

# Acidophilic phytoplankton in Argentina: the case study of Lake Caviahue (Patagonia)

Mónica M. Diaz\* & Guadalupe Beamud

With 7 figures and 2 tables

**Abstract:** This article presents a review of the studies carried out over a 10-year period in Lake Caviahue, a natural acidic lake located in Patagonia. The main patterns of the phytoplankton populations are described.

Five extremophiles phytoplanktonic species were studied in relation to the zooplankton and nutrients bioavailability under the environmental conditions registered in Lake Caviahue: very low pH (~ 3), high concentrations of iron (18.4 mg L<sup>-1</sup>) and sulphur (130 mg L<sup>-1</sup>). During the 10-years studies, the biomass (0.2 and 1.4 mg fw L<sup>-1</sup>) and the biodiversity were very low being *Keratococcus raphidioides* the dominant species (60 to 100% of the total biomass). *Philodina* sp. (Bdelloidea) was the only zooplankton responsible of the zooplankton biomass. From the lack of relationship between phyto-zooplankton biomass, as well as from the results obtained in the feeding experiments, we conclude that no control of algal abundance by the zooplankton occurs.

The microalgae were nitrogen limited in the lake and according to the results from experiments with nutrient addition, the phytoplankton showed nitrogen limitation on growth rate and yield. The species have also the capacity to use mixotrophically alternative sources of organic and inorganic carbon and organic nitrogen. The importance of the uptake and the expression of CO<sub>2</sub> concentrating mechanisms (CCMs) were demonstrated in *Euglena* and in the ellipsoidal form of *Watanabea* but not in the spherical form of *Watanabea* and in *Palmellopsis*. The two forms of *Watanabea* differed in their possession of a CCM.

**Keywords:** Acidophilic phytoplankton, natural acidic lake, Patagonia

## Introduction

Only exceptional organisms among the planktonic communities can tolerate extreme environmental conditions such as those registered in Lake Caviahue: very low pH (~ 3), high aluminium (Al), iron (Fe), and sulphate (SO<sub>4</sub><sup>=</sup>) contents (Pedrozo et al. 2001, 2008). These organisms growing at extreme environments have been named acidophilic extremophiles

### Authors' address:

Instituto de Investigaciones en Biodiversidad y Medioambiente (INIBIOMA), Universidad Nacional del Comahue, CONICET, Quintral 1250, 8400 Bariloche, Argentina.

\*Corresponding author: [monica.diaz@crub.uncoma.edu.ar](mailto:monica.diaz@crub.uncoma.edu.ar)