Primary Production in the Benguela System

By Janet Botha

The Benguela system is one of the most productive ocean systems in the world. The strong southerly winds which dominate off the westcoast of southern Africa cause deep nutrient-rich water to well up. A variety of microscopic organisms thrive because of this. They are part of the plankton or tiny drifting plants and animals, whose phenomenal growth creates rich feeding conditions. This rich garden of tiny plants, at the very base of the food chain, provides for a wealth of marine life.

In the food chain the production of plant (photosynthetic) material is referred to as the primary production. The accumulative effect of marine primary production in the world's oceans can be equal to the total annual production on land. Yet the production of phytoplankton is largely limited to the surface skin of the sea, where there is sufficient light for photosynthesis.

Few species of phytoplankton exceed the size of a pinhead and most are very much smaller: yet they are usually very beautiful when viewed through a microscope. The microscopic plants in Figures 1 and 2 are examples of two of the major groups of marine phytoplankton, namely the dinoflagellates and the diatoms.

The Noctiluca in Figure 1 commonly occurs along the coast of Namibia. It is mobile and swims with whiplike flagellae. It is one of the organisms responsible for the formation of so-called "red tides", the term loosely applied to phytoplankton blooms that cause discoloration of the sea. Noctiluca results in orange patches in the sea, and sometimes visible phosphorescence at night.

Noctiluca is usually harmless, but some other dinoflagellates, like *Gonyaulax catanella* which caused marked blooms in January 1993, contain poisons that are among the most potent of biological toxins. Even non-toxic species can cause quite a nuisance, as the blooms can be so dense that the gills of marine animals get clogged, or decomposing algae deplete the water of oxygen, and fish die or avoid the area.

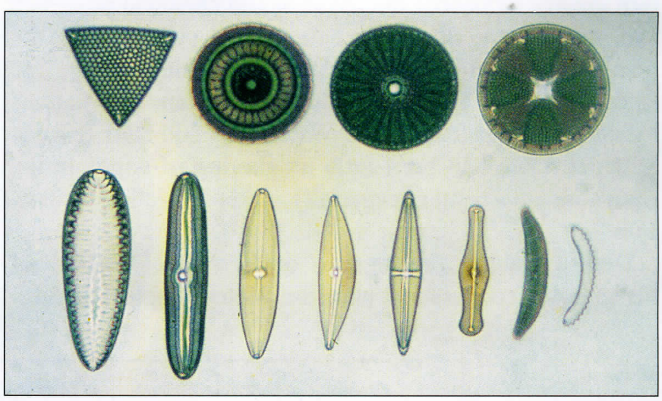

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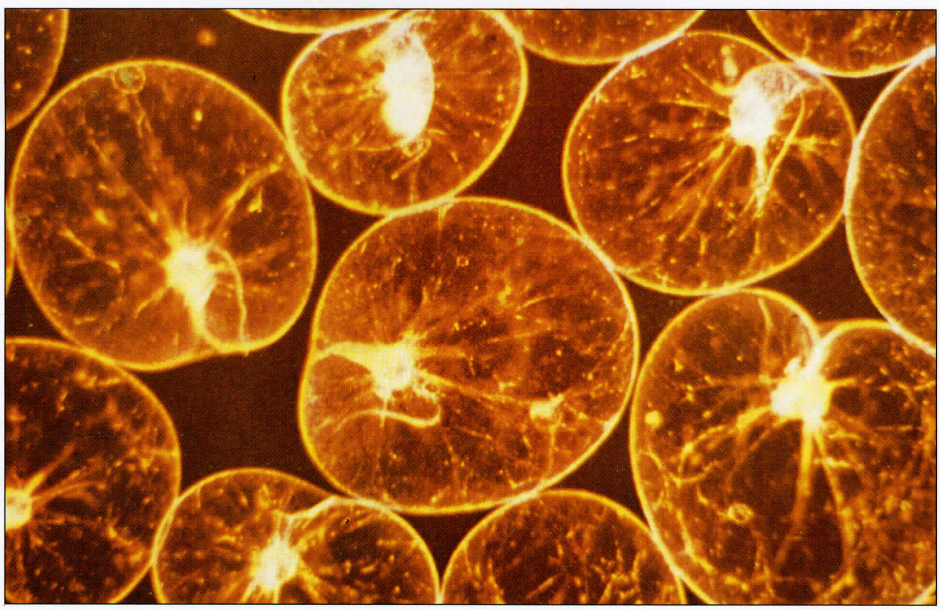
Figure 2: The silica-rich phytoplanktons, the diatoms, are an important part of our marine food chain.

The silica-rich phytoplankton, namely the diatoms (See Figure 2) are an important part of our marine food chain. In some areas, these diatom cells aggregate and form long chains. These chains are relatively large as phytoplankton particles go, and are easier to remove by filtration. Food particle size is an important factor in the survival of filter feeders like pilchard.

The author: *Janet Botha graduated from the Universities of Natal, Pretoria and Orange Free State. She holds a MSc in Phytoplankton Ecology. She lectured in microbiological botany and worked in aquaculture ventures before joining the Ministry. Ms Botha is employed in the Plankton Section of the Ministry of Fisheries and Marine Resources.*

Figure 1



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The microscopic plant, Noctiluca *is one of the organisms responsible for the formation of so called "red tides".*