Chapter 2-2
Plankton

Abstract
"Plankton" is a general term for small organisms that float in the water and drift along the waves.
Keywords: Plankton, The food chain, Seasonal changes

1. About Plankton

Plankton are defined as a class of organisms that live floating in the water. They are carried along on currents, whether capable or incapable of swimming. However, the term "plankton" is also used to refer to "aquatic organisms of microscopic size" rather than "floating organisms."

The term "plankton" was coined by the German physiologist, Viktor Hensen in 1887 and, taxonomically speaking, includes life forms belonging to a wide diversity of biomes. Although there are numerous theories on the subject, generally, plankton that are capable of photosynthesis are called "phytoplankton" and plankton incapable of photosynthesis that survive by ingesting organic matter that serves as nutrition are called "zooplankton."

2. Phytoplankton

Phytoplankton is classified into various types such as cyanobacteria, chrysophyceae, diatoms, dinoflagellates, cryptomonads, euglena and chlorophyceae. Of these, types such as *Microcystis* and *Anabaena* that belong to the cyanobacteria category form algal blooms (blue-green algae) that resemble streaks of green paint in eutrophic lakes and reservoirs from summer through to autumn. As well as this, types such as *Uroglena* that belongs to the chrysophyceae category and *Peridinium* that belongs to the dinoflagellates category are the organisms that are responsible for the formation of algal blooms (freshwater red tides) that appear in spring.

3. Zooplankton

The main classified groups of zooplankton include types ranging from lower orders ranked in the ascending order of protozoa, rotifera and crustaceans. Although small, in terms of population, protozoa are distributed in the largest numbers in Lake Biwa. While rotifera have a characteristic corona around the head that resembles a wheel, crustaceans are characterized by the shedding of their exoskeletons in order to grow and also by their large, segmented legs.

4. The Food Chain

Plankton play a central role in the food chain in lakes and reservoirs. To be precise, phytoplankton are the principal primary producers in lakes and reservoirs, while zooplankton that feed on these phytoplankton are the primary consumers. Moreover, zooplankton are a source of food for higher-order consumers such as fish and shellfish.

5. Seasonal Changes

Seasonal changes in the main phytoplankton found in Lake Biwa are shown in Table 2-2-1 below. It has been observed that chrysophyceae that form freshwater red tides in the center of the North Basin are the dominant species in spring, while types such as diatoms and flagellates tend to dominate in winter through summer. In addition, green algae appears year round, but periods during which it tends to dominate are particularly common in autumn.

Satoshi Ichise
(Lake Biwa Environmental Research Institute)

Table 2-2-1 Seasonal changes in the main dominant phytoplankton in the center of the Lake Biwa North Basin (Off the Imazu shore) (1978-2005)

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Cyanobacteria	*Gomphosphaeria lacustris*							○	○				
Chrysophyceae	*Uroglena americana*					◎	●	◎					
Diatoms	*Aulacoseira nipponica*		○	○	○	○							
	Stephanodiscus suzuki	○	○	○	○	○	○	○				○	○
	Stephanodiscus suzuki mutation	○	○	○	○	○	○	○				○	○
	Fragilaria crotonensis				○								
	Asterionella formosa			○	○								
Dinoflagellates	*Gymnodinium helveticum*	○	◎	◎	○	○	○						
	Ceratium hirundinella					○		○					
Cryptophyceae	*Cryptomonas*	○	○	○	○	○	○	○					○ ○
Green algae	Genus Planktosphaeria						○	○	○	○	○		○
	Coelastrum cambricum							○	○	○	○		
	Genus Mougeotia				○		○	○					
	Ctenocladium constrictum											○	○
	Closterium aciculare	○	○		○	○	○	○	○	○	○		
	Genus Closterium				○								
	Staurastrum dorsidentiferum	◎	◎	◎	○	◎	○	○	○	○	○	○	◎
	Staurastrum arctiscon	○		○		○		○				○	○

Note: The term "dominant species of phytoplankton" refers to the species with the largest total cell volume per unit of water (1ml).
The symbols show the number of periods of domination from 1978 - 2005 (28 years).
Legend: ○: 2 - 5 periods, ◎: 6 - 10 periods, ●: 11 - 20 periods, ■: 21 - 28 periods

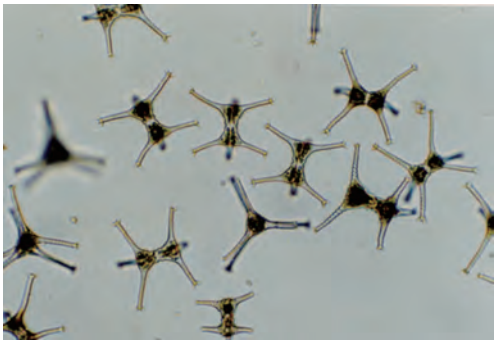

Fig. 2-2-1 Typical phytoplankton found in Lake Biwa (*Staurastrum dorsidentiferum*)

Fig. 2-2-2 Typical zooplankton found in Lake Biwa (*Daphnia pulicaria*)