SOME CORRELATIONS BETWEEN HYDROLOGICAL PARAMETERS AND PHYTOPLANKTON CONCENTRATIONS IN THE SOUTH EUBOIKOS GULF (GREECE)

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Abstract: Hydrological parameters including temperature, salinity, phosphate, ammonium, nitrite, nitrate and silicate, as well as, phytoplankton standing stocks were collected from the South Euboikos Gulf, a restricted tidal marine embayment on the eastern coast of Greece. Relationships between the abundance and taxonomic diversity with the environmental variables were examined by regression analysis.

Introduction: The present paper attemps to correlate hydrological parameters with phytoplankton abundance and diversity along the S.Euboikos Gulf. Previous studies are limited to few stations for the study of phytoplankton (Blasco, 1974; Ignatiades, 1974).

Materials and Methods: The location of stations is shown in Fig.1. Surface water samples were collected in February and August 1982. Methodology for the examined hydrological parameters and chlorophyll a has been given elsewhere (Friligos, 1982). Phytoplankton samples were fixed with lugol and examined by an inverted microscope (Lund et al., 1958). Species diversity was calculated as suggested by Margalef (1967).

Results and Discussion: The S.Euboikos Gulf is naturally divided into three major sections: the southern part (A; stations E1-E3), which is connected to the open Aegean Sea and has salinities between 38.07 and 38.17‰ and temperatures between 10.40 and 24.30°C; the northern part (B; stations E4-E8), with salinities between 37.10 and 37.95‰ and temperatures in the range 10.94 and 24.20°C, and the Chanel of Euripos (C; stations 9 and 10). The salinities in section C are distingly lower than those of the other sections, ranging from 35.72 to 36.15‰ and temperatures between 10.90 and 23.40°C.

In the S.Euboikos Gulf, the nutrient concentrations ranged as follows: phosphate 0.05-0.73 µg-at/l, ammonium 0.13-1.42 µg-at/l, nitrite 0.04-0.28 µg-at/l, nitrate 0.27-3.97 µg-at/l and silicate 0.80-43.10 µg-at/l.Generally, the values of nutrients were higher in section C and gradually decreased from north to the south.

The phytoplankton of the Gulf had increased values during late February, with higher mean values in sections C (142 cells/ml) and B (135 cells/ml) and lower one in section A (40 cells/ml). Chlorophyll a concentrations showed a similar distribution in the three areas, ranging from 0.16 µg/l in section A to 0.82 µg/l in section C.

The statistical analysis shows that a weak negative correlation exists between the phytoplankton abundance and temperature ($r = -0.38$ at 0.99 confidence coefficient). This suggests that high abundance was well associated with low temperatures, presumably because of extensive grazing

and inhibiting light intensities during the summer period. The absence of correlation between the abundance and nutrients (N, P, Si) indicates that these influence the number of individuals much less than temperature. Salinity did not show great changes in the Euboikos Gulf during 1982 (35.72 - 38.17%), and the low correlation coefficient between the abundance and the salinity suggests no particular effect of it on the phytoplankton cycle. The data seem to indicate that the cell concentration was affected by temperature. These observations about the relationship between the abundance and certain environmental factors agree with the data presented by Ignatiades (1970) for the silicoflagellates in Saronikos Gulf. Diversity was highly correlated with temperature, too ($r = -0.71$ at 0.99 confidence coefficient). However, there is a lower correlation with nutrients and salinity. Nitrite ($r = 0.63$ at 0.99 confidence coefficient) and phosphate ($r = -0.44$ at 0.95 confidence coefficient) seem to play an important role in controlling taxonomic diversity.

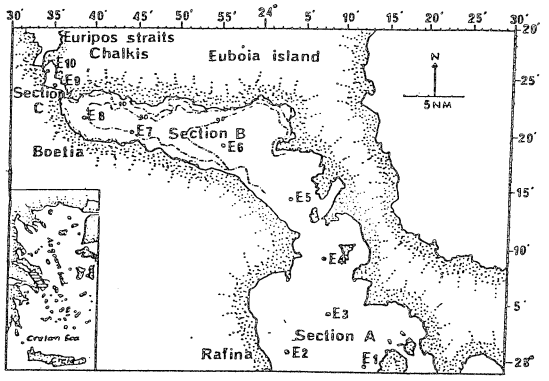

Figure 1

These results suggest that physical processes are possibly the main factors in influencing the distribution and growth of phytoplankton. The contribution of physical features in localised blooms of some phytoplankton species in coastal waters has been demonstrated (Kaiser and Schultz, 1978).

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