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Phytoplankton Ecology

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1. INTRODUCTION

1.1 Objectives

The main purpose of the Group "Phytoplankton Ecology" was defined at the end of the first oceanographic expedition in the Ross Sea to give a contribution to the problem, still debated, of a poor phytoplanktonic biomass in contrast with the enormous nutrients richness (Innamorati *et al.*, 1990a; 1990b). In particular, the problem arose of estimating phytoplankton biomass not only in its spatial distribution but also in its temporal development. During the first expedition, in fact, several observations indicated the occurrence of a bloom at the end of february, whose development was not followed due to weather conditions at the end of the expedition.

Following those previous data, during summer 1989/90 a programm has been set in order to:

1 - define phytoplankton temporal variations and their relationships to environmental factors.

2 - define the spatial distribution on a large area, from the Ross Sea to the Pacific Ocean towards New Zealand, related to important hydrographic structure (Antarctic Convergence and Divergence).

These two objectives have been realized by two different groups, the Neritic and the Oceanic one.

The Neritic group has carried out his work in Terra Nova Bay, and was composed by Mario Innamorati, Enzo Saggiomo, Giovanna Mori and Mannuccio Mannucci.

The Oceanic group has worked on board the R/V Cariboo and the partecipants were Luigi Lazzara, Caterina Nuccio and Luciano Di Fazio.

1.2 Sampling programm

The Neritic group began his research activity

in Terra Nova Bay on december 24th with sampling in three stations (Fig. 1) named Baia Terra Nova (BTN, 74° 41'42"S, 164° 07' 24" E), Mergellina (M, 74° 41'33, 164° 07' 15"E) and Santa Maria Novella (SMN, 74° 43'S, 164° 16' E). Due to the frequent covering by the drifting sea ice, only BTN could be sampled daily from the rocky shore. At station Mergellina, located at about 250 m from the coast, samples have been collected at the surface and at 10 and 25 m, while at Santa Maria Novella, which is in the centre of the bay where the bottom is 500 m deep, sampling has been carried out at the surface, 10, 25, 50, 100 and 200 m. Sometimes samples at stations Mergellina and Santa Maria Novella have been collected at 5, 15 and 20 m, in occurrence of the fluorescence maximum.

Three ice samplings have been carried out on one occasion on the pack ice just near the base of Terra Nova Bay. A block of brown fast ice has been divided in 5 samples from the top to the bottom. These samples, corresponding to different states of the ice, are named TB2 through TB6 in Tab. 1,2 and 3; TB1 is the water between ice and the shoreline. Samples TB7 and TB8 are collected from a block of ice floating in a crack. The third ice sampling has been carried out drilling a hole in the pack ice and collecting different portions of the 2 m ice core obtained. One sample of the underlying water has also been collected. These sample are indicated as core 1 through 6 in Tab 1, 2 and 3.

The Oceanic group has carried out its research work on board the R/V Cariboo in 27 stations along the route 45S - 75S (Fig. 2) which have been sampled at 12 to 18 depths, as far as 200 m for chlorophyll pigments analysis and as far as the bottom for particle size spectra measurements.

Seventy-nine samples have also been collected at the surface from the continuous system along the same route to and from Terra