



Representatives of Family HAPLOPHRAGMOIDIDAE Mainc, 1952 to Family LITUOLIDAE de Blainville, 1827 from the Paleocene of the coastal part of East Stara Planina

Boris Valchev

University of Mining and Geology “St. Ivan Rilski”, 1700 Sofia; E-mail: b_valchev@mgu.bg

Б. Вълчев. 2005. Представители на семейство HAPLOPHRAGMOIDIDAE Mainc, 1952 до семейство LITUOLIDAE de Blainville, 1827 от палеоценската серия в приморската част на Източна Стара планина. — *Сп. Бълг. геол. д-во*, 66, 1–3, 37–42.

Резюме. Настоящата статия е трета от поредицата, посветена на таксономията на „флишкия тип“ аглутинирани фораминифери от палеоценската серия в приморската част на Източна Стара планина. Представени са таксономични описания на 12 вида, принадлежащи на 6 рода (*Cribrostomoides* — 1 вид, *Haplophragmoides* — 5 вида, *Lituotuba* — 1 вид, *Paratrochamminoides* — 1 вид, *Trochamminoides* — 3 вида, *Ammobaculites* — 1 вид), 3 семейства и 1 надсемейство. Осем вида се описват за първи път в България. Използвана е класификацията на Loeblich, Tappan (1988).

Ключови думи: „флишки тип“ аглутинирани фораминифери, таксономия, Палеоценска серия, Източна Стара планина.

Introduction

This is the third article of a series concerning the taxonomy of the Paleocene “flysh—type” agglutinated foraminifera from the coastal part of East Stara Planina. We published the geological map with location of the studied outcrop and borehole sections (Valchev, 2002). We also provided data about the biostratigraphical schemes used for determination of the stratigraphical range of the species.

Taxonomical descriptions of 12 species belonging to 6 genera, 3 families and 1 superfamily are given in the article. Eight of the species are first described in Bulgaria. The Loeblich, Tappan’s (1988) classification is applied.

Taxonomical descriptions

Superfamily LITUOLACEA de Blainville, 1827
Family HAPLOPHRAGMOIDIDAE Mainc, 1952
Genus *Cribrostomoides* Cushman, 1910

Type species. *Cribrostomoides bradyi* Cushman, 1910 (by original designation);

Distribution. Holocene; Atlantic and Pacific.

Remarks. Loeblich, Tappan (1988) gave Holocene age, but the numerous finds in the Upper Cretaceous and Lower Paleogene flysh sediments of Tethys region

broadened the stratigraphical and geographical distribution of the genus.

Cribrostomoides trinitatensis Cushman and Jarvis, 1928

Plate I, Figs. 1, 2

1928. *Cribrostomoides trinitatensis* Cushman and Jarvis, n. sp.; Cushman, Jarvis, p. 91, Pl. 12, Fig. 12.

1947. *Cribrostomoides trinitatensis* Cushman and Jarvis; Cushman, p. 4, Pl. 1, Fig. 6, 7.

1988. *Cribrostomoides trinitatensis* Cushman and Jarvis; Kaminski et al., p. 188, Pl. 6, Fig. 1–3.

1996. *Cribrostomoides trinitatensis* Cushman and Jarvis; Kaminski et al., p. 10, Pl. 2, Fig. 14.

Nomenclature. The holotype (Cushman Coll. No. 9728) is from the Paleocene of Trinidad (Lizard Springs Formation).

Material. Byala Formation (249 specimens), Emine Formation (1 specimen).

Description. The test is coarsely agglutinated, planispiral, slightly asymmetrical, involute, inflated. The last whorl is composed of 5–6 triangular chambers. Sutures are grooved, straight, radial. Umbilicus is narrow and deep. Periphery is broadly rounded. Aperture is composed of several openings located above the base of the apertural surface of the last chamber.

Distribution. The species is known from the Upper Cretaceous and the Paleocene of Trinidad, Venezuela.

Occurrence. Byala Formation: C-11 (191.60–192.40 m – P1c Zone), C-12 (167.00 m – Lower Paleocene, 219.20 m – P1b Zone, 264.50 m – Lower Paleocene, 268.50–289.20 m – P1c Zone, 303.40 m – P1b Zone), C-21 (7.50 m – P1c Zone, 22.00–38.50 m – P1b Zone), C-24 (40.00 m – P2 Zone, 107.70 m – P1c Zone), C-25 (22.50–40.40 m – P1b Zone, 355.00 m, 454.60 m – P2 Zone), C-28 (16.00 m – P2 Zone), C-29 (364.40–365.00 m – P3 Zone, 383.20–420.60 m – P4 Zone, 464.70–476.30 m – P5 Zone), C-30 (83.90–88.70 m – P3 Zone, 103.50 m – P5 Zone), Sections: Byala 1 (NP3–5 Zone), Byala 2b (NP2–3 Zone), Byala 2c (NP1–2 Zone), Byala River and Koundilaki Cheshme Valleys (Paleocene); Emine Formation: Emona Section (NP1 Zone).

Genus **Haplophragmoides** Cushman, 1910

Type species. *Nonionina canariensis* d'Orbigny, 1839 (by original designation);

Distribution. Cretaceous-Holocene; cosmopolitan.

Haplophragmoides kirki Wickended, 1932
Plate I, Fig. 3

1977. *Haplophragmoides kirki* Wickended; Samuel, p. 40, Pl. 29, Fig. 2–4.

1988. *Haplophragmoides kirki* Wickended; Loeblich, Tappan, Pl. 49, Fig. 14–16.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (9 specimens).

Description. The test is coarsely agglutinated, planispiral, involute, slightly laterally compressed. The last whorl is composed of 4 triangular chambers, separated by straight, grooved, radial sutures. Umbilicus is narrow, shallow. Aperture is basal.

Remarks. The species differs from *H. suborbicularis* (Grzybowski) by the lower number of chambers, the shallow umbilicus and the more compressed test.

Distribution. It is known from the Upper Cretaceous of North America, Carpathians, the Maastrichtian and Paleocene of Tunisia, the Lower Eocene of deep sea holes in Norwegian and Greenland Seas.

Occurrence. Byala Formation: C-21 (38.50 m – P1b Zone), C-25 (40.40 m – P1b Zone), C-28 (513.00 m – P3 Zone), Byala River Valley (Paleocene).

Haplophragmoides porrectus Maslakova, 1955
Plate I, Fig. 4

1955. *Haplophragmoides porrectus* sp. n.; Maslakova, p. 47, Table 3, Fig. 5, 6.

1977. *Haplophragmoides porrectus* Maslakova; Samuel, p. 41, Pl. 6, Fig. 3.

1988. *Haplophragmoides porrectus* Maslakova; Kaminski et al., p. 189, Pl. 5, Fig. 7, 8.

Nomenclature. The holotype (Maslakova, 1955, Table 3, Fig. 5, 6; MGRI Museum Coll. № VI-92/12) is

from the Paleocene of West Carpathians (Yamnen Formation, Ukraine).

Material. Emine Formation (1 specimen).

Description. The test is finely agglutinated, planispiral, involute, strongly laterally compressed. The last whorl is composed of 5 subspherical chambers. Sutures are straight, radial, grooved. Surface is smooth. Periphery is rounded. Umbilicus is narrow, shallow. Aperture is low, arch-shaped, basal.

Remarks. The species differs from the previous one by its smooth surface and the more compressed test.

Distribution. It is known from the Paleocene of the Carpathians, Trinidad.

Occurrence. Emine Formation: Kochan Section (P1c Zone).

Haplophragmoides retroseptus (Grzybowski, 1896)
Plate I, Figs. 5, 6

1962. *Haplophragmoides retrosepta* (Grzybowski); Hillebrandt, S. 27, Taf. 1, Fig. 2.

1981. *Haplophragmoides eggeri* Cushman; Gradstein, Berggren, p. 250, Pl. 6, Fig. 1–4.

1983. “*Cyclammima retrosepta* n. sp.”; Geroch, Verdenius, Pl. 9, Fig. 7, 8.

1988. *Haplophragmoides retroseptus* (Grzybowski); Kaminski et al., p. 189, Pl. 5, Fig. 9, 10.

1990. *Haplophragmoides* aff. *retroseptus* (Grzybowski); I. De Klasz, S. de Klasz, p. 410, Pl. 4, Fig. 7.

Nomenclature. Geroch, Verdenius (1983) refigured the Grzybowski's original images. I compare to them. The species was first described from the Polish Carpathians (Wadowice area).

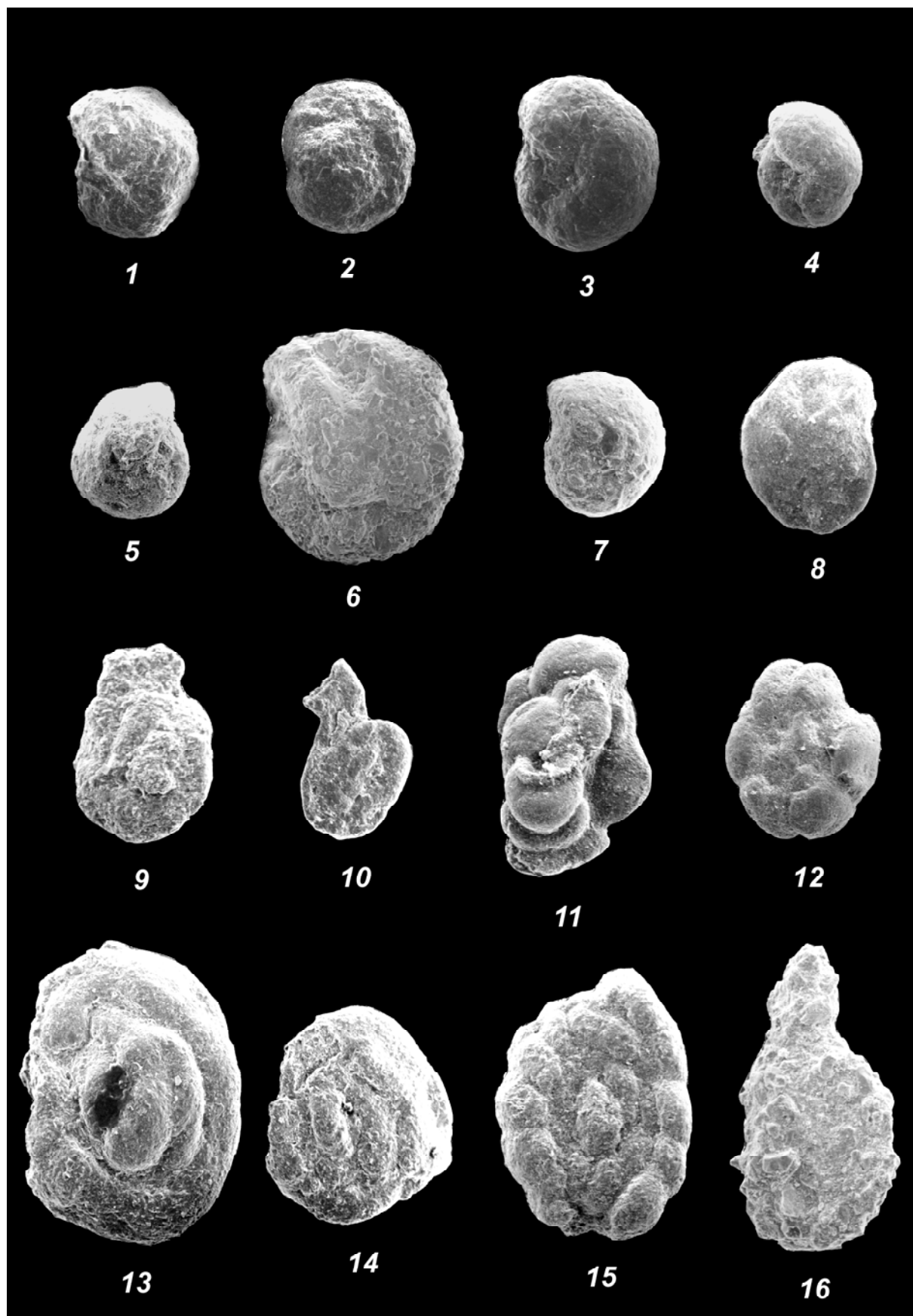
Material. Byala Formation (211 specimens), Emine Formation (76 specimens).

Description. The test is coarsely agglutinated, planispiral, involute, laterally flattened, often asymmetrical. The last whorl is composed of 5–6 triangular chambers gradually increasing in size. The last 1–2 are asymmetrically arranged. Sutures are grooved, radial. Umbilicus is narrow, shallow. Aperture is basal.

Remarks. The species differs from *H. suborbicularis* (Grzybowski) by the flattened test and the asymmetrically arranged last chambers.

Distribution. It is known from the Campanian, Maastrichtian and Paleocene of Trinidad, the Paleocene of the Alps, the Maastrichtian and Paleogene of deep sea holes in Labrador and North Seas.

Occurrence. Byala Formation: C-11 (191.60 m – P1c Zone), C-12 (219.20–243.00 m – P1b Zone, 268.50 m – P1c Zone, 296.10–303.40 m – P1b Zone), C-21 (7.50 m – P1c Zone, 22.00–38.50 m – P1b Zone), C-25 (22.50–40.40 m – P1b Zone), C-29 (383.20–420.60 m – P4 Zone, 433.50–476.30 m – P5 Zone), C-30 (83.90 m – P4 Zone, 103.50 m – P5 Zone), Sections: Byala 1 (NP4–5 Zones), Byala 2b (NP1–3 Zones), Byala 2c (NP1–2 Zones), Byala



- 1, 2. *Cribrostomoides trinitatensis* Cushman, Jarvis, 1928.
Byala Formation, C-12, 296.10 m, Lower Paleocene, P1b Zone, sample C-12-107M:
1, lateral view; 2, apertural view; SEM x40.8
3. *Haplophragmoides kirki* Wickended, 1932.
Byala Formation, C-29, 364.40 m, Middle Paleocene, P3 Zone, sample C-29-4; SEM x50.5
4. *Haplophragmoides porrectus* Maslakova, 1955.
Emine Formation, Kochan Section, Lower Paleocene, P1c Zone, sample E-K-5; SEM x50.5
- 5, 6. *Haplophragmoides retroseptus* (Grzybowski, 1896).
5, Byala Formation, Lower Paleocene, C-25, 26.40 m, P1b Zone, sample C-25-3; SEM x48.6;
6, Emine Formation, Kochan Section, Middle Paleocene, P3 Zone, sample E-K-7; SEM x50.5
7. *Haplophragmoides suborbicularis* (Grzybowski, 1896).
Byala Formation, Byala River Valley, Paleocene, sample БР-2; SEM x48.6
8. *Haplophragmoides walteri* (Grzybowski, 1898).
Byala Formation, Byala 2b Section, Lower Paleocene, NP3 Zone, sample Б2b-16; SEM x50.5
- 9, 10. *Lituotuba lituiformis* (Brady, 1879).
Emine Formation, Kochan Section, Lower Paleocene, P1c Zone, sample E-K-5; SEM x57.5
11. *Paratrochamminoides irregularis* (White, 1928).
Byala Formation, Upper Paleocene, C-30, 83.90 m, P4 Zone, sample C-30-6; SEM x37.4
12. *Trochamminoides coronatus* (Brady, 1879).
Byala Formation, Byala River Valley, Paleocene, sample БР-6; SEM x37.4
- 13, 14. *Trochamminoides dubius* (Grzybowski, 1901).
Emine Formation, Kochan Section, Middle Paleocene, P3 Zone, sample E-K-9; SEM x44.4
15. *Trochamminoides proteus* (Karrer, 1866).
Byala Formation, C-29, 395.20 m, Upper Paleocene, P4 Zone, sample C-29-7; SEM x37.4
16. *Ammobaculites* sp.
Byala Formation, Byala 2b Section, Lower Paleocene, NP1 Zone, sample Б2b-8; SEM x57.5

River and Koundilaki Cheshme Valleys (Paleocene); Emine Formation: Kochan Section (P3, NP8–9 Zones), Emona Section (NP1–2 Zones), Banya-north and Banya-southwest sections (Lower Paleocene), samples from the geological mapping (Paleocene).

Haplophragmoides suborbicularis (Grzybowski, 1896) Plate I, Fig. 7

1961. *Haplophragmoides suborbicularis* (Grzybowski); Stancheva, p. 262, Table 1, Fig. 3.

1970. *Cribrostomoides* ex. gr. *suborbicularis* (Grzybowski); Myatlyuk, p. 76, Table. 18, Fig. 3.

1977. *Haplophragmoides suborbicularis* (Grzybowski); Samuel, p. 41, Pl. 6, Fig. 5.

1981. *Haplophragmoides (Cribrostomoides) suborbicularis* (Grzybowski); Liszka, Liszkowa, p. 176, Pl. 3, Figs. 2, 3.

1983. “*Cyclamina suborbicularis* n. sp.”; Geroch, Verdenius, pl. 9, Fig. 5, 6.

1988. *Haplophragmoides* ex. gr. *suborbicularis* (Grzybowski); Kaminski et al., p. 189, Pl. 5, Fig. 12, 13.

Nomenclature. Geroch, Verdenius (1983) refigured the Grzybowski’s original images. I compare to them. The species was first described from the Polish Carpathians (Wadowice area).

Material. Byala Formation (27 specimens), Emine Formation (3 specimens).

Remarks. The species was described from the Paleocene of East Stara Planina (Stancheva, 1961). It was also established from the Eocene of Bourgas District (Darakchieva, 1999).

Distribution. It is known from the Upper Cretaceous in Italy, Spain, the Maastrichtian, Paleocene and Lower Eocene of Trinidad, the Middle and Upper Eocene of West Carpathians, the Oligocene of Bavaria.

Occurrence. Byala Formation: C–21 (22.00 m – P1b Zone), C–25 (26.40 m – P1b Zone), C–28 (512.00 m – P3 Zone), C–29 (395.20 m – P4 Zone, 440.30–476.30 m – P5 Zone), C–30 (83.90 m P4 Zone), Sections: Byala 1 (NP4 Zone), Byala 2b (NP2–3 Zones), Byala River and Koundilaki Cheshme Valleys (Paleocene); Emine Formation: a sample from the geological mapping (Paleocene).

Haplophragmoides walteri (Grzybowski, 1898) Plate I, Fig. 8

1937. *Haplophragmoides walteri* (Grzybowski); Glaessner, S. 362, Taf. 1, Fig. 11.

1962. *Haplophragmoides walteri* (Grzybowski); Hillebrandt, S. 27, Taf. 2, Fig. 20.

1969. *Haplophragmoides walteri* (Grzybowski); Kraeva, Zernetskij, p. 20, Table. 5, Fig. 11.

1970. *Asamospira walteri* (Grzybowski); Myatlyuk, p. 78, Table. 19, Fig. 5–7; Table 20, Fig. 1, 2.

1977. *Haplophragmoides walteri* (Grzybowski); Samuel, p. 41, Pl. 29, Fig. 5, 6.

1981. *Haplophragmoides walteri* (Grzybowski); Gradstein, Berggren, p. 250, Pl. 6, Fig. 5–7.

1983. “*Trochammina Walteri* n. sp.”; Geroch, Verdenius, Pl. 11, Fig. 31.

1988. *Haplophragmoides walteri* (Grzybowski); Kaminski et al., p. 190, Pl. 5, Fig. 14, 15.

Nomenclature. Geroch, Verdenius (1983) refigured the Grzybowski’s original image. I compare to it. The species was first described from the Polish Carpathians (Krosno area).

Material. Byala Formation (42 specimens), Emine Formation (14 specimens).

Description. The test is finely agglutinated, planispiral, involute, with round outline, strongly laterally flattened. The last whorl comprises 8–12 triangular, narrow, slightly curved chambers gradually increasing in size. Sutures are grooved, radial. Periphery is slightly sharpened. Umbilicus is narrow, grooved. Aperture is basal.

Distribution. The species is known from the Upper Cretaceous in Italy, Spain, the Upper Cretaceous, Paleocene and Eocene of the Flysh Carpathians, Alps, the Paleocene and Eocene of the Netherlands, Trinidad, Ukraine, Azerbaydzhan, deep sea holes in Norwegian (Lower Eocene) and North Sea (Paleocene-Eocene).

Occurrence. Byala Formation: C–12 (204.00 m – P1c Zone, 219.20 m – P1b Zone), C–21 (7.50 m – P1c Zone, 38.50 m – P1b Zone), C–25 (22.50–40.40 m – P1b Zone), C–28 (Maastrichtian-Paleocene), C–29 (364.40–365.00 m – P3 Zone, 395.20–420.60 m – P4 Zone, 440.30 m – P5 Zone), C–30 (83.90 m – P4 Zone, 99.50 m – P5 Zone), Sections: Byala 1 (NP4–5 Zone), Byala 2b (NP1–3 Zone), Byala River and Koundilaki Cheshme Valleys (Paleocene); Emine Formation: Kochan Section (P1c Zone), Emona Section (NP1–2 Zones), Banya-north and Banya-southwest Sections (Lower Paleocene).

Family LITUOTUBIDAE Loeblich and Tappan, 1984

Genus *Lituotuba* Rhumbler, 1895

Type species. *Trochammina lituiformis* Brady, 1879 (subsequent designation by Cushman, 1910);

Distribution. Holocene; Atlantic, Pacific, Caribbean, Gulf of Mexico.

Remarks. Loeblich, Tappan (1988) gave Holocene age, but the numerous finds in the Upper Cretaceous and Lower Paleogene flysh sediments of Tethys region broadened the stratigraphical and geographical distribution of the genus.

Lituotuba lituiformis Brady, 1879 Plate I, Figs. 9, 10

1961. *Lituotuba lituiformis* Brady; Stancheva, p. 261, Table 1, Fig. 8.

1981. *Trochamminoides lituiformis* (Brady); Morgiel, Olszewska, p. 12, Pl. 3, fig. 10.

1988. *Lituotuba lituiformis* Brady; Kaminski et al., p. 190, Pl. 4, Fig. 14, 15.

1988. *Lituotuba lituiformis* Brady; Loeblich, Tappan, Pl. 53, Fig. 3.

1996. *Lituotuba cf. lituiformis* Brady; Ujetz, p. 104, Pl. 2, Fig. 4, 5.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (7 specimens), Emine Formation (12 specimens).

Remarks. The species was described from the Paleocene of East Stara Planina (Stancheva, 1961).

Distribution. It is known from the Upper Cretaceous in Italy, Spain, the Maastrichtian, Paleocene and Lower Eocene of Trinidad, Carpathians, North Caucasus, the Paleocene of the Alps.

Occurrence. Byala Formation: C—12 (289.20 m — P1c Zone), C—24 (40.00 m — P2 Zone, 56.90 m — P1c Zone), Byala 1 Section (NP4—5 Zones); Emine Formation: Kochan Section (P1c—P2 Zones), Emona Section (NP1—2 Zone), Banya—north and Banya—southwest Sections (Lower Paleocene); samples from the geological mapping (Paleocene).

Genus **Paratrochamminoides** Soliman, 1972

Type species. *Trochamminoides korosmezoensis* Majzon, 1943 (by original designation);

Distribution. Turonian-Paleocene; Carpathians, Mexico.

Remarks. The numerous finds of representatives of the genus from the Tethys region broadened its geographical distribution given by Loeblich, Tappan (1988).

Paratrochamminoides irregularis White, 1928

Plate I, Fig. 11

1928. *Trochamminoides irregularis* n. sp.; White, p. 307, Pl. 42, Fig. 1.

1928. *Haplophragmoides coronata* (Brady); Cushman, Jarvis, p. 90, Pl. 12, Fig. 17.

1930. *Trochamminoides irregularis* White; Nuttall, p. 279, Pl. 23, Fig. 4.

1937. *Trochamminoides irregularis* White; Glaessner, S. 360, Taf. 1, Fig. 9.

1977. *Trochamminoides irregularis* White; Samuel, p. 46, Pl. 5, Fig. 3, Pl. 26, Fig. 3.

1988. *Trochamminoides irregularis* White; Kaminski et al., p. 191, Pl. 4, Fig. 18.

1990. *Paratrochamminoides irregularis* (White); I. De Klasz, S. de Klasz, p. 411, Pl. 5, Fig. 1.

Nomenclature. The holotype (Columbia University Paleo. Coll. No. 19 952) is from the Paleocene of Mexico (Velasco Shale, Tampico embayment).

Material. Byala Formation (146 specimens), Emine Formation (112 specimens).

Description. The test is slightly flattened, composed of flattened chambers, irregularly coiled in several planes.

Distribution. The species is known from the Upper Cretaceous in Italy, Spain, the Turonian, Senonian and Paleocene in the Alps, Carpathians, the Upper Cretaceous, Paleocene and Eocene of Mexico, the Maastrichtian, Paleocene and Lower Eocene of Trinidad, the Paleocene of Ukraine, Caucasus, Tunisia, the Maastrichtian-Oligocene of Azerbaydzhan, the Eocene of Turkmenia.

Occurrence. Byala Formation: C—11 (192.40 m — P1c Zone), C—12 (204.00 m — P1c Zone, 219.20 m — P1b Zone, 289.20 m — P1c Zone, 296.10 m — P1b Zone), C—21 (22.00—38.50 m — P1b Zone), C—24 (107.70 m — P1c Zone), C—25 (22.50—40.40 m — P1b Zone, 355.00 m, 454.60 m — P2 Zone), C—29 (364.40 m — P3 Zone, 383.20—420.60 m — P4 Zone, 433.50—464.70 m — P5 Zone), C—30 (83.90—91.90 m — P4 Zone, 99.50—107.90 m — P5 Zone), Sections: Byala 1 (NP3—5 Zones), Byala 2b (NP1—3 Zones), Byala 2c (NP1—2 Zones), Byala River and Koundilaki Cheshme Valleys (Paleocene); Emine Formation: Kochan Section (P1c—3, NP8—9 Zones), Emona Section (NP1—2 Zone), Banya—north and Banya—southwest Sections (Lower Paleocene), samples from the geological mapping (Paleocene).

Genus **Trochamminoides** Cushman, 1910

Type species. *Trochammina proteus* Karrer, 1866 (by original designation);

Distribution. Cretaceous—Holocene; Atlantic, Pacific, Caribbean, Gulf of Mexico.

Remarks. The numerous finds of representatives of the genus from the Tethys region broadened its geographical distribution given by Loeblich, Tappan (1988).

Trochamminoides coronatus (Brady, 1879)

Plate I, Fig. 12

1962. *Trochamminoides coronatus* (Brady); Hillebrandt, S. 26, Taf. 1, Fig. 1.

1977. *Trochamminoides coronatus* (Brady); Samuel, p. 44, Pl. 4, Fig. 4, Pl. 25, Fig. 1—4.

1988. *Trochamminoides subcoronatus* (Grzybowski); Kaminski et al., p. 192, Pl. 4, Fig. 19.

1990. *Trochamminoides coronatus* (Brady); I. De Klasz, S. de Klasz, p. 411, Pl. 4, Fig. 11.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (16 specimens), Emine Formation (61 specimens).

Description. The test is finely agglutinated, planispiral, evolute, composed of subspherical chambers gradually increasing in size. The central area of the test is grooved.

Distribution. The species is known from the Upper Cretaceous, Paleocene of North Caucasus, the Paleocene and Eocene of the Alps, Carpathians, the Maastrichtian, Paleocene and Lower Eocene of Trinidad. It was also established during the deep sea drilling in Labrador and North Seas (Maastrichtian-Lower Eocene), the Atlantic (Upper Cretaceous).

Occurrence. Byala Formation: C—12 (219.20, 296.10 m — P1b Zone), C—25 (22.50—26.40 m — P1b Zone, 454.60 m — P2 Zone), C—29 (420.60 m — P4 Zone, 433.50—440.30 m — P5 Zone), C—30 (83.90, 91.90 m — P4 Zone, 107.90 m — P5 Zone), Sections: Byala 1 (NP4 Zone), Byala 2b (NP3 Zone); Emine Formation: Kochan Section (P1c—3, NP8—9 Zones), Emona Section (NP1—2 Zone), Banya—north and Banya—southwest sections (Lower Paleocene), samples from the geological mapping (Paleocene).

Trochamminoides dubius (Grzybowski, 1901)
Plate I, Figs. 13, 14

1901. *Ammodiscus dubius* n. sp.; Grzybowski, p. 274, Tab. 8, Fig. 12, 14.
1977. *Trochamminoides dubius* (Grzybowski); Samuel, p. 45, Pl. 5, Fig. 6, Pl. 25, Fig. 5, 6.
1988. *Trochamminoides dubius* (Grzybowski); Kaminski et al., p. 191, Pl. 4, Fig. 16, 17.
1990. *Trochamminoides dubius* (Grzybowski); I. De Klasz, S. de Klasz, p. 411, Pl. 4, Fig. 12.

Nomenclature. I have no data about the holotype. The species was first described from the inoceramid beds in the Polish Carpathians (Gorlic surroundings).

Material. Byala Formation (6 specimens), Emine Formation (17 specimens).

Description. The test is finely agglutinated, irregularly coiled, flattened, composed of 3–4 whorls. Chambers are indistinct. Surface is smooth.

Distribution. The species is known from the Upper Cretaceous in Italy, Spain, The Senonian, Paleocene and Lower Eocene of the Carpathians, the Maastrichtian, Paleocene and Lower Eocene of Trinidad, the Paleocene of the Bavarian Alps.

Occurrence. Byala Formation: C–25 (26.40 m – P1b Zone), C–29 (361.40–364.40 m – P3 Zone), C–30 (107.90 m – P5 Zone), Byala 2b Section (NP3 Zone); Emine Formation: Kochan Section (P3 Zone), samples from the geological mapping (Paleocene).

Trochamminoides proteus (Karrer, 1866)
Plate I, Fig. 15

1866. *Trochammina proteus* n. sp.; Karrer, S. 494, Taf. 1, Fig. 1–8.
1928. *Trochamminoides proteus* (Karrer); White, p. 308, Pl. 42, fig. 2.
1928. *Ammodiscus proteus* Karrer; Franke, S. 14, Taf. 1, Fig. 18.
1961. *Trochamminoides proteus* (Karrer); Stancheva, p. 261, Table 1, Fig. 4.
1977. *Trochamminoides proteus* (Karrer); Samuel, p. 46, Pl. 5, Fig. 5.
1988. *Trochamminoides proteus* (Karrer); Kaminski et al., p. 192, Pl. 4, Fig. 20.
1988. *Trochamminoides proteus* (Karrer); Loeblich, Tappan, Pl. 53, Fig. 1, 2.
1990. *Trochamminoides proteus* (Karrer); Bellagamba, Coccioni, p. 901, Pl. 1, Fig. 10–12.

References

- Bellagamba, M., R. Coccioni. 1990. Deep-water agglutinated Foraminifera from the Massignano section (Ancona, Italy), a proposed stratotype for the Eocene-Oligocene boundary. — In: Hemleben, C., M. Kaminski, W. Kuhnt, D. Scott (Eds.). *Paleoecology, Biostratigraphy, Paleocyanography and Taxonomy of Agglutinated Foraminifera*. Kluwer Academic Publishers, 883–922.
- Cushman, J. A. 1947. A foraminiferal fauna from the Santa Anita Formation of Venezuela. — *Contrib. Cush. Lab. For. Res.*, 23, 1, 1–18.
- Cushman, J. A., P. W. Jarvis. 1928. Cretaceous foraminifera from Trinidad. — *Contrib. Cush. Lab. For. Res.*, 4, 4, 85–103.
- Darakchieva, S. 1999. *Small Tertiary Foraminifers from Bulgaria*. Atlas. Sofia, 92 p.
- Franke, A. 1928. Die Foraminiferen der Oberen Kreide Nord- und Mitteldeutschlands. — *Abh. Preuss. Geol. Landdenst. Neue Folge*, Neft 111.
- Geroch, S., J. G. Verdenius. 1983. Note to the Plates of J. Grzybowski's Micropaleontological Publications. — In:

1996. *Trochamminoides proteus* (Karrer); Ujetz, p. 105, Pl. 2, Fig. 10, 11.

Nomenclature. A holotype was not designated. The species was first described from the Eocene of Vienna surroundings.

Material. Byala Formation (15 specimens), Emine Formation (23 specimens).

Remarks. Karrer (1866) figured 8 specimens. Our specimens are morphologically the same as the specimen on Fig. 1. The species was described from the Paleocene of East Stara Planina (Stancheva, 1961).

Distribution. It is known from the Upper Cretaceous in Italy, Spain, Senonian of North Germany, the Maastrichtian and Paleocene of Mexico, Trinidad, the Upper Cretaceous and Paleocene of the Carpathians, the Eocene of Austria, the Upper Eocene of North Italy, the deep sea holes in the Atlantic (Upper Cretaceous).

Occurrence. Byala Formation: C–24 (56.90 m – P1c Zone, 74.25 m – P1b Zone), C–25 (22.50 m – P1b Zone), C–29 (395.20–399.20 m – P4 Zone, 433.50 m – P5 Zone), C–30 (83.90 – P4 Zone, 103.50 m – P5 Zone), Sections: Byala 1 (NP5 Zone), Byala 2b (NP3 Zone), Byala River Valley (Paleocene); Emine Formation: Kochan Section (P1c Zone), Emona Section (NP1–2 Zone), samples from the geological mapping (Paleocene).

Family LITUOLIDAE de Blainville, 1827

Subfamily AMMOMARGINULININAE Podobina, 1978

Genus **Ammobaculites** Cushman, 1910

Type species. *Spirolina agglutinans* d'Orbigny, 1846 (by original designation);

Distribution. Carboniferous-Holocene; cosmopolitan.

Ammobaculites sp.
Plate I, Fig. 16

Material. Byala Formation (2 specimens).

Description. The test is coarsely agglutinated, heteromorphous. Initial portion is planispiral, evolute, composed of 2 whorls. The late portion is straight, uniserial. Chambers are indistinct. Aperture is terminal.

Occurrence. Byala Formation: Byala 2b Section (NP1–2 Zone).

- Verdenius, J. G., J. E. van Hinte, A. R. Fortuin (Eds.). *Proceedings of the First Workshop on Arenaceous Foraminifera*. September 7–9, 1981, 273–303.
- Glaessner, M. 1937. Studien über Foraminiferen aus der Kreide und dem Tertiär des Kaukasus. 1. Die Foraminiferen der Ältesten Tertiärschichten des Northwest Kaukasus. — *Probl. Paleot.*, 2–3, 349–410.
- Gradstein, F. M., W. A. Berggren. 1981. Flysh-type agglutinated foraminifera and the Maestrichtian to Paleogene history of the Labrador and North Seas. — *Mar. Micropaleont.*, 6, 211–268.
- Grzybowski, J. 1901. Otwornice warstw inoceramowych okolicy Gorlic. — *Rozpr. Akad. Um.*, 41, 219–288.
- Hillebrandt, A. von. 1962. Das Paleozän und seine Foraminiferenfauna im Becken von Reichenhall und Salzburg. — *Bayer. Acad. Wiss., math-natw. Cl., Abh., (N. F.)*, 108, 1–192.
- Kaminski, M. A., F. W. Gradstein, W. A. Berggren, S. Geroch, J. P. Beckman. 1988. Flysh-type agglutinated foraminiferal assemblages from Trinidad. — In: Rogl, F., F. M. Gradstein (Eds.). *Second Workshop on Agglutinated Foraminifera, Abh. Geol. Bundesanstalt*, 41. Viena, 1986, 155–227.
- Kaminski, M. A., W. Kuhnt, J. D. Radley. 1996. Paleocene-Eocene deep water agglutinated foraminifera from the Numidian Flysh (Rif, Northern Morocco): their significance for the paleoceanography of the Gibraltar gateway. — *J. Micropaleont.*, 15, 1–19.
- Karrer, F. 1866. Über das Auftreten von Foraminiferen in den älteren Schichten des Wiener Sandsteins. — *Sitz. K. Akad. Wiss., math-naturwiss. Cl.*, 52. Wien, 492–497.
- Klasz, I. de, S. de Klasz. 1990. Danian deep-water (bathyal) agglutinated Foraminifera from Bavaria and their comparison with approximately coeval agglutinated assemblages from Senegal and Trinidad. — In: Hemleben, C., M. Kaminski, W. Kuhnt, D. Scott (Eds.). *Paleoecology, Biostratigraphy, Paleocyanography and Taxonomy of Agglutinated Foraminifera*. Kluwer Academic Publishers, 387–432.
- Kraeva, E. Y., B. F. Zernetskij. 1969. Paleogene Foraminifera from Ukraine. — *Paleont. Misc.*, 3, 197 p. (in Russian).
- Liszka, S., J. Liszkowa. 1981. Revision of J. Grzybowski's paper (1896) "Foraminifera of the red clays from Wadowice". — *Rocz. Pol. tow. geol.*, 51, 1/2, 153–208.
- Loeblich, A. Jr., H. Tappan. 1988. *Foraminiferal Genera and their Classification*. New York, Van Nostrand Reinhold C., 970 p.
- Maslakova, N. I. 1955. Stratigraphy and small foraminifera from the Paleogene of the Eastern Carpathians. — In: *Materials in Biostratigraphy of Western USSR*. M., Gostgeoltehzdat, 5–132 (in Russian).
- Morgiel, J., B. Olszewska. 1981. Biostratigraphy of the Polish External Carpathians based on agglutinated foraminifera. — *Micropaleont.*, 27, 1, 1–30.
- Myatlyuk, E. V. 1970. Foraminifera from the flysh deposits of Eastern Carpathians (Cretaceous-Paleogene). — *Tr. VNIGRI*, 282, 360 p. (in Russian).
- Nuttall, W. L. F. 1930. Eocene Foraminifera from Mexico. — *J. Paleont.*, 4, 271–293.
- Samuel, O. 1977. Agglutinated foraminifera from the Paleogene flysh formations in West Carpathians of Slovakia. — *Zapadne Karpati, ser. paleont.*, 2–3, 7–70.
- Stancheva, M. 1961. Foraminifera from the Kozichino Series. — *Tr. Geol. Bulg.*, 3, 257–268 (in Bulgarian).
- Ujetz, B. 1996. Micropaleontology of Paleogene deep-water sediments, Haute-Savoie, France. — *Publ. Dep. Géol. paléontol. Univ. Genève*, 22, 149 p.
- Valchev, B. 2002. 'Flysh-type' Agglutinated foraminifera from the Paleocene of the coastal part of East Stara Planina. Family BATHYSIPHONIDAE Avnimelech, 1952 to Family HIPPOCREPINIDAE Rhumbler, 1895. — *Rev. Bulg. Geol. Soc.*, 63, 1–3, 69–75.
- White, M. P. 1928. Some index foraminifera of the Tampico Embayment Area of Mexico. Part II. — *J. Paleont.*, 2, 280–316.

(Посъпила на 18.03.2004 г., приета за печат на 17.05.2005 г.)