CRUSTACEAN (COPEPODA AND CLADOCERA) ZOOPLANKTON RICHNESS IN CHILEAN PATAGONIAN LAKES

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ABSTRACT

The Chilean Patagonian lakes are characterized by their oligotrophy, high endemism, significant predominance of calanoid copepods in comparison to daphnid cladocerans, and low species richness. These characteristics are in marked contrast to the situation in North American lakes. In the present study, published information of chlorophyll concentrations and species richness for Chilean Patagonian lakes was considered. The results denoted direct correlations between chlorophyll concentration and species richness, as well as an inverse correlation between latitude and species richness, whereas a relationship between lake surface and species richness was not observed. The results obtained would indicate that the oligotrophic status of the sites studied is the main cause of low species richness. Our conclusions most probably reveal the existence of different regulator mechanisms in comparison to North American lakes. Ecological and biogeographical topics are discussed.

RESUMEN

Los lagos de la Patagonia Chilena se caracterizan por su oligotrofia, alto endemismo, marcado predominio de los copépodos calanoideos en comparación a los cladóceros dafnidios y una baja diversidad de especies. Estas características son marcadamente opuestas a los lagos de América del Norte. En el presente estudio se consideró información publicada para lagos de la Patagonia Chilena. Los resultados indicaron que la riqueza de especies estuvo directamente relacionada con la concentración de clorofila, inversamente relacionada con la latitud, y no estuvo relacionada con la superficie del lago. Los resultados obtenidos en el presente estudio indican que la oligotrofia sería la causa principal de la baja riqueza de especies, y que habría una diferencia marcada en los mecanismos reguladores observados para lagos norteamericanos. Se discutieron aspectos ecológicos y biogeográficos en el presente estudio.

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INTRODUCTION

The large Chilean Patagonian lakes are characterized by their oligotrophy, significant predominance of calanoids copepods in comparison to daphnid cladocerans, and low species richness (Campos, 1984; Soto & Zúñiga, 1991). Similar characteristics have been described for large lakes in Argentinean Patagonia (Modenutti et al., 1998). These characteristics are in marked contrast to the situation in North American lakes, which show a high predominance of daphnid cladocerans and high species richness (Soto & Zúñiga, 1991; Soto & Campos, 1995; Gillooly & Dodson, 2000).

The Chilean lakes have simple trophic chains that are characterized by the presence of phytoplankton, zooplankton with a predominance of calanoid copepods (mainly Boeckella spp.) and zooplanktivorous fishes (mainly Galaxiidae) in the pelagic zone (Soto & Zúñiga, 1991). These features are similar to those described for Argentinean lakes (Modenutti et al., 1998), and New Zealand lakes and ponds (Jeppensen et al., 1997, 2000). In a study done in lakes and ponds at different locations in the Torres del Paine National Park, we found that a relatively high species richness was observed in the absence of zooplanktivorous fish and the presence of a high chlorophyll concentration (Soto & De los Ríos, 2006). In an ecological community, species richness is an important attribute of that system, and this richness is conditioned by environmental factors such as productivity and habitat area (Jaksic, 2001; Guisande et al., 2003). The first study of zooplankton assemblages in Chilean lakes described a low species richness that is probably explained most by an oligotrophic status (Soto & Zúñiga, 1991). The aim of the present study is to determine the role of geographical characteristics and chlorophyll concentration on species richness in Chilean Patagonian lakes, mainly considering a review of the literature of deep Chilean lakes, and information collected in field work.

MATERIAL AND METHODS

Published information was considered first of all (Campos et al., 1982, 1983, 1988, 1990, 1992, 1994a, b; Soto et al., 1994; Campos, 1995; Wölfl, 1996; Villalobos, 1999; De los Ríos, 2003) for southern Chilean lakes between 38° (Villarica Lake, fig. 1) to 51°S (Torres del Paine National Park, fig. 1). This included data of species richness, latitude, and chlorophyll concentration. Also, zooplankton samples were collected in lakes of the Aysen region during spring and summer 2001, a period when maximum zooplankton abundance occurs (Wölfl, 1996). Samples were collected in vertical hauls from 30 m depth to the surface, with an Apstein net. This layer constitutes the zone with maximum zooplankton abundance.