A PHYTOPLANKTON SEASON IN COOK STRAIT.

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THE study of marine phytoplankton, its constitution, quantity, and seasonal variations, has become of increasing interest as its importance as the primary producers of the sea has been realized. It is on these microscopic, floating algae—diatoms and dinoflagellates principally—with their ability to manufacture organic compounds from carbon dioxides, salts, etc., dissolved in the water, that the whole food cycle of the sea depends.

The distribution of phytoplankton species is fairly cosmopolitan. However, there is a warm-water flora and a cold-water flora of both oceanic and neritic (coastal) species. It has been postulated that an examination of the flora would point to the origin of the water mass. However, these floras are not exactly distinct and the intermingling which takes place makes it very difficult to define their range. Dinoflagellates are more characteristic of warmer waters, tropical species having elaborate winged expansions to keep them afloat. Diatoms, on the other hand, are more numerous in the colder waters.

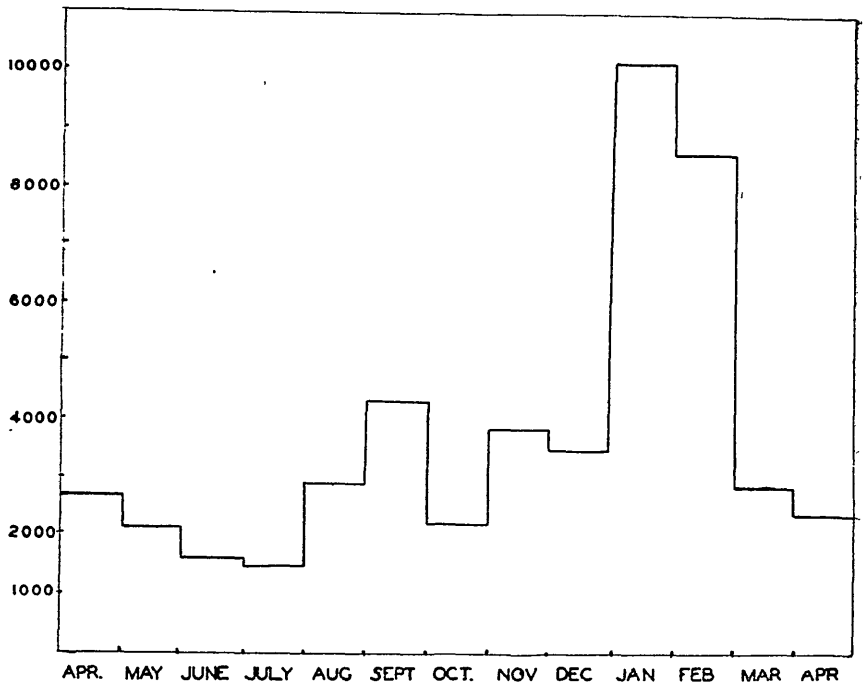
Sheltered water masses usually produce a much greater population than more exposed situations; for example, sounds, fiords, and enclosed seas such as the North Sea, produce large populations which, on exhausting the phosphate supply, die out again. Consequently, such places show more extreme seasonal variations than stations subject to ever-changing waters. The station chosen for this particular study—Cook Strait Region—was subject to turbulence and changing water masses, as was evidenced by the mixture of cold-and warm-water species, of oceanic and neritic species, along with the abundance of bottom forms found in the upper layers. The waters passing through Cook Strait are probably of mixed origin, part being subtropical, from the warm East Australian current, and part being subantarctic from the West Wind Drift.

Seasonal fluctuations, due to climatic, chemical, physical and biotic factors, were noticeable here as elsewhere. Two periods of maximum population were found—the first in September, the second from January to February.

The following table gives a summary of the occurrence of the major plankton groups for the season 1944–45.

March–April	Autumn	Phytoplankton	Diatoms	Represented by a number of genera, but population decreasing throughout period.
			Dinoflagellates	At first more plentiful than diatoms, but by the end of the period almost disappeared.
		Zooplankton		Not profuse.
May–July	Winter	Phytoplankton	Diatoms	Still decreasing, though never entirely disappearing.
			Dinoflagellates	Decreasing — entirely absent by July.
		Zooplankton		Absent on the whole.
August–October	Spring	Phytoplankton	Diatoms	Increase first noticeable in August.
			Dinoflagellates	Continue to be rare, though later showing an increase.
		Zooplankton		Becoming plentiful after diatom increase.
November–Feby.	Summer	Phytoplankton	Diatoms	Both show a drop in population at beginning of period with a marked increase toward the end.
			Dinoflagellates	
		Zooplankton		More plentiful than the phytoplankton at beginning of period.

Graph of the Seasonal Distribution of Phytoplankton in Cook Strait. April, 1944–April, 1945.
(Quantities expressed as monthly averages in 1000's per litre.)



The spring increase started in August, but the highest count for this period was made on 11th September, 10,930 cells per litre—this includes 21 major diatom species and a few dinoflagellate species. The main diatoms contributing towards the early spring increase were *Thalassiosira* (August), *Leptocylindricus minimus, Thalassionema nitzschiodes, Nitzschia closterium, Rhizosolenia* sp., and *Asterionella japonica* along with various *Coscinodiscus* spp., *Melosira* spp. and *Paralia sulcata,* which were fairly plentiful throughout May, June, and July.

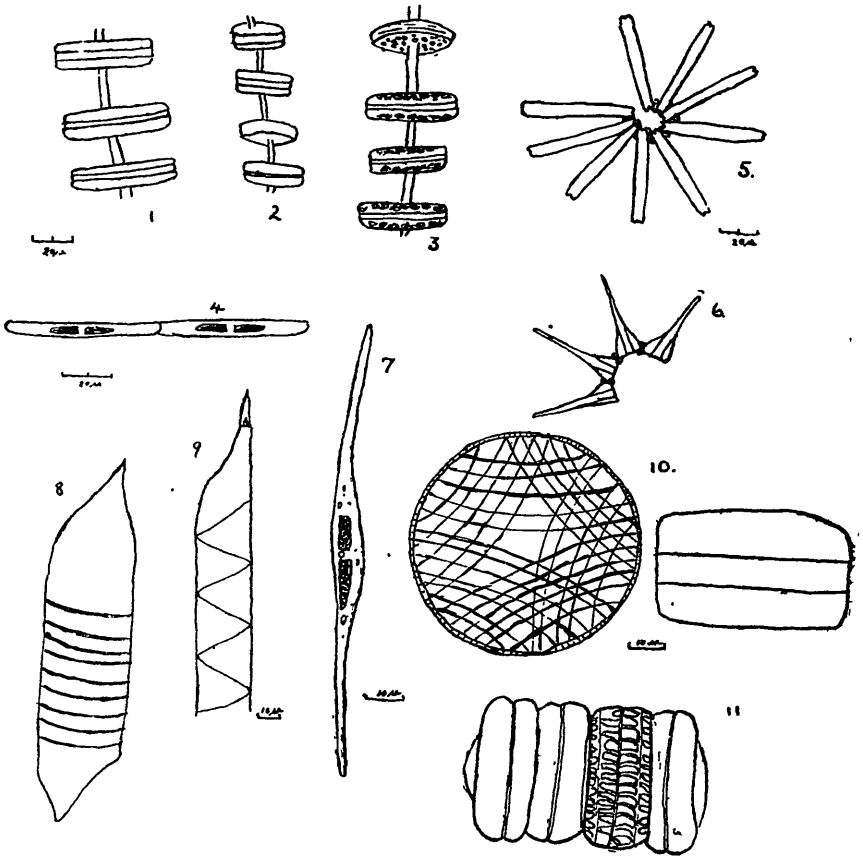
Larger diatoms not well represented in the water-bottle samples, but which were prevalent in tow-net samples during the early Spring period, were *Stephanopyxis turris, Biddulphia mobiliensis, B. sinensis, Corethron criophilum* and later larger *Rhizosolenia* sp., and *Chaetoceros* spp.

Dinoflagellates present at the time (August and September) were *Dinophysis acuta, D. recurva, Peridinium divergens, Ceratium tripos, C. furca, C. fusus,* and *C. trichoceros.*

The spring increase was followed by a slight decrease in October and December. In January and February numbers again soared up to give a late-summer production peak. Although the late-summer maximum on 31st January, 22,840 cells per litre, was numerically greater than the earlier one, there were only 14 species concerned, of which four very minute diatoms made up more than 88 per cent. of the total number—*Skeletonema costatum* (15,740 cells per litre), *Nitzschia seriata* (2,000), *Leptocylindricus danicus* (1,450), *N. closterium* (1,000). Other species occurring during this period were *Licmorphora lyngbyei, Thalassiosira* spp., *Asterionella japonica,* and *Chaetoceros* sp.

It is worthy of note that at no time during the year were there no diatoms present. Overseas workers have usually found that the spring increase was much greater than the late-summer increase.

In conclusion, I would like to say that this is but an introduction to a very large and almost unexplored field in New Zealand. There is an urgent need for fundamental research done on a large scale into problems of phytoplankton composition, distribution and correlation with fisheries problems.



TEXT FIG. 1—Early Spring Diatoms.

1. *Thalassiosira* sp., diam. 80μ.
2. *Thalassiosira* sp., diam. 28.5μ.
3. *Thalassiosira* sp., diam. 40μ.
4. *Leptocylindricus minimus*, 5μ across.
5. *Thalassionema nitzschioides*, 80μ long.
6. *Asterionella japonica*, 40μ long.
7. *Nitzschia closterium*, 115μ long.
8. *Rhizosolenia robusta*, 160μ across.
9. *R. styliformis*, 600μ long, 22μ across.
10. *Coscinodiscus* sp., 80μ diam.
11. *Paralia sulcata*, 40μ diam.

STATION RECORDS OF INDIGENOUS PLANTS

By MISS R. MASON, Botany Division, Plant Research Bureau, Wellington.

THE majority of plants recorded here were collected on five trips in the South Island. The routes taken are indicated below.

February, 1945. Eastern District: Bealey Corner, Waimakariri River, Jordan Stream, over saddle to tributary of Avoca River, Avoca Valley, up tributary and down Anti-Crow River and to Bealey Corner.

1945–46. Eastern District: Lake Heron, Rakaia River, Lyell Hut; Ramsay Glacier and Erewhon Col; Lyell Hut; Ramsay and Clarke Glaciers, Strachan Pass. Western District: Lord Glacier, Lord Range and Blue Lookout, Big Wanganui River.

February, 1946. North-western District: Up Anatoki River and the south branch; to saddle between Anatoki and Stanley Rivers and on to the end of