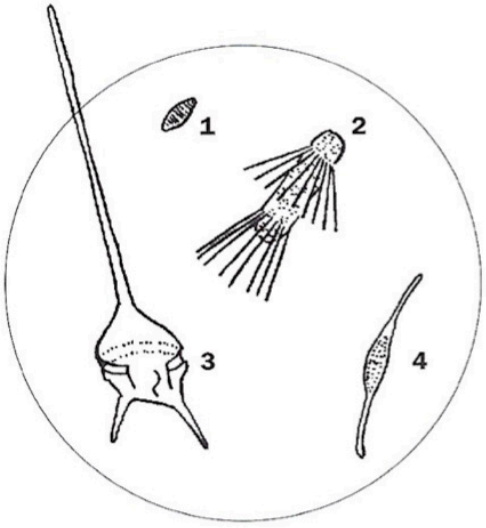
... at first sight: water, water and water as far as the eye can see, but for the researchers, sea water regularly brought up from all depths and of which hundreds of vials must be filled, at the same time as temperatures are recorded ! The subsequent physico-chemical analyses of these samples will allow us to better understand the quantities of nutrients present in the ocean and essential for the growth of microscopic planktonic algae, the basis of the marine food chain.

THE DEVELOPMENT OF PLANKTONIC ALGAE

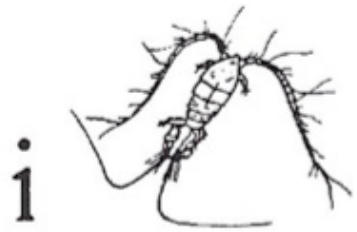
The development of planktonic algae is governed, as for all plants, by physical (temperature, light) and chemical (nutrient salts, metals, dissolved gases) factors. The oceanographic campaigns conducted in the Southern Ocean have allowed us to answer a surprising question: why are these waters, which have long been assumed to be rich in nutrients - based on the model of the Northern Hemisphere - so little productive in phytoplankton (primary production)? The poor penetration of light at depth, due to the strong permanent agitation, limits the profit that the algae could draw from the nutrients (iron, nitrates, phosphates, sulphates, silicates), some of which are limiting, such as iron, i.e. they are essential and available in limited quantities compared to the other nutrients. Moreover, Diatoms use up silicates very quickly, to build their silica envelope. However, this primary production becomes more important at the edge of the Antarctic continent and the sub-Antarctic islands at the beginning of the southern summer, thanks to the release of iron and the return of light. Elsewhere, the very blue waters of the Southern Ocean are synonymous with «oceanic desert».



Four Antarctic planktonic algae compared at the point of an i magnified 200 times (circle), 3 Diatoms, F. Kerguelensis (1), C. criophilum (2), N. closterium (3) and 1 Dinoflagellate C. pentagonum (4).

THE ANTARCTIC PLANKTONIC ALGAE

The majority of Antarctic planktonic algae are Diatoms (10 to 200 microns), whose siliceous remains cover the deep sea at high latitudes to a depth of hundreds of meters. Corenthron criophilum and Fragilariopsis kerguelensis are particularly common. Dinoflagellates are also well represented. Here, we are far from the 2 or 3 divisions per day, common in the tropics. The low temperature of the Southern Ocean (less than 4°C) slows down their metabolism by almost a factor of 10. Here, we are far from the 2 or 3 divisions per day, common in the tropics.



i

Ce copépode est un des animaux du plancton (l'agrandissement du i du texte donne l'échelle).

Un filet à plancton.

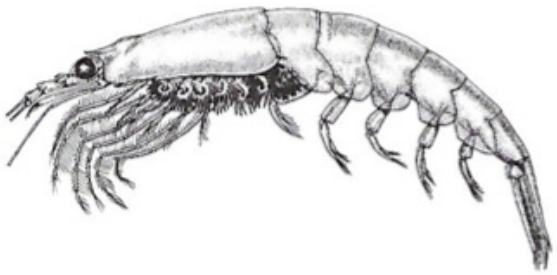
This copepod is one of the plankton animals (the enlargement of the i in the text gives the scale). A plankton net.

Krill, a small crustacean of a few centimeters (Euphausiids - especially Euphasia superba in Antarctica) is always presented as the star of Antarctic planktonic animals. However, tiny crustaceans of the copepod type are, as everywhere else in the world, probably the most numerous in the zooplankton (1 to 10 per liter of ocean!).

Krill are not strictly speaking planktonic since they swim at more than 2 km/h, going down to the bottom and coming back up to find their food by filtering the water. Krill multiply south of the convergence, following the pulses of the pack ice and taking advantage of the microscopic algae that grow under the drifting sea ice.

The concentration by the currents in swarms, sometimes visible by plane, makes the krill particularly exploitable by whales, birds... and eventually humans! It is this concentration that deceives on the real productivity of Antarctic waters which is, all in all, much lower than that of Arctic waters...

The word krill is not a scientific term, but a Norwegian appellation that designates the «small things», the «small fry» that whales feed on.



Krill Euphausia superba (life size 6 cm).

DEFINITION

The word plankton does not designate an animal, as is sometimes believed, but a particular living world with its plants and animals (thousands of species!). Plankton in fact comes from the Greek planetos (which also gave the word planet) which means «wandering», because algae (phytoplankton) and animals (zooplankton) are «erratically» transported by the currents. Fish eggs and larvae, for example, are, for a time, part of the plankton.