

Small and beautiful: Diatoms in Arctic waters



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Baltic Sea



University of Rostock

- ALMA MATER ROSTOCHIENSIS, founded 1419
- the oldest University in the Baltic Sea region
- today 14.000 students, all faculties
 - Department of Biological Sciences
 - Marine Biology, Ecology, Applied Ecology
 - Institute for Baltic Sea Research

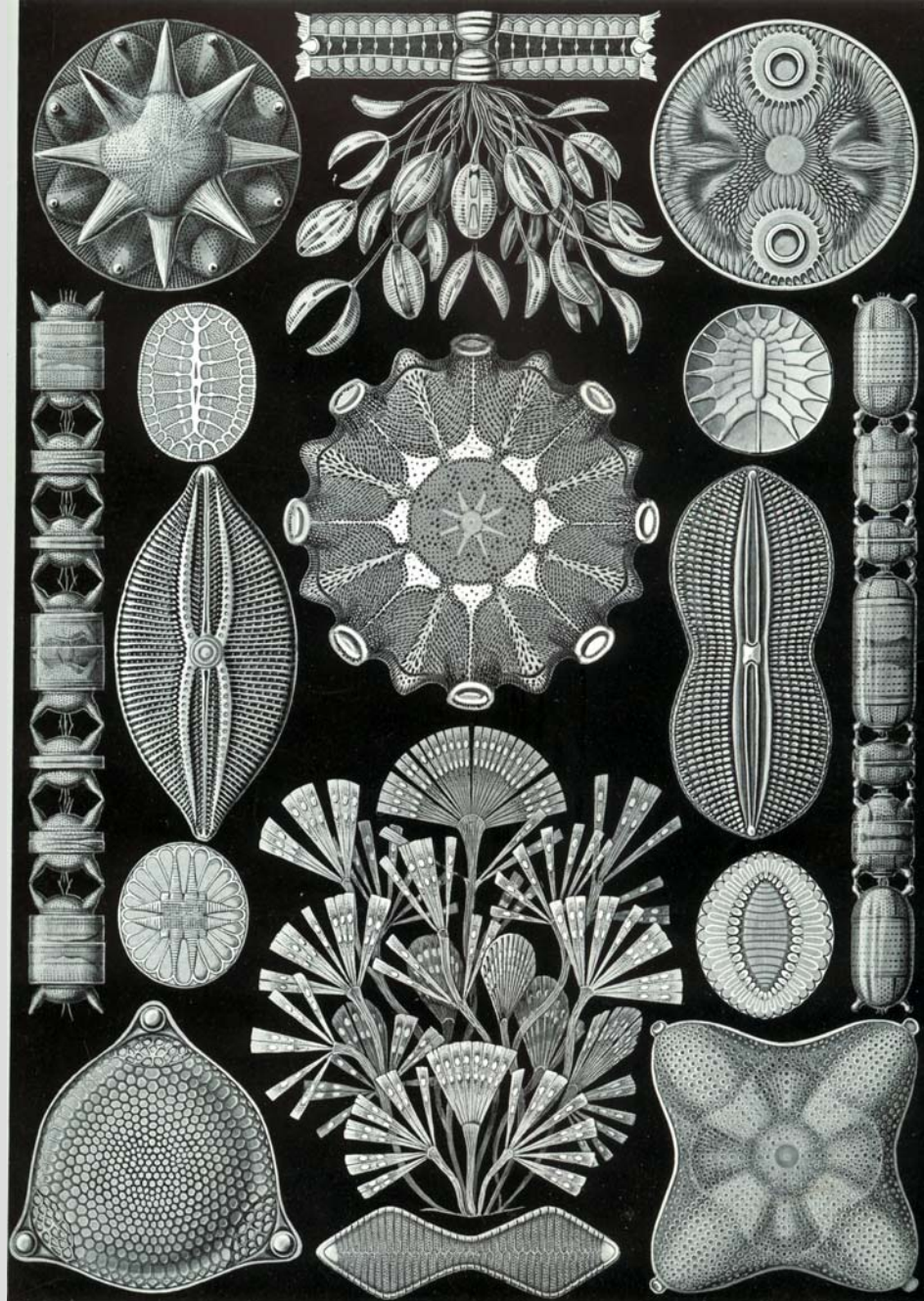


What are diatoms?

- unicellular microorganisms
- algae (plants)
- 100.000 species
- silica cell wall

Where live diatoms?

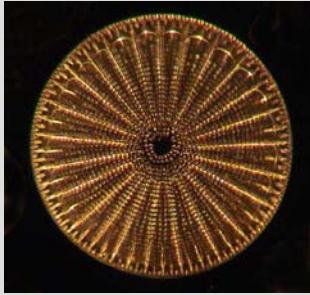
- freshwater (everywhere)
- oceans (everywhere)
 - water column
 - “phytoplankton”
 - in/under ice
 - “ice algae”
 - **sediment**
 - “**microphytobenthos**”



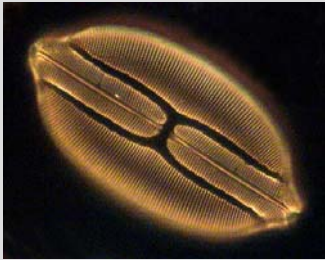
Ernst Haeckel, 1904, Artforms of Nature

What do diatoms?

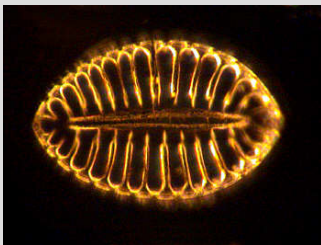
- Photosynthesis → 25% of global primary production (Carbon fixation, oxygen release)
→ 45% of marine primary production
→ CO_2 sink → transport deep sea



- Food source → Grazer (zooplankton, filter feeders etc.)



- Sediment stabilization



- excretion of "glue" (biofilm)
- Diatoms are ecologically the most important algal group!

What are we doing in Kongsfjorden?

3 years project funded by:
2005-2007



Biomass, primary production and
ecophysiology of the microphytobenthos
in the Arctic Kongsfjorden



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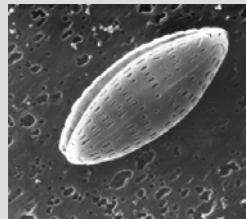
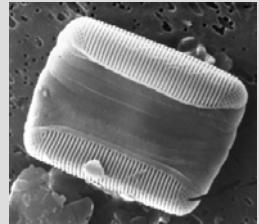
Christian Wiencke

Alfred-Wegener Institut for
Polar and Marine Research



Why are we working in Kongsfjorden?

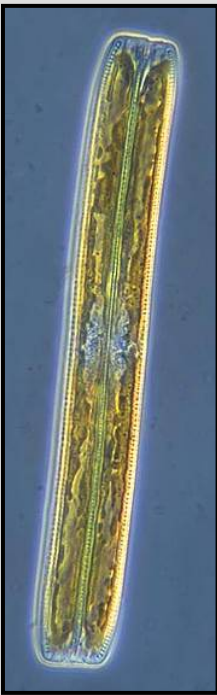
- Microphytobenthic diatoms are ecologically important
- Microphytobenthic diatoms in temperate to tropical waters are well studied: → tidal flats (e.g. wadden sea)
- Very few ecological studies from polar regions
 - Antarctica unstudied
 - Arctic: Young Sound, Greenland (Glud et al. 2002)
 - > 40% primary production due to benthic diatoms
 - most important food source for zoobenthos
- Ecophysiological adaptation of benthic diatoms to polar conditions are badly investigated (e.g. polar night)



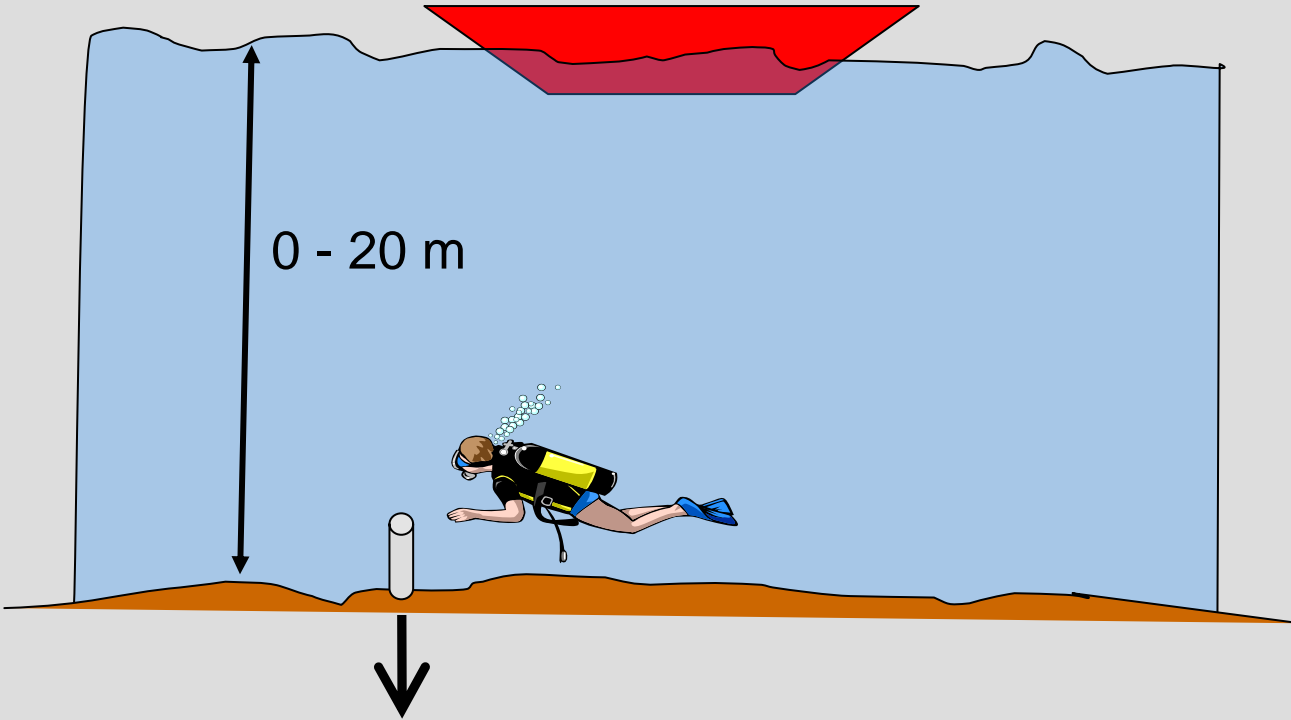
What are we doing in Kongsfjorden?

Aims

1. Qualitative & quantitative evaluation of sediment diatoms in Kongsfjorden
 - Biomass in different sediments
 - Biodiversity of diatoms
2. Analysis of production biology → Primary production
3. Ecophysiological Adaptation
 - Tolerance ($^{\circ}\text{C}$, radiation, salinity)
4. Comparision to Antarctica
 - Cooperation Angela Wulff, University of Gothenburg

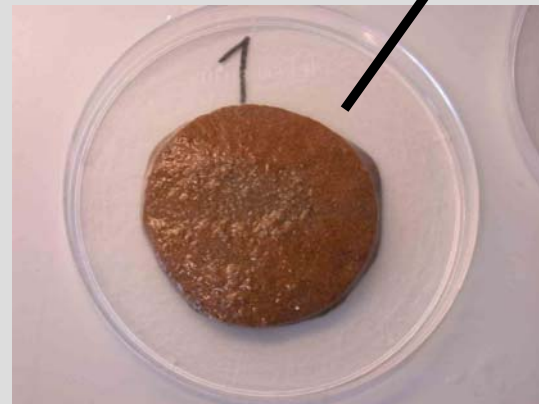
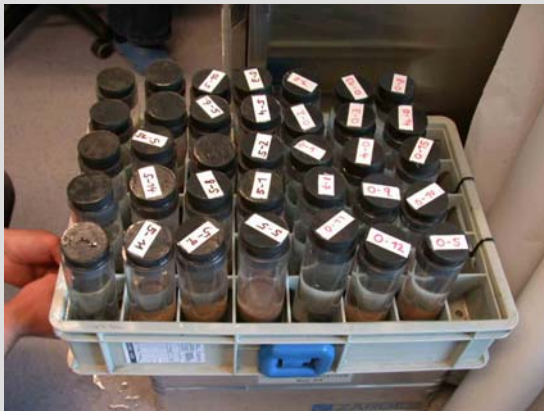


How are we working in Kongsfjorden and Marine Lab?

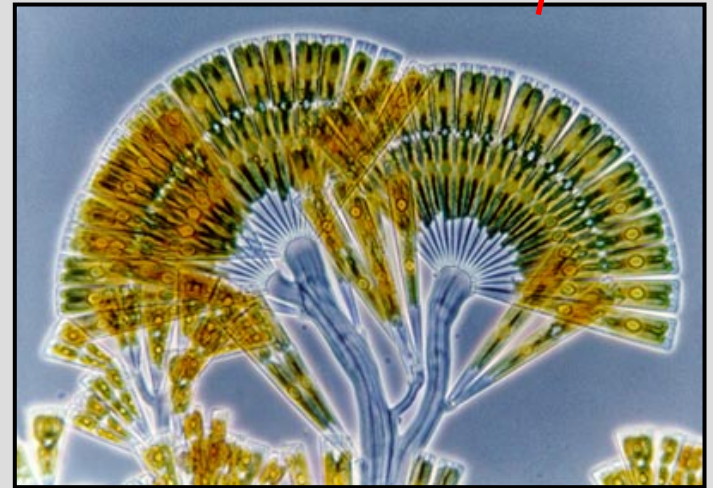
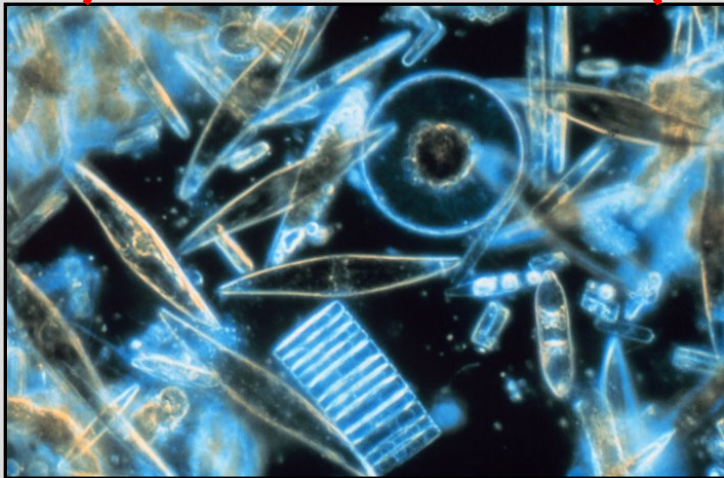
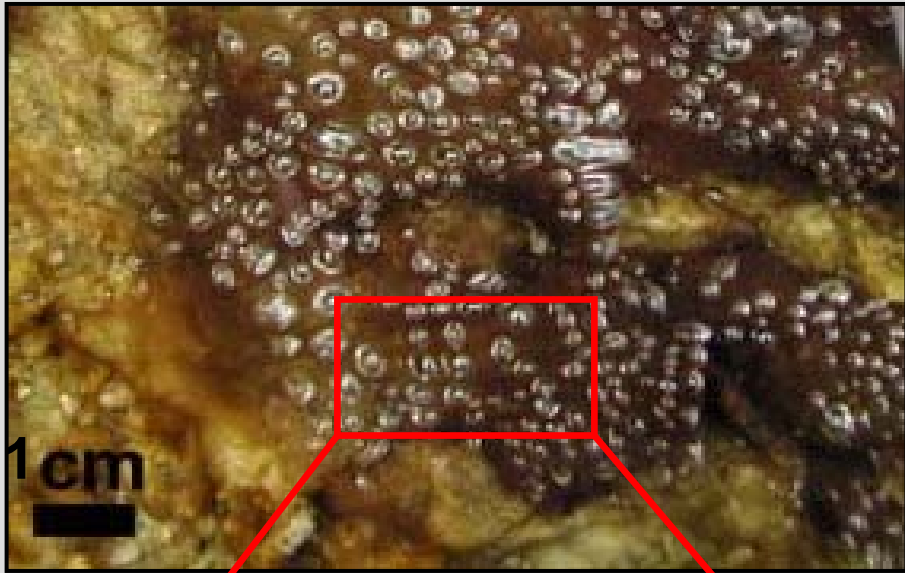


Analysis:

- Biomass
 - Abundance
 - Nutrients
 - Sediment features
- Diatom cultures



What we found so far in Kongsfjorden



What we take home from Kongsfjorden

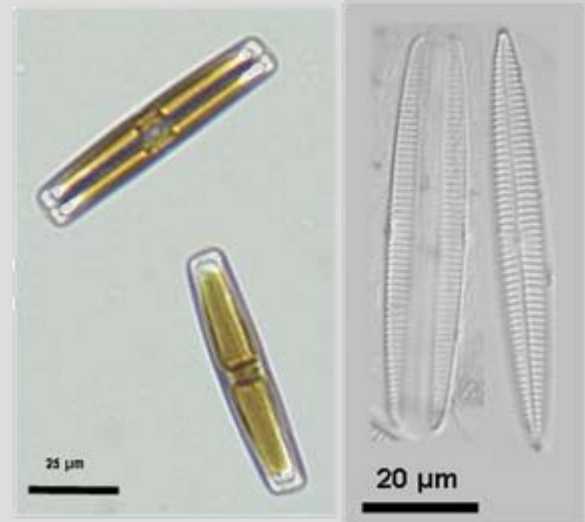
Culture collection of Arctic benthic diatoms at the University of Rostock



- Isolation from field samples
- Establishment of unialgal cultures
- Culturing for biomass production
- Identification (morphology, DNA)

Running experiments in Rostock:

- Growth & photosynthesis
 - light stress & long-term darkness
 - temperature stress
 - salinity stress



Navicula directa

What we found out so far in Rostock

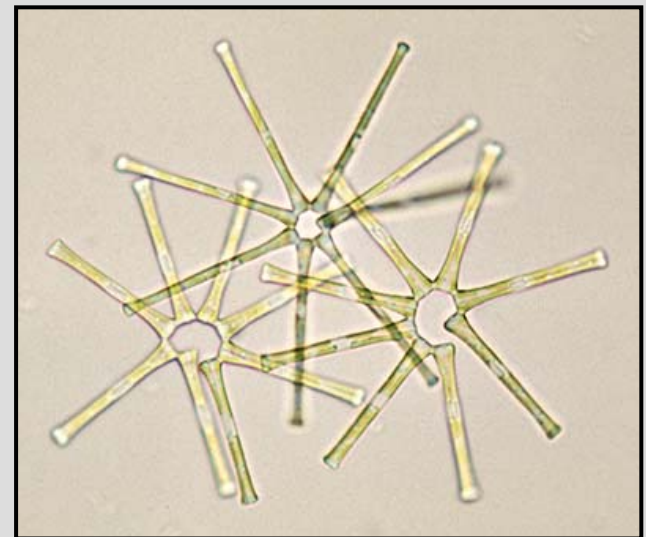
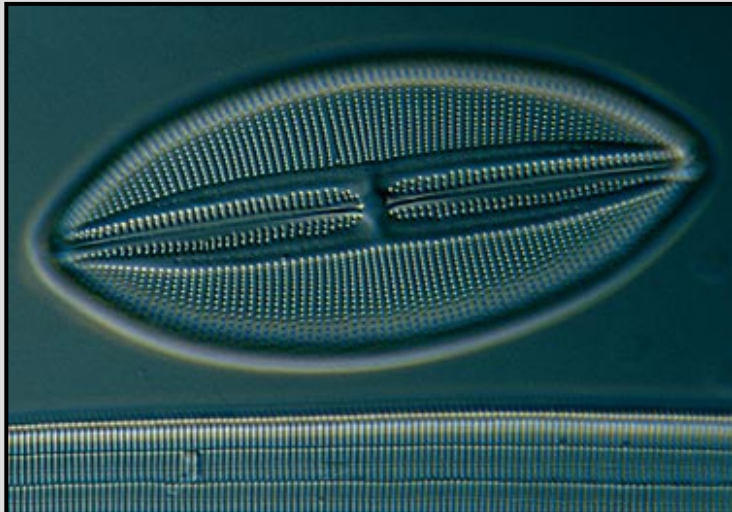
Growth & photosynthesis of 3 diatom species
from Kongsfjorden - preliminary results

→ low light adaptation

→ long-term survival in darkness (< 5 months)

→ high temperature tolerance (0-15/17°C)

→ low salinity tolerance



Diatoms in art

