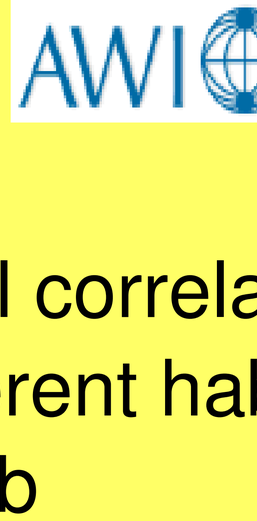
Examination of ecological and structural correlations of *Micromonas sp.* (Prasinophyceae) from different habitats and its role in the marine foodweb

Britta Knefelkamp
International Max Planck Research School of Marine Microbiology (*marmic*)
Biologische Anstalt Helogland des Alfred-Wegener-Instituts für Polar- und Meeresforschung in der Helmholtz-Gemeinschaft

The aim of my project (01.2005-12.2007) is to obtain expertise allowing me to investigate the role of picophytoplankton in the pelagic trophodynamic processes. Picophytoplankton are the smallest (0.2-2 µm), single celled plants and cyanobacteria, living in the world's oceans. The autotrophs play an important role in the production of oxygen by the process of photosynthesis and hence are a basis of life in marine habitats.

Figure 1: *Micromonas pusilla*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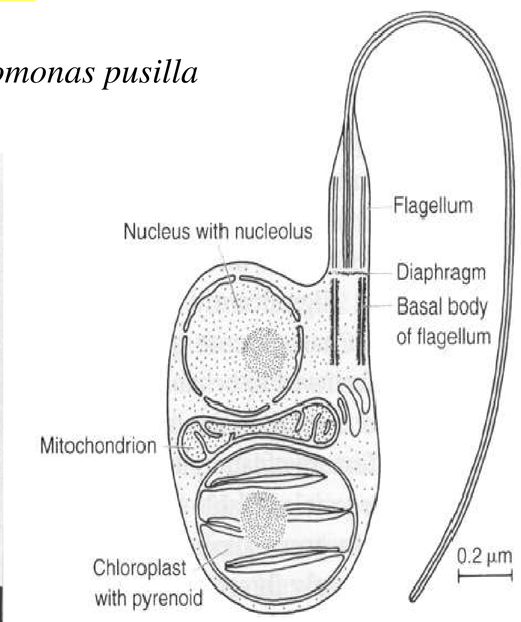

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Goals

Next to the study of picophytoplankton succession off Helgoland, the goals of this research project are the characterisation of three picophytoplankton species ubiquitous to Oslofjord, North Sea and Atlantic (with special regard to *Micromonas sp.,* figure 1) and the investigation of their different biochemical and physiological adaptation in the form of photosynthesis activity (PAM), fluorescence characteristics (flow cytometry, fluorometer), organelle and cell wall structures (electron microscope), pigments (HPLC) and genetic suit. Afterwards culturing tests will be carried out to investigate their preferred ecological conditions and the resulting attractiveness to different grazers.

Genetics

One possibility for identifying phytoplankton taxa is the use of genetic methods. These usually involve the identification of species-specific DNA compositions to identify different species and indicate strains within the same species. Furthermore, genetic methods can characterise different physiological properties and therefore can describe the genetic diversity of species on a wider geographic scale. In addition, differences between species of different locations can be examined genetically (Bruin et al., 2003). Methods that have been developed are FISH-TSA, DNA micro-arrays (PICODIV; Vaulot, 2001) and DGGE (Díez et al., 2001).

I work in co-operation with groups in France (Dr. D. Vaulot) and Norway (Prof. J. Throndsen) to identify the probably huge species number off Helgoland and to examine the currently almost unknown role of pico-phytoplanktonic organisms in pelagic trophodynamic processes. Furthermore, they teach me their methods in genetic and electron microscopic examinations of picophytoplankton organisms.

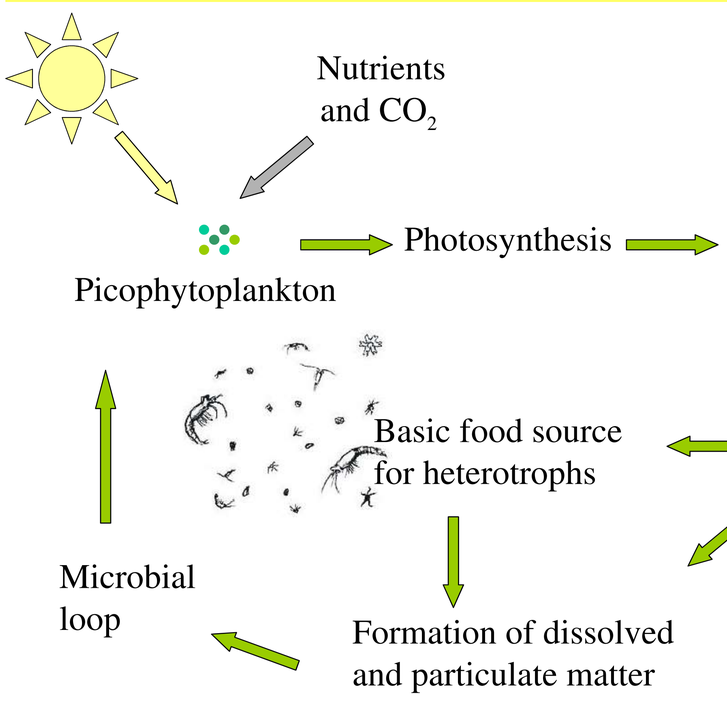


Figure 2: Picophytoplankton in the marine foodweb

Microscopics

Light microscopy will be used to describe the picophytoplankton community succession off Helgoland and to count the cultures. By the use of electron microscopes, the ultra structures of different picophytoplankton organisms will be described and used as another tool of determination (Eikrem and Throndsen 1990, 1998).

Flow cytometry and fluorometer

Fluorometric methods like flow cytometry and a fluorometer (*bbe Moldaenke*) will be used to study the living picophytoplankton composition in comparison to the HPLC measurements.

HPLC

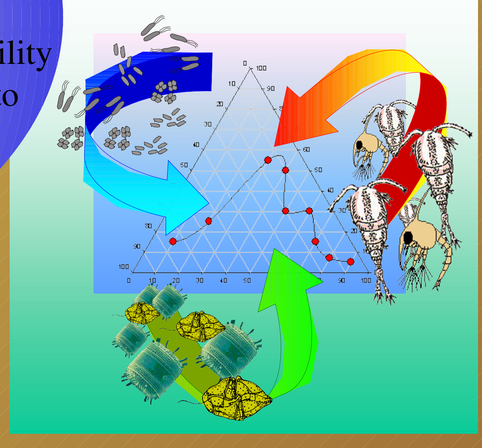
The pigment composition of different plant groups and members of the same species is influenced by the habitat and the spectral quality of the available light (chromatic adaptation; Lalli and Parsons, 2002; Barlow et al., 2002). The pigment composition of the picophytoplankton community influences the absorption characteristics of a water sample and will be measured by an HPLC method (Garrido et al., 2003) to determine the composition.

In short, the picophytoplankton organisms shall be identified, examined genetically, structurally and physiologically, and their recognised basic role in trophodynamic processes will be deliberated. Furthermore, the same species from different habitats will be compared and the international co-operation in this field of marine research will be extended.

Culturing tests

In co-operation with members of the "Helgoland Foodweb" Project, the reaction of grazers to their food, grown under different conditions, will be examined to under-stand the starting point of the marine foodweb (figure 2). Culturing tests under different nutrient concentrations, temperatures and light intensities shall bring knowledge about the range of environmental tolerances of picophytoplankton species and their ability to adapt to less preferential conditions. The organisms are likely to have varying pigment compositions and therefore varying physiological abilities that will be examined with the mentioned methods and are expected to affect the attractiveness to different grazers.

Das "Helgoland Foodweb" Projekt



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