

A preliminary account on the annual cycle of Utermhol phyto  
plankton in a Mediterranean brackish-water lagoon.

by

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Summary - A description of the seasonal and bathymetric di  
stribution of the phytoplankton biomass in a meromictic bra  
ckish-water lagoon is given.

Sommaire - Aperçu préliminaire de la distribution bathyme  
trique et saisonniere de la biomasse phytoplantonique dans  
une lagune saumâtre meromictique du litoral méditerranéen.

Lago Lungo is a litoral brackish-water lagoon (0,5 km<sup>2</sup>; max.  
depth 7 m) on the shore of the Pontine Region, a few kilome  
ters south of the town of Terracina.

A detailed description of its geographical, physico-che  
mical and biological characteristics has been given by Som  
mani (1954) and Marcolini (1954).

The lagoon is fed, on its northeastern side, by the wa  
ter flowing from the fresh water lake of S. Puoto and, on  
the western side, by an artificial, narrow and shallow con  
nection with the sea. Such connection and the morphology of  
the basin, appear to be the main causes of the insufficient  
circulation of the lagoon waters, so that a stable and per  
manent pycnocline, associated with a well defined chemocli  
ne, is found at a depth of about 3 m (Carrada, Rigillo Tron  
cone, 1975).

In the oxygen-depleted and hydrogen sulphide rich hypo  
limnetic waters, a layer of "bacterial red water" is perma  
nently present (Carrada, Rigillo Troncone, 1974).

The following data are the results of monthly samplings  
carried out from March 1975 to February 1976 at three sta  
tions: stat. 1, located in the zone of maximum depth (7 m);  
stat. 2, by the sea-mouth; stat. 3, by the outlet of S.Puo  
to waters.

The water has been collected using a Ruttner sampling bottle and the phytoplankton biomass has been computed according to Ütermhol (1958).

The marked stratification of the lagoon originates well defined water masses with different physico-chemical and biological characteristics as shown by the phytoplankton distribution.

The communities of the upper layers (high oxygen concentrations and low salinities) consists of fresh- (Closterium ceratium Perty, Cosmarium bioculatum Breb., C. succisum West, etc.), marine- (Cyclotella kutzingiana (Kützing) Thwaites, C. striata (Kützing) Grunow, Synedra acus Kützing, Prorocentrum micans Ehrenberg, Chaetoceros curvisetus Cleve, etc.) and typically brackish-water elements (Euglena proxima Dangeard), and shows a clear seasonal cycle (Fig. 2,A).

Two picks are present, in February and August respectively, at stat.1; the two maxima (spring and autumn) shown by the material from stat. 3 (Fig. 1, D) reflect the different pattern of phytoplankton seasonal distribution in the freshwater lake S. Puoto.

The more uniform environment of hypolimnetic waters supports a phytoplankton population characterized by low constant biomasses of a few tolerant species (Cyclotella kutzingiana (Kützing) Thwaites, Cocconeis scutellum Ehrenberg, Gymnodinium sp.).

The spring and autumn picks are brought about by the outburst of a few species (Cyclotella kutzingiana (Kützing) Thwaites, Euglena proxima Dangeard, Prorocentrum minimum Schiller) at different levels and times. Fig. 1, which shows the seasonal distribution of biomass per m<sup>2</sup>, is an evidence of the late-spring dystrophic crisis being a unifying factor for the whole water mass.

At stat. 2 (Fig. 1,C) the sampling took place at low tide (except in August, September and November) and consequently its phytoplankton composition mostly reflects that of the same levels of stat. 1, while concentrations are extremely variable, probably due to the strong turbulence which affects water masses of different bathimetric origin.

#### References

- Carrada, G.C., Rigillo Troncone, M., 1974 - Presence of "red water" and environmental conditions in some meromictic brackish-water lagoons of the Pontine Region. Rapp.Comm.int.Mer Médit., 22: 33-35.

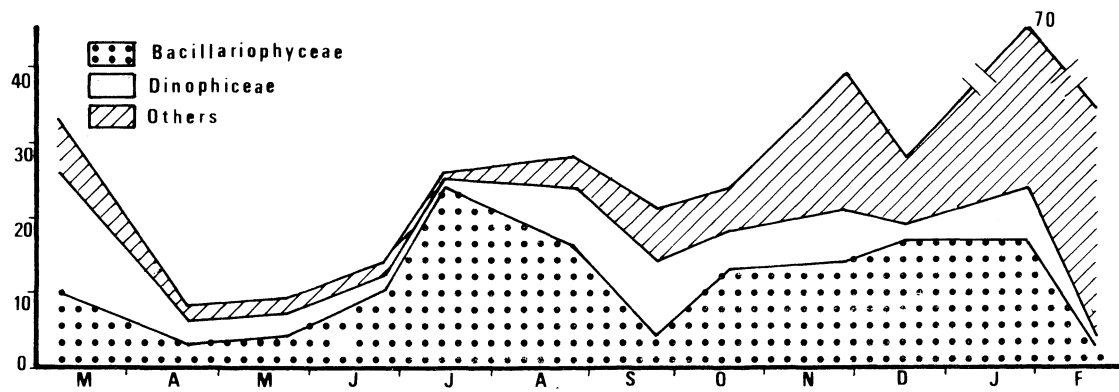


Fig. 1 Phytoplankton biomass ( $n^{\circ}$  cells  $\times 10^9/m^2$ ) at the station 1  
- march 75 - february 76 -

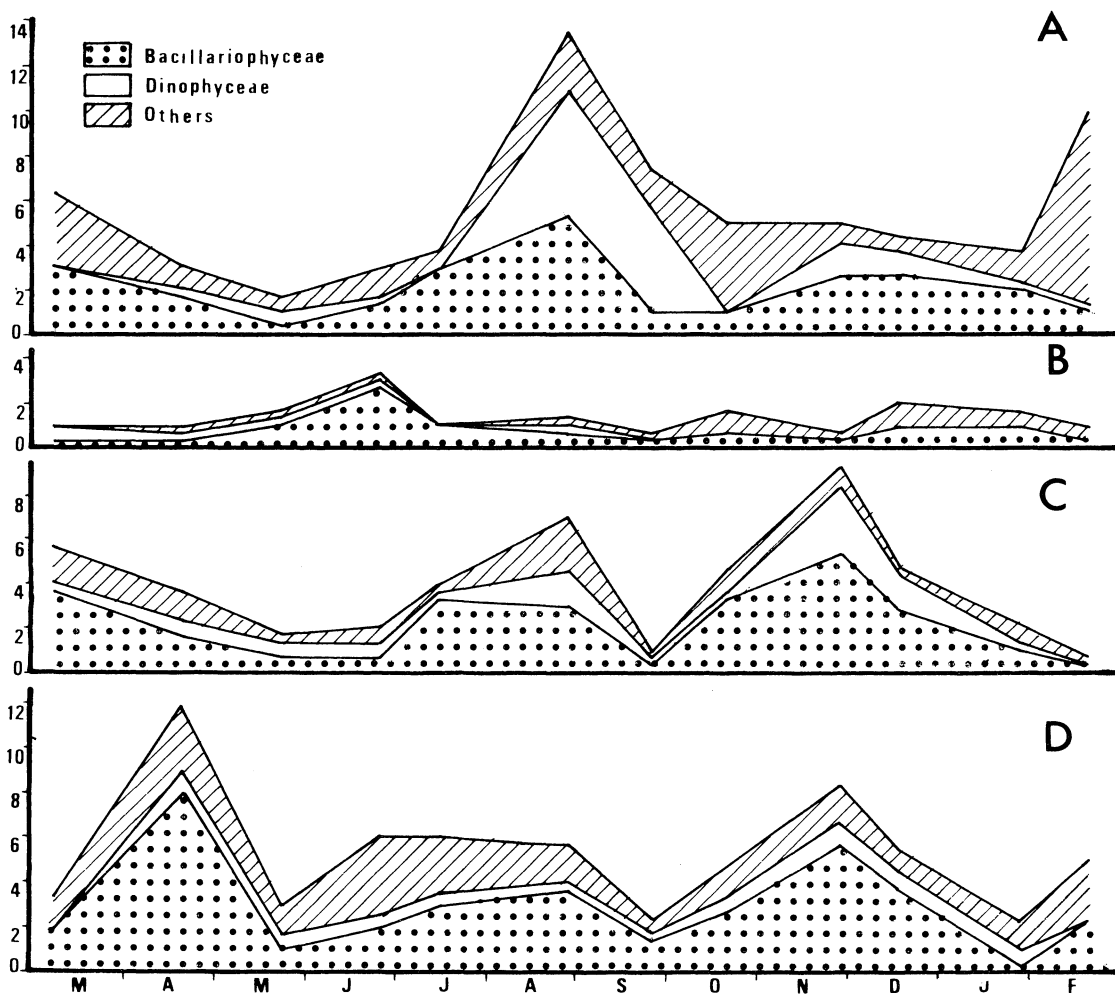


Fig. 2 Phytoplankton biomass ( $n^{\circ}$  cells  $\times 10^6/l.$ ) - march 75 - february 76 -

A - station 1: surface; B - station 1: 5.5 m.;  
C - station 2: surface; D - station 3: surface.

- Carrada, G.C., Rigillo Troncone, M., 1975 - Nychthemeral cycle of nutrients in a meromictic brackish-water lagoon (L. Lungo). Rapp.Comm.int.Mer Médit., 23: 81-84.
- Marcolini, B.M., 1954 - Il Lago Lungo. Caratteristiche idrologiche di un ambiente salmastro. Osservazioni chimico-fisiche. Boll.Pesca Pisc. e Idrobiol., 9 (I): 54-72.
- Sommani, E., 1954 - Il Lago Lungo. Caratteristiche idrobiologiche di un ambiente salmastro. Osservazioni generali e biologiche. Boll.Pesca Pisc. e Idrobiol., 9 (I): 30-53.
- Ütermohl, H., 1958 - Zur Vervollkommnung der quantitativen Phytoplankton. - Methodik. Int.Ver. für Theor. und Ang. Limn., 9: 1-38.