Diversity, morphology and phylogenetic placement of centrohelid heliozoans from different-type freshwater and marine habitats.

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Centrohelid heliozoa is a monophyletic group of protists with siliceous (rarely organic) tangental or radial scales, and one genus, *Oxnerella*, without scales. Like some heliozoans, centrohelids are obligate passive predators, floating in the water or gliding along a substrate and capturing prey with axopodia. The species composition and morphology of centrohelid heliozoa from different-type freshwater biotopes of Northern Russia, Western Mongolia, Southern Chile, and the Black Sea littoral were investigated. Electron microscopy was used to investigate the external morphology of scales. Thirty-five species and forms of centrohelids from eight genera and five families were found. *Choanocystis* sp. and *Acanthocystis* sp. were isolated as clonal cultures and their SSU rRNA genes and transcriptomes are sequenced. The multigene phylogenetic analysis strongly supports the close relationship of centrohelid heliozoans to haptophytes (Burki et al., 2016). Presented morphological descriptions and micrographs of the observed scales amplify the concept of intraspecies variability and supplement diagnosis of species. Three variations of *Acanthocystis turfacea* cells, significantly different in the morphology of scales, were observed. Two species (*Pterocystis foliacea* and *Raineriophrys fortesca*) had an unusual morphology of scales and significantly differed from those most frequently encountered in literature. The new species *Pterocystis sevastopolii* sp. n. is proposed. Most of the observed species have a world-wide distribution.

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