Roemer, 1838)
Plate I, Figure 6

1945. *Pyrulina* cf. *cylindroides* (Roemer); Cushman, Stainforth, p. 34, pl. 4, fig. 34, pl. 5, fig. 3.
1962. *Pyrulina cylindroides* (Roemer); Hillebrandt, S. 65, Taf. 4, Fig. 30.
1983. *Pyrulinoides cylindroides* (Roemer); Basov, Krasheninnikov, pl. 763, pl. 7, fig. 1.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (42 specimens), Emine Formation (3 specimens).

Description. The test is elongated, fusiform, tapered at both ends, biserial. The chambers are with sharply increasing size as the last two ones comprise up to 4/5 of the test length. The sutures are oblique, flush. The surface is smooth. The aperture is terminal, radiate.

Distribution. Cretaceous – recent; cosmopolitan.

Occurrence. Byala Formation: C-11 (191.60 m - P1c Zone), C-23 (271.20 m - P1b Zone), C-24 (40.00 m - P2 Zone), C-25 (40.40 m - P1b Zone), C-28 (15.00 m - P2 Zone), C-29 (361.10-364.40 m - P3 Zone), C-30 (83.90-86.30 m - P4 Zone), Sections Byala 1 (NP4-5 Zone), Byala 2b (NP1-3 Zone), Byala 2c (NP1-2 Zone), Byala River and Koundilaki Cheshme Valleys (Paleocene); Emine Formation: samples from the geological mapping (Paleocene).

Subfamily RAMULININAE Brady, 1884
Genus ***Ramulina*** T. R. Jones, 1875

Type species. *Ramilina laevis* T. R. Jones, in J. Wright, 1875 (original designation).

Distribution. Jurassic - Holocene; cosmopolitan.

Ramulina globulifera Brady, 1879
Plate I, Figure 7

1928. *Ramilina globulifera* Brady; White, p. 214, pl. 29, fig. 2.
1947. *Ramilina globulifera* H. B. Brady; Субботина, с. 89, табл. 3, фиг. 8, 9.
1953. *Ramilina globulifera* H. B. Brady; Hagn, S. 82, Taf. 6, Fig. 11.
1962. *Ramilina globulifera* Brady; Hillebrandt, S. 68, Taf. 4, Fig. 35.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (65 specimens), Emine Formation (1 specimen).

Description. The test is composed of globular chambers joined by straight or curved stolon-like necks with various length and thickness. The surface is covered with fine spines or nodes. The aperture is a round opening at the end of the tube.

Remarks. Single chambers with two necks only were found.

Distribution. The species is known from the Upper Cretaceous of Germany, Austrian Alps, Turkmenia, the Paleocene of Mexico, Trinidad, North Caucasus, Germany, Austria, Azerbajdjan, Turkmenia, the Eocene of Ukraine, the Middle Miocene of Dominican Republic, recent sea deposits. It was also established in deep sea holes in North-west Atlantic (Eocene).

Occurrence. Byala Formation: C-11 (191.60-192.40 m - P1c Zone), C-12 (203.00-204.00 m - P1c Zone, 296.10 m - P1b Zone), C-23 (74.00-128.00 m - P3 Zone, 215.00 m – Lower Paleocene), C-24 (40.00 m - P2 Zone), C-25 (26.40 m - P1b Zone, 355.00 m - P2 Zone), C-28 (15.00 m - P2 Zone), C-29 (420.60 m - P4 Zone, 433.50-476.30 m - P5 Zone), C-30 (99.50-107.90 m - P5 Zone), Sections Byala 1 (NP3-5 Zone), Byala 2b (NP1-3 Zone), Byala 2c (NP1-2 Zone), Byala River and Koundilaki Cheshme Valleys (Paleocene); Emine Formation: Section Banya-Southwest (Lower Paleocene).

Семейство GLANDULINIDAE Reuss, 1860
Подсемейство GLANDULININAE Reuss, 1860
Род ***Glandulina*** d'Orbigny, 1839

Type species. *Nodosaria* (les Glandulines) *laevigata* d'Orbigny, 1826 (subsequently designated by Cushman, 1927).

Distribution. Paleocene - Holocene; cosmopolitan.

Glandulina laevigata d'Orbigny, 1826
Plate I, Figure 8

1846. *Glandulina laevigata* d'Orbigny; d'Orbigny, p. 29, tab. 1, fig. 4, 5.
1951. *Glandulina laevigata* (d'Orbigny); Спасов, с. 112, табл. 2, фиг. 3.
1969. *Glandulina laevigata* d'Orbigny; Краева, Зернецкий, с. 68, табл. 24, фиг. 6.
1985. *Glandulina ovula* d'Orbigny; Papp, Schmidt, p. 21, pl. 2, figs. 1-6.

1988. *Glandulina laevigata* (d'Orbigny); Loeblich, Tappan, pl. 468, figs. 1-4.

1992. *Glandulina laevigata* (d'Orbigny); Darakchieva, Juranov, p. 18, pl. 3, fig. 3.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (30 specimens).

Remarks. The species was described from the Badenian near Staropatitsa Village, Vidin District (Спасов, 1951). It was also established in the Eocene of Bourgas District (Darakchieva, Juranov, 1992).

Distribution. It is known from the Upper Cretaceous of Poland, the Upper Paleocene of England, the Eocene and Oligocene of Belgium, the Upper Eocene of Ukraine, Caucasus, England, Poland, the Oligocene of Turkmenia, the Miocene of Vienna Basin. It was also established in deep sea holes in Southeast Atlantic (Upper Eocene).

Occurrence. C-11 (191.60 m - P1c Zone), C-24 (107.70 m - P1c Zone), C-25 (40.40 m - P1b Zone), C-28 (15.00 m - P2 Zone), C-29 (361.10-364.40 m - P3 Zone, 383.20-399.20 m - P4 Zone, 433.50-440.30 m - P5 Zone), Sections Byala 1 (NP3-5 Zone), Byala 2b (NP1-3 Zone), Byala River Valley (Paleocene).

References

Basov, I. A., V. A. Krasheninnikov. 1983. Benthic foraminifers in Mesozoic and Cenozoic sediments of the Southeastern Atlantic as an indicator of paleoenvironment, Deep Sea Drilling Project Leg 71. – *Init. Repts. DSDP*, *71*, 739-783.

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., A. N. Dusenbery. 1934. Eocene foraminifera of the Poway Conglomerate of California. – *Contrib. Cush. Lab. For. Res*., *10*, 3, 51-64.

Cushman, J. A., R. M. Stainforth. 1945. Foraminifera of the Cipero Marl Formation of Trinidad, British West Indies. – *Cushman Lab. For. Res*., *Sp. Publ., 14*, 75 p.

Darakchieva, S., S. Juranov. 1992. Small foraminifers from the Middle and Upper Eocene in the Burgas District. Calcareous benthic foraminifers. Part I. – *Geologica Balc*., *22*, 4, 3-42.

Franke, A. 1928. Die Foraminiferen der Oberen Kreide Nord- und Mitteldeutschlands. – *Abh. Preuss. Geol. Landdenst., Neue Folge, 111.*

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. von, 1962. Das Paleozän und seine Foraminiferenfauna im Becken von Reichenhall und Salzburg. –*Bayer. Acad. Wiss*., M*ath-Natw. Cl., Abh., (N. F.), 108*, 1-192.

Le Calvez, Y. 1970. Contribution a l'étude des foraminifères Paléogenès du Basin de Paris. – *Cahiers Paleont*., 1-324.

Loeblich, A. Jr., H. Tappan. 1988. *Foraminiferal Genera and Their Classification*. New York, Van Nostrand Reinhold, 970 p.

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

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.

Ujetz, B. 1996. Micropaleontology of Paleogene deep water sediments, Haute-Savoi, France. – *Publ. Dep. Geol. Paleontol. Univ. Geneve*, *22*, 149 p.

Valchev, B. 2003a. Two types of Paleocene benthic foraminiferal assemblages from the coastal part of east Stara Planina. – *Compt. Rend. Acad. Bulg. Sci.*, *56*, 3, 43-47.

Valchev, B. 2003b. Biostratigraphy of the Paleocene of the coastal part of East Stara Planina based on small benthic foraminifera. – *Geologica Balc*., *33*, 1-2, 47-59.

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

Василенко, В. П. 1950. Фораминиферы палеоцена центральной части Днепровско-Донецкой впадины. – В: *Микрофауна СССР*, *4*, 177-224.

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

Спасов, Х. 1951. Тортонски фораминифери от Старопатица, Кулско. – *Изв. геол. инст., 1*, 103-124.

Субботина, Н. Н. 1947. Фораминиферы датских и палеогеновых отложений Северного Кавказа. – В: *Микрофауна нефтяных месторождений Кавказа, Эмбы и Средней Азии*. ВНИГРИ, 39-160.

Recommended for publication by Department of
Geology and Paleontology, Faculty of Geology and Prospecting

PLATE I

1. ***Globulina gibba*** d'Orbigny, 1826. Byala Formation, Section Byala 2c, Lower Paleocene, NP2 Zone, sample Б2c-4; SEMx55. *2.* ***Guttulina communis*** (d'Orbigny, 1826). Byala Formation, Byala River Valley, Paleocene, sample БР-4; SEMx50. *3.* ***Guttulina ipatovcevi*** Vassilenlo, 1950. Byala Formation, Section Byala 2b, Lower Paleocene, NP3 Zone, sample Б2b-10; SEMx50. *4.* ***Guttulina lidiae*** Vassilenko, 1950. Byala Formation, Section Byala 2c, Lower Paleocene, NP2 Zone, sample Б2c-4; SEMx68.5. *5.* ***Guttulina irregularis*** (d'Orbigny, 1846). Byala Formation, Section Byala 2b, Lower Paleocene, NP3 Zone, sample Б2b-14; SEMx55. *6.* ***Pyrulinoides cylindroides*** (Roemer, 1838). Byala Formation, Byala River Valley, Paleocene, sample БР-6; SEMx50. *7.* ***Ramulina globulifera*** Brady, 1879. Byala Formation, Byala River Valley, Paleocene, sample БР-7; SEMx68.5. *8.* ***Glandulina laevigata*** (d'Orbigny, 1826). Byala Formation, Section Byala 2b, Lower Paleocene, NP3 Zone, sample Б-2b-16; SEMx65.5.

P L A T E I