

Observations on some biological properties in the upper layer of the Ionian Sea  
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In the frame of the POEM phase-II program, an interdisciplinary cruise was carried out in the Ionian Sea with the CNR RV "Bannock" from October 2nd to 24th, 1991; aside of the study on the physical oceanography of the Eastern Mediterranean Sea, which was the main goal of the POEM phase-I project, this cruise was more oriented to investigate the physical and chemical features of the Ionian basin, as well as the interactions with the biological properties of the water masses. The station grid was chosen on the basis of the knowledge derived from the results of previous campaigns.

During the sampling period, the general circulation in the upper layer of the Ionian Sea (down to 200 m depth) was characterized by the presence of the Atlantic Water in subsurface waters: the AW flow, coming from the Sicily Strait, is easily identified by a salinity minimum (about 37.7 PSU) mainly at 50 m depth. This core streams in N-F. direction, crossing and spreading over a wide area in the Ionian Sea. The proper Ionian waters are characterized by salinity values ranging from 38.0 to 38.7 PSU.

Our aim was to evaluate if, from this hydrological pattern, some consequences on the distribution of the biological properties derive: for this purpose, in the following discussion, two stations were chosen as representative of different hydrological situations; st. 308, fully interested by the AW, and st. 112, out of the AW flow.

In st. 308 (fig. 1), the AW is located in a layer ranging from 30 to 75 m depth: the salinity minimum of 37.59 PSU is located at 50 m. Here, relative maxima in biological activity, like as bacteria and phytoplankton abundances, as well as particulated organic carbon (POC) and chlorophyll *a*, were found, which contribute to a maximum value of apparent oxygen utilization (AOU = -27 μM). A deeper peak of *in-situ* fluorescence, obtained by a Sea-Tech fluorometer, was also observed; this behaviour can be ascribed entirely to the presence of phaeopigments, as shown by the highly significant correlation between all phaeo/fluorescence data ( $r = 0.959$ ,  $df = 52$ ).

In st. 112 (fig. 2), total bacteria and POC maxima were observed at the surface, while phytoplankton abundances were located between 20 and 50 m, associated with chlorophyll/phaeopigments ratios close to the unit and with a maximum value of AOU, both of them at 20 m. The maximum of *in-situ* fluorescence is between 100 and 120 m, once again strictly related to the maximum of chlorophyll degradation products.

These results let us to suppose that the Atlantic Water, streaming and meandering into the Ionian Sea characterized by a biological activity higher than the upper or lower layers, while, outside of AW flow, from our observations the most active layer from the biological point of view is very close to the surface (0-20m).

Generally, the biological activity was rather poor in the whole basin, biomasses ranging from values very close to zero (as chlorophyll *a* and particulated organic carbon regards) up to 0.2 μg dm<sup>3</sup> of Chl *a*, 4.8 μM of POC, and 36 10<sup>4</sup> cells ml<sup>-1</sup> of total bacteria. The chlorophyll/phaeopigments ratios are mostly less than 1, indicating predominance of degradation products. Phytoplankton abundances range between 25 and 109 10<sup>3</sup> cells dm<sup>-3</sup>. As the main taxonomic groups, weak is the contribution of diatoms, representing 6-7% of the total: this scarcity can be explained because of limiting silica concentrations (Si-SiO<sub>4</sub> range = 0.5-5.9 μM; BREGANT, pers. comm.). The phytoplankton contribution to the POC varies with depth: from 0 to 50 m depth, the carbon fraction due to phytoplankton is 3-5%, from 50 to 100 m it increases up to 10-25%, while below 100 m it decreases again to 5% of the total. Consequently it appears that, in the surface layer, bacteria and detritus are the major suppliers to organic carbon, as verified by very high POC/Chl ratios (always < 100); below 50 m, the increase in phytoplankton biomass leads to a decrease of these ratios.

Even if in absence of informations about annual biological cycling in the Ionian Sea, these observations, together with the vertical pattern and their absolute values, let us to assess some preliminary conclusions:

- in the sampling period, the biological system was in a terminal growth phase, characterized mainly by low activities;
- the richness of organic carbon of the surface layer is mainly devoted to bacteria, while phytoplankton, generally located in a more deep layer, contributes only up to 25% to the total carbon;
- the metabolic products, associated to senescent cells (and probably to the grazing pressure), sinked till the discontinuity layer.

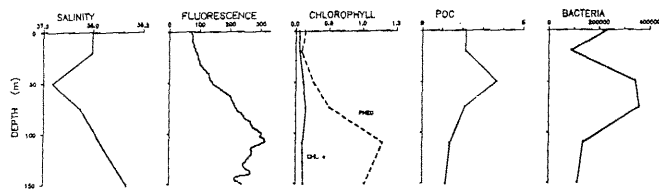


Fig. 1.- Vertical distribution of the studied parameters in st. 308, interested by AW.

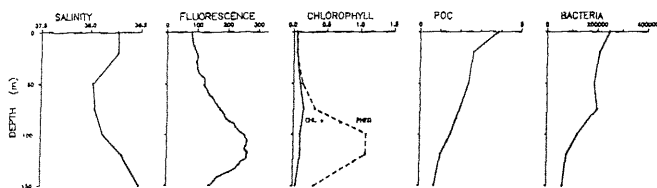


Fig. 2.- Vertical distribution of the studied parameters in st. 112, not interested by AW.

