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MORPHOLOGICAL AND GENETIC DIVERSITY OF BEAUFORT SEA DIATOMS WITH HIGH CONTRIBUTIONS FROM THE *CHAETOCEROS NEOGRACILIS* SPECIES COMPLEX[1]

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Seventy-five diatom strains isolated from the Beaufort Sea (Canadian Arctic) in the summer of 2009 were characterized by light and electron microscopy (SEM and TEM), as well as 18S and 28S rRNA gene sequencing. These strains group into 20 genotypes and 17 morphotypes and are affiliated with the genera *Arcocellulus*, *Attheya*, *Chaetoceros*, *Cylindrotheca*, *Eucampia*, *Nitzschia*, *Porosira*, *Pseudo-nitzschia*, *Shionodiscus*, *Thalassiosira*, and *Synedropsis*. Most of the species have a distribution confined to the northern/polar area. *Chaetoceros neogracilis* and *Chaetoceros gelidus* were the most represented taxa. Strains of *C. neogracilis* were morphologically similar and shared identical 18S rRNA gene sequences, but belonged to four distinct genetic clades based on 28S rRNA, ITS-1 and ITS-2 phylogenies. Secondary structure prediction revealed that these four clades differ in hemi-compensatory base changes (HCBCs) in paired positions of the ITS-2, suggesting their inability to interbreed. Reproductively isolated *C. neogracilis* genotypes can thus co-occur in summer phytoplankton communities in the Beaufort Sea. *C. neogracilis* generally occurred as single cells but also formed short colonies. It is phylogenetically distinct from an Antarctic species, erroneously identified in some previous studies as *C. neogracilis*, but named here as *Chaetoceros* sp. This work provides taxonomically validated sequences for 20 Arctic diatom taxa, which will facilitate future metabarcoding studies on phytoplankton in this region.

Key index words: **biogeography; ITS; ITS2 secondary structure; LSU; morphology; phylogeny; polar diatoms; SSU**

***Abbreviations*: CCMP, National Centre for Marine Algae and Microbiota; DCM, Deep Chlorophyll Maximum; ITS-1, first internal transcribed spacer; ITS-2, second internal transcribed spacer; ITS, internal transcribed spacer; RCC, Roscoff Culture Collection; T-RFLP, terminal-RFLP**

Due to fluctuations in light, temperature, salinity, and sea ice extent, Arctic phytoplankton undergo high seasonal variability in abundance and composition. Higher temperatures and longer daylight between March and September, lead to an increase in algal biomass and primary production (Sherr et al. 2003, Wang et al. 2005). Diatoms account for a high portion of Arctic phytoplankton, especially in coastal locations (Booth and Horner 1997, Lovejoy et al. 2002) and species belonging to the genera *Chaetoceros* Ehrenberg and *Thalassiosira* Cleve can dominate phytoplankton communities in different regions (Tuschling et al. 2000, Booth et al. 2002, Ratkova and Wassmann 2002).

The Beaufort Sea is a major basin of the Arctic Ocean, and is highly influenced by the Mackenzie River, which plays a key role in disrupting the winter ice in early spring promoting primary production and phytoplankton blooms (Carmack and MacDonald 2002). In addition, periodic wind-driven upwelling events can bring nutrient rich waters up to the surface layer and promote phytoplankton growth

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