



Representatives of Family AMMODISCIDAE Reuss, 1862 to Family HORMOSINIDAE Haeckel, 1894 from the Paleocene of the coastal part of East Stara Planina

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Á. Áúë-áá. 2004. *Í ðááñòááèòáèè íà ñàì áéñòáì AMMODISCIDAE Reuss, 1862 áì ñàì áéñòáì HORMOSINIDAE Haeckel, 1894 íò ì áèáì óáì ñèàòà ñáðëý á ì ðèì ì ðñèáòà ÷áñò íà Èçòì-íà Ñòáðà ì éáì éíà. – Ñì. Áúë. ááí. è. á-áì, 65, 1-3, 67-75.*

Ðàçþì á. Í áñòì ÷ìáòà ñòáðëý á áòì ðà ìò ì ðááèòà, ì ñááòáí á ì óáèñì ì ì èýòá íà „óèèøèèý ðèì“ òì ðáì éíè-óáðì è áñì óèáòèè ìò ì ðèì ì ðñèáòà ÷áñò íà Èçòì-íà Ñòáðà ì éáì éíà. Í ðááñòáááì è ñà óáèñì ì ì è-íè ì éíè ì éíàì èý íà 18 áèää è 1 ì ì áèáè ááèóèíè ðáì è òì ðáì éíè óáðè, ì ðèì ááèáèáè ì íà 9 ðì áá (Ammodiscus – 3 áèää, Glomospira – 2 áèää, Glomospirella – 3 áèää, Repmanina – 1 áèä, Rzehakina – 1 áèä, Kalamopsis – 1 áèä, Reophax – 3 áèää, Subreophax – 2 áèää, Hormosina – 2 áèää è 1 ì ì áèää), 4 ñàì áéñòáá è 3 ì ááñàì áéñòáá. 17 áèää è 1 ì ì áèáè ñà ì éíè ááò çà ì úðáè ì úò á Áúëááðëý.

Èçì ì èçááì á à èèáèóèèáèóèýòá íà Loeblich, Tappan (1988).

Èèþ-íáè áòì è: „óèèøèèý ðèì“ ááèóèíè ðáì è òì ðáì éíè óáðè, óáèñì ì ì èý, ì áèáì óáì ñèà ñáðëý, Èçòì-íà Ñòáðà ì éáì éíà.

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Abstract. The present article is the second one from a series of contributions to taxonomy of the “flysh-type” foraminiferal assemblages from the coastal part of East Stara Planina. Taxonomical descriptions of 18 species and 1 subspecies agglutinated foraminifera belonging to 9 genera (Ammodiscus – 3 species, Glomospira – 2 species, Glomospirella – 3 species, Repmanina – 1 species, Rzehakina – 1 species, Kalamopsis – 1 species, Reophax – 3 species, Subreophax – 2 species, Hormosina – 2 species and 1 subspecies), 4 families and 3 superfamilies are given. 17 species and 1 subspecies are first described in Bulgaria.

The Loeblich, Tappan’s (1988) classification is applied in the article.

Key words: “flysh-type” agglutinated foraminifera, taxonomy, Paleocene, East Stara Planina.

Introduction

This is the second article of series of contributions to the taxonomy of the “Flysh-type” foraminiferal assemblages from the coastal part of East Stara Planina. The investigated foraminiferal microfauna was obtained from 215 samples (including 72 samples from the geological mapping carried out in the same area in 1993). Generalized geological map with the location of the studied borehole and outcrop sections was published by Valchev (2002).

Taxonomical description

The present article represents taxonomical descriptions of 18 species and 1 subspecies belonging to 9 genera, 4 families and 3 superfamilies. 17 species and 1 subspecies are first described in Bulgaria.

The Loeblich, Tappan’s (1988) classification is applied in the article.

Superfamily AMMODISCACEA Reuss, 1862
Family AMMODISCIDAE Reuss, 1862
Subfamily AMMODISCINAE Reuss, 1862
Genus Ammodiscus Reuss, 1862

Type species. Ammodiscus infimus L. G. Bornemann, 1874 (subsequent designation by Loeblich, Tappan, 1954);

Distribution. Silurian – Holocene; cosmopolitan.

Ammodiscus cretaceus (Reuss, 1845)

Plate I, Fig. 1

1845. *Operculina cretacea* Reuss; Reuss, S. 35, Taf. 13, Fig. 64, 65.
1860. *C. (Cornuspira) cretacea* Rss; Reuss, S. 33, Taf. 1, Fig. 1.
1926. *Cornuspira cretacea* Reuss; Cushman, p. 608, Pl. 21, Fig. 3.

1958. *Involutina cretacea* (Reuss); Haynes, p. 58, Pl. 15, Fig. 3.
 1962. *Involutina cretacea* (Reuss); Ebensberger, S. 30, Taf. 1, Fig. 8.
 1981. *Ammodiscus cretaceus* (Reuss); Gradstein, Berggren, p. 241, Pl. 2, Figs. 12, 13.
 1988. *Ammodiscus cretaceus* (Reuss); Kaminski et al., p. 184, Pl. 3, Fig. 7.
 1990. *Ammodiscus cretaceus* (Reuss); I. de Klasz, S. de Klasz, p. 404, Pl. 2, Figs. 2, 3.
 1996. *Ammodiscus cretaceus* (Reuss); Ujetz, p. 102, Pl. 1, Figs. 15, 16.

Nomenclature. There are no data about the holotype available. The species was first described from the Late Cretaceous of Bohemia.

Material. Byala Formation (132 specimens), Emine Formation (34 specimens).

Description. Test is finely agglutinated, planispiral, biconcave, evolute, with round outline, composed of 6 to 8 whorls. Surface is smooth.

Remarks. It differs from *A. glabratus* Cushman Jarvis by the lower number of the whorls (6-8) and the larger proloculus.

Distribution. It is known from the Cretaceous and Paleocene of the Alps, North and Central Germany, the Upper Cretaceous of Italy, Spain, the Maastrichtian and Paleocene of Trinidad, Tunisia, the Paleocene of Mexico, Egypt, the Upper Paleocene of England, the Oligocene and Miocene of Bavaria. It was established during the deep sea drilling in the Atlantic (Upper Cretaceous), Labrador and North Sea (Maastrichtian-Paleocene), Norwegian Sea (Lower Eocene).

Occurrence. Byala Formation: C-11 (191.60 m – P1c Zone), C-12 (257.00 m – Lower Paleocene), C-21 (22.00-29.50 m – P1b Zone), C-24 (23.00 m – P3 Zone, 74.25 m – P1b Zone, 107.70 m – P1c Zone), C-25 (26.40- 40.40 m – P1b Zone), C-29 (364.40-365.90 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), Byala 1 Section (NP3-NP5 Zone), Byala 2b Section (NP1-NP3 Zone), Byala 2c Section (NP1-NP2 Zone), Byala Reka valley (Paleocene); Emine Formation: Kochan Section (P1c-P3 Zone), Emona Section (NP1-NP2 Zone), samples from the geological mapping (Paleocene).

Ammodiscus glabratus Cushman Jarvis, 1928

Plate I, Fig. 2

1928. *Ammodiscus glabratus* Cushman, Jarvis, n. sp.; Cushman and Jarvis, p. 86, Pl. 12, Fig. 6.
 1962. *Ammodiscus glabratus* Cushman, Jarvis; Hillebrandt, S. 25, Taf. 1, Fig. 3.
 1970. *Grybowskiella glabrata* (Cushman, Jarvis); Myatlyuk, p. 71, Pl. 12, Fig. 7.
 1983. *Ammodiscus glabratus* Cushman, Jarvis; Basov, Krashennikov, p. 760, Pl. 5, Fig. 4.
 1988. *Ammodiscus glabratus* Cushman, Jarvis; Kaminski et al., p. 184, Pl. 3, Fig. 8.

Nomenclature. The holotype (Cushman Coll. No. 9683) is from the Paleocene of Trinidad (Lizard Springs Formation).

Material. Byala Formation (222 specimens), Emine Formation (18 specimens).

Description. Test is planispiral, evolute to partly involute, biconcave, composed of 8 to 10 whorls. Surface is smooth.

The species differs from *A. cretaceus* (Reuss) by the larger number of the whorls (10-12) and being partly involute. It was established in the Upper Paleocene-Middle Eocene interval of Northeast Bulgaria (Darakchieva, 1999).

Distribution. It is known from the Upper Cretaceous and Paleocene of Trinidad, the Alps, the Carpathians, the Maastrichtian of Tunisia, the Paleocene of Venezuela, Tunisia, the Upper Paleocene of France, Georgia, the Lower Eocene of Trinidad. It was also established during the deep sea drilling in the Atlantic (Upper Cretaceous).

Occurrence. Byala Formation: C-11 (191.60-247.50 m – P1c Zone), C-12 (167.00 m – Lower Paleocene, 203.00-204.00 m – P1c Zone, 219.20 m – P1b Zone, 268.50-289.20 m – P1c Zone, 296.10 m – P1b Zone), C-21 (22.00-38.50 m – P1b Zone), C-24 (23.00 m – P3 Zone, 40.00 m – P2 Zone, 56.90 m – P1c Zone, 74.25 m – P1b Zone, 107.70 m – P1c Zone), C-25 (22.50 m – P1b Zone, 355.00 m – P2 Zone, 454.60 m – P2 Zone), C-28 (15.00-16.00 m – P2 Zone, 512.00-513.00 m – P3 Zone), C-29 (361.50-365.90 m – P3 Zone, 384.20-420.60 m – P4 Zone, 433.50-476.30 m – P5 Zone), C-30 (83.90-91.90 m – P4 Zone, 99.50-107.90 m – P5 Zone), Byala 1 Section (NP3-NP5 Zone), Byala 2b Section (NP1-NP3 Zone), Byala 2c Section (NP1-NP2 Zone), Byala Reka and Koundilaki Cheshme valleys (Paleocene); Emine Formation: Kochan Section (P3 Zone), Emona Section (NP1-NP2 Zone), samples from the geological mapping (Paleocene).

Ammodiscus peruvianus Berry, 1928

Plate I, Fig. 3

1981. *Ammodiscus peruvianus* Berry; Gradstein, Berggren, p. 241, Pl. 2, Figs. 14, 15.
 1988. *Ammodiscus peruvianus* Berry; Kaminski et al., p. 185, Pl. 3, Figs. 11, 12.
 1990. *Ammodiscus peruvianus* Berry; I. de Klasz, S. de Klasz, p. 404, Pl. 2, Fig. 4.

Nomenclature. I have no data about the holotype. The species was first described from the Upper Eocene of Peru.

Material. Byala Formation (80 specimens), Emine Formation (17 specimens).

Description. Test is planispiral, evolute to partly involute, biconvex, elliptical in outline, with smooth surface.

Remarks. The species differs from *A. glabratus* Cushman Jarvis by its elliptical outline.

Distribution. It is known from the Campanian and Maastrichtian of Greenland, Campanian, Maastrichtian, Paleocene and Lower Eocene of Trinidad, the Maastrichtian and Paleogene in the deep sea holes of Labrador and North Seas, the Upper Eocene of Peru.

Occurrence. Byala Formation: C-12 (167.00 m – Lower Paleocene), C-21 (29.50 m – P1b Zone), C-24 (23.00 m – P3 Zone, 40.00 m – P2 Zone), C-25 (22.50-40.40 m – P1b Zone), C-29 (364.40 m – P3 Zone, 383.20-420.60 m – P4 Zone, 440.30-464.70 m – P5 Zone), C-30 (83.90-86.30 m – P4 Zone, 99.50 m – P5 Zone), Byala 1 Section (NP3-NP4 Zone), Byala 2b Section (NP1-NP3 Zone), Byala 2c Section (NP1 Zone),

Byala Reka and Koundilaki Cheshme valleys (Paleocene); Emine Formation: Kochan Section (P1c-P3 Zone), Emona Section (NP1-NP2 Zone), Banya-West Section (Paleocene), samples from the geological mapping (Paleocene).

Subfamily **AMMOVERTELLINIDAE** Saidova, 1981

Genus ***Glomospira*** Rzehak, 1895

Type species. Trochammia squamata Jones, Parker var. *gordialis* Jones, Parker, 1860 (original designation by monotypy);

Distribution. Visean – Holocene; cosmopolitan.

Glomospira gordialis (Jones and Parker, 1860)

Plate I, Fig. 4

1928. *Glomospira gordialis* (Jones, Parker); Cushman, Jarvis, p. 87, Pl. 12, Fig. 7.

1977. *Glomospira gordialis* (Jones, Parker); Samuel, p. 28, Pl. 4, Figs. 4, 5.

1981. *Glomospira gordialis* (Jones, Parker); Gradstein, Berggren, p. 246, Pl. 3, Figs. 2, 3.

1988. *Glomospira gordialis* (Jones, Parker); Kaminski et al., p. 185, Pl. 3, Fig. 17.

1988. *Glomospira gordialis* (Jones, Parker); Loeblich, Tappan, Pl. 38, Figs. 5, 6.

1990. *Glomospira gordialis* (Jones, Parker); I. De klasz, S. de klasz, p. 405, Pl. 2, Fig. 9.

1996. *Glomospira gordialis* (Jones, Parker); Ujetz, p. 102, Pl. 1, Figs. 18, 19.

Nomenclature. I have no data about the holotype. The species was first described from recent sediments of Indian and Arctic Oceans.

Material. Byala Formation (92 specimens), Emine Formation (8 specimens).

Description. Test is finely agglutinated, subspherical to slightly flattened. Initial whorls are regularly spirally coiled around the proloculus, while the late portion is irregularly coiled.

Remarks. The species differs from *R. charoides* (Jones, Parker) by the irregular coiling of the late portion.

Distribution. It is known from the Cretaceous to recent. It has been established in the Upper Cretaceous of Italy, Spain, the Cretaceous and Paleogene of the Alps, Carpathians, the Paleocene of the Netherlands, Turkmenia. It was also identified during the deep sea drilling in the Labrador and North Seas (Maastrichtian – Lower Eocene), the Atlantic (Upper Cretaceous), recent deposits in the Indian and Arctic Oceans.

Occurrence. Byala Formation: C-12 (303.40 m – P1b Zone), C-21 (22.00-38.50 m – P1b Zone), C-25 (22.50 m – P1b Zone), C-28 (15.00 m – P2 Zone, 512.00-513.00 m – P3 Zone), C-29 (361.50-365.90 m – P3 Zone, 383.20-420.60 m – P4 Zone, 433.50-464.70 m – P5 Zone), C-30 (83.90-86.30 m – P4 Zone, 99.50 m – P5 Zone), Byala 1 Section (NP3-NP5 Zone), Byala 2b Section (NP2-NP3 Zone), Byala 2c Section (NP1 Zone), Byala Reka and Koundilaki Cheshme valleys (Paleocene); Emine Formation: Kochan Section (P1c Zone), Emona Section (NP1-NP2 Zone), samples from the geological mapping (Paleocene).

Glomospira irregularis (Grzybowski, 1898)

Plate I, Figs. 5, 6

1937. *Glomospira irregularis* (Grzybowski); Glaessner, S. 359, Taf. 1, Fig. 7.

1981. *Glomospira irregularis* (Grzybowski); Gradstein, Berggren, p. 246, Pl. 3, Figs. 1-4.

1983. “*Ammodiscus irregularis* n. sp.”; Geroch, Verdenius, Pl. 11, Figs. 2, 3.

1988. *Glomospira irregularis* (Grzybowski); Kaminski et al., p. 185, Pl. 3, Figs. 20, 21.

1990. *Glomospira irregularis* (Grzybowski); Kaminski et al., p. 365, Pl. 3, Fig. 3.

1996. *Glomospira irregularis* (Grzybowski); Ujetz, p. 102, Pl. 1, Fig. 20.

Nomenclature. There are no data about the holotype. Geroch, Verdenius (1983) refigured the original Grzybowski’s images. The species was first described from the Eocene of Polish Carpathians (Krosno area).

Material. Byala Formation (93 specimens), Emine Formation (44 specimens).

Description. Test is moderately coarse, composed of a broad, irregularly coiled tube, often flattened.

Distribution. The species is known from the Upper Cretaceous of Italy, Spain, the Upper Cretaceous and Paleocene of the Alps, Carpathians, Caucasus, the Paleocene of Trinidad, the Lower and Middle Eocene of deep sea holes of Norwegian and Greenland Seas.

Occurrence. Byala Formation: C-11 (191.60 m – P1b Zone), C-12 (204.00 m – P1c Zone, 219.00, 296.10-303.40 m – P1b Zone), C-21 (22.00-38.50 m – P1b Zone), C-24 (40.00 m – P2 Zone), C-25 (22.50-40.40 m – P1b Zone), C-28 (15.00-16.00 m – P2 Zone, 513.00 m – P3 Zone), C-29 (364.40 m – P3 Zone, 383.20-420.60 m – P4 Zone, 433.50-452.20 m – P5 Zone), C-30 (83.90-86.30 m – P4 Zone, 99.50 m – P5 Zone), Byala 1 Section (NP3-NP5 Zone), Byala 2b Section (NP2-NP3 Zone), Byala 2c Section (NP1-NP2 Zone), Byala Reka and Koundilaki Cheshme valleys (Paleocene); Emine Formation: Kochan Section (P1c-P3, NP8-NP9 Zone), Emona Section (NP1-NP2 Zone), samples from the geological mapping (Paleocene).

Genus ***Glomospirella*** Plummer, 1945

Type species. Glomospira umbilicata Cushman, Waters, 1927 (by original designation).

Distribution. Upper Carboniferous – Miocene; cosmopolitan.

Glomospirella diffundens (Cushman, Renz, 1946)

Plate I, Fig. 8

1960. *Glomospira gordialis* (Jones et Parker) var. *diffundens* Cushman, Renz; Geroch, p. 46, Tabl. 4, Fig. 1, Tabl. 10, Fig. 2.

1962. *Glomospira gordialis diffundens* Cushman, Renz; Hillebrandt, S. 25.

1981. *Glomospira diffundens* (Cushman, Renz); Morgiel, Olszewska, p. 8, Pl. 1, Figs. 13, 14.

1983. *Glomospira gordialis* (Jones, Parker) var. *diffundens* Cushman, Renz; Geroch, Novak, Pl. 1, Fig. 10.

1988. *Glomospira diffundens* (Cushman, Renz); Kaminski et al., p. 185, Pl. 3, Figs. 18, 19.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (10 specimens), Emine Formation (5 specimens).

Description. Test is finely agglutinated, heteromorphous. Initial portion is irregularly coiled, while the late one is planispiral, evolute. Chambers are broad.

Distribution. The species is known from the Maastrichtian and Paleocene of Trinidad, the Maastrichtian, Paleocene and Lower Eocene of Polish Carpathians, the Paleocene of the Alps.

P1b Zone), C-24 (56.90 m – P1c Zone), C-28 (Paleocene), C-29 (395.20 m – P4 Zone, 440.30 m – P5 Zone), Byala 1 Section (NP4 Zone), Byala 2c Section (NP1 Zone), Byala Reka valley (Paleocene); Emine Formation: Kochan Section (P1c Zone), Banya-West Section (Paleocene), samples from the geological mapping (Paleocene).

Glomospirella gorayskii (Grzybowski, 1898)

Plate I, Fig. 7

1969. *Glomospira gorayskii* (Grzybowski); Kraeva, Zernetskij, p. 16, Pl. 4, Fig. 2.

1970. *Glomospira gorayskii* (Grzybowski); Bratu, Alexandrescu, Pl. 2, Figs. 2, 3.

1977. *Glomospirella gorayskii* (Grzybowski); Samuel, p. 30, Pl. 4, Fig. 1, Pl. 21, Figs. 4-6, Pl. 22, Figs. 1-3.

1983. "*Ammodiscus gorayskii* n. sp."; Geroch, Verdenius, Pl. 11, Fig. 15.

1996. *Paratrochaminoides gorayskii* (Grzybowski); Kaminski et al., p. 16, Pl. 4, Figs. 6, 7.

Nomenclature. There are no data about the holotype. Geroch, Verdenius (1983) refigured the original Grzybowski's image. The species was first described from the Eocene of Polish Carpathians (Krosno area).

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

Description. Test is finely to moderately coarse agglutinated, planispiral, evolute, round in outline. It is composed of 3-4 whorls, as the initial one is at angle oriented to the coiling plane of the further 2-3 whorls. Surface is smooth.

Remarks. The species differs from *G. serpens* (Grzybowski) by its round outline and the larger number of the whorls.

Distribution. It is known from the Paleocene of Ukraine, Tunisia, the Paleocene and Eocene of the Carpathians.

Occurrence. Byala Formation: C-29 (364.40 m – P3 Zone); Emine Formation: Kochan Section (P1c-P3 Zones), a sample from the geological mapping (Paleocene).

Glomospirella serpens (Grzybowski, 1898)

Plate I, Fig. 9

1960. *Glomospira serpens* (Grzybowski); Geroch, p. 47, Tabl. 4, Fig. 13.

1977. *Glomospira serpens* (Grzybowski); Samuel, p. 30, Pl. 4, Fig. 2, Pl. 22, Fig. 4.

1983. "*Ammodiscus serpens* n. sp."; Geroch, Verdenius, Pl. 10, Figs. 31-33.

1988. *Glomospira serpens* (Grzybowski); Kaminski et al., p. 185, Pl. 3, Figs. 22, 23.

1990. *Glomospira serpens* (Grzybowski); I. De Klasz, S. de Klasz, p. 405.

Nomenclature. There are no data about the holotype. Geroch, Verdenius (1983) refigured the original Grzybowski's image. The species was first described from the Eocene of Polish Carpathians (Krosno area).

Material. Byala Formation (16 specimens), Emine Formation (8 specimens).

Description. Test is planispiral, evolute, elliptical in outline, composed of 2-3 whorls as the first one is at angle oriented to the coiling plane of the further 1-2 whorls.

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

Occurrence. Byala Formation: C-25 (40.40 m – P1b Zone), C-29 (364.40 m – P3 Zone, 433.50-440.30 m – P5 Zone), C-30 (83.90 m – P4 Zone, 99.50 m – P5 Zone), Byala 2b Section (NP3 Zone), Byala Reka valley (Paleocene); Emine Formation: Kochan Section (P1c-P3 Zone), a sample from the geological mapping (Paleocene).

Subfamily **USBEKISTANIINAE** Vyalov, 1968

Genus ***Repmanina*** Suleymanov, 1966

Type species. *Trochammina squamata* Jones, Parker var. *charoides* Jones, Parker, 1860 (by original designation);

Distribution. Jurassic (USA), Cretaceous (Canada, Ukraine), Cenozoic (Iran, Ukraine, Italy).

Remarks. The numerous finds of *R. charoides* (Jones, Parker) in various localities of the Tethyan region emended the geographical distribution given by Loeblich, Tappan (1988).

Repmanina charoides (Jones, Parker, 1860)

Plate I, Figs. 12, 13

1928. *G. charoides* (Jones, Parker) var. *corona*; Cushman, Jarvis, p. 89, Pl. 12, Figs. 9-11.

1961. *Glomospira charoides* (Jones, Parker); Stancheva, p. 261, Pl. 1, Fig. 13.

1962. *Glomospira charoides corona* Cushman, Jarvis; Hillebrandt, S. 25, Taf. 2, Fig. 24.

1977. *Glomospira charoides* (Jones, Parker); Samuel, p. 27, Pl. 4, Fig. 6, Pl. 23, Figs. 5, 6, Pl. 24, Fig. 1.

1981. *Glomospira charoides* (Jones, Parker); Gradstein, Berggren, p. 241, Pl. 3, Figs. 5-7.

1983. "*Ammodiscus charoides* n. sp."; Geroch, Verdenius, Pl. 8, Figs. 39-43.

1988. *Glomospira charoides* (Jones, Parker); Kaminski et al., p. 185, Pl. 3, Figs. 14, 15.

1988. *Repmanina charoides* (Jones, Parker); Loeblich, Tappan, Pl. 39, Figs. 24-26.

1990. *Glomospira charoides* (Jones, Parker); I. De Klasz, S. de Klasz, p. 405, Pl. 2, Figs. 6, 7.

1997. *Usbekistania charoides* (Jones, Parker); Laursen, Andersen, Pl. 1, Fig. 8.

1999. *Repmanina charoides* (Jones, Parker); Darakchieva, p. 7.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (220 specimens), Emine Formation (22 specimens).

Remarks. The species was described from the Lower Paleocene of Kozichino area, Eastern Bulgaria (Stancheva, 1961). It was also established in the Upper Paleocene and Lower Eocene of East Stara Planina (Darakchieva, 1999).

Distribution. Cretaceous – Recent. Cosmopolitan.

Occurrence. Byala Formation: C-12 (167.00 m – Lower Paleocene, 204.00 m – P1c Zone, 264.50 m – Lower Paleocene, 296.10-303.40 m – P1b Zone), C-21 (37.00-38.50 m – P1b Zone), C-25 (22.50-40.40 m – P1b Zone), C-28 (56.90 m – P1c Zone), C-29 (361.10-365.90 m – P3 Zone, 383.20-420.60 m – P4 Zone, 433.50-476.30 m – P5 Zone), C-30 (83.90 m – P4 Zone, 99.50-107.90 m – P5 Zone), Byala 1 Section

(NP3-NP5 Zone), Byala 2b Section (NP2-NP3 Zone), Byala 2c Section (NP1 Zone), Byala Reka and Koundilaki Cheshme valleys (Paleocene); Emine Formation: Kochan Section (P1c-P3 Zone), Emona Section (NP1-NP2 Zone), Banya-West Section (Paleocene), samples from the geological mapping (Paleocene).

Superfamily **RZEHAKINACEA** Cushman, 1933

Family **RZEHAKINIDAE** Cushman, 1933

Genus **Rzehakina** Cushman, 1927

Type species. Silicina epigona Rzehak, 1895 (by original designation);

Distribution. Cretaceous – Paleocene; cosmopolitan.

Rzehakina epigona (Rzehak, 1895)

Plate I, Fig. 14

1895. *Silicina epigona* n. f.; Rzehak, S. 214, Tabl. 6, Fig. 1.

1962. *Rzehakina epigona* (Rzehak); Hillebrandt, S. 26, Taf. 2, Fig. 21.

1970. *Rzehakina epigona epigona* (Rzehak); Myatlyuk, p. 96, Tabl. 32, Fig. 1.

1970. *Rzehakina epigona lata* (Cushman, Jarvis); Myatlyuk, c. 96, Tabl. 32, Fig. 3.

1977. *Rzehakina epigona* (Rzehak); Samuel, p. 38, Pl. 4, Fig. 13, Pl. 24, Figs. 5, 6.

1981. *Rzehakina epigona* (Rzehak); Gradstein, Berggren, p. 248, Pl. 5, Fig. 1.

1988. *Rzehakina epigona* (Rzehak); Kaminski et al., p. 186, Pl. 7, Figs. 6, 7.

1988. *Rzehakina epigona* (Rzehak); Loeblich, Tappan, Pl. 41, Figs. 7-11.

1990. *Rzehakina epigona* (Rzehak); I. De Klasz, S. de Klasz, p. 405, Pl. 2, Figs. 10, 11.

1996. *Rzehakina epigona* (Rzehak); Ujetz, p. 102, Pl. 1, Figs. 21, 22.

Nomenclature. Holotype is the specimen figured by Rzehak (1895, Tabl. 6, Fig. 1). The species was first described from the Lower Paleogene of Austria.

Material. Byala Formation (1 specimen), Emine Formation (7 specimens).

Description. Test is finely agglutinated, planispiral, partly involute, bilaterally flattened, elliptical in outline. Chambers are narrow, elongate, comprising half a whorl. Aperture is terminal, round.

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

Occurrence. Byala Formation: C-29 (420.60 m – P4 Zone); Emine Formation: Kochan Section (P3 Zone), Emona Section (NP1-NP2 Zone), Banya-West Section (Paleocene).

Superfamily **HORMOSINACEA** Haeckel, 1894

Family **ASCHEMOCELLIDAE** Vyalov, 1966

Genus **Kalamopsis** M. Folin, 1883

(original designation by monotypy);

Distribution. Holocene; North Atlantic.

Remarks. According to Loeblich, Tappan (1988) the genus is restricted in the Holocene of the North Atlantic only, but the numerous finds of *K. grzybowskii* (Dylazanka) in the Upper Cretaceous and Lower Paleogene in the flysh deposits of the Tethyan region emended the generic stratigraphical and geographical distribution.

Kalamopsis grzybowskii (Dylazanka, 1923)

Plate I, Figs. 10, 11

1923. *Hyperammina Grzybowski* nov. sp.; Dylazanka, p. 65.

1956. *Hyperammina grzybowskii* Dylazanka; Geroch, Gradzinski, p. 37.

1960. *Kalamopsis grzybowskii* (Dylazanka); Geroch, p. 39, Tabl. 1, Fig. 22, 23; Tabl. 10, Fig. 7.

1977. *Kalamopsis grzybowskii* (Dylazanka); Samuel, p. 32, Pl. 1, Figs. 12-14; Pl. 15, Figs. 2, 3.

1988. *Kalamopsis grzybowskii* (Dylazanka); Kaminski et al., p. 187, Pl. 1, Figs. 18-20.

1990. *Kalamopsis grzybowskii* (Dylazanka); I. De Klasz, S. de Klasz, p. 407, Pl. 3, Fig. 1.

1996. *Kalamopsis grzybowskii* (Dylazanka); Ujetz, p. 103, Pl. 1, Figs. 23, 24.

Nomenclature. There are no data about the holotype available. The species was first described from the Cretaceous (inoceramid beds) of the Polish Carpathians.

Material. Byala Formation (36 specimens), Emine Formation (4 specimens).

Description. Only unilocular, cylindrical, slightly flattened fragments were established during the present study. Test is finely agglutinated, smooth.

Distribution. The species is known from the Upper Cretaceous of Italy, Spain, the Upper Cretaceous, Paleocene and Lower Eocene of the Alps, Carpathians, the Maastrichtian, Paleocene and Lower Eocene of Trinidad, the Paleocene of Tunisia. It is also known from the deep sea holes in the Atlantic (Upper Cretaceous).

Occurrence. Byala Formation: C-12 (264.50 m – Lower Paleocene, 268.50 m – P1c Zone, 296.10 m – P1b Zone), C-25 (22.50 m – P1b Zone), C-29 (364.40-365.00 m – P3 Zone, 420.60 m – P4 Zone, 440.30 m – P5 Zone), C-30 (99.50 m – P5 Zone), Byala 2b Section (NP1-NP3 Zone), Byala 2c Section (NP1-NP2 Zone), Byala Reka and Koundilaki Cheshme valleys (Paleocene); Emine Formation: Kochan Section (NP9 Zone), a sample from the geological mapping (Paleocene).

Family **HORMOSINIDAE** Haeckel, 1894

Subfamily **REOPHACIDAE** Cushman, 1910

Genus **Reophax** de Montfort, 1808

Type species. Reophax scorpiurus de Montfort, 1808 (original designation by monotypy);

Distribution. Middle Ordovician – Holocene; cosmopolitan.

Reophax duplex Grzybowski, 1896

Plate II, Fig. 1

1896. *Reophax duplex* Grzybowski; Kraeva, Zernetskij, p. 14, Tabl. 3, Fig. 1.

1977. *Reophax duplex* Grzybowski; Samuel, p. 34, Pl. 3, Fig. 3.
 1981. *Reophax duplex* Grzybowski; Gradstein, Berggren, p. 248, Pl. 2, Fig. 7.
 1981. *Reophax duplex* Grzybowski; Liszka, Liskowa, p. 167, Pl. 1, Fig. 12.
 1983. "*Reophax duplex* n. sp. var. alpha"; Geroch, Verdenius, Pl. 8, Figs. 23, 24.
 1983. "*Reophax duplex* n. sp. var. beta"; Geroch, Verdenius, Pl. 8, Fig. 25.
 1988. *Reophax duplex* Grzybowski; Kaminski et al., p. 187, Pl. 2, Fig. 15.
 1990. *Reophax duplex* Grzybowski; I. De Klasz, S. de Klasz, p. 407, Pl. 3, Fig. 25.

Nomenclature. There are no data about the holotype. Geroch, Verdenius (1983) refigured the original Grzybowski's image. The species was first described from the Eocene of Polish Carpathians (red clays in Wadowice area).

Material. Emine Formation (29 specimens).

Description. Test is coarsely agglutinated, large sized. It is composed of 2 laterally flattened chambers with oval outlines. The second chamber is larger in size and overlaps partly the first one. Aperture is terminal.

Distribution. The species is known from the Campanian of Poland, Trinidad, the maastrichtian of Trinidad, Carpathians, deep sea holes in Labrador and North Seas, the Paleocene of Trinidad, Carpathians, Alpes, the Lower Eocene of Trinidad, the Eocene of Carpathians and Alps, the Paleogene of Ukraine.

Occurrence. Kochan Section (P3, NP8-NP9 Zone), Banya-West Section (Paleocene), samples from the geological mapping (Paleocene).

***Reophax pilulifer* Brady, 1884**

Plate II, Fig. 2

1969. *Reophax pilulifera* Brady; Kraeva, Zernetskij, p. 13, Tabl. 2, Fig. 6.
 1977. *Reophax pilulifer* Brady; Samuel, p. 35, Pl. 2, Fig. 2.
 1981. *Reophax pilulifer* Brady; Gradstein, Berggren, p. 248, Pl. 2, Figs. 10, 11.
 1996. *Reophax* cf. *pilulifera* Brady; Ujetz, p. 103, Pl. 1, Figs. 27, 28.

1997. *Mormosina pilulifera* (Brady); Laursen, Andersen, Pl. 1, Fig. 5.

Nomenclature. I have no data about the holotype.

Material. Byala Formation (2 specimens), Emine Formation (12 specimens).

Description. Test is coarsely agglutinated, uniserial, composed of 3 subspherical chambers, sharply increasing in size. Aperture is terminal, round, with short neck.

Distribution. The species is known from the Paleocene to recent deposits. It was established in the Paleogene flysh deposits in the Carpathians, deep sea holes in the Labrador and North Seas, the Eocene of Ukraine, the Oligocene of Hungary. Nowadays it lives in the high latitudes of the Atlantic and Pacific.

Occurrence. Byala Formation: Byala 2b Section (NP1 Zone), Byala 2c Section (NP1 Zone); Emine Formation: Kochan Section (P1c Zone), Banya-West Section (Paleocene), a sample from the geological mapping (Paleocene).

***Reophax splendidus* Grzybowski, 1898**

Plate II, Fig. 3

1937. *Reophax splendidus* Grzybowski; Glaessner, S. 356, Taf. 1, Fig. 4.
 1969. *Reophax splendidus* Grzybowski; Kraeva, Zernetskij, p. 14, Tabl. 3, Fig. 3, 4.
 1977. *Reophax splendidus* Grzybowski; Samuel, p. 36, Pl. 3, Fig. 5, Pl. 19, Fig. 5.
 1983. "*Reophax splendida* n. sp."; Geroch, Verdenius, Pl. 10, Fig. 16.

Nomenclature. There are no data about the holotype. Geroch, Verdenius (1983) refigured the original Grzybowski's image. The species was first described from the Eocene of Polish Carpathians (Krosno area).

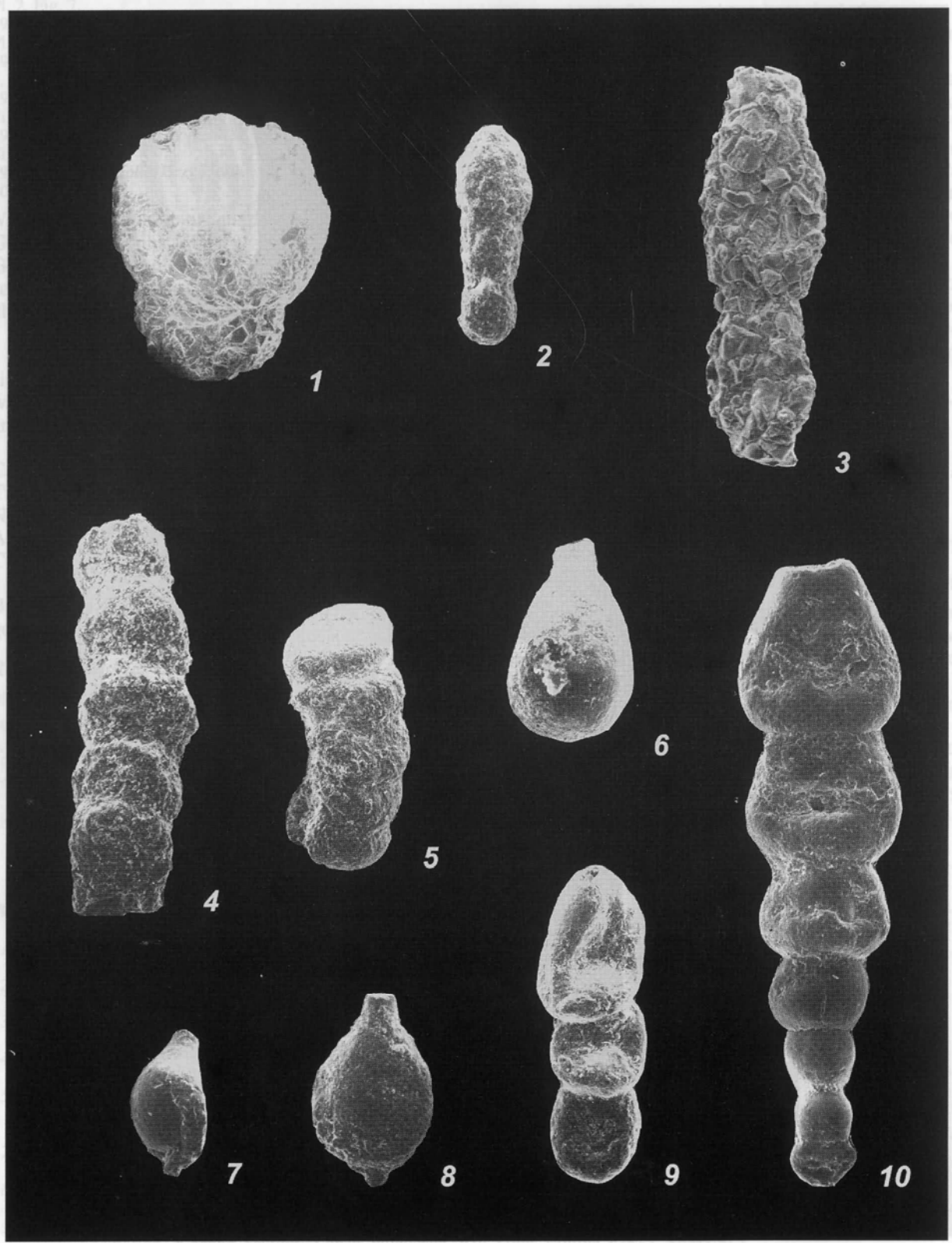
Material. Byala Formation (1 specimen), Emine Formation (18 specimens).

Description. Test is coarsely agglutinated, elongate, uniserial. It is composed of 3-4 almost equidimensional, elliptical in outline chambers, flattened from both sides. Aperture is terminal.

PLATE I

ТАБЛИЦА I →

1. *Ammodiscus cretaceus* (Reuss, 1845).
Emine Formation, Kochan Section, Middle Paleocene, P3 Zone, sample E-K-9; SEM×37.4.
2. *Ammodiscus glabratus* Cushman, Jarvis, 1928.
Byala Formation, Borehole C-30, 86.30 m, Upper Paleocene, P4 Zone, sample C-30-8; SEM×37.4.
3. *Ammodiscus peruvianus* Berry, 1928.
Emine Formation, Kochan Section, Lower Paleocene, P1c Zone, sample E-K-5; SEM×37.4.
4. *Glomospira gordialis* (Jones, Parker, 1860).
Byala Formation, Borehole C-29, Middle Paleocene, 364.40 m, P3 Zone, sample C-29-4; SEM×50.5.
- 5, 6. *Glomospira irregularis* (Grzybowski, 1898).
Byala Formation, 5 - Borehole C-29, 364.40 m, Middle Paleocene, P3 Zone, sample C-29-4; SEM×50.5; 6 - Borehole C-29, 420.60 m, Upper Paleocene, P4 Zone, sample C-29-8; SEM×50.5.
7. *Glomospirella gorayskii* (Grzybowski, 1898).
Emine Formation, Kochan Section, Lower Paleocene, P1c Zone, sample E-K-3; SEM×50.5.
8. *Glomospirella diffundens* (Cushman, Renz, 1946).
Emine Formation, Kochan Section, Lower Paleocene, P1c Zone, sample E-K-5; SEM×50.5.
9. *Glomospirella serpens* (Grzybowski, 1898).
Emine Formation, Kochan Section, Lower Paleocene, P1c Zone, sample E-K-5; SEM×50.5.
- 10, 11. *Kalamopsis grzybowskii* (Dylazanka, 1923).
Byala Formation, Byala 2b Section, Lower Paleocene, NP3 Zone, sample Б2b-16; SEM×63.
- 12, 13. *Repmanina charoides* (Jones, Parker, 1860).
Byala Formation; 12 - Borehole C-30, 83.90 m, Upper Paleocene, P4 Zone, sample C-30-6; SEM×50.5; 13 - Borehole C-12, 296.10 m, Lower Paleocene, P1b Zone, sample C-12-107; SEM×50.5.
14. *Rzehakina epigona* (Rzehak, 1895).
Emine Formation, Kochan Section, Middle Paleocene, P3 Zone, sample E-K-7; SEM×50.5.



The species is known from the Upper Cretaceous of Italy, Spain, North Caucasus, the Upper Cretaceous and Paleogene of the Alps, Carpathians, the Paleocene and Eocene of Ukraine, Caucasus.

Occurrence. Byala Formation: C-25 (22.50 m – P1b Zone); Emine Formation: Kochan Section (P1c-P3, NP8-NP9 Zone), samples from the geological mapping (Paleocene).

Genus *Subreophax* Saidova, 1975

Type species. *Reophax aduncus* Brady, in Tizard and Murray, 1882 (by original designation);

Distribution. Holocene; Atlantic, Pacific, Antarctica.

Remarks. According to Loeblich, Tappan (1988) the genus is restricted in the Holocene of the modern oceans only, but the numerous finds of subreophacids in the Upper Cretaceous and Lower Paleogene flysh sediments of the Tethyan region emended the generic stratigraphical and geographical distribution.

Subreophax pseudoscalaris (Samuel, 1977)

Plate II, Fig. 5

1977. *Subreophax pseudoscalaria* nov. sp.; Samuel, p. 36, Pl. 3, Fig. 4.

1988. *Subreophax pseudoscalaria* Samuel; Kaminski et al., p. 187, Pl. 3, Figs. 5, 6.

1996. *Subreophax pseudoscalaris* Samuel; Ujetz, p. 103, Pl. 1, Figs. 31, 32.

Nomenclature. The holotype is from the flysh sediments of the Polish Carpathians (*Rzehakina epigona* Zone). It is kept in the collection of the Geological Institute of Bratislava.

Material. Byala Formation (1 specimen), Emine Formation (3 specimens).

Description. Test is coarsely agglutinated, uniserial, composed of 5 strongly embracing almost equidimensional chambers with round outline, flattened along the axis of the growth. Initial chamber and aperture are not available.

Remarks. The species differs from *S. scalaria* (Grzybowski) by the larger and more embracing equidimensional chambers.

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

Occurrence. Byala Formation: Byala 2b Section (NP3 Zone); Emine Formation: Kochan Section (P1c Zone), Emona Section (NP1-NP2 Zone), Banya-West Section (Paleocene).

Subreophax scalaria (Grzybowski, 1896)

Plate II, Fig. 4

1969. *Reophax scalaria* (Grzybowski); Kraeva, Zernetskij, p. 14, Tabl. 3, Fig. 2.

1977. *Reophax scalaria* (Grzybowski); Samuel, p. 35, Pl. 3, Fig. 6, Pl. 19, Fig. 4.

1981. *Reophax scalaria* (Grzybowski); Liszka, Liszkowa, p. 168, Pl. 1, Fig. 15.

1983. "*Reophax guttifera* Brady var. *scalaria*"; Geroch, Verdenius, Pl. 8, Fig. 26.

1988. *Subreophax scalaria* (Grzybowski); Kaminski et al., p. 187, Pl. 2, Figs. 16, 17.

Nomenclature. There are no data about the holotype. Geroch, Verdenius (1983) refigured the original Grzybowski's image. The species was first described from the Eocene of Polish Carpathians (red clays in Wadowice area).

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

Description. Test is uniserial, slightly curved, composed of disc-shaped, partly embracing chambers, slightly increasing in size. Aperture is terminal.

Distribution. It is known from the Upper Cretaceous of Italy, Spain, the Maastrichtian, Paleocene and Lower Eocene of Trinidad, the Eocene of Ukraine, the Paleogene of the Carpathians.

Occurrence. Byala Formation: C-30 (107.90 m – P5 Zone); Emine Formation: Kochan Section (P1c-P3 Zone), Emona Section (NP1-NP2 Zone), Banya-West Section (Paleocene).

Subfamily **HORMOSININAE** Haeckel, 1894

Genus *Hormosina* Brady, 1879

Type species. *Hormosina globulifera* Brady, 1879 (subsequent designation by Cushman, 1910);

Distribution. Holocene; Pacific, North Atlantic.

Remarks. According to Loeblich, Tappan (1988) the genus is restricted in the Holocene of the North Atlantic only, but the numerous finds of hormosinids in the Upper Cretaceous and Lower Paleogene in the flysh de-

← PLATE II

ТАБЛИЦА II

1. *Reophax duplex* Grzybowski, 1896.

Emine Formation, Kochan Section, Middle Paleocene, P3 Zone, sample E-K-9; SEM×40.8.

2. *Reophax pilulifer* Brady, 1884.

Byala Formation, Byala 2c Section, Lower Paleocene, P3 Zone, sample B2c-6; SEM×60.

3. *Reophax splendidus* Grzybowski, 1898.

Emine Formation, Kochan Section, Middle Paleocene, P3 Zone, sample E-K-7; SEM×57.5.

4. *Subreophax pseudoscalaris* (Samuel, 1977).

Emine Formation, Emona Section, Lower Paleocene, NP1 Zone, sample E-ИЕ-7; SEM×50.5.

5. *Subreophax scalaria* (Grzybowski, 1896).

Emine Formation, Kochan Section, Lower Paleocene, P1c Zone, sample E-K-3; SEM×50.5.

6. *Hormosina ovuloides* (Grzybowski, 1901).

6 - Byala Formation, Borehole C-25, 40.40 m, Lower Paleocene, P1b Zone, sample C-25-6; SEM×60; 7 - Emine Formation, Kochan Section, Lower Paleocene, P1c Zone, sample E-K-5; SEM×60.

8. *Hormosina ovulum ovulum* (Grzybowski, 1896).

Byala Formation, Borehole C-25, 40.40 m, Lower Paleocene, P1b Zone, sample C-25-6; SEM×60.

9. *Hormosina velascoensis* (Cushman, 1926).

Emine Formation, Paleocene, sample E-1316 (from geological mapping); 9 - SEM×63; 10 - SEM×48.6.

positions of the Tethyan region emended the stratigraphical and geographical distribution of the genus.

Hormosina ovuloides (Grzybowski, 1901)

Plate II, Fig. 6, 7

1901. *Reophax ovuloides* n. sp.; Grzybowski, p. 268, Tabl. 7, Fig. 3.

1977. *Hormosina ovuloides* (Grzybowski); Samuel, p. 33, Pl. 3, Figs. 14, 15, Pl. 16, Figs. 3, 4.

1988. *Hormosina ovuloides* (Grzybowski); Kaminski et al., p. 186, Pl. 2, Figs. 3, 4.

1990. *Hormosina ovuloides* (Grzybowski); I. De Klasz, S. de Klasz, p. 407, Pl. 3, Fig. 3.

Nomenclature. Holotype is the specimen figured by Grzybowski (1901, Tabl. 7, Fig. 3). The species was first described from the inoceramid beds of the Polish Carpathians (near Gorlic).

Material. Byala Formation (16 specimens), Emine Formation (4 specimens).

Description. Test is finely agglutinated, composed of pear-like or oval chambers, often slightly flattened. Surface is smooth. Aperture is terminal, with long, thin neck.

Remarks. Only single chambers were found during the present investigation.

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

Occurrence. Byala Formation: C-12 (264.50 m – Lower Paleocene), C-25 (22.50-40.40 m – P1b Zone), Byala 1 Section (NP3-NP4 Zone), Byala 2b Section (NP3 Zone), Byala 2c Section (NP1-NP2 Zone); Emine Formation: Emona Section (NP1-NP2 Zone), Banya-West Section (Paleocene).

Hormosina ovulum ovulum (Grzybowski, 1896)

Plate II, Figs. 8

1937. *Hormosina ovulum* (Grzybowski); Glaessner, S. 357, Taf. 1, Fig. 5.

1969. *Hormosina ovulum* (Grzybowski); Kraeva, Zernetskij, p. 15, Tabl. 3, Fig. 5.

1970. *Carpathiella ovulum* (Grzybowski); Myatlyuk, p. 52, Tabl. 8, Fig. 12-16; Tabl. 9, Fig. 7-14, Tabl. 14, Fig. 1, 2.

1974. *Carpathiella ovulum* (Grzybowski); Szczechura, Pozaryska, p. 27, Pl. 3, Fig. 19.

1977. *Hormosina ovulum ovulum* (Grzybowski); Samuel, p. 33, Pl. 3, Fig. 11, Pl. 16, Fig. 5, Pl. 17, Figs. 1-6, Pl. 18, Figs. 1-4.

1981. *Hormosina ovulum* (Grzybowski); Liszka, Liszkowa, p. 166.

1983. "*Reophax ovulum* n. sp."; Geroch, Verdenius, Pl. 8, Figs. 19-21.

1988. *Hormosina ovulum ovulum* (Grzybowski); Kaminski et al., p. 186, Pl. 2, Fig. 10.

1990. *Hormosina ovula* (Grzybowski); I. De Klasz, S. de Klasz, p. 407, Pl. 3, Fig. 3.

Nomenclature. There are no data about the holotype. Geroch, Verdenius (1983) refigured the original Grzybowski's image. The species was first described from the Eocene of Polish Carpathians (red clays in Wadowice area).

Material. Byala Formation (28 specimens), Emine Formation (19 specimens).

Description. Test is finely agglutinated, composed of subspherical, slightly flattened chambers with smooth surface. Aperture is terminal, with thin neck.

Remarks. Only single chambers were found during the present investigation. The species differs from *H. ovuloides* (Grzybowski) by its subspherical chambers.

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

Occurrence. Byala Formation: C-12 (264.50 m – Lower Paleocene), C-21 (22.00 m – P1b Zone), C-24 (107.70 m – P1c Zone), C-25 (22.50-40.40 m – P1b Zone), C-29 (364.40 m – P3 Zone, 420.60 m – P4 Zone, 440.30 m – P5 Zone), C-30 (83.90-86.30 m – P4 Zone), Byala 1 Section (NP3-NP5 Zone), Byala 2b Section (NP3 Zone), Byala 2c Section (NP2 Zone), Byala Reka valley (Paleocene); Emine Formation: Kochan Section (P1c-P3 Zone), samples from the geological mapping (Paleocene).

Hormosina velascoensis (Cushman, 1926)

Plate II, Fig. 9, 10

1926. *Nodosinella velascoensis* Cushman, n. sp.; Cushman, p. 583, Pl. 20, Fig. 9.

1969. *Nodellum velascoense* (Cushman); Kraeva, Zernetskij, p. 15, Tabl. 3, Fig. 7.

1974. *Nodellum velascoense* (Cushman); Kraeva, Zernetskij, p. 25, Pl. 1, Fig. 5.

1977. *Nodellum velascoense* (Cushman); Samuel, p. 16, Pl. 4, Fig. 8; Pl. 15, Figs. 4, 5.

1988. *Nodellum velascoense* (Cushman); Kaminski et al., p. 187, Pl. 1, Figs. 21, 22.

1990. "*Nodellum*" *velascoense* (Cushman); I. De Klasz, S. de Klasz, p. 408, Pl. 3, Fig. 10.

1997. *Hormosina velascoensis* (Cushman); Peryt et al., Pl. 1, Figs. 1, 3.

Nomenclature. The holotype (Cushman Coll. No. 5200) is from the Paleocene of Mexico (Velasco Shale).

Material. Byala Formation (28 specimens), Emine Formation (98 specimens).

Description. Test is large-sized, uniserial, finely agglutinated, with smooth surface. Initial chamber is spherical, the next 2-3 ones are cylindrical. Chambers from the latest portion are slightly flattened, gradually increasing in size, as every new formed chamber overlaps partly the previous one. Aperture is terminal, round.

Distribution. The species is known from the Upper Cretaceous of Mexico, the Carpathians, North Caucasus, the Maastrichtian of Trinidad, Turkmenia, the Paleocene of Mexico, Italy, Trinidad, Carpathians, Alps, Azerbaydzhan, Turkmenia, Crimea, Caucasus, Tunisia, the Lower Eocene of Trinidad, Azerbaydzhan, Turkmenia. It was also established during the deep sea drilling in the Atlantic (Paleocene).

Occurrence. Byala Formation: C-12 (296.10 m – P1b Zone), C-25 (22.50 m – P1b Zone), C-28 (15.00 m – P2 Zone), C-29 (383.20 m – P4 Zone), C-30 (83.90 m – P4 Zone), Byala 1 Section (NP4-NP5 Zone), Byala 2b Section (NP3 Zone), Byala 2c Section (NP1-NP2 Zone), Koundilaki Cheshme valley (Paleocene); Emine Formation: Kochan Section (P1c-P3, NP8-9 Zone), Emona Section (NP1-NP2 Zone), Banya-West Section (Paleocene), samples from the geological mapping (Paleocene).

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