

Observations on the vertical distribution
of phytoplankton in a mixed layer

by

Lydia IGNATIADES
Department of Biology, Greek Atomic Energy Commission
Aghia Paraskevi Attikis, Athens, Greece

Introduction

The problem of phytoplankton suspension in the sea has been discussed in literature and attention has been directed towards the influence of water movements on the sinking behavior of phytoplankton.

In this study, an attempt was made to examine whether the vertical distribution of phytoplankton was influenced by the winter vertical mixing of the water in Elefsis Bay, Aegean Sea.

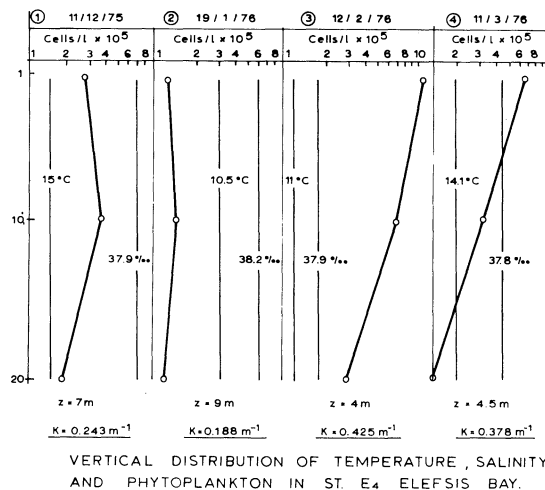
Materials and methods

The sampling station was located approximately in 37° 58' N, 23° 25' E, on 20 m depth. Samples of water were collected from 1, 10 and 20 m depth using a van Dorn sampler in december 1975 and january, february and march 1976. Phytoplankton enumeration, phosphate, nitrate silicate and temperature and salinity were recorded for each sampling depth. Light transparency was measured by the Secchi Disc.

Results and discussion

The results are shown in fig. 1. The temperature and salinity data indicate that the water column in the four presented examples could be considered homogeneous. However, the phytoplankton quantitative analysis suggests stratification of the population with the maximum either at

10 m depth (december, january) or at the surface (february, march). The 10 m maxima were associated with higher transparencies of the water whereas the surface maxima occurred at lower transparencies. So, the pattern of phytoplankton stratification seemed to be affected by the water transparency.



The data of the chemical analysis of the water (table 1) showed that the vertical distribution of phosphate, nitrate, nitrite and silicate was irregular and there is no distinct correspondence with the phytoplankton vertical distribution.

Table 1.- Vertical distribution of nutrients in St. E₄, Elefsis Bay.

Date	Depth (m)	Nutrient concentrations ($\mu\text{g-at/l}$)			
		P- PO_4	N- NO_3	N- NO_2	Si- SiO_2
11/12/1975	1	0.78	3.08	0.42	7.80
	10	0.60	2.00	0.22	12.40
	20	0.70	3.08	0.48	8.50
19/1/1976	1	0.38	4.64	0.72	11.30
	10	0.32	4.20	0.60	10.50
	20	0.35	4.88	0.84	10.20
12/2/1976	1	0.04	5.62	0.62	8.50
	10	0.06	5.66	0.64	10.10
	20	0.22	7.00	0.92	12.20
11/3/1976	1	0.10	4.04	0.36	6.40
	10	0.03	4.70	0.34	7.80
	20	0.00	3.96	0.42	6.90

Table 2 presents the vertical distribution of species diversity calculated by the formula of MARGALEF (1967). It is apparent that the populations at the three examined depths resembled each other in diversity.

Table 2. Vertical distribution of species diversity in St. N., Elefsis Bay.

Depth/ Date	11/12/75	19/1/76	12/2/76	11/3/76
1m	2.37	3.41	3.12	2.46
10m	2.64	3.62	3.62	2.71
20m	2.87	3.57	3.05	2.13

Finally, the vertical distribution of the dominant species (data are too lengthy for inclusion here) showed that there was no specific accumulation or absence of a certain species or taxa from a certain depth. All species and taxa were equally reduced or increased at a given depth, and their stratification was influenced by the water transparency.

Bibliography

MARGALEF (R.), 1967. - Some concepts relative to the organization of plankton. Oceanogr. Mar. biol. Ann. Rev., 5, pp. 257-289.

