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THE FIRST FINDING OF *PAULINELLA CHROMATOPHORA* (RHIZARIA, EUGLYPHIDA) IN UKRAINE

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The First Finding of *Paulinella chromatophora* (Rhizaria, Euglyphida) in Ukraine. Kapustin D. A. — A itestate amoeba, *Paulinella chromatophora* Lauterborn, 1895, is recorded for the first time in the fauna of Ukraine. It is illustrated under the light and scanning electron microscope and redescribed.

Key words: *Paulinella chromatophora*, testate amoebae, Polesian Nature Reserve.

Первая находка *Paulinella chromatophora* (Rhizaria, Euglyphida) в Украине. Капустин Д. А. — Обнаружен новый для фауны Украины вид раковинных амёб *Paulinella chromatophora* Lauterborn, 1895. Приводятся его описание и иллюстрации.

Ключевые слова: *Paulinella chromatophora*, раковинные амёбы, Полесский природный заповедник.

Paulinella chromatophora Lauterborn, 1895 is a testate amoeba which became widely known after the revival of the endosymbiotic theory and the subsequent molecular phylogenetic studies. On this subject there are a number of reviews (e. g. Keeling, 2010). Among 10 known species of the genus *Paulinella* (Lauterborn, 1895; Vürrs, 1993; Hannah et al., 1996; Nicholls, 2009) *P. chromatophora* is the only species, which has cyanobacterial endosymbionts termed “cyanelles” (whether it is endosymbiont or organelle, see Theissen, Martin, 2006; Bhattacharya, Archibald, 2006), morphologically and genetically close to the *Synechococcus* and *Prochlorococcus* (Yoon et al., 2009). Apparently due to this fact *P. chromatophora* was included sometimes in phycological (algological) works within cyanoprokaryotes (cyanobacteria) or glaucophytes (e. g. Bourrelly, 1966; Ling, Tyler, 2000).

Studying freshwater samples, collected in water bodies of Polesian Nature Reserve (Zhytomyr Region, Ukraine) during 2008–2010, we have found this interesting protist which appeared to be a new species for the fauna of Ukraine.

Material and methods

Material was collected during 2008–2010 from three rivers (Ubort', Perga and Bolotnytsya) and the pond (Grybove Lake) of Polesian Nature Reserve. Benthic samples were collected by siphon and fixed with 4% formaldehyde solution. During sampling, the water temperature and pH were measured. Initially samples were observed under light microscope MBI-11 at $\times 90$. For SEM, samples were rinsed with distilled water to remove formalin. Then a few drops of each sample were pipetted onto a clean cover glass, air-dried and affixed to an aluminum stub with double-sided transparent tape. The stubs were sputter coated with gold and viewed with HITACHI S-4700 (Laboratory of Scanning Electron Microscopy of Biological and Geological Sciences, Jagiellonian University, Krakow, Poland).

Results and discussion

Below we present the systematic position according to Adl et al. (2005) and the description of the found organism based on our observations and literature data (Lauterborn, 1895; Mazei, Tsyganov, 2006; Nicholls, 2009; Yoon et al., 2009).

RHIZARIA Cavalier-Smith, 2002

CERCOZOA Cavalier-Smith, 1998 emend. Adl et al., 2005

EUGLYPHIDA Copeland, 1956 emend. Cavalier-Smith, 1997

PAULINELLIDAE de Saedeller, 1934

Paulinella Lauterborn, 1895 emend. Hannah, Rogerson et Anderson, 1996

Paulinella chromatophora Lauterborn, 1895 (fig. 1–4)

Test is ovoid (28.5–31.0 x 19.0–23.0 μm) and covered with rectangular silica scale plates, which are organized in five descending columns in 7–11 (avg. 9) rows. The scales around the anterior and posterior ends are smaller than in the middle. Three rows of scales from the posterior end have pustules (fig. 1–3) on their surface but the external surface of the rest of the body scales is smooth. The internal surface of the scales has pores. The mouth (5.0–7.5 μm wide) is terminal and located on short neck. This neck consists of the three slightly curved oral scales, two of them abut each other and the third one covers their edge (fig. 2). There are two blue-green curved cyanelles (4 μm wide) in the cytoplasm (fig. 4).

Locations. Ukraine, Zhytomyr Region, Polessian Nature Reserve, Olevsk District, Perga forestry, Perga river at $t = 16^{\circ}\text{C}$, pH 5.8; Kopytsche forestry, Ubort' river in the vicinity of Maydan-Kopytschensky village at $t = 21^{\circ}\text{C}$, pH 5.4; Ovruch District, Selezivka forestry, Bolotnytsya river and Grybove Lake. Rare.

General distribution. Probably cosmopolitan.

A recent study of testate amoebae fauna of Zhytomyr Polissya reservoirs (Alpatova, 2012) indicates a significant diversity of this group of protists (109 species and infraspecies taxa are known). The fact that *P. chromatophora* was not revealed earlier once again confirms the rarity of this organism. In all studied locations we observed

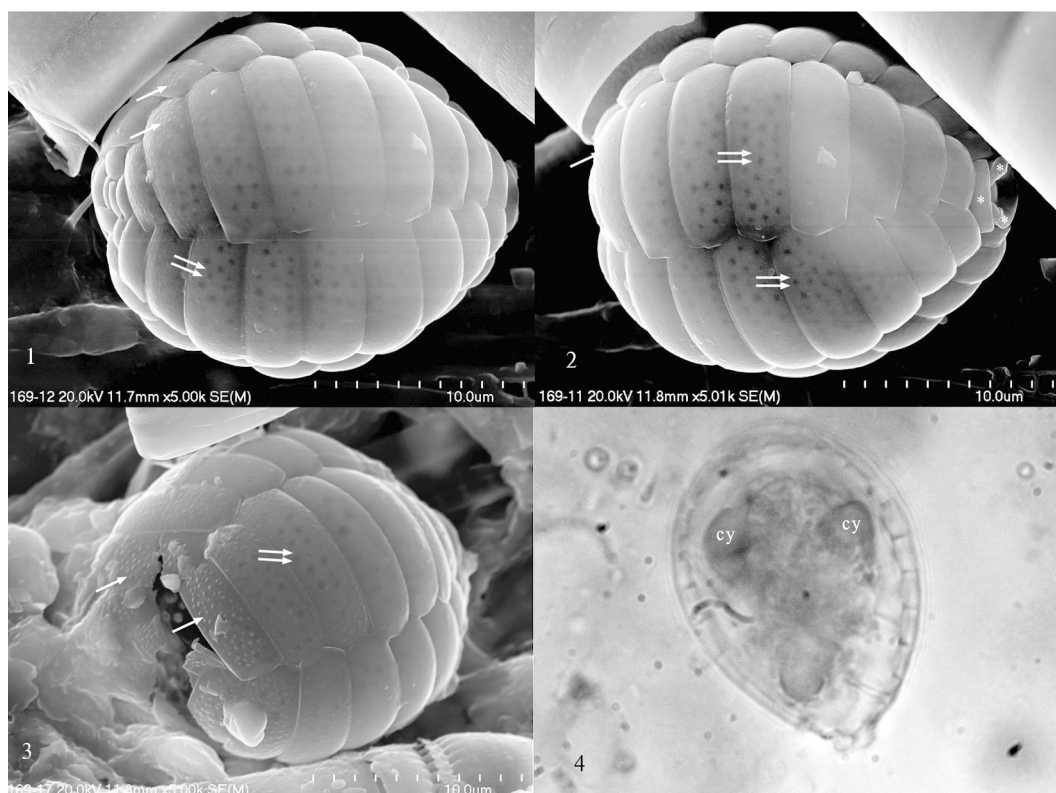


Fig. 1–4. *Paulinella chromatophora*: 1–3 — SEM images; oral scales (asterisks), pustules (arrow) and pores (double arrow) are shown; 4 — LM image, x 90; two curved cyanelles (cy) are visible.

Рис. 1–4. *Paulinella chromatophora*: 1–3 — сканирующая электронная микроскопия; обозначены оральные пластинки (звездочка), пустулы (стрелка) и поры (двойная стрелка); 4 — световая микроскопия, x 90; видны две изогнутые цианеллы (cy).

single specimens of it. Oligotrophic acidic waters with high content of iron and humic acids are, apparently, optimal for growth of this species and this explains its distribution in the northern part of Ukraine in Polesian Nature Reserve. Considering the rarity and high theoretical value of *P. chromatophora*, we believe that it is necessary to include it in the new edition of the Red Data Book of Ukraine.

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