

AULACOSEIRA MAKAROVAE (BACILLARIOPHYTA), A NEW SPECIES FROM RUSSIA

S. I. Genkal^{a,#}, I. S. Trifonova^{b,##}, and E. V. Lepskaya^{c,###}

^a*Papanin Institute for Biology of Inland Waters RAS
Borok, Nekouzskiy District, Yaroslavl Region, 152742, Russia*

^b*Institute of Limnology RAS
Sevastyanova Str., 9, St. Petersburg, 196185, Russia*

^c*Kamchatka Branch of Russian Federal Research Institute of Fisheries and Oceanography (KamchatNIRO)
Naberezhnaya Str., 18, Petropavlovsk-Kamchatsky, 683000, Russia*

[#]*e-mail: genkal@ibiw.ru*

^{##}*e-mail: itrifonova@mail.ru*

^{###}*e-mail: lepskaya@list.ru*

DOI: 10.31857/S0006813622090022

The electron microscopy study of *Aulacoseira subarctica* populations from waterbodies and watercourses in the European part of Russia, Western and Eastern Siberia, and the Far East made it possible to reveal morphological variability of quantitative (valve diameter, mantle height, height/diameter ratio, number of striae and areolae in 10 μm on mantle) and qualitative (areola arrangement on the valve face and mantle, size of ringleist and spines) characteristics. The analysis of morphological features in the studied populations shows that the form from Krasnoye Lake is distinguished by a larger valve diameter, smaller ratio of the mantle height to valve diameter, areolae spread over the whole surface of the valve face and arranged in straight rows on the mantle. These distinctive features allow to describe the form from Krasnoye Lake as a new species, *Aulacoseira makarovae* Genkal et I.S. Trifonova.

Keywords: reservoirs, watercourses, European part of Russia, Western and Eastern Siberia, Far East, Bacillariophyta, *Aulacoseira subarctica*, *Aulacoseira makarovae*, morphology, electron microscopy, new species

ACKNOWLEDGEMENTS

This research was carried out within the state assignment No. 121051100099-5 and “Comprehensive assessment of the dynamics of ecosystems of Lake Ladoga and water bodies of its basin under the influence of natural and anthropogenic factors” (№ AAAA-A19-119031890106-5).

REFERENCES

- Balonov I.M. 1975. Podgotovka vodorosley k elektronnoy mikroskopii [Preparation of algae for electron microscopy]. – In: Methods for the study of biocenoses. Moscow. P. 87–89 (In Russ.).
- Denys L., Muylaert K., Krammer K., Joosten T., Reid M., Rioual P. 2003. *Aulacoseira subborealis* stat. nov. (Bacillariophyceae): a common but neglected plankton diatom. – *Nova Hedwigia*. 77 (3–4): 407–427. <https://doi.org/10.1127/0029-5035/2003/0077-0407>
- Genkal S.I., Kulikovskiy M.S. 2009. On taxonomic position of *Aulacoseira subborealis* (Bacillariophyta). – *Bot. Zhurn.* 94 (9): 1359–1370 (In Russ.).
- Genkal S.I., Trifonova I.S. 2001. Some new and rare species of centric diatoms in waterbodies of the North-Western Russia and Baltics. – *Biology of Inland Water*. 3: 11–19 (In Russ.).
- Genkal S.I., Trifonova I.S. 2009. Diatomovye vodorosli planktona Ladozhskogo ozera i vodoemov ego basseyna. [Diatom algae of the plankton of Lake Ladoga and waterbodies of its basin]. Rybinsk. 72 p. (In Russ.).
- Genkal S.I., Yarushina M.I. 2018. Diatomovye vodorosli slabo izuchennykh vodnykh ekosistem Kraynevo Seve-
ra Zapadnoy Sibiri. [Diatom algae of poorly studied aquatic ecosystem in the Far North of Western Siberia]. Moscow. 212 p. (In Russ.).
- Genkal S.I., Chekryzheva T.A., Komulaynen S.F. 2015. Diatomovye vodorosli vodoemov i vodotokov Karelii. [Diatom algae in waterbodies and watercourses of Karelia]. Moscow. 202 p. (In Russ.).
- Genkal S.I., Kulikovskiy M.S., Kuznetsova I.V. 2020. The recent freshwater centric diatoms of Russia. Yaroslavl. 433 p. (In Russ.).
- Gibson C.E., Anderson N.J., Haworth E.Y. 2003. *Aulacoseira subarctica*: taxonomy, physiology, ecology and palaeoecology. – *Eur. J. Phycol.* 38: 83–101. <https://doi.org/10.1080/0967026031000094102>
- Haworth E.J. 1988. Distribution of Diatom Taxa of the Old Genus *Melosira* (now mainly *Aulacoseira*) in Cumbrian waters. – In: *Algae and aquatic environment*. Bristol. P. 138–168.
- Houk V. 2003. Atlas of freshwater centric diatoms with a brief key and descriptions. Part. I. Melosiraceae, Orthoseiraceae, Paraliaceae and Aulacoseiraceae. – *Czech Phycology Supplement*. 1. 27 p.
- Houk V., Klee R., Tanaka H. 2017. Atlas of freshwater centric diatoms with a brief key and descriptions. Second emended edition of Part I and II. Melosiraceae, Orthoseiraceae, Paraliaceae and Aulacoseiraceae. – *Fottea*. 17(Supplement): 1–616.
- Krammer K., Lange-Bertalot H. 1991. Bacillariophyceae 3. Teil: Centrales, Fragilariaceae, Eunotiaceae. – *Süßwasserflora von Mitteleuropa*. Stuttgart, Jena. 2/3: 1–576.

- Kulikovskiy M.S., Glushchenko A.M., Genkal S.I., Kuznetsova I.V. 2016. *Opredelitel diatomovykh vodorosley Rossii* [Identification book of diatoms from Russia]. Yaroslavl. 804 p. (In Russ.).
- Lepkaya E.V., Jewson D.H., Usoltseva M.V. 2010. *Aulacoseira subarctica* in Kurilskoye Lake, Kamchatka: a deep, oligotrophic lake and important pacific salmon nursery. – *Diatom Research*. 25 (2): 323–335.
<https://doi.org/10.1080/0269249X.2010.9705853>
- Likhoshway Y.V., Crawford R.M. 2001. The rimoportula – neglected feature in the systematics of *Aulacoseira*. – In: *Proceedings of the 16th International Diatom Symposium*. Vol. 16. Greece. P. 33–47.
- Siver A.P., Kling H. 1997. Morphological observations of *Aulacoseira* using scanning electron microscopy. – *Can. J. Bot.* 75 (11): 1807–1835.
<https://doi.org/10.1139/b97-894>
- Trifonova I.S. 1990. *Ecologiya i suksessiya ozernogo fitoplanktona* [Ecology and Succession of Lake Phytoplankton]. Leningrad. 184 p. (In Russ.).
- Trifonova I., Genkal S. 2001. Species of the genus *Aulacoseira* Thwaites in lakes and rivers of north-western Russia – distribution and ecology. – In: *Proceedings of the 16th International Diatom Symposium* (A. Economou–Amilli, ed.). University of Athens, Greece. P. 315–323.
- Tuji A., Houki A. 2004. Taxonomy, ultrastructure and biogeography of the *Aulacoseira subarctica* species complex. – *Bull. Natn. Sci. Mus. Tokyo. Ser. B.* 30 (2): 35–54.
- Usoltseva M.V., Likhoshway E.V. 2006. The fine structure of frustula in the species of the genus *Aulacoseira* Thw. (Bacillariophyta) from the Ob' River. – *International Journal on Algae*. 8 (4): 378–394.