

# The pan-Arctic biodiversity of marine pelagic and sea-ice unicellular eukaryotes: a first-attempt assessment

<http://link.springer.com/article/10.1007/s12526-010-0058-8>

## Abstract

Arctic marine unicellular eukaryotes are composed of microalgae and non-autotrophic protists. These eukaryotes comprise a well-diversified group of organisms that are either adapted to live in the upper water column of coastal and oceanic regions, here defined as phytoplankton/pelagic communities, or in bottom horizons of sea ice and known as sympagic/sea-ice-associated communities. There are approximately 5,000 recognized legitimate marine phytoplankton species and an unknown number of sympagic eukaryotes. Although pelagic and sea-ice eukaryotes have been described since the exploration phase of the Arctic regions up to the early twentieth century, no synthesis regarding information from all Arctic seas have been undertaken, and no exhaustive current information provides the exact number and composition of species on a pan-Arctic scale. In a first attempt to assess the pan-Arctic diversity of pelagic and sea-ice eukaryotes, a wealth of data from various sources (e.g., scientific publications, unpublished reports, databases) were reviewed, while taxonomic data were confirmed with current nomenclature and classification. We report a total of 2,106 marine single-celled eukaryote taxa with 1,874 phytoplankton and 1,027 sympagic taxa from four grouped pan-Arctic regions, namely Alaska, Canada, Scandinavia including Greenland and the Russian Federation. Both phytoplankton and sympagic taxa were present in four of the six super-groups of eukaryotes described by Adl et al. (*J Eukaryot Microbiol* 52:399-451, 2005), which are Archaeplastida (chlorophytes and prasinophytes), Chromalveolata (e.g., chrysophytes, cryptophytes, diatoms, dictyochophytes, dinoflagellates and prymnesiophytes), Excavata (euglenids) and Opisthokonta (choanoflagellates). The bulk of this marine biodiversity of Arctic microorganisms consists of large cells (>20  $\mu\text{m}$ ) mainly due to examination at low magnification under light microscopy. Future efforts should focus enhancing our knowledge of the biological diversity of small cells (<20  $\mu\text{m}$ ), which represent less than 20% of our actual biodiversity assessment of pan-Arctic regions.

## Keywords

ArcticBiodiversityPelagicSea iceUnicellular eukaryotes

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