HYDROGRAPHY AND PLANKTONIC DIATOMS IN THE MARINE LAKE MIR (EASTERN ADRIATIC SEA, CROATIA)

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Abstract
Due to its geomorphologic isolation and shallow depths, the lake Mir is a peculiar biotope, with highly specific water dynamics driven by the considerable temperature amplitudes and high salinity (max. 44.36). Diatoms dominated the phytoplankton abundance in the lake almost throughout the entire investigated period. The greatest number of diatom taxa correlated positively with temperature or salinity. The most abundant and most frequent diatom taxon was *Actinocyclus* sp., with abundances exceeding 10^5 cells L^{-1}.
Keywords : Temperature, Salinity, Diatoms, Adriatic Sea.

Introduction
Lake Mir is a landlocked marine environment, situated on the southern edge of Dugi Otok Island (Middle Adriatic). It is an enclosed water-body with special geomorphological phenomenon, where communication with the surrounding sea takes place through a system of subterranean caves and siphons. The lake is elongated, 910 x 280 m in size, with a surface area of 0.23 km^2. This is the first study carried out on the ecology of diatoms in karstic Lake Mir, the most saline marine lake on the Adriatic coast.

Materials and Methods
Samples for temperature, salinity and phytoplankton analyses were collected between November 1999 and December 2000 at monthly intervals. Samples were taken using 5 L Niskin bottles at one station, from the surface to the bottom (7 m), at one meter intervals. Temperature and salinity were determined using standard oceanographic methods [1]. Phytoplankton abundance was determined using an inverted microscope Olympus IX71 [2]. Correlation analysis was performed on collected data in order to determine the relationship between diatom abundance, and temperature and salinity, using STATISTICA 4.5 software.

Results
The annual distribution of temperature and salinity in the marine Lake Mir is shown in Figure 1. Temperatures in the lake oscillated between 3.65 °C (January) to 27.5 °C (June). The water column throughout the year was mostly isothermal. Salinity ranged from 37.90 to 44.36, with a peak in September.

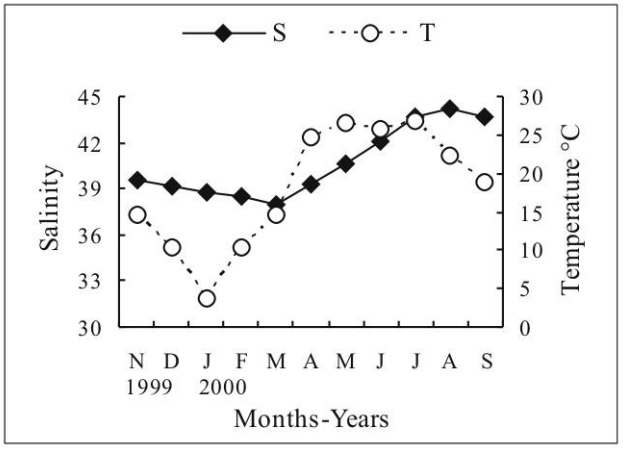

Fig. 1. Distribution of temperature (T) and salinity (S) (values are expressed as water column mean).

Microphytoplankton (MICRO) abundances varied from 1.3 x 10^3 cells L^{-1} (March) to 4.5 x 10^5 cells L^{-1} (November). Altogether, 63 taxa of MICRO were identified in the samples, of which 36 were diatoms. Thereof, 15 diatom species were identified in $\geq 10\%$ of the total sample number. *Actinocyclus* sp. was the most abundant and most frequent diatom taxa that reached intensive development in November 1999 (6.8 x 10^5 cells L^{-1}).
Correlations between the most frequent diatom taxa (presented $\geq 10\%$ in total number of samples) and temperature and salinity variables are shown in Table 1. The greatest number of taxa correlated, positively, with temperature or salinity. A total of four taxa correlated with these two variables at the same time. *Actinocyclu*s sp., the most abundant taxon, significantly and positively correlated with those two variables.

Tab. 1. Correlations between the most frequent diatom species and temperature and salinity. Only significant correlations are shown (P<0.05, N=78).

Variables / Taxa	TEMP	SAL
Actinocyclus sp.	.30	.42
Amphora ostrearia		.23
Amphora	.26	.50
Coscinodiscus sp.		
Diploneis sp.		
Entomoneis pulchra		
Navicula spp.		.46
Naviculoid cells	.23	.47
Nitzschia incerta		
Nitzschia sp.		
Paralia sulcata	.32	
Pleurosigma angulatum	.27	
Pleurosigma sp.		
Tropidoneis sp.		
Undetermined pennate diatoms	.29	.34

Conclusions
There were no temperature and salinity stratification in the lake throughout the observed period. The increase in the temperature and salinity during the summer period could be caused by the isolation of Lake Mir and evaporation processes. MICRO as well as diatom populations were represented by a relatively small number of species, however, some of them with high abundances (10^4-10^5 cells L^{-1}). Diatoms, both in terms of taxa number and abundances, were the dominant MICRO group throughout the year. Distribution of diatoms coincided with the distribution of temperature and salinity, which was confirmed by correlation analysis.

References
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