



First data on the presence of *Nubecularia novorossica* Karrer & Sinzow, 1877 in the Bessarabian limestone of the Odartsi Formartion (Northeastern Bulgaria)

Първи данни за наличието на *Nubecularia novorossica* Karrer & Sinzow, 1877 в бесарабските варовици на Одърската свита (Североизточна България)

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Introduction

During the Sarmatian *s. s.*, Volhynian and Early Bessarabian (= Early and late Middle Sarmatian *s. l.*) the Central and Eastern Paratethys were connected. The fair connection between these two seas was reflected by a striking similar faunistic inventory (Piller, Harzhauser, 2005). As an example, the unique sessile benthic foraminifera *Nubecularia novorossica* Karrer & Sinzow, 1877 flourished simultaneously in both seas and in many cases it was a rock-forming constituent. This nubeculariid also existed on the territory of Bulgaria.

The present study aims to report on the presence of *Nubecularia novorossica* in the Bessarabian limestone of the Odartsi Formation from two previously described sections – Odartsi and Kamen Bryag (Koleva-Rekalova, Darakchieva, 2002), and two new outcrops at Kaliakra Cape and Bolata Bay, Northeastern Bulgaria, and to correlate it with coeval findings from other localities of the Sarmatian Paratethys.

About 35 thin-sections of the limestone containing *Nubecularia novorossica* were investigated using light transmitting microscope “Zeiss Axioscope 40”. Photomicrographs were taken with a ProgRes GT3 digital camera.

Results, Discussion and Conclusion

The preliminary study on the limestone in the lower parts of Kaliakra Cape and Bolata Bay sections re-

vealed that they were composed mainly of special nubeculariid *Nubecularia novorossica*. This fact led to re-evaluation of the Bessarabian limestone of two sections near the villages of Odartsi and Kamen Bryag (Koleva-Rekalova, Darakchieva, 2002).

The Bessarabian limestone in Northeastern Bulgaria, comprising *Nubecularia novorossica*, are mostly creamy to ocher in color (Fig. 1a). The thickness of the beds varies from 5 to 30 cm. Their total thickness is 26.5 m in Kamen Bryag section, about 20.0 m in Bolata Bay section and 16.0 m in Kaliakra Cape and Odartsi sections.

We recognized two forms of *Nubecularia novorossica* according to Boda’s division (1979): solitaria – single young test with a concave lower surface and a convex upper part, often resembling “Napoleon’s hat” in cross-section (Fig. 1b), and nodula – several tests form nodular aggregates (with different sizes but up to 2–3 mm in diameter, Fig. 1c) with so-called ring-like shape in longitudinal-section (Fig. 1b, c). Larger specimens are visible on the weathered upper limestone surfaces (Fig. 1a).

In Kaliakra Cape, Bolata Bay and Kamen Bryag sections *Nubecularia novorossica* dominates over the foraminiferal assemblages (Fig. 1c). For the last section, this fact was described by Koleva-Rekalova and Darakchieva (2002). The rest allochems are mollusc shell and bryozoan fragments, gastropods (Fig. 1b), algae and ooids. Thus this sessile benthic foraminifera can be defined as a rock-forming constituent. But in the limestone from Odartsi section it is rare and repre-

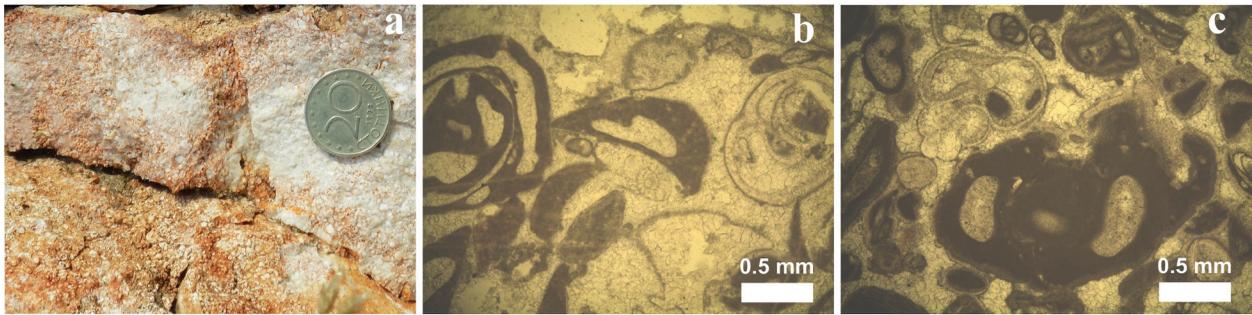


Fig. 1. *a*, upper surface of limestone containing *Nubecularia novorossica*, Bolata Bay section (photograph of N. Dobrev); *b*, photomicrograph of *Nubecularia novorossica solitaria* test resembling “Napoleon’s hat” (centre), *Nubecularia novorossica nodula* with ring-like shape (left) and re-crystallized gastropod shell (right), plane-polarized light, thin-section 152-III, Kamen Bryag section; *c*, photomicrograph of *Nubecularia novorossica nodula* about 2.0 mm long (centre) and other smaller foraminifera, plane-polarized light, thin-section B-1, Bolata Bay section

sented only by single tests that are often crushed and sometimes serve as cores of the ooids.

The same as our coeval limestones with rock-forming *Nubecularia novorossica* are characteristic for the Western, Northern and Eastern Black Sea Regions (Eastern Paratethys Realm). They were included in the volume of the Vasylivka horizon, which has recently been referred to the South Kryvyi Rih Formation of the Northern Black Sea Region (Vernyhorova, 2015).

During the *Mastra* zone (Late Sarmatian *s.s.* = Early Bessarabian *s.l.*) in the Eisenstadt-Sopron Basin, as well as in the NW Styrian Basin (Central Paratethys), bioconstructions up to 20 m wide were formed, exclusively represented by sessile nubeculariids (*Sinzowella*) (Piller, Harzhauser, 2005). Small hemispherical lenses or extensive crusts with nubeculariids (*Sinzowella novorossica*), red algae and bryozoans, associated with diversified mollusc shell accumulations were investigated in the Zsámbék Basin (also Central Paratethys) (Cornée et al., 2009).

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References

- Boda, J. 1979. Nubecularia-félék (Foraminifera) kőzetalkotó mennyiségben a hazai szarmatában. – *Földtani Közlemények*, 109, 2, 288–293.
- Cornée, J.-J., P. Moissette, J.-P. Saint Martin, M. Kázmér, E. Tóth, Á. Görög, A. Dulai, P. Müller. 2009. Marine carbonate systems in the Sarmatian (Middle Miocene) of the Central Paratethys: the Zsámbék Basin of Hungary. – *Sedimentology*, 56, 1728–1750.
- Koleva-Rekalova, E., S. Darakchieva. 2002. The Bessarabian foraminiferal limestones of the Odartsa Formation, North-eastern Bulgaria. – *Minno delo i Geologia J.*, 4, 31–33 (in Bulgarian with an English abstract).
- Piller, W. E., M. Harzhauser. 2005. The myth of the brackish Sarmatian Sea. – *Terra Nova*, 17, 5, 450–455.
- Vernyhorova, Yu. V. 2015. Stratigraphic scheme for the Neogene deposits of the Northern Black Sea Region and adjacent part of the Ukrainian Shield. – *Heolohiia ta rudonosnist Ukrainy*, 1, 1, 81–124 (in Ukrainian with an English abstract).