OBJECTIVES

It was the aim of this study to assess the microbial diversity and its functional potential in a coastal upwelling area in the Pacific coast of Chile employing both molecular and conventional phylogenetic methods.

STUDY SITE

Conception Bay (Fig. 1) is located in central Chile. It is the largest (167.4 km²), and most arid embayment along the Chilean coast. The bay's water column is influenced by seasonal upwelling of equatorial subsurface water (ESW) in summer. The upwelling region is characterized by a pH of 8.0-8.5 (Fig. 2), high nitrogen (i.e., nitrate at 30 m depth, Fig. 2), and high chlorophyll-a/phaeopigment biomass (i.e., 4-5 mg m⁻³) in July (Fig. 1) and primary productivity close to values between 3.5 and 7.5 gC m⁻²d⁻¹.

SAMPLING

Samples were collected from aboard the research vessel Ray May on December 5, 2003 at stations 7 and 14 using an oceanographic rosette (Fig. 1). The environmental determinants at the site were characterized by CTD profiles (Fig. 2).

ANALYSES

The following determinants were analyzed in samples from three different depth ranges (0-4, 5-10, and 20-30 m) where phytoplankton biomass was highest.

- Concentration of NO₂⁻, NO₃⁻, and NH₄⁺ by fluorometry (Fig. 3).
- Chlorophyll a and phaeopigment concentration in the total phytoplankton and from the size fraction < 5 µm by fluorometric methods (Fig. 4).
- Concentrated samples from each depth were examined qualitatively by fluorescence microscopy, as well as by bright and dark field microscopy after phase contrast microscopy, when appropriate (Fig. 5).
- Bacterial abundance in the bacterioplankton community in the surface layer, was amplified 16S rDNA genes from prokaryotes using primers which were specific for bacteria (167F-1193R) and cyanobacteria (7-12) (Fig. 6).

Microscopy

Microscopy was performed using a Zeiss Axioskop microscope with a digital camera (Fig. 7).

RESULTS

Study results on hydrographic parameters obtained at the same depth and at this station as well as at station 14 on November 5, 2003.

- Temperature (°C) and salinity (psu) profiles (Fig. 2).
- Oxygen (µM) and fluorescence (r.u.) profiles (Fig. 2).
- Nitrate (µM) and Nitrite (µM) profiles (Fig. 2).
- Chlorophyll a and phaeopigment concentration (mg m⁻³) from different depths (Fig. 4).

CONCLUSIONS

The high nitrogen concentrations observed in Conception Bay and in the adjacent coastal upwelling area are a common feature of this upwelling area. The RFLP patterns obtained from amplified 16S rDNA genes from prokaryotes using primers specific for cyanobacteria and pico-eukaryotic phototrophs were distributed throughout the entire water column. The presence of Chlorophyll a and phaeopigment pigments from cyanobacteria and picoeukaryotic phototrophs were distributed throughout the entire water column, suggesting the presence of diatoms and cyanobacteria in the surface layer. The concentrations measured corroborate those obtained previously by the CPUE and www.microeco.unizh.ch/chile/chile.html.

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